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

IN RE: REVIEW OF PUERTO RICO ELECTRIC SYSTEM REMEDIATION PLAN	**CASE NO. NEPR-MI-2020-0019** **SUBJECT: Motion in Compliance with Order Submitting Revised Public Versions of SRP and Public Versions of Portion of Attachments to Responses to Requests for Information.**

MOTION SUBMITTING REVISED REDACTED PUBLIC VERSION OF SYSTEM REMEDIATION PLAN AND REDACTED PUBLIC VERSIONS OF ATTACHMENTS TO RESPONSES TO REQUESTS FOR INFORMATION IN COMPLIANCE WITH ORDER

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COME NOW LUMA Energy, LLC ("ManagementCo"), and **LUMA Energy ServCo, LLC** ("ServCo"), (jointly referred to as "LUMA"), and respectfully state and request the following:

1. On May 6, 2021, this honorable Energy Bureau issued a Resolution and Order ("May 6th Order") that included two rulings on confidential treatment of LUMA's submissions in this proceeding: (1) granting LUMA's request to file confidentially several Responses to the Requests for Information that were issued by this Bureau in a Resolution and Order dated April 6, 2021 ("Responses to SRP Requests for Information") and directing that redacted public versions of several confidential attachments to the Responses to SRP Requests for Information be filed for the public record; and (2) granting and denying in part LUMA's Motion for Partial Reconsideration of the Resolution and Order of April 23, 2021 whereby the Energy Bureau had denied in part, LUMA's request to file Portions of the System Remediation Plan ("SRP") under seal of confidentiality ("SRP Motion for Partial Reconsideration").

2. With regards to the SRP Motion for Partial Reconsideration, in the May 6th Order the Bureau designated as confidential information the following: (1) the first and fourth bullets of Section 3.3 in page 59; (2) the first bullet of Section 3.3 in page 250; and (3) the third bullet of Section 3.3 in page 304.

3. In the May 6th Order, the Bureau granted LUMA two days, to expire on May 10, 2021, to submit (1) redacted public versions of several confidential attachments to the Responses to SRP Requests for Information; and (2) a revised public version of the SRP redacting the portion that the Bureau designated as confidential information.

4. In compliance with the May 6th Order, LUMA is submitting the following public and redacted versions of the confidential attachments to LUMA's Responses to SRP Requests for Information:

Document	**Pages in which Confidential Information is Found**	**Summary of Legal Basis for Confidentiality Protection**
RFI-LUMA-MI-20-0019-21046-PREB-001 Attachment 2	Entire Document**	Critical Energy Infrastructure Information and/or CII 18 C.F.R. §388.113; 6 U.S.C. §§ 671-674
RFI-LUMA-MI-20-0019-21046-PREB-001 Attachment 4	Entire Document**	Critical Energy Infrastructure Information and/or CII 18 C.F.R. §388.113; 6 U.S.C. §§ 671-674
RFI-LUMA-MI-20-0019-21046-PREB-001 Attachment 5	Entire Document**	Critical Energy Infrastructure Information and/or CII 18 C.F.R. §388.113; 6 U.S.C. §§ 671-674
RFI-LUMA-MI-20-0019-21046-PREB-001 Attachment 6	Entire Document**	Critical Energy Infrastructure Information and/or CII 18 C.F.R. §388.113; 6 U.S.C. §§ 671-674

5. Also in compliance with the May 6th Order, LUMA is submitting as Exhibit 1 to this Motion, the revised public version of the SRP that redacts those portions that the Bureau designated as confidential information as detailed in the following table:

Document	Sections	Confidential Information Redacted
SRP		
Distribution Streetlighting	Section 3.3	the **first and fourth** bullets of Section 3.3 in page 59.
IT OT Telecom System & Networks	Section 2.1-2.6	Pages 102-107
Transmission Substation Security	Sections 2.1-2.6	Pages 138-140
Physical Security for Distribution Facilities	Section 2.1-2.6	Pages 150-152
Critical Energy Management System Upgrades	Section 2.1-2.6	Pages 166-168
Control Center Construction & Refurbishment	Section 2.1-2.6	Pages 170-172
Critical Energy Management & Load Generation Balancing	Section 2.1-2.6	Pages 178-181
HR Programs	Section 3.3	the **first bullet** of Section 3.3 in page 250.
IT OT Cybersecurity Program	Sections 2.1-2.6	Pages 259-264
Waste Management	Section 3.3	the **third bullet** of Section 3.3 in page 304.
Appendix F to the SRP		Pages 349-356

WHEREFORE, LUMA respectfully requests this Honorable Bureau **take notice** of the aforementioned, **accept** the redacted versions of the confidential attachments to the Responses to SRP Requests for Information as identified in this Motion; **accept** the submission of a revised redacted and public version of the SRP; and **deem** that LUMA timely complied with the May 6th Order.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 7th day of May 2021.

I hereby certify that I filed this motion using the electronic filing system of this Energy Bureau and that I will send an electronic copy of this motion to the attorneys for PREPA, Joannely Marrero-Cruz, jmarrero@diazvaz.law; and Katiuska Bolaños-Lugo, kbolanos@diazvaz.law.

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/s/ Margarita Mercado Echegaray
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Exhibit 1
Revised Public and Redacted Version of the System Remediation Plan

Prefacio radicación regulatoria LUMA Energy

Febrero 2021

¿Quiénes somos?

Los puertorriqueños dependen de la electricidad. Un sistema eléctrico robusto y resiliente es la columna vertebral del desarrollo económico.

En LUMA, nuestro compromiso es proveer a los puertorriqueños un sistema eléctrico en el que puedan confiar. Nuestro norte es transformar la red eléctrica en una centrada en el servicio al cliente, confiable, resiliente y segura para todos los puertorriqueños, tal y como ellos merecen. Queremos mejorar la calidad de vida y el crecimiento económico del país proveyendo el sistema eléctrico para ellos.

La gente, nuestros empleados, nuestros clientes y las comunidades en las que vivimos y trabajamos son prioridad para LUMA.

- Motivamos e inspiramos a nuestra gente a aprovechar todas las oportunidades que reciben, mientras trabajan para construir un mejor sistema eléctrico para Puerto Rico.
- Nuestra meta es proveer un servicio al cliente excepcional e implementar políticas públicas a través de una operación de excelencia.

Creados para
Comprometidos con
Escuchando a
Puerto Rico

LUMA

Nuestra misión para Puerto Rico

Reconstruir y transformar el sistema eléctrico para proveer un servicio sostenible, centrado en el cliente, confiable, resiliente, seguro y a precios razonables para todos los puertorriqueños.

OBJETIVOS CLAVE

LA SEGURIDAD ES PRIORIDAD
Reformar los estilos de trabajo, enfocados en una cultura de seguridad para nuestros empleados y la gente de Puerto Rico

MEJORAR LA SATISFACCIÓN DEL CLIENTE
Transformar las operaciones para ofrecer un excelente servicio al cliente y electricidad confiable a precios razonables

RECONSTRUCCIÓN DEL SISTEMA Y RESILIENCIA
Utilización efectiva de fondos federales para restaurar la red eléctrica y mejorar la resistencia de la infraestructura, que actualmente está muy vulnerable

EXCELENCIA OPERACIONAL
Inspirar a los empleados a conseguir la excelencia operativa a través de nuevos sistemas, procesos y capacitación

TRANSFORMACIÓN ENERGÉTICA SOSTENIBLE
Modernizar la red eléctrica para permitir la transformación energética sostenible

¿Cómo llegamos aquí?

El sistema eléctrico de Puerto Rico está en un punto de inflexión crucial. Puerto Rico aprobó reformas legales fundamentales que establecieron un regulador independiente; la necesidad de nuevos operadores para el sistema de distribución y transmisión y separadamente para el de generación de la Autoridad de Energía Eléctrica (AEE) y así allanó el camino para una red eléctrica más limpia y resistente.

La AEE está en bancarrota. Puerto Rico necesita un operador profesional para manejar y administrar los fondos federales que son tan necesarios para poner en marcha la operación de recuperación y transformación.

Luego de un riguroso proceso competitivo que duró 18 meses, se seleccionó y adjudicó a LUMA un contrato para operar y mantener el sistema de transmisión y distribución eléctrica. Esto luego de evaluaciones y aprobaciones de la Junta de Directores de la Autoridad de Alianzas Público-Privadas, la Junta de Gobierno de la Autoridad de la AEE, la Junta de Supervisión Fiscal, el Negociado de Energía de Puerto Rico y el Gobernador de Puerto Rico.

LUMA fue escogida de manera unánime por el Comité de Alianza por:

- Nuestra experiencia líder en la industria
- Historial de cumplir con nuestros compromisos y
- El enfoque en soluciones diseñadas para cumplir con los objetivos del gobierno de transformar el sistema de transmisión y distribución.

Lo que hemos hecho desde junio 2020

Desde junio de 2020, LUMA ha estado revisando información y visitando las instalaciones de la Autoridad de Energía Eléctrica (AEE), como parte de un proceso de evaluación detallada de las condiciones actuales de la red y los servicios que se ofrecen. Los problemas encontrados no se limitaron a daños causados por los huracanes. Las evaluaciones resaltaron un desempeño por debajo de los estándares de la industria eléctrica y condiciones precarias en la mayoría de las instalaciones.

Hemos diseñado programas para la recuperación de la infraestructura, lograr mejoras operacionales y aumentar la satisfacción de los clientes. Nuestro enfoque entrelaza políticas públicas claves con planes factibles. Dimos prioridad y se establecieron planes de acción para cumplir con nuestros clientes, y al mismo tiempo satisfacemos los requisitos de política pública y contractuales.

Desarrollamos planes, presupuestos, métricas de desempeño y principios de operación para el sistema que estamos presentando al Negociado de Energía de Puerto Rico. Todos estos informes serán revisados y deberán ser aprobados por el Negociado de Energía antes de que LUMA asuma la operación del sistema de trasmisión y distribución, calendarizada para junio de 2021.

Nuestra gente primero.
Seguridad siempre.

Lo que estamos presentando para la aprobación del Negociado de Energía

Plan de remediación

Nuestros planes

El plan de remediación del sistema se enfoca en atender las áreas que están por debajo del estándar de la industria y plantean los mayores riesgos para los puertorriqueños, incluyendo a nuestros empleados.

Presupuestos iniciales

Cómo llegaremos allí

Los presupuestos iniciales no proponen un aumento de la tarifa básica. Cubren todos los planes durante los primeros tres años de operación, abarcan los gastos de operación y mantenimiento, y las inversiones (incluyendo aquellas subvencionadas por del gobierno federal).

Métricas de desempeño

Cómo seremos responsables

Las métricas de desempeño son indicadores numéricos para medir el buen desempeño de LUMA, alineados con las políticas públicas y la creación de mejoras tangibles para Puerto Rico.

Principios del sistema de operación

Cómo operaremos la red eléctrica

Los principios del sistema de operación definen cómo funcionará el despacho y control para garantizar el suministro y entrega de energía eficiente y confiable.

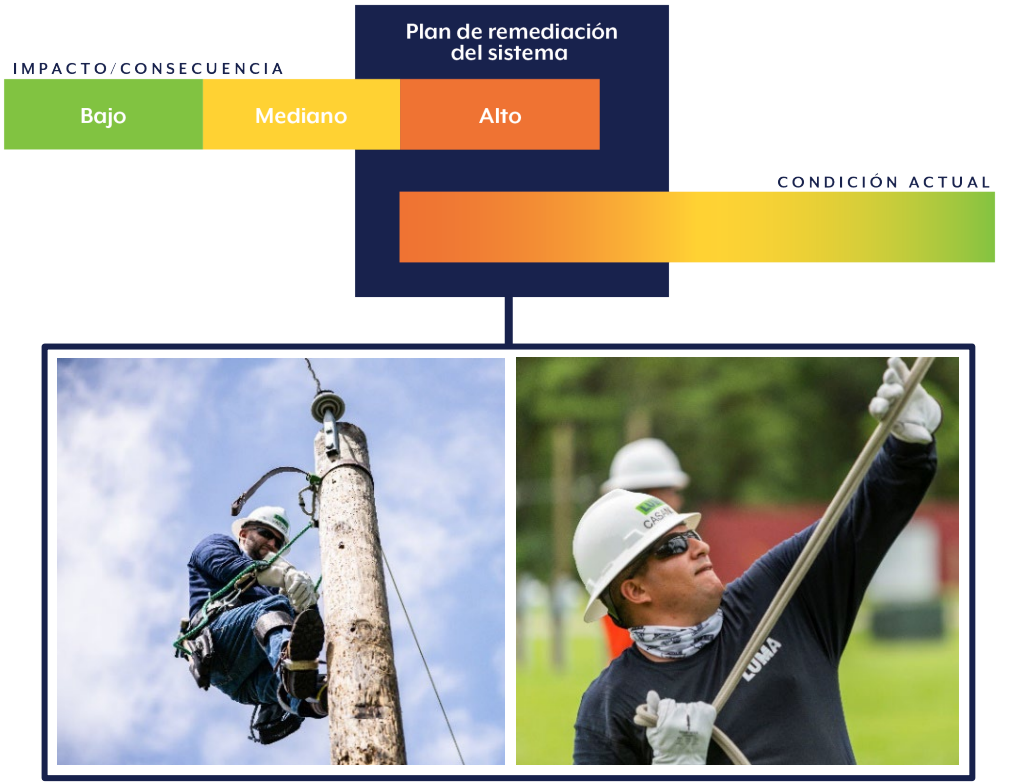
Nuestro plan

Plan de remediación del sistema

El plan de remediación de LUMA establece la estrategia para remediar, reparar, reemplazar y estabilizar el sistema, las prácticas y los servicios, así como los equipos del sistema de transmisión y distribución. Las iniciativas de este plan son fundamentales para la recuperación y transformación y abordan los aspectos más peligrosos y frágiles del sistema eléctrico de Puerto Rico. Estas estrategias le permitirán a LUMA operar y mantener el sistema eléctrico de la isla en cumplimiento con los estándares de la industria, los requisitos contractuales y las leyes aplicables.

El plan de remediación es la culminación de las evaluaciones que LUMA realizó durante el período de transición inicial. LUMA ha planeado la inversión de aproximadamente $4 mil millones de dólares en iniciativas y proyectos como parte del plan de remediación y más de $10 mil millones de dólares totales en todos los programas de mejora.

El plan de remediación trabajará las áreas que están por debajo del estándar en la industria y que representan el mayor riesgo para los puertorriqueños, incluidos los empleados y el propio sistema eléctrico. Es una parte crítica de un conjunto más grande de medidas para mejorar y reconstruir la red eléctrica.

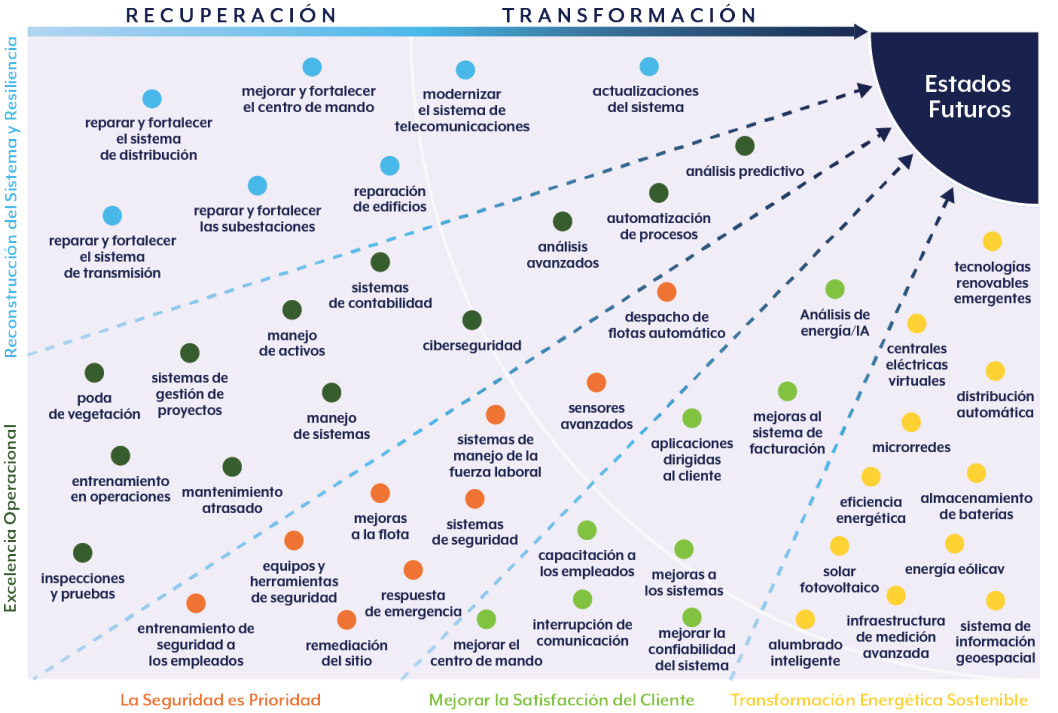


Hacia dónde vamos

La estrategia general de LUMA para implementar el cambio de acuerdo a las políticas públicas se compone de dos fases: Recuperación y Transformación.

La FASE DE RECUPERACIÓN conlleva restaurar la infraestructura y los procesos de la utilidad a un estado de funcionamiento correcto, reparar la red a corto plazo y aprovechar la experiencia de los empleados actuales de la Autoridad de Energía Eléctrica (AEE) que se unirán a LUMA. Simultáneamente, se implementarán nuevos procesos, sistemas y capacitación para gestionar de manera más eficaz la operación de los servicios fundamentales.

Mientras se recupera el nivel del servicio eléctrico, LUMA acelerará el paso de la TRANSFORMACIÓN, en concordancia con las metas del gobierno y las políticas públicas adoptadas, rediseñando el sistema eléctrico para que esté a la altura de las necesidades del pueblo de Puerto Rico durante las próximas décadas. La transformación estará enfocada en energías renovables y más opciones para los clientes a través de sistemas y tecnologías avanzadas. Muchos de los programas de transformación se llevarán a cabo concurrentes con los programas de recuperación.



Cómo lo alcanzaremos

Presupuestos iniciales

Los presupuestos iniciales cubren todas las gestiones de LUMA durante los primeros tres años de operación e incluyen los programas asociados con el plan de remediación del sistema y las métricas de desempeño. Hemos identificado 69 áreas de reparación y mejoras para encaminar a la utilidad hacia la recuperación y transformación mediante la implementación de políticas públicas, mejoras de desempeño y el uso de fondos federales. Comenzaremos la mayoría de estos programas durante nuestro primer año de operación.

LO QUE INCLUYE

Nuestros presupuestos iniciales comprenden partidas para costos operacionales y de capital (incluyendo aquellos sufragados por subvenciones federales) para el sistema de transmisión y distribución.

Propuesta de presupuesto de LUMA

Sin aumento en la tarifa base

* LUMA no está solicitando aumento en la tarifa base. LUMA no posee autoridad legal para determinar las tarifas de servicio eléctrico. El Negociado de Energía, como regulador independiente y especializado y como monitor del cumplimiento con la política pública energética en Puerto Rico, es el organismo autorizado en ley para evaluar y fijar las tarifas.

Cómo seremos responsables

Métricas de desempeño

LUMA evaluó el desempeño de la Autoridad de Energía Eléctrica (AEE) utilizando métodos estándar de la industria. Analizamos los procesos existentes en la AEE, los sistemas y los datos sobre sus operaciones e identificamos áreas a mejorar al compararlas con las prácticas en la industria. Los hallazgos (incluidos los de un tercero independiente) muestran que el desempeño de la AEE se posiciona por debajo de otras compañías de energía en América del Norte.

SERVICIO AL CLIENTE
(J.D. Power)

Más Bajo de 144 compañías de energía en América del Norte

47% más bajo que el de peor porcentaje

INCIDENTES DE SEGURIDAD
(OSHA, 2019)

5 veces mayor al estándar de la industria

200% más que la empresa de peor porcentaje

INTERRUPCIONES DE SERVICIO
(IEEE)

9 veces más largos y frecuentes que la media

LUMA SERÁ RESPONSABLE

Los puertorriqueños merecen responsabilidad de su proveedor de servicios de electricidad.

Las métricas de rendimiento de LUMA son indicadores numéricos que indicarán cómo va el desempeño de LUMA. Diseñadas para la industria de la energía eléctrica y compartidas con el público para garantizar la transparencia, utilizamos métricas estándar para medir nuestro desempeño y mostrar cuán bien adelantamos los compromisos contractuales y de política pública contraídos. Cada indicador mide el desempeño de LUMA en funciones clave como: servicio al cliente, seguridad, trabajo técnico y gestión financiera.

Métricas de desempeño propuestas por LUMA

SATISFACIÓN DEL CLIENTE

- J.D. Power-Encuesta de satisfacción al cliente: Clientes residenciales y comerciales
- Rapidez media de respuesta
- Tasa de quejas
- Tasa de abandono

SEGURIDAD

- Tasa de incidentes registrables de OSHA
- Fatalidades OSHA
- Tasa de gravedad OSHA
- Tasa OSHA DART

TÉCNICO

- Índice de frecuencia de Interrupción media del sistema (SAIFI)
- Índice de duración de Interrupción media del sistema (SAIDI)
- Inspecciones (Líneas de distribución y transmisión, subestaciones)

FINANCIERA

- Presupuesto operativo
- Presupuesto de capital: Financiado por el gobierno federal y el cobro de tarifas
- Días Ventas Pendientes: Clientes Generales y Gubernamentales
- Horas extras

MÉTRICAS DE RESPUESTA DE EMERGENCIA

Cómo operaremos la red eléctrica

Principios de operación del sistema

Estos principios definen cómo funcionará el sistema de despacho y control de la red. Habrá reglas para lograr un suministro de energía eficiente, entrega de energía confiable y toma de decisiones transparentes. El despacho de recursos en tiempo real, la planificación del sistema y los procedimientos de emergencia se enfocarán en conseguir resultados positivos para el sistema en general y nuestros clientes. Esto será cada vez más importante, a medida que se mejore el sistema de transmisión y distribución y las energías renovables se conviertan en la mayor fuente y opción energética para el País.

Lo que esto significa

- LUMA entregará energía lo más económicamente posible, mientras se mantiene la confiabilidad del sistema para reducir los costos del combustible y las emisiones
- Con reglas definidas y mejoras al sistema seremos capaces de “ver” las interrupciones del servicio antes de que ocurran para evitar desconexión de carga, acelerar los tiempos de respuesta y minimizar las interrupciones del servicio a los clientes
- Observarán mejoras en la respuesta a emergencias como huracanes y terremotos
- El Sistema operativo sentará las bases para que los inversionistas y el público tengan un mejor entendimiento de los aspectos técnicos y las limitaciones de la red eléctrica, permitiendo propuestas más competitivas y focalizadas en proyectos de energía renovable y soluciones de mayor valor para Puerto Rico

principios definidos
de operación
del sistema

Mejor
Confiabilidad

Qué esperar

A la expectativa de la aprobación de nuestros informes regulatorios, continuamos trabajando para asumir la operación del sistema de transmisión y distribución en junio 2021.

Una vez arranquemos, verán:

- Mejoras en la capacidad de respuesta a los clientes
- Desganche de vegetación
- Inspecciones de áreas que reportan un gran número o significativas interrupciones del servicio
- Mejoras en la seguridad pública, incluyendo el alumbrado de las calles

Queremos ser una compañía de la que los puertorriqueños se sientan orgullosos y en la que quieran trabajar. Para conseguirlo vamos a:

- Priorizar la seguridad
- Mejorar la satisfacción del cliente
- Reconstruir y mejorar la resiliencia del sistema
- Enfocarnos en la excelencia operacional
- Asegurar una transformación energética sostenible

Queremos que tengas la energía segura y confiable que te mereces.

LUMA Energy's Regulatory Filings

February 2021

Who We Are

Puerto Ricans rely on electricity. A robust and resilient energy system is the backbone for economic development.

At LUMA, our job is to provide electricity that Puerto Ricans can depend on. Our commitment is to transform the electric system by implementing public policy to achieve the customer-centric, reliable, resilient, safe energy that Puerto Ricans deserve — energy that will support economic growth and quality of life.

- We put people first, our employees, our customers and the Puerto Rican communities where we live and work
- We encourage and inspire our people to embrace opportunities as they work to build a better electric system for Puerto Rico
- Our goal is to provide exceptional customer service and implement public policy through operational excellence

Built for Puerto Rico
Invested in Puerto Rico
Listening to Puerto Rico

LUMA

Our mission for Puerto Rico

To recover and transform the utility to deliver customer-centric, reliable, resilient, safe and sustainable electricity at reasonable prices.

KEY GOALS

PRIORITIZE SAFETY
Reform utility activities to support a strong safety culture focused on employee safety and the safety of the people of Puerto Rico

IMPROVE CUSTOMER SATISFACTION
Transform utility operations to deliver a positive customer experience and reliable electricity at reasonable prices

SYSTEM REBUILD & RESILIENCY
Effectively deploy federal funding to restore the grid and improve the resilience of vulnerable infrastructure

OPERATIONAL EXCELLENCE
Enable employees to pursue operational excellence through new systems, processes and training

SUSTAINABLE ENERGY TRANSFORMATION
Modernize the grid and the utility to enable the sustainable energy transformation

How we got here

Puerto Rico's electricity system is at a crucial inflection point. Puerto Rico introduced fundamental legal reforms that established an independent regulator; required new operators for PREPA's distribution, transmission and generation assets; and paved the way for a cleaner, more resilient grid.

With PREPA in bankruptcy, Puerto Rico needs a professional operator to manage and administer the critical federal funds required for this recovery and transformation.

After a rigorous 18-month selection process, LUMA was awarded a partnership contract to operate and maintain the electric transmission and distribution system following evaluations and approvals from the Public-Private Partnership Committee, Board of Directors of the Public-Private Partnership Authority, PREPA Governing Board, Financial Oversight Board, Puerto Rico Energy Bureau and Governor of Puerto Rico.

LUMA was unanimously chosen by the Public-Private Partnership Authority Board because of:

- Our industry-leading expertise
- History of delivering on our commitments and
- Our focus on solutions designed to meet the government's goals for transforming the transmission and distribution system.

Regulator: PREB — Puerto Rico Energy Bureau

PUBLIC-PRIVATE PARTNERSHIP: O&M AGREEMENT

Asset Owner | **Administrator** (P3 Puerto Rico Public-Private Partnerships Authority) | **Operator** (LUMA / IEM)

PROMESA & Title III (Financial Oversight & Management Board for Puerto Rico)

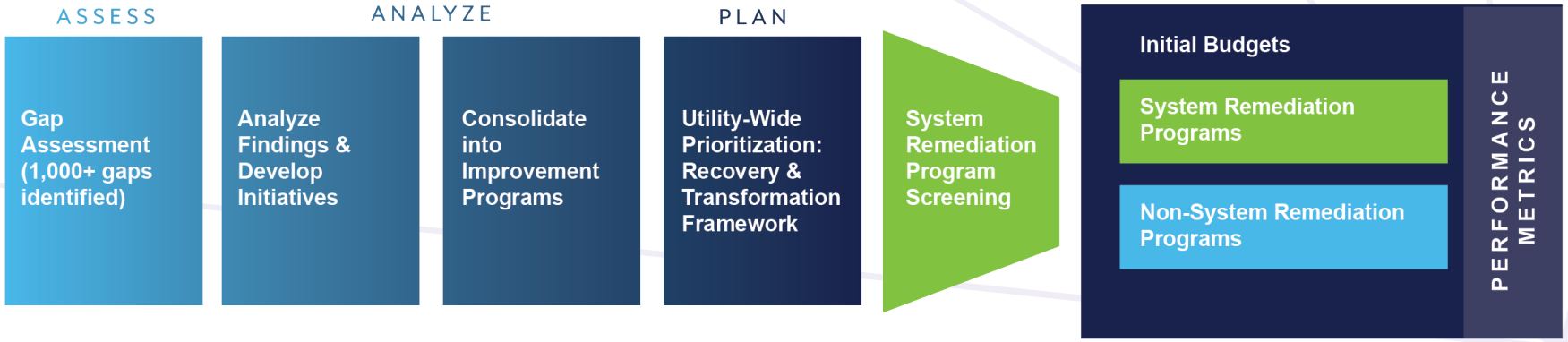
Federal Recovery Funds (CDBG-DR, FEMA and other agencies)

What we've been doing since June 2020

Since June 2020, LUMA has been reviewing PREPA's data and sites, conducting a detailed assessment of the current conditions of the grid and utility service. The issues were not limited to hurricane damage. The assessments highlighted performance below industry standards and consistently poor health across most assets.

We then designed programs to carry out infrastructure recovery and achieve operational and customer satisfaction improvements. Our coordinated approach links key public policy to actionable plans. We prioritized and sequenced activities to deliver value to our customers and meet public policy and contractual requirements.

We developed plans, budgets, performance metrics and system operation principles and are now submitting our work to the PREB. These submissions will be reviewed and approved by PREB before LUMA begins operations, currently targeted for June 2021.



People First.
Safety Always.

What we're submitting for PREB approval

System Remediation Plan

What we have planned

The System Remediation Plan (SRP) addresses areas that are below standard and pose the highest risk to Puerto Ricans, including our employees, and the system.

Initial Budgets

How we'll get there

Initial budgets do not propose a base rate increase. They cover all activities during the first 3 years of operations and include O&M, non-federally funded capital and federally funded capital.

Performance Metrics

How we'll be accountable

Performance metrics are numeric indicators to measure how well LUMA is performing in alignment with public policy and making tangible improvements for Puerto Rico.

System Operation Principles

How we'll operate the grid

System Operation Principles (SOP) define how the bulk power system will operate to ensure efficient energy generation and reliable energy delivery.

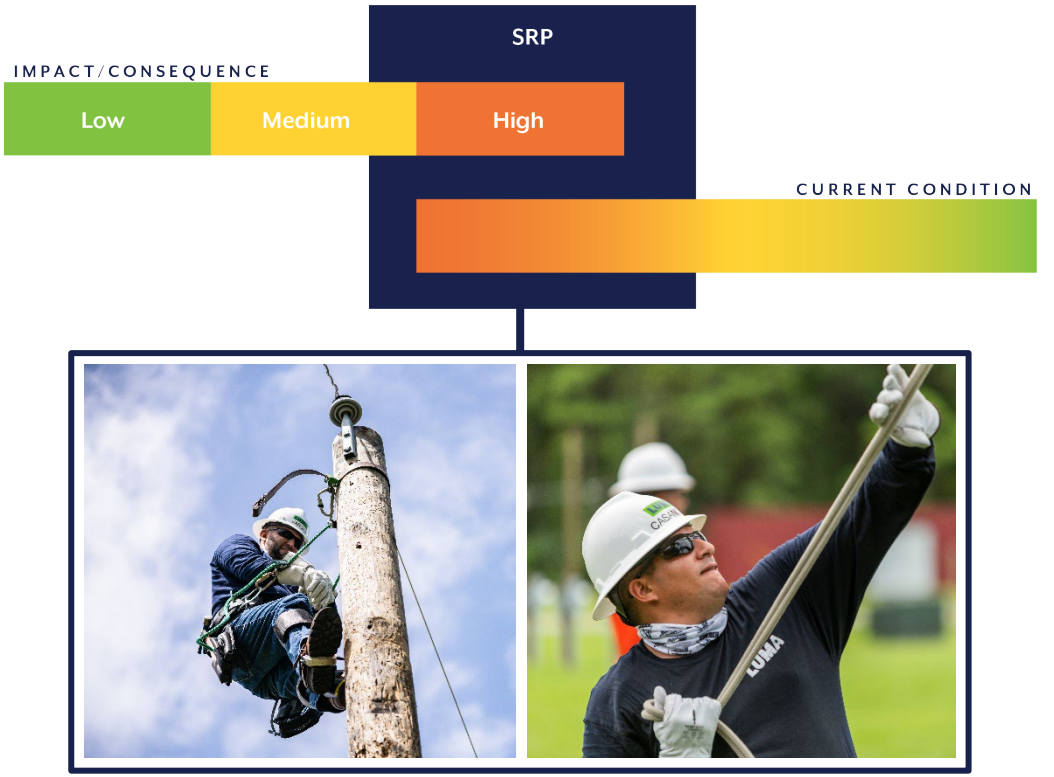
What we have planned

System Remediation Plan

LUMA's SRP establishes our strategy to remediate, repair, replace and stabilize transmission and distribution system equipment, systems, practices and services. The initiatives are foundational to recovery and transformation and address the most dangerous and fragile aspects of Puerto Rico's electricity system. They will enable LUMA to operate and maintain Puerto Rico's electricity system in compliance with industry standards, contractual requirements and applicable laws.

The SRP is a culmination of the assessments LUMA performed during the front-end transition period. LUMA has planned for approximately $4 billion in initiatives as part of the SRP and over $10 billion in total improvement programs.

The SRP is our plan to address areas that are below standard and pose the highest risk to Puerto Ricans, including employees, and the system. It's a critical part of a larger set of improvement activities to recover and transform the grid.

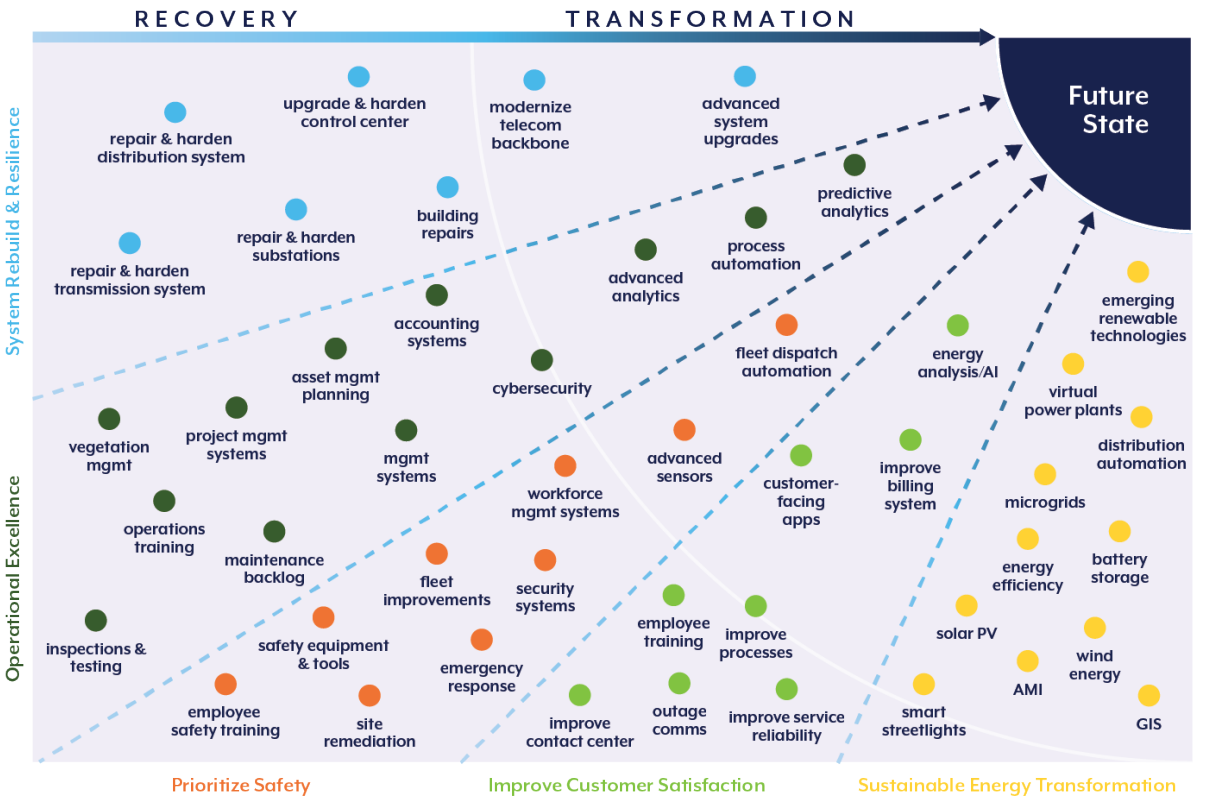


Where we're going

LUMA's overall strategy to implement the change mandated in public policy is composed of two phases: Recovery and Transformation.

The RECOVERY PHASE will involve restoring the utility's infrastructure and processes to a well-functioning state, repairing the grid in the near term and leveraging the experience of current PREPA employees who will be joining LUMA — while implementing new processes, systems and training to more effectively manage fundamental utility operations.

As the utility recovers, LUMA will accelerate the pace of TRANSFORMATION, in accordance with the government's goals and policy, by redesigning the utility to meet Puerto Rico's energy needs for the coming decades, with a focus on renewable generation and distributed energy resources made possible through advanced operational systems and technologies. Many of these Transformation programs will begin alongside Recovery programs.



How we'll get there

Initial Budgets

The initial budgets cover all LUMA activities during the first three years of operations and include activities associated with the system remediation plan and performance metrics. We've identified 69 remediation and improvement activities to start the utility on the path to recovery and transformation by implementing public policy, improving performance and strategically deploying federal funds. We'll start most these programs during our first year of operations.

WHAT'S INCLUDED

Our initial budgets comprise operating and capital (federally funded and ratepayer funded) budgets for transmission and distribution.

LUMA budget proposal

No Increase in Base Rate

* LUMA is not applying for a base rate increase. LUMA does not have legal authority to determine electric rates: PREB, the independent and specialized body to regulate, monitor and enforce energy public policy of the Government of Puerto Rico, is authorized by Puerto Rico laws to evaluate and approve rates.

How we'll be accountable

Performance Metrics

LUMA assessed PREPA's performance using industry-standard methods. We analyzed PREPA's existing processes, systems and data, identifying gaps as compared to electric utility industry practices. Results (including through independent third-party sources) show that PREPA consistently ranks at the bottom of all North American utilities.

CUSTOMER SERVICE
(J.D. Power)

Lowest of 144
North American utilities

47% lower than the next lowest

SAFETY INCIDENTS
(OSHA, 2019 stats)

5 times
the industry average
for workplace incidents

200% more than the next-worst utility

POWER OUTAGES
(IEEE)

9 times
longer & more frequent
than median performers

LUMA WILL BE ACCOUNTABLE.

Puerto Ricans deserve accountability from their electricity service provider.

LUMA's performance metrics are numeric indicators and scorecards of how well we're doing. Tailored to the electric utility business and shared with the public to ensure transparency, they use industry standards to measure performance and show how well we advance public policy. Each indicator measures LUMA's performance in key functional areas such as customer service, safety, reliability and financial management.

LUMA's Proposed Performance Metrics

CUSTOMER SATISFACTION

- J.D. Power Customer Satisfaction Survey: Residential & Business Customers
- Average Speed of Answer
- Customer Complaint Rate
- Abandonment Rate

SAFETY

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

TECHNICAL

- System Average Interruption Frequency Index (SAIFI)
- System Average Interruption Duration Index (SAIDI)
- Inspections (Distribution & Transmission Lines, Substations)

FINANCIAL

- Operating Budget
- Capital Budget: Federally Funded & Ratepayer Funded
- Days Sales Outstanding: General & Government Customers
- Overtime

EMERGENCY RESPONSE METRICS

How we'll operate the grid

System Operation Principles

The SOP defines how the bulk power system will operate. There will be effective rules for efficient energy generation, reliable energy delivery and transparent decision-making on how the grid is managed. Real-time dispatch, resource and system planning and emergency procedures will be focused on achieving outcomes for the overall system and customers. This will become increasingly important as the transmission and distribution system is improved and renewables become a larger source of energy.

What this means

- LUMA will dispatch energy as economically as possible while maintaining reliability to reduce fuel costs and emissions
- With defined rules and system improvements, we'll be able to "see" outages before they happen to avoid load-shedding, expedite response times and shorten most customer outages
- You'll see improved response to emergencies such as major hurricanes and earthquakes
- The SOP will create the basis for developers and stakeholders to better understand grid issues and constraints, allowing for more competitive, tailored proposals for new renewables and value-added solutions for Puerto Rico

defined
operation
principles

Improved
Reliability

What to expect

Pending the required approvals of our regulatory filings, we will commence operations in June 2021.

Following commencement, you'll see:

- Improvement in contact center responsiveness
- Clearing of vegetation from utility rights of way
- Walkdowns and inspections of areas experiencing a significant number or size of outages
- Improved public safety, including streetlights

We want to be a company that Puerto Rico is proud of and that Puerto Ricans want to work for. To get there, we'll

- Prioritize safety
- Improve customer satisfaction
- Rebuild the system and improve system resiliency
- Focus on operational excellence
- Ensure a sustainable energy transformation

We want you to have the safe, reliable energy you deserve.

System Remediation Plan

February 23, 2021

Executive Summary

The System Remediation Plan (SRP) contained herein is presented pursuant to the approved Transmission and Distribution System Operation and Maintenance Agreement (OMA) executed by the Puerto Rico Electric Power Authority (PREPA), the Puerto Rico Public-Private Partnerships Authority (P3A), LUMA Energy and its subsidiary LUMA Energy ServCo, LLC (LUMA ServCo) (LUMA Energy and LUMA Servco, together LUMA) and dated as of June 22, 2020. The execution of the OMA marks an important milestone in the implementation of the Government of Puerto Rico's energy policy objectives.

As stated in the OMA, "certain components of the Transmission and Distribution (T&D) System and the manner which the T&D System is operated do not currently meet the standards of performance required under [the OMA]" (OMA, Section 4.1 (d)(i)). This SRP submission establishes "a plan to remediate, repair, replace and stabilize T&D System equipment, systems, practices and services, as may be needed, to enable [LUMA] to perform the O&M Services in compliance with the Contract Standards" (OMA, Section 4.1 (d)(ii)).

LUMA is also concurrently filing the proposed Initial Budgets, Performance Metrics, and the System Operation Principles, in accordance with the OMA. These filings are closely interrelated and are each part of aligning utility service with current Puerto Rico public energy policy as reflected in LUMA's Recovery and Transformation Framework.

As part of LUMA's work during the Front-End Transition (FET), LUMA developed over 600 initiatives to:

- Achieve compliance with public policy (including the Integrated Resource Plan [IRP] and Renewable Portfolio Standards [RPS]) for transforming Puerto Rico's electricity system
- Remediate concerns identified through the gap assessment
- Carry out infrastructure recovery (repair, replacement or hardening) projects, and
- Achieve operational and customer satisfaction improvements.

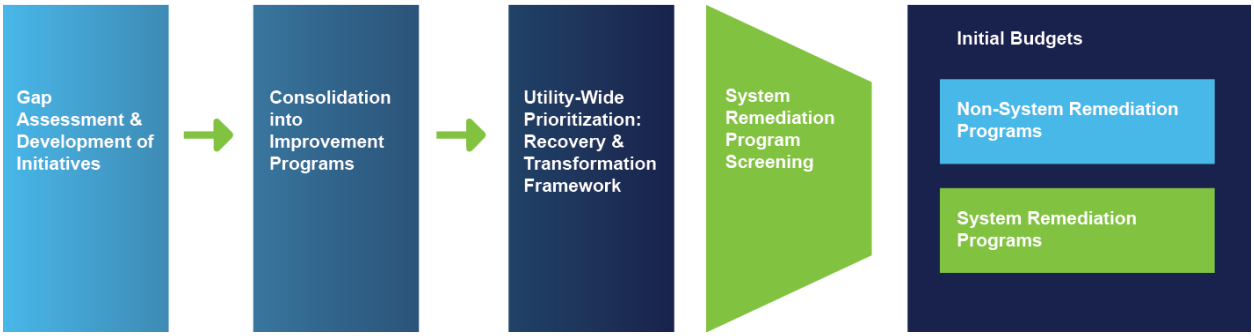
LUMA's process to create this SRP had multiple steps. LUMA conducted a system-wide gap assessment resulting in the identification of over 1,000 gaps. In conducting these evaluations, LUMA considered the current state of business processes, organizational systems and assets as well as the applicable laws and regulations, Prudent Utility Practice and other requirements defined in the OMA to operate and maintain Puerto Rico's T&D System. The results of the gap assessments reflect low maturity levels across most of the organization and consistently poor health across most of the assets.

LUMA then developed a comprehensive set of initiatives to address these gaps along with other broader goals to recover and transform the system and deliver benefits to customers. These initiatives were consolidated into programs of similar, interdependent initiatives. LUMA prioritized and sequenced the improvement programs to ensure that the right changes are made at the right time to deliver value to customers and meet regulatory and contractual requirements, as described in Section 1.4.3 of this document.

LUMA then conducted a screening process to delineate SRP initiatives, which focus only on those items that posed the highest risk. This risk-based screening process identified: 1) those processes and organizational systems that have a low maturity; and 2) those assets in poor health that have the largest negative consequence or highest impact to the utility, its employees and customers. These deficiencies

represent the highest risks to employees, the people of Puerto Rico, and the delivery of electricity and are fundamental in bringing the utility in compliance with public policy.

The resulting subset of SRP programs will be implemented alongside non-SRP programs (which address lower-risk high-priority items), which are presented in full in the Initial Budgets filing. The SRP programs are summarized in Section 6.0 of this document.



KEY ASSESSMENT FINDINGS

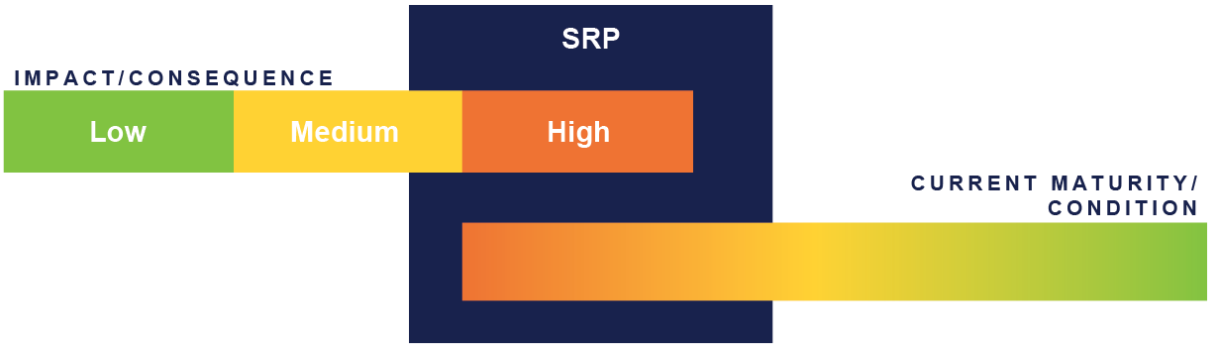
LUMA's initial assessment of the utility, its organization and assets, has classified the identified deficiencies into two broad categories: (i) systems and processes and (ii) physical assets. Organizational systems and processes require significant improvement resources and capital. Physical assets are in poor condition from storm damage, age and deferred maintenance. Both categories of deficiencies have corresponding negative effects on system performance and reliability, as evidenced in the System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) performance metrics presented in Appendix G.

In assessing the organization, low maturity scores were noted consistently with an overall rating of 1.6 (refer to Appendix A). This means that PREPA's ability to provide solutions to its assessed problems range from having a basic understanding of the need to resolve noted deficiencies and being in the process of starting or deciding on how best to address them, to being unaware of or opting not to comply with industry norms. In particular, LUMA noted substantive deficiencies in areas that have significant impact or consequence to a utility, such as workplace health and safety, maintenance practices, project management and controls, policies and procedures and the collection and use of accurate data.

In assessing the assets, the lack of accurate data to inform business and asset management decisions is particularly prevalent when assessing the health of the T&D System. In recent years, PREPA has neither had nor performed an inspection program to document the health condition of its system assets. There is little data or other evidence to prove that inspection, test and repair of critical system assets has been performed. There is also no evidence to demonstrate any effort by PREPA to assess the health and condition of its assets. Consequently, LUMA relied on reports of sample inspections by Sargent & Lundy (S&L), Navigant Consulting, Siemens PT and the US Department of Energy (DOE) and performed confirmatory site inspections across the T&D System to assess the current state. The process confirmed that the T&D System is in a state of disrepair, primarily from storm damage and lack of maintenance. Upon commencing operations, LUMA will carry out a comprehensive system-wide inspection program to measure the health of all the assets and take appropriate remedial action.

CONCLUSION

Given the magnitude of issues identified in the assessment, a utility wide, risk-based screening process was implemented to differentiate between SRP and non-SRP initiatives. The assessment reflected extremely low maturity levels and consistently poor health of the most critical assets, implying a consistently high likelihood of a risk event occurring. Therefore, LUMA focused primarily on the impact or consequences of not addressing the deficiencies. In doing so, LUMA identified those projects and/or initiatives that address the items with the highest potential risk to the utility, its employees and customers. Once projects were categorized as SRP, LUMA determined the point at which the gaps and asset deficiencies could be defined as remediated.



In each case, remediation will be reached when the high- risk activities or infrastructure reach compliance with the Contract Standards as defined in the OMA. In some cases, this means total replacement of processes and controls, while in others it may simply require mitigation. It must be noted that reaching remediation does not equal complete correction of the deficiencies. Further corrections and improvements must continue to be performed to achieve the Recovery and Transformation goals outlined in Section 1.4.3.

LUMA anticipates that, as work proceeds, a more comprehensive picture of the state of the T&D System and the pace of improvements will be further understood. Annual reviews and updates will be performed, reflecting not only the progress made on specific projects/initiatives, but also the effect of continually improving source data and information.

Contents

Tables & Figures

List of Acronyms

Acronym	Definition
AC	Alternating Current
ACA	Asset Condition Assessment
ACE	Area Control Error
AD&D	Accidental Death and Dismemberment
ADMS	Advanced Distribution Management Systems
AGC	Automated Generation Control
AI	Artificial Intelligence
AM	Asset Management
AMI	Advanced Metering Infrastructure
AMP	Asset Management Plan
AMR	Automatic Meter Reading
ANSI	American National Standards Institute
BFE	Base Flood Elevation
BMS	Building Management System
BPS	Bulk Power System
BUCC	Back-Up Control Center
C&I	Commercial and Industrial
CAIDI	Customer Average Interruption Duration Index
CAPEX	Capital Expenditures
CBM	Component Business Model
CBS	Cost Breakdown Structure
CC&B	Customer Care and Billing
CCMO	Construction and Commissioning Management Office
CCTV	Closed-Circuit Television
CERT	Community Emergency Recovery Team
CIA	Confidentiality, Integrity, Availability
CISA	Cybersecurity and Infrastructure Security Agency
CMMS	Computerized Maintenance Management System
CILT	Contribution in Lieu of Taxes
COR3	Central Office for Recovery, Reconstruction and Resiliency
CSAT	Customer Satisfaction
CVR	Conservation Voltage Reduction
DA	Data Aggregation
DC	Direct Current

Acronym	Definition
DCC	Distribution Control Center
DER	Distributed Energy Resources
DG	Distributed Generation
DGA	Dissolved Gas Analysis
DNER	Department of Natural and Environmental Resources
DOE	United States Department of Energy
DOL	United States Department of Labor
DR	Demand Response
DSO	Day Sales Outstanding
DTS	Dispatcher Training Simulator
DTT	Directional Transfer Trip
EA	Enterprise Architecture
EAP	Employee Assistance Program
EBS	Oracle E-Business Suite
ECC	Energy Control Center
EE	Energy Efficiency
EEI	Edison Electric Institute
EMAP	Emergency Management Accreditation Program
EMS	Energy Management System
EOC	Emergency Operations Center
EOP	Emergency Operating Plan
EPA	Environmental Protection Agency
EPC	Engineering, Procurement and Construction
ERIS	Equipment Reliability Information System
ERM	Enterprise Risk Management
ERP	Emergency Response Plan
ESS	Energy Storage System
FAT	Factory Acceptance Test
FCR	First Contact Resolution
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FET	Front-End Transition
FIRM	Flood Insurance Rate Maps
FM	Financial Management
FMIS	Fleet Management Information System
FOMB	Federal Oversight and Management Board

Acronym	Definition
FRC	Fire Retardant Clothing
FT	Flexitest
FTE	Full Time Employee
GenCo	Generation Company
GIS	Geospatial Information System or Gas Insulated Switchgear
GridCo	Grid Company
HCM	Human Capital Management
HIL	Hardware-in-the-Loop
HMI	Human-Machine Interface
HPS	High-Pressure Sodium
HR	Human Resources
HRIS	Human Resources Information System
HSE	Health, Safety and Environment
HSEQ	Health, Safety, Environment and Quality
HUD	United States Department of Housing and Urban Development
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
IAM	Identity and Access Management
IB	Initial Budgets
IBM	International Business Machines
ICC	Incident Command Center
ICEE	ICEE Metering Solutions
ICS	Incident Command System
IED	Intelligent Electronic Devices
IEEE	Institute of Electrical and Electronics Engineers
IEM	Innovative Energy Management
IMS	Inventory Management System
IP	Internet Protocol
IRP	Integrated Resource Plan
ISO	International Organization for Standardization
IT	Information Technology
IT OT	Information Technology/Operational Technology
ITP	Inspection and Test Plan
ITSM	Information Technology Service Management
IVR	Interactive Voice Response
KPI	Key Performance Indicators

Acronym	Definition
LED	Light Emitting Diode
LMR	Land Mobile Radio
LMV	Locational Marginal Value Study
LNBA	Locational Net Benefit Study
LTD	Long-Term Disability
MAM	Mobile Application Management
MDM	Meter Data Management
MED	Major Event Day
MoR	Methods of Repairs
MSSP	Managed Security Service Provider
NEC	National Electrical Code
NERC	North American Electric Reliability Corporation
NERC-CIP	North American Electric Reliability Corporation Critical Infrastructure Protection
NESC	National Electrical Safety Code
NIST	National Institute of Standards and Technology
NIST-CSF	NIST Cybersecurity Framework
NLC	Northwest Lineman College
NME	Necessary Maintenance Expenditure
NTLs	Non-Technical Losses
OCB	Oil Circuit Breaker
O&M	Operations and Maintenance
OEMBC	Office of Emergency Management and Business Continuity
OHA	Organizational Health Assessment
OMA	Puerto Rico Transmission and Distribution System Operation and Maintenance Agreement
OMS	Outage Management System
OPEX	Operating Expenditures
OPGW	Optical Ground Wire
OSHA	Occupational Safety and Health Administration
OT	Operational Technology
OTS	Operator Training Simulator
P3A	Puerto Rico Public-Private Partnerships Authority
PAM	Privileged Access Management
PBX	Private Branch Exchange
P&C	Protection and Control
PC	Procurement and Construction
PES	IEEE Power and Energy Society

Acronym	Definition
PF	Power Factor or Power Flow
PLC	Programmable Logic Controller
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMO	Project Management Office
PoC	Proof of Concept
PPE	Personal Protective Equipment
PPOA	Power Purchasing and Operating Agreements
PREB	Puerto Rico Energy Bureau
PREPA	Puerto Rico Electric Power Authority
PRM	Planning Reserve Margin
PROMESA	Puerto Rico Oversight, Management, and Economic Stability Act
PUP	Prudent Utility Practice
PV	Photovoltaic
QA	Quality Assurance
QC	Quality Control
R3	Puerto Rico Department of Housing Repair, Reconstruction or Relocation R3 Program
RA	Resource Adequacy
RACI	Responsible, Accountable Contributor Informed
RFP	Request for Proposals
RFQ	Request for Qualifications
ROW	Right of Way
RPO	Recovery Point Objective
RPS	Renewable Portfolio Standards
RSA	Restructuring Support Agreement
RTCA	Real Time Contingency Analysis
RTO	Recovery Time Objective
RTU	Remote Terminal Units
S&L	Sargent and Lundy
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SCM	Supply Chain Management
SCO	Service Control Objectives
SE	State Estimator

Acronym	Definition
SF6	Sulfur Hexafluoride
SIEM	Security Information and Event Management
SLA	Service Level Agreement
SLD	Single Line Diagram
SLMPD	Single Line Multi Point Diagram
SME	Subject Matter Expert
SO	System Operator
SOC	System Operations Center
SOCs	Service Organization Controls
SONET	Synchronous Optical Networking
SOP	System Operation Principles
SOW	Scope of Work
SPCC	Spill Prevention, Control and Countermeasures
SRP	System Remediation Plan
STD	Short-Term Disability
T&D	Transmission and Distribution
T&G	Transmission and Generation
TOU	Time of Use
TWACS	Two-Way Automatic Communication System
UHF	Ultra-High Frequency
UPS	Uninterruptible Power Supply
US	United States
USoA	Uniform System of Accounts
UT	Utility Transformation
VAR	Volt-Amps Reactive
VM	Vegetation Management
VMP	Vegetation Management Plan
VoC	Voice of the Customer
VVO	Volt VAR Regulation/Optimization
WBS	Work Breakdown Structures
WHMIS	Workplace Hazardous Materials Information System

1.0 Foreword

Puerto Rico's electricity system is at a crucial inflection point. Decades of deterioration compounded by the damage from Hurricanes Irma and Maria in 2017, followed by earthquakes in late 2019 and early 2020, provide a powerful impetus for meaningful change. Puerto Rico has set ambitious public policies to transform the electricity grid into a flexible, modern, smart grid platform that leverages renewable energy resources. LUMA is committed to implementing the transformation to a reliable, resilient and sustainable energy future for the people of Puerto Rico.

LUMA's initial assessment of the utility, its assets and organization, reveals infrastructure and organizational systems that are in significant need of improvement. Nearly all organizational systems and processes require substantial change or complete replacement to enable more systematic, standardized and cost-effective deployment of resources and capital. Physical assets are in poor condition from inadequate maintenance and subsequent storm damage, which has corresponding effects on system performance and reliability. The Puerto Rico Electric Power Authority's (PREPA) reliability metrics (i.e., SAIDI, SAIFI) are currently eight to nine times higher (worse) than the median benchmark for US utilities in the fifty states, as shown in Appendix A. According to the 2020 the Institute of Electrical and Electronics Engineers (IEEE) Distribution Reliability Benchmark[1], an average US customer can expect to have approximately one outage per year and approximately 120 minutes without electricity, excluding major events like hurricanes. In Puerto Rico, 2020 data shows the average PREPA customer suffers more than 9 outages per year for a total of over 1,300 minutes (or 21 hours), not including major events like hurricanes.

The hurricanes in 2017 destroyed significant electrical infrastructure and were devastating to the overall health and safety of the people of Puerto Rico. The restoration of service was slow and chaotic, and the length of time that customers had to wait for service restoration was unprecedented. Puerto Rico's electric system was already fragile and wholly unprepared for a major disaster. The lack of emergency preparedness, weak physical assets and inability to draw on resources quickly for restoration all contributed to a complete failure of the system for many months. PREPA's does not have a formalized Crisis/ Disaster Recovery Plan in place and, consequently, PREPA's emergency preparedness is well below industry standards for a utility of its size that is subject to multiple threats of natural disasters.

LUMA's task is to repair a damaged system while simultaneously reshaping the fundamental architecture of that system. The transformation required to achieve that must be carefully coordinated and managed. The right changes must be prioritized and sequenced at the right time to prevent further disruption and deterioration of service reliability. Otherwise, as noted in Hawaii's recent Grid Modernization Strategy, "investing in advanced technologies overlaid on old, failing infrastructure is like putting a high-performance battery-electric drive system in a rusty 40-year-old car with flat tires."[2]

LUMA's strategy to implement the change mandated by the Government is comprised of two phases, Recovery and Transformation, as shown in Figure 1-1 below. The Recovery phase begins with the restoration of the utility's infrastructure and

[1] https://cmte.ieee.org/pes-drwg/wp-content/uploads/sites/61/2020-IEEE-DRWG-Benchmarking-Results.pdf

[2] Hawaiian Electric Companies. *Modernizing Hawaii's Grid for Our Customers*. Pg. 39. 2017.

processes to a well-functioning state. During this phase, LUMA will complete foundational investments to repair the grid in the near term (1-3 years). As part of this phase, LUMA will leverage the experience of existing PREPA employees who will be joining LUMA while implementing new processes, systems and training to more effectively manage fundamental utility operations. As the utility recovers, LUMA will accelerate the pace of transformation by training its employees on the knowledge, skills and abilities they need to manage advanced technologies and systems. In this Transformation phase, the utility will be redesigned to meet Puerto Rico's energy policies and needs for the coming decades. This phase will accelerate the transition to greater reliance, and eventually full reliance on renewable generation and distributed energy resources (DERs), made possible through advanced operational systems and technologies designed for the utility of the future. It should be noted that Recovery and Transformation are not distinct, sequential phases as many Transformation programs will begin alongside and in coordination with Recovery programs.

Figure 1-1. Recovery & Transformation Phases

LUMA has developed a comprehensive approach to planning for the Recovery and Transformation of Puerto Rico's electric power system using the same comprehensive spirit with which it intends to implement it. The following section outlines LUMA's coordinated approach to developing the major filings LUMA is required to submit to the Puerto Rico Public-Private Partnerships Authority (P3A) and the Puerto Rico Energy Board (PREB). These filings are for the Initial Budgets, System Remediation Plan (SRP), System Operation Principles and Performance Metrics. These filings are closely interrelated and are each part of LUMA's overall approach to planning the Puerto Rico utility service in alignment with current public energy policy.

1.1 Background

PREPA's difficulties have been evident for decades in the deteriorating performance of the electric system and consistently negative annual cashflows that led to their financial decline. PREPA has struggled to adapt to new circumstances and has been unable to operate and maintain the electric system to minimum industry standards within existing customer rates. PREPA lacks fundamental system planning processes, including capital project planning and preventative maintenance and operates in a way contrary to creating lasting efficiencies. In the last five years, the energy sector in Puerto Rico has been subject to significant events that have further highlighted the fragile state of the utility's physical infrastructure, financial situation and employee confidence. These events are outlined below.

STORMS & AFTERMATH

In September 2017, Puerto Rico experienced two major hurricanes — Irma and Maria. During Hurricane Irma, the island experienced sustained tropical storm force winds and received 15 inches of rainfall. More

than one million customers lost electricity. Within two weeks, and as power was still being restored to customers, Hurricane Maria hit the island, bringing sustained winds over 150 mph. The combination of a severely damaged grid from Hurricane Irma and the short time frame between the two hurricanes had a devasting impact, leaving nearly all of PREPA's customers without electricity. The period of restoration for Hurricane Maria extended far beyond that of any other major event in North America or the Caribbean, as many customers were still without power six months later, with the timeframe even longer in some rural areas.

Periodic System Blackouts

As the Puerto Rico electric grid was still recovering from Hurricane Maria between February and March 2018, two blackouts occurred within three weeks of each other. One was caused by an explosion and fire, which damaged a substation. The other was due to a transmission line failure, which caused two generation stations to shut down. These events affected nearly a million customers, plunging customers back into darkness amidst the continuation of outages from Hurricane Maria.

Earthquakes

Starting on December 28, 2019 and progressing into 2020, the southwestern part of Puerto Rico was struck by several earthquakes. The largest and most damaging had a magnitude of 6.4 on January 7, 2020. Tremors and aftershocks leveled damaged buildings, split streets and severely damaged the Costa Sur power plant, the largest in the system. The 820-megawatt oil and gas burning facility, which generates more than one-fourth of Puerto Rico's electricity, initially shut down during the tremors as part of an automatic emergency response. The Costa Sur power plant nevertheless sustained physical damage during the actual quake.

Federal Recovery Funds & Emergency Management

In September 2020 Federal Emergency Management Agency (FEMA) announced a grant for $10.7 billion in public assistance funds for PREPA under Section 428 of the Stafford Act. Along with other mitigation funds available to PREPA, there is an estimated total of $14 – 16 billion in federal funds that will be available for rebuilding, improving and hardening Puerto Rico's electric utility infrastructure. LUMA's proven capabilities managing federal disaster recovery funds and implementing multibillion-dollar utility capital programs were key factors in LUMA's selection as the new private operator of the Puerto Rico grid. LUMA is supported by IEM who has provided program and project management support to some of the largest recovery programs in recent years in states and territories affected by hurricanes and flooding. IEM has been an active participant in federal response and recovery in Puerto Rico since Hurricane Maria. In recent years, LUMA's owners have helped restore utility services after every major disaster in North America. Each owner has executed $10 billion plus capital programs over the last decade.

Government Response

For years, Puerto Rico has been working to restructure $120 billion in public debt and pension obligations, even as it continues to recuperate from the destruction caused by the hurricanes in 2017 and earthquake in January 2020. Puerto Rico's electrical grid remains fragile and unreliable despite an estimate of over $2.7 billion in emergency repairs since September 2017. To help overcome the significant financial, operational and reliability hurdles facing PREPA amidst a declining population and stagnant economy, several initiatives have been proposed or pursued by the Government:

- P3A has undertaken some of the activities envisioned in the "Puerto Rico Electrical Transformation Act" (Act 120-2018), which was passed to commence a process to transform the energy system in

Puerto Rico into a modern, sustainable, reliable, efficient, cost effective and resilient energy system. To that end, the Act also envisioned establishing the processes to open the energy sector to attract and introduce private investment, knowledge and experience to manage and operate PREPA's electric Transmission & Distribution (T&D) System, as well as PREPA's generation assets.

- In August 2020, PREB approved an Integrated Resource Plan (IRP) including a Modified Action Plan to, amongst other actions, establish the resources to satisfy the demand of electric service in Puerto Rico.
- PREPA completed emergency system repairs using federal funds and in December submitted a plan to FEMA for use of public assistance recovery funds to rebuild electrical infrastructure damaged by Hurricanes Irma and Maria.
- The Central Office for Recovery, Reconstruction and Resiliency (COR3) developed a grid modernization plan, which includes investments and programs to improve grid resilience.
- PREPA and the Puerto Rico Fiscal Agency and Financial Advisory Authority are negotiating a definitive Restructuring Support Agreement (RSA) with bondholders to exit Title III and realize savings through the recovery of legacy costs associated with the financing of Puerto Rico's electric infrastructure.

The events of the last five years and the resulting government initiatives provide a powerful impetus for meaningful improvement to Puerto Rico's electric utility service. The decisions made today to modernize, harden and green the grid will underpin the vitality, sustainability and prosperity of Puerto Rico and its people for generations to come.

1.2 Introduction to LUMA

On June 22, 2020 an important milestone in the implementation of the Government of Puerto Rico's energy policy was achieved. LUMA Energy LLC and its subsidiary LUMA Energy ServCo, LLC (together LUMA), PREPA and P3A executed the Puerto Rico Transmission and Distribution System Operation and Maintenance Agreement (the "OMA"). Under the OMA, LUMA, as Operator, was engaged to provide "management, operation, maintenance, repair, restoration and replacement and other related services to (PREPA's transmission and distribution system [T&D System]) in each case as is customary and appropriate for a utility transmission and distribution service provider" and to "establish policies, programs and procedures with respect thereto" (OMA, Section 5.1). LUMA's O&M Services must comply with "Contract Standards," which include requirements under applicable laws, the OMA and Prudent Utility Practice. (OMA, Sections 1.1 and 5.1). Prudent Utility Practice includes: "[…] the practices, methods, techniques, conduct and acts that, at the time they are employed, are generally recognized and accepted by the companies operating in the United States electric transmission and distribution business as such practices, methods, techniques, conduct and acts [are] appropriate to the operation, maintenance, repair and replacement of assets facilities and properties of the type covered in the [OMA]" (OMA, Section 1.1).

LUMA combines experience operating several world class utilities with leading industry expertise in building reliable and sustainable infrastructure alongside skilled workforce training. These skills come from the owners, Canadian Utilities Limited, an ATCO Company (ATCO), and Quanta Services, Inc. (Quanta). Innovative Emergency Management, Inc. (IEM) supports LUMA's administration and deployment of US federal funds and emergency management, as provided under the OMA (OMA, Annex II. Section VII).

ATCO owns and operates more than 80,000 miles of transmission and distribution lines, delivering utility services to over two million customers in Canada and Australia and consistently earning superior customer service ratings. For more than 70 years, and in over 100 countries, ATCO has provided a range

of products and services including electricity, natural gas, energy storage, industrial water, modular structures, site support, transportation and commercial real estate.

Quanta is the leading infrastructure solutions provider for the electric utility industry in North America. Leveraging its unparalleled leadership in training and safety, Quanta has trained its 40,000 strong workforce to do the job correctly, effectively, efficiently and safely. With the fourth largest private fleet of equipment in North America, Quanta responds swiftly and effectively to natural disasters to restore electric service quickly and efficiently. For 26 years, the Quanta owned Northwest Lineman College (NLC) has been the leader in industry education and training in North America. Quanta is one of the few organizations in the world to offer a complete course in storm hardening for electrical infrastructure. The NLC will enhance workforce development in Puerto Rico through the delivery of proven, benchmark training and education to all industry related, craft-skilled trade employees.

For over 35 years, IEM has overseen over $51 billion in disaster recovery programs, supporting over 300 state and local jurisdictions with a wide range of emergency preparedness, management and recovery services. IEM deployed disaster response personnel in Puerto Rico after Hurricanes Irma and Maria and supports the Puerto Rico Department of Housing's Repair, Reconstruction or Relocation (R3) Program.

LUMA steps into the relatively young legal and regulatory structure put in place by the Puerto Rican legislature, executive and regulator. The series of reforms that led to contracting LUMA as the operator of the T&D System was the subject of vigorous debate. These reforms were also the result of multisector cooperation across different political parties and Government administrators and included the input of many stakeholders in Puerto Rico.

LUMA looks forward to hiring current PREPA employees, in recognition that their talent, historical knowledge and specific expertise is vital to achieving Puerto Rico's policy goals to recover and transform the electric sector in Puerto Rico. LUMA holds the safety of employees, customers and the people of Puerto Rico as its top priority and will offer employees a safe work environment, competitive pay and benefits, along with extensive training and career opportunities.

1.2.1 Operation & Maintenance Agreement

PREPA is a public corporation of the Government of Puerto Rico and was created pursuant to the PREPA Enabling Act, Act No. 83 of May 2,1941, as amended. PREPA was created to provide reliable electric power and contribute to the general welfare and the sustainable development of Puerto Rico.

PREPA is currently a vertically integrated utility that provides electric service to approximately 1.5 million customers. The T&D System connects PREPA's power plants and independent power plants with its customers and consists of approximately 1,100 miles of transmission lines (230 kV and 115 kV), 1,500 miles of sub-transmission lines (38 kV) and 31,000 miles of primary distribution lines (13.2 kV through 4.16 kV). The system includes 47 transmission centers or substations, 339 sub-transmission substations and 613 privately owned substations.

Act No. 120-2018, as amended, known as the Puerto Rico Electric System Transformation Act, was enacted to begin the process of transforming the energy system in Puerto Rico to a "modern, sustainable, reliable, efficient, cost-effective and resilient" system to address a system deemed "deficient and obsolete, which result in suboptimal service, with frequent interruptions and high rates that punish the consumer […]" and are an obstacle to economic opportunities (LUMA translation, Act 120, Statement of Motives). Act 120 establishes a process under the framework of Act 29-2009, as amended, known as the Public Private Partnership Act (Act 29), to establish public private partnerships for any function, service or

facility of PREPA, including the T&D System. Pursuant to Acts 120 and 29, the P3A conducted a market sounding process in the summer of 2018 for a potential public private partnership for the T&D System.

Following the results of the market sounding, and pursuant to Section 5 of Act 120 and Section 3 of Act 29, P3A issued a Request for Qualifications (RFQ) for potential operators of PREPA's T&D System on October 31, 2018. On December 5, 2018, five private sector parties submitted Statements of Qualifications in response to the RFQ. On January 17, 2019, the P3A Partnership Committee accepted four experienced and reputable respondents into the qualification process and subsequently issued a Request for Proposals (RFP) on February 1, 2019 to those qualified respondents.

Pursuant to the RFP process, LUMA submitted its Definitive Proposal to the P3A Partnership Committee on November 25, 2019. The P3A Partnership Committee determined that LUMA's proposal is the most advantageous to the Government and the people of Puerto Rico and following negotiations recommended acceptance of LUMA's Definitive Proposal on May 15, 2020. As required by Act 120, the P3A submitted the proposed OMA to PREB for PREB's review. By resolution of case NEPR-AP-2020-0002 issued on June 17, 2020, PREB issued an Energy Compliance Certificate with respect to the proposed OMA, determining that the proposed OMA, as modified by PREB's requirements during the proceeding, complied with the Puerto Rico Energy Public Policy and regulatory framework. The OMA, as certified by PREB, was executed by the P3A, PREPA and LUMA on June 22, 2020. The agreement received the approval and consent of the Board of Directors of P3A and the Governing Board of PREPA (both as parties to the OMA), the Federal Oversight and Management Board (FOMB) and the Governor of Puerto Rico, acting through her delegate, the Secretary of State of Puerto Rico.

On June 22, 2020, the OMA became effective and the Front-End Transition (FET) commenced. The following graphic displays the entities involved in the OMA or that have a key role in oversight of LUMA's activities.

Figure 1-2. OMA and regulatory structure

Note: P3 process for private operator for PREPA Legacy Generation expected to have similar structure

1.3 Key Front-End Transition Deliverables

The period between the OMA Effective Date and LUMA's start of operations is referred to as the FET period. The FET period ends on the date when the O&M services are to commence, which is anticipated to occur on June 1, 2021. During this period, LUMA is tasked with completing a set of FET services in preparation for taking over full operation of the T&D System.

To complete the FET Services, LUMA mobilized key transition team members to establish working relationships with PREPA and key stakeholders and begin conducting initial assessments of the organization. LUMA has also developed plans to ensure an orderly transition of responsibility for the management, operation, maintenance, repairs, restoration and replacement of the T&D System without disruption of customer service and business continuity.

LUMA's FET activities resulted in several key deliverables detailing LUMA's plans for operating the system, which LUMA is required to submit to P3A and PREB prior to service commencement. The following section will discuss LUMA's coordinated approach to developing these key deliverables, briefly summarized below.

INITIAL BUDGETS

Initial Budgets, defined in Article 1 (*Definitions; Interpretations*) of the OMA as "collectively the Operating Budget, the Capital Budgets, and the Generation Budget, in each case, for the initial Contract Year, and together with the projected budget for the following two contract years," is presented per Section 4.2 (*ManagementCo Responsibilities*) (e). The Capital Budgets include the Capital Budget Non-Federally Funded and Capital Budget Federally Funded. As the PREPA Generation Budget is currently outstanding, LUMA has included its understanding of the Generation Budget, aligned with the PREB's Resolution and Order in Case CEPR-AP-2015-0001 dated March 31, 2017 (2017 Rate Order) and allocations in recent certified fiscal plans for PREPA. The Initial Budgets are proposed on a fiscal year basis, with Fiscal Year 2022 being the first year of the Initial Budgets.

SYSTEM REMEDIATION PLAN

A SRP is required under the OMA to address the fact that "certain components of the T&D System and the manner in which it is operated do not currently meet the standards of performance required under the [OMA]" and "a period of review, planning, remediation, repair and replacement will be required to enable [LUMA] to achieve Contract Standards" (OMA, Section 4.1(d)(i)). Given this situation, LUMA is required under the OMA to develop a plan to "remediate, repair, replace and stabilize [the current] equipment, systems, practices and services" in the T&D System "to enable [LUMA] to perform the O&M services in Compliance with the Contract Standards […]" This plan is called the SRP, and it is further defined in the OMA document as detailing "the scope, resources, timelines, milestones, cost estimates and achievement criteria for each activity or project required to enable the Operator to perform the O&M services in compliance with Contract Standards, including the deadlines by which each such activity or project shall be fully implemented" (OMA, Section 4.1(d)(ii)). The SRP is presented in accordance with Section 4.1(d)(ii) of the OMA.

PERFORMANCE METRICS

The purpose of the Performance Metrics filing is to incentivize LUMA to improve the performance of the T&D System with for the benefit of customers and to measure LUMA's performance and alignment with public policy. Under the OMA, LUMA's achievement of the approved performance metrics will determine whether LUMA will be eligible to receive financial incentive compensation, referred to as an Incentive Fee

under the OMA (OMA, Annex IX, Section I). The Performance Metrics are presented in accordance with the requirements specified in Regulation 9137 and Section 4.2 (*ManagementCo Responsibilities*) (f) of the OMA and includes providing our proposed updates to Annex IX (*Performance Metrics*).

SYSTEM OPERATION PRINCIPLES

The System Operation Principles (SOP) define how the bulk electrical system in Puerto Rico will be managed upon LUMA's commencement of operations as per the terms of the OMA, and to enable the System Operator to safely, reliably and efficiently operate the electrical system in the future. As the System Operator, LUMA will manage the real time operation of the Bulk Power System including dispatch of power plants and flow of power over the electric system to maintain supply and demand in balance. LUMA will also carry out short-term and long-term system planning and will manage the system under emergency conditions. The SOP establishes rules and protocols to operate the system in accordance with Prudent Utility Practice and as economically as possible, considering the available electricity supply, other system constraints and Power Purchasing and Operating Agreements (PPOA) obligations. The SOP are presented in accordance with the requirements specified in Section 4.1 (Front-End Transition Period Generally) (h) of the OMA.

1.4 Coordinated Approach to Front-End Transition Deliverables

LUMA's FET deliverables address the multiple different objectives that have been set for the energy sector as part of public policy. LUMA's proposed programs to achieve these objectives are highly interrelated. Information gathered during the initial assessments was used to develop improvement programs that include both SRP and non-SRP initiatives. Some of LUMA's programs address performance metrics targets and some directly address IRP and other orders, while others indirectly contribute to IRP and other regulatory objectives. In addition, some programs are partially funded by federal capital, partially non-federal capital, and partially O&M expenses. The interrelated nature of LUMA's improvement programs is depicted by Figure 1-3 below.

Figure 1-3. Interrelated Front-End Transition Deliverables

The interdependency of LUMA's improvement programs required a coordinated approach to planning and budgeting. Focusing investment exclusively on remediating gaps or improving performance metrics would not necessarily result in prioritizing activities with the highest value to the customer. As a result, the pace of system improvement depends on the funding available to complete SRP programs alongside other programs required to rebuild damaged infrastructure and meet performance targets and IRP and other public policy milestones.

Table 1-1 below outlines LUMA's three phase approach to development of the FET deliverables: assess, analyze and plan. These phases indicate the general organization of activities conducted during the FET.

Additional activities specific to each deliverable are covered separately throughout each respective document.

Table 1-1. Three-Phased Front-End Transition Plan

Phases	Key Activities
Phase 1: Assess	▪ Conduct Organizational Health Assessment (OHA) ▪ Conduct asset condition assessment (ACA) ▪ Review system performance data ▪ Review regulatory, legal and contractual requirements
Phase 2: Analyze	▪ Analyze assessment findings ▪ Develop improvement initiatives ▪ Conduct System Remediation Program screening
Phase 3: Plan	▪ Consolidate improvement initiatives into programs ▪ Prioritize and sequence programs to achieve key goals within constraints ▪ Finalize Initial Budgets (Capital, O&M)

1.4.1 Phase 1: Assessment

LUMA applied its collective knowledge of the industry, Prudent Utility Practice, OMA requirements and applicable codes and standards to conduct a broad, preliminary assessment of the condition of the utility physical assets and management practices. The objectives of this assessment were to understand the following:

- Organization processes, controls, communication and safety protocols, technologies and tools
- Capabilities across general management and business specific functions
- Condition of T&D assets, including supporting physical infrastructure and temporary restoration work
- Areas representing significant improvement opportunities (“major gaps”)

ORGANIZATIONAL HEALTH ASSESSMENT

In assessing the condition of the organization, LUMA reviewed all departmental functions, recording observations, identifying gaps and evaluating organizational health using a qualitative rating system. LUMA’s subject matter experts (SMEs) attended workshops, conducted interviews with a representative cross-section of PREPA’s staff, reviewed data provided by PREPA, reviewed studies that have been performed by others such as S&L, visited facilities and, where applicable, observed activities in the field.

ASSET CONDITION ASSESSMENT

LUMA SMEs also conducted a preliminary ACA to determine the following:

- Level of effort required to restore the grid and improve the resilience of vulnerable electric transmission and distribution infrastructure in an island environment
- Readiness for grid modernization improvements related to the sustainable energy transformation
- Actions required to improve reliability, thus enhancing the customer experience

In assessing the asset condition, LUMA leveraged reports previously developed by S&L, Navigant Consulting, Siemens PT and the US DOE and performed multiple high-level site inspections across the T&D System.

PERFORMANCE DATA ASSESSMENT

LUMA mobilized a team of SMEs in each functional area for which Performance Metrics are specified in the OMA. These functional areas include:

- Customer Service
- Health, Safety, Environment and Quality
- Asset Management (AM)
- Financial Management

Each functional team worked with PREPA staff to gather data, meet with PREPA personnel, investigate IT system functionality, assess data quality and processes and identify gaps compared to industry standard practices. Each team analyzed past performance data to develop a proposed performance baseline for each metric, establish annual targets for performance improvement and develop corresponding improvement programs to achieve the performance targets. This work also included discussions with key stakeholders, who provided feedback on process, regulations and other context that informed the development of LUMA's proposed performance metrics.

SYSTEM OPERATIONS ASSESSMENT

In preparing the SOP, LUMA SMEs reviewed information provided by PREPA (in particular the functionality of system operations and its dispatch of generation and transmission), and industry practice and principles employed in Bulk Power Systems (BPSs) in North America, including North American Electric Reliability Corporation (NERC) guidelines for the operation of the BPS. LUMA carried out other due diligence activities, including interviews and workshops with PREPA's Generation and System Operations personnel, confirmatory site visits to PREPA's major generation stations, and a review of historical and current data on generation and transmission dispatch, availability, outages and other information relevant to the BPS.

The LUMA team reviewed manuals and procedures from several North American control areas and system operators to develop "best practices" applicable to Puerto Rico, given the size of the BPS, generation portfolio and other characteristics. LUMA also visited all major operating plants and transmission centers, reviewed generation and operations information and spoke with operators to develop an understanding of how the existing system is being operated and maintained, as well as reviewing current operational and other constraints.

This assessment provided LUMA with important knowledge of the health of the organization and its physical assets before identifying the major improvement initiatives that inform the FET deliverables. In doing so, LUMA has gained a better understanding of system deficiencies and underlying issues, along with an appreciation for the efforts and talent of many dedicated and capable PREPA professionals. LUMA has worked with many of the engineers, line workers, administrative and technical personnel currently employed by PREPA. LUMA recognizes the importance of the collective knowledge and skills within PREPA. LUMA also looks forward to having experienced personnel join a new organization that will allow them to be effective in fulfilling the shared goal of improving the utility's performance to transform Puerto Rico's electric grid.

The gaps identified through the process above informed the creation of corresponding improvement programs presented in LUMA's Initial Budgets and SRP filings through the process summarized in the following sections.

1.4.2 Phase 2: Analysis

During the second phase of the Front-End Transition Plan, LUMA analyzed information collected during the assessment phase to compare it to industry standards, understand root causes and begin developing potential solutions. During this analysis phase LUMA also defined gap-remediation activities for the SRP, determined initial budget limits, evaluated availability of federal funds and used available data to establish performance metrics.

DEVELOPMENT OF IMPROVEMENT INITIATIVES

The results of LUMA's initial assessment were used to inform the development of corresponding initiatives to meet one or more of the following objectives:

- Achieve compliance with public policy (including the IRP and Renewable Portfolio Standards [RPS]) for transforming Puerto Rico's electricity system
- Remediate concerns identified through the gap assessment
- Carry out infrastructure recovery (repair, replacement, or hardening) projects, and
- Achieve operational and customer satisfaction improvements.

This process led to the development of over 600 initiatives. For each initiative, a scope was developed, including a description of the solution, interdependencies with other initiatives, cost estimates and resource requirements.

SYSTEM REMEDIATION PLAN SCREENING

Not all initiatives developed through the process above are classified as SRP projects. A utility-wide risk-based screening process was implemented to delineate between SRP and non-SRP initiatives. Each initiative was screened by evaluating the following:

- Likelihood of a failure occurring if the initiative does not address the identified deficiency
- Potential for significant adverse consequences or impacts of that failure

Based on this assessment, LUMA identified those programs that pose the highest risks to the utility, its employees and customers. This process is described in detail in Section 4.0.

DEVELOPMENT OF PROGRAM BRIEFS

The initiatives described above were bundled together into programs of similar, interdependent initiatives. Cross-functional program teams then conducted additional research and analysis to develop a "Program Brief" for each program, which outline the following:

- Program description
- Program rationale, including current state and completed state (or "remediated state")
- Program activities required to achieve the completed state
- Program benefits and risks
- Annual cost estimate and resource requirements, including estimation methods and assumptions
- Program timeline and milestones

The Program Briefs specific to the SRP are included in Section 6.0 of this submission. For a complete view of all Program Briefs (i.e., including non-SRP Program Briefs), please refer to Appendix D of LUMA's Initial Budgets submission.

1.4.3 Phase 3: Planning

The complex, interrelated nature of LUMA's FET deliverables required a coordinated approach to strategic planning to ensure improvement programs were not planned and budgeted separately and inconsistently for each deliverable. LUMA developed a comprehensive strategic planning framework based on the Governments goals for the electric system in Puerto Rico. The "***Recovery and Transformation Framework***", used public policy to a set of overarching guiding principles to prioritize, sequence and budget all programs together, regardless of which deliverable they pertain to. The Recovery and Transformation Framework, described in the remainder of this section, was used to:

- Ensure LUMA's priorities align with Puerto Rico's broader public policy objectives and customer needs
- Ensure the programs included in the SRP were developed and prioritized consistently alongside non-SRP programs
- Ensure a balance of investment in programs that directly contribute to Performance Metrics improvements and those that do not
- Ensure LUMA's Initial Budgets include all federally funded, non-federally funded capital and O&M expenditures across all programs and deliverables, and remain within current 2017 Rate Order limits to avoid increasing customer base rates

RECOVERY & TRANSFORMATION FRAMEWORK

LUMA's strategic planning process began by synthesizing the complex landscape of public policy objectives, stakeholder needs and regulatory and contractual requirements into a comprehensive strategic framework to guide planning and decision-making across all deliverables. LUMA's team conducted a broad review of key reports, plans, laws and regulations to form a comprehensive picture of the policy and stakeholder landscape.

The resources reviewed include the following, among others:

- Energy Transformation Act and RELIEF (Act 57-2014, as amended)
- Rate Order (CEPR-AP-2015-0001)
- Puerto Rico Energy Public Policy Act (Act 17-2019, as amended)
- PREB Final Resolution and Order on the PREPA's IRP (CEPR-AP-2018-0001)
- COR3 Grid Modernization Plan for Puerto Rico
- US DOE's Energy Resilience Solutions for the Puerto Rico Grid
- FEMA Public Assistance Policy Guide
- FEMA National Disaster Recovery Framework
- A survey of Puerto Rican utility customers commissioned by ATCO and Quanta Services, LUMA's owners

LUMA then conducted a strategic planning process to synthesize the information above into a comprehensive set of guiding principles that ensure LUMA's plans align with Puerto Rico's public policy objectives and customer needs. Figure 1-4 below summarizes this process.

Figure 1-4. Strategic Planning Approach for Goal Development

This planning framework is meant to establish a solid link from Puerto Rico's key policy drivers to LUMA's strategy and plans, then maintain alignment down to the tactical level of day-to-day project execution. The outcome from this process, shown in Figure 1-5 below, was the Recovery and Transformation *Mission* for the T&D System along with a set of *Goals* for making progress towards that Mission in the near term.

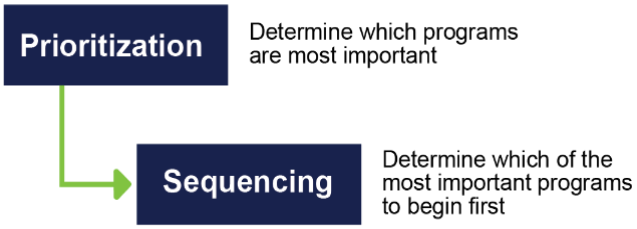
Figure 1-5. LUMA's Recovery & Transformation Mission and Goals

To make the high level goals actionable in the near term, the planning team broke each goal out into component *Objectives*, which are activities that need to be completed to reach each goal. The full list of Goals and Objectives is provided in Appendix B.

These Goals were then used as guiding principles in the prioritization and sequencing of programs for budgeting purposes, as outlined in the following section. The key objective of this process was to determine the funding of investments, identified in the gap assessments, over the next three years to

meet all Goals while remaining within the available budget. In other words, this process was to maximize value while maintaining a balance across all priority areas.

Program Prioritization and Sequencing



Federal disaster recovery aid provides a large, invaluable source of funding to repair damaged physical infrastructure. However, there are stipulations in place that limit how this funding can be deployed to ensure prudent use of federal funds. In general, the bulk of currently available federal funding must be used to rebuild, repair or harden storm-damaged physical infrastructure. Consequently, some of the basic system remediation projects and transformational grid modernization investments required to meet IRP milestones or other objectives must be funded from non-federal capital.

These funding constraints created the need to prioritize and sequence remaining investment programs to ensure the right investments are completed at the right time to deliver value to our customers in accordance with regulatory and contract requirements. To aid this effort, LUMA used a prioritization framework to qualitatively value each program's contribution to our key Goals and Objectives.

Programs were rated according to their contribution to each of the Recovery and Transformation Goals (e.g., Safety, Customer Satisfaction, etc.), to identify programs that benefit multiple goals as highest priority. A qualitative rating scale (0-3) was used, where 0 meant that the program did not contribute to the Goal; a rating of 1 indicates some or indirect contribution; a rating of 2 indicates moderate impacts and a rating of 3 indicates high impacts.

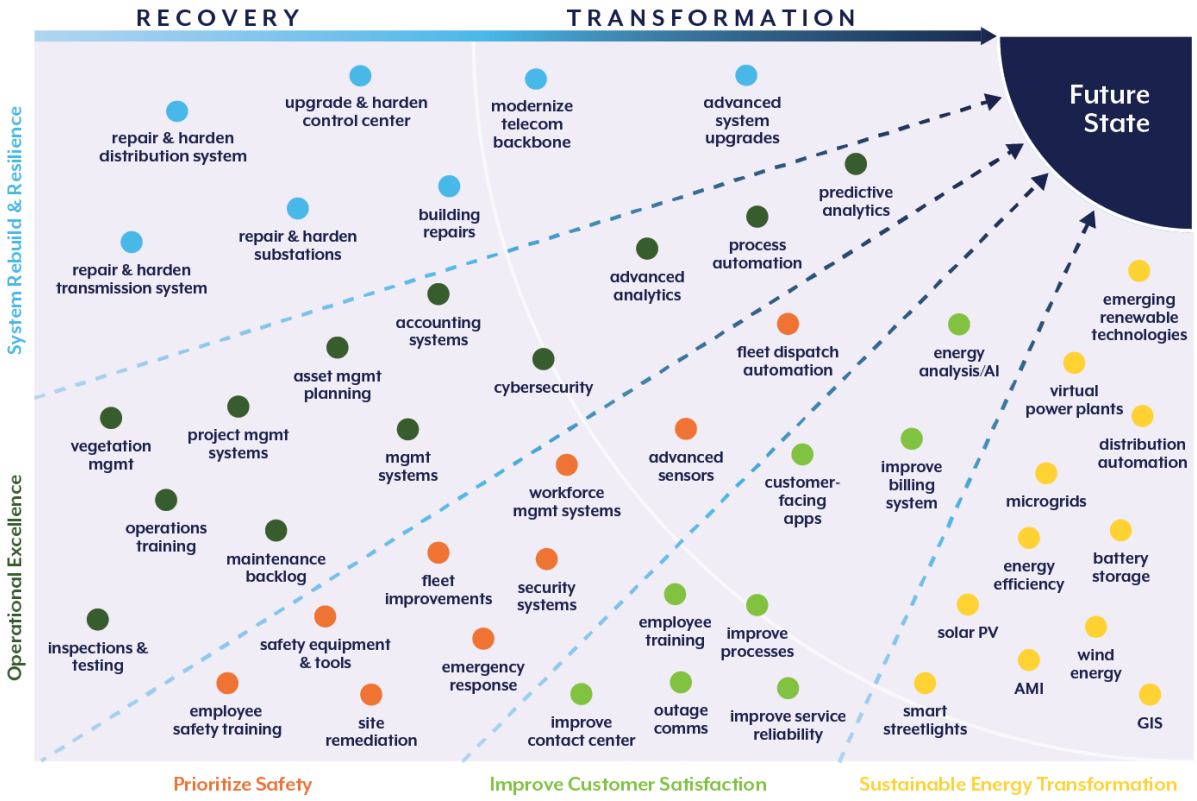
These program ratings were used to identify an initial list of the highest priority improvement programs. This initial list was a starting point to provide a basis for a series of subsequent budget planning workshops. The prioritization ratings were factored in alongside careful consideration of operational and logistical risk and interdependencies. An iterative budget optimization process was used to determine the most important programs for sequencing in the first three years of LUMA's operation. This process is summarized by Figure 1-6 below.

Figure 1-6. Program Prioritization and Sequencing Process

RECOVERY & TRANSFORMATION ROADMAP

LUMA used the process outlined above to develop a comprehensive investment plan that guided the development of all FET deliverables. The result of this effort is a set of Recovery and Transformation programs designed to deliver value to customers in accordance with policy and contract requirements within annual budget constraints. LUMA's investment plan is characterized by a near term emphasis on foundational Recovery programs to improve both infrastructure and organizational health, while paving the way for an increasing focus on Transformation programs. Figure 1-7 below presents a high-level illustration of LUMA's Recovery and Transformation Roadmap. The diagram depicts LUMA's key Recovery and Transformation Programs, organized by their primary Goal (though most programs have multiple benefits). It should be noted that Recovery and Transformation are not distinct, sequential phases, as many Transformation programs will begin alongside and in coordination with Recovery programs. A full list of the SRP specific programs is provided in Program Briefs included in Section 6.0 of this document.

Figure 1-7. Recovery and Transformation Roadmap



LUMA's initial FET planning resulted in a list of programs that represent a total investment of nearly $4.0 billion over the next three years. Over half of LUMA's annual program spending will be related to system recovery and resilience[3] programs that will establish the foundation required to enable transformation. The majority of these programs involve federally funded infrastructure restoration efforts predominantly focused on transmission, distribution and substation repairs and replacements.

LUMA has reviewed PREPA's 10-Yr Infrastructure Plan and found the near-term federally funded projects related to the T&D System to generally align with LUMA's federally funded projects for the same time period, as both were based third-party damage assessments and cost estimates previously prepared for the obligation of funds under Section 428 of the Stafford Act. Many of these activities LUMA views as foundational and enabling to the core recovery of the grid. LUMA is working to ensure activities PREPA undertakes prior to LUMA's commencement of services will remain aligned with LUMA's post-commencement recovery and remediation activities, preventing duplication of work.

LUMA also plans a significant near term investment in operational excellence and safety programs related to technical training, tools and safety equipment, cybersecurity, T&D fleet repairs and replacements, and security systems — collectively viewed as enabling programs necessary to establish the necessary organizational infrastructure to enable the successful execution of operational and capital work.

[3] LUMA defines resilience as the ability to limit the extent, severity, and duration of system degradation following an extreme event which has low frequency of occurrence but with significant consequences.

In addition, LUMA will undertake programs related to the sustainable energy transformation including Light Emitting Diode (LED) streetlight replacements, limited advanced metering infrastructure (AMI), geospatial information system (GIS) upgrades and IRP compliance related research and planning.

Finally, LUMA is planning numerous customer service process improvements, billing system enhancements, a Voice of the Customer program and quick win service reliability improvements to the distribution grid.

The remainder of this document will present LUMA's SRP, which is a key outcome of the process noted above.

2.0 System Remediation Plan Introduction

The SRP contained herein is presented pursuant to the approved OMA executed by the Puerto Rico Electric Power Authority (PREPA), the P3A, LUMA Energy and its subsidiary LUMA Energy ServCo, LLC (LUMA ServCo) (LUMA Energy and LUMA Servco, together LUMA) and dated as of June 22, 2020. Under Section 4.1(d)(i) of the OMA, the SRP is to be presented by LUMA for approval by the Puerto Rico Energy Bureau (PREB) after having received comments or recommendations from the P3A. (Any undefined terms in this SRP have the meaning set forth in the OMA.)

As stated in the OMA, "certain components of the T&D System and the manner in which the T&D System is operated do not currently meet the standards of performance required under [the OMA]" (OMA, Section 4.1 (d)(i)). The SRP is intended to address these deficiencies through "a plan to remediate, repair, replace and stabilize such equipment, systems, practices and services, as may be needed, to enable Operator to perform the O&M Services in compliance with the Contract Standards as soon as reasonably possible and at a reasonable cost to Owner" (OMA, Section 4.1 (d)(ii)).

"Contract Standards" is defined in the OMA as "the terms, conditions, methods, techniques, practices and standards imposed or required by: (i) Applicable Law; (ii) Prudent Utility Practice; (iii) applicable equipment manufacturer's specifications and reasonable recommendations; (iv) applicable insurance requirements under any insurance procured pursuant to this Agreement; (v) the Procurement Manuals, as applicable, and (vi) any other standard, term, condition or requirement specifically contracted in this Agreement to be observed by Operator" (OMA, Section 1.1).

In turn, "Prudent Utility Practice" is defined in the OMA as "the practices, methods, techniques, conduct and acts that, at the time they are employed, are generally recognized and accepted by companies operating in the United States electric transmission and distribution business as such practices, methods, techniques, conduct and acts appropriate to the operation, maintenance, repair and replacement of assets, facilities and properties of the type covered by this Agreement. The interpretation of acts [. . .] shall take into account the facts and the characteristics of the T&D System and System Power Supply known at the time the decision was made [. . .]" (OMA, Section 1.1).

The purpose of the SRP is to provide an appropriate transition from the current state where utility assets and activities are not compliant with Contract Standards, including Prudent Utility Practice, to one where the minimum conditions are met for Contract Standards, including Prudent Utility Practice. This transition is specific to the identified activities and assets and, as such, will end based on the attainment of certain milestones identified in the SRP specific to those assets and activities.

To prepare the required SRP, LUMA conducted a gap assessment, described in Section 1.4.1 of this document, to gain a better understanding of the condition of the T&D System and utility operations. This assessment revealed that a significant portion of both the organizational systems and physical assets currently fail to meet the Contract Standards. Many of these organizational systems and assets require improvements to conform to minimum Prudent Utility Practice. LUMA included in the SRP those items that were evaluated to be below standard and pose the greatest threat. These items have the potential for significant adverse consequences, financial loss to the utility or the activity clearly does not comply with applicable laws. Such adverse consequences include impacts on employee health and safety, public safety, physical and cyber security and the delivery of electric service.

The results of the gap assessment informed the development of corollary improvement initiatives, which were then consolidated into programs based on operational and execution considerations. LUMA has developed a "Program Brief" for each program to describe our plans for remediating each gap identified as high risk. The "Remediated State" for each SRP program is the minimum state required to meet the Contract Standards. The program will reach the Remediated State once the SRP portion of the work has been completed. However, this minimum remediated state may not be sufficient for efficient, optimal operations or exhibit best practices. Many programs will continue after remediation, to implement best or leading industry practices and achieve higher level organizational goals and objectives. The Program Briefs detail the scope, resources, timelines, milestones, cost estimates and remediated state achievement criteria for each initiative.

Before further discussion of the process, it is important to further elaborate on the relationship between the SRP and LUMA's other FET deliverables.

The SRP focuses only on correcting operating practices and repairing assets that pose the highest risks. SRP improvement initiatives, however, are only a subset of a comprehensive set of initiatives designed to meet broad objectives to improve the T&D System. Remediation of SRP initiatives needs to be considered within the broader context of other day-to-day activities necessary to deliver safe and reliable electricity.

The nature of the SRP activities as an interdependent subset of LUMA's overall utility work required a coordinated approach to strategic planning. Focusing improvement initiatives exclusively on remediating gaps would not necessarily result in prioritizing activities with the highest value to the customer. As such, programs within the SRP were planned and budgeted alongside all other programs through the strategic planning process described in Section 1.4.3. The SRP Program Briefs in Section 6.0 are only those Program Briefs related to remediating the high-risk operational gaps and asset deficiencies and represent a subset of the spending proposed within the Initial Budgets.

The remainder of this document presents an overview of the SRP process (Section 3.0), the method for selecting SRP programs and determining the remediated state (Section 4.0), anticipated management and review of the SRP after commencement of operations (Section 5.0) and the SRP Program Briefs, organized by portfolio (Section 6.0).

3.0 System Remediation Plan Process

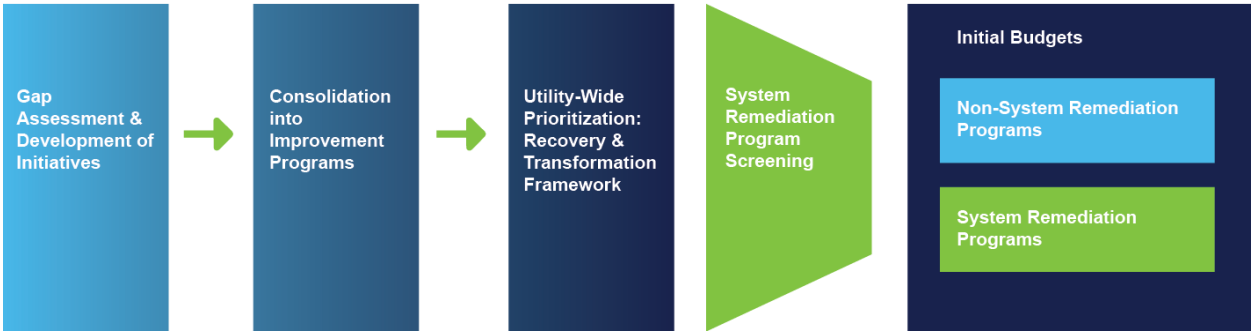
3.1 Process Overview

This section describes the process LUMA undertook to select programs for the SRP. As stated previously, SRP programs were selected as a subset within the broader process of developing a comprehensive,

coordinated approach to Recovery and Transformation. The key work in formulating the SRP was to view the results of this broader process through the lens of conditions, activities and assets that pose the highest risk and identify initiatives and plans to remediate these risks.

Figure 3-1 outlines the process LUMA used to assess the current state of the utility, develop improvement programs, prioritize those programs based on the Recovery and Transformation Framework (refer to Section 1.4.3) and select programs for inclusion in the SRP.

Figure 3-1. Assessment, Improvement Programs, Prioritization & SRP Selection



The remainder of this section presents descriptions of each step of the process leading to the selection of those programs that comprise the SRP.

3.2 Gap Assessment

LUMA performed a comprehensive gap assessment to understand the current state of the T&D System and utility performance, as described in Section 1.4.1. The primary objective of this assessment related to the SRP was to identify major gaps where current operating practices and assets are below industry standards and best practices, do not meet applicable legal requirements and/or do not comply with Contract Standards.

In *assessing the state of the organization* and those assets that support the functioning of the T&D System (e.g., telecommunications, IT OT platforms and buildings/facilities), LUMA reviewed all relevant departmental functions within PREPA, recording observations, identifying gaps and evaluating organizational health and maturity using a qualitative rating system, as detailed in Appendix C. A pre-established maturity rating system determined the utility's relative maturity with regard to how the utility currently operates and maintains the T&D System (often referred to as "people, process, tools and technology"), focused primarily on those areas required to manage, operate and maintain the grid effectively and efficiently. Key findings from the Organization Gap Assessment are presented in Appendix C.

In *assessing the assets,* LUMA leveraged information from reports previously developed by S&L, Navigant Consulting, Siemens PT and the US DOE and performed multiple confirmatory site inspections across the T&D System, as detailed in Appendix D. These inspections involved a sample of key assets, including critical substations, transmission lines and poorly performing distribution circuits. These inspections allowed LUMA to verify and supplement the findings contained in these other reports and contributed to the development of initiatives. Examples of detailed inspection checklists used to collect critical information to confirm asset condition are provided in Appendix E. Key findings from the Asset Assessment are presented in Appendix F.

3.2.1 Summary of Key Organizational Health Findings (State of the Organization)

The scope of this gap assessment included a review of 69 core business functions associated with electric service delivery and nine general management categories across the entire PREPA operation. Over 1,000 major gaps were identified when compared to the industry standards. As these gaps were defined, they were categorized and subsequently aggregated by focus area for the assignment of a maturity score rating. Table 3-1 below presents the criteria used to qualitatively assess organizational maturity, illustrating a five-point scale that ranges from "1 - Unfocused" to "5 - Excellent." Each level builds on the one before it, creating new functionality and increasing operational effectiveness, thereby indicating an increase in capability and maturity.

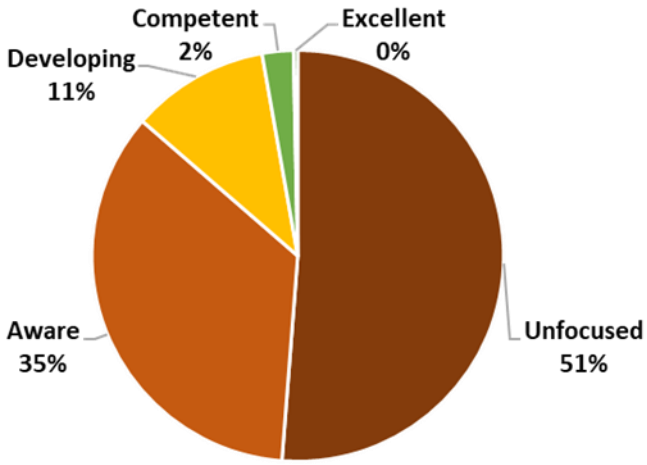
Table 3-1. Organizational Maturity Scoring Criteria

Score	Unfocused 1	Aware 2	Developing 3	Competent 4	Excellent 5
Scoring Criteria	The organization has not recognized the need for the basic elements and/or there is no evidence of commitment to put them in place. Work is performed informally or ad hoc Processes are undocumented and/or undefined Issues present major exposures Required expertise/training does not exist, capacity is insufficient or both	The organization has a basic understanding of the need to address these elements and is in the process of deciding how/starting to apply them. Preliminary documentation of processes being compiled Performance is unmeasured Little organizational effort to identify issues	The organization has identified the means to address the major elements and some work is progressing on implementation. Basic performance can be measured Performance is minimally adequate Processes are documented and defined Issue identification is performed Competitively sub-par	All elements are in place and are implemented in the day-to-day operations of the business. Major improvements made Performance is adequate and continuously measured/verified Processes are managed (followed consistently) with appropriate controls Disciplined issues identification Competitively at par	The organization is using processes and approaches beyond the basic requirements, driving to achieve maximum value. Verifiable issues/ defect reductions and or practices continuous improvement Deliberate effort to optimize/improve processes Competitively well positioned to competitively differentiated

This Organizational Maturity Scoring Rating System is similar to those used in performing ISO 55000 (the international standard for asset management) and the Project Management Body of Knowledge (PMBOK, the industry accepted standard for project/portfolio management) assessments. This approach was adopted to ensure consistency in aggregating major gaps and translating them into scores and ratings to represent competence within a specific area or function in the business. This scale served several purposes, among them to select initiatives for inclusion in the SRP, and is able to demonstrate progress towards meeting the Contract Standards including demonstrating Prudent Utility Practice. Further discussion around its implementation is provided in Appendix C.

Low maturity scores were noted across the organization, with an overall rating between "1 - Unfocused" and "2 - Aware" (refer to Figure 3-2 below and Appendix C) for the results of LUMA's assessment. This means that PREPA exhibits a basic understanding of a need to resolve noted deficiencies and is in the process of starting or deciding on how best to address them; however, in over 50 percent of the areas, PREPA is unaware of or opts not to comply with industry norms.

Figure 3-2. Maturity Scale Ratings Profile (Percent of Areas Assessed)



Described below are the areas representing the most significant shortfalls with the potential to have the highest impact or consequence.

Significant opportunity for improvement in workplace health and safety

Though PREPA management acknowledges safety as important, LUMA found significant opportunity for improvement in health and safety training and compliance. Many employees are exposed to hazardous working conditions due to damaged and insufficiently maintained equipment and facilities, inadequate tools and PPE, substandard technical practices and inadequate policies and procedures for documenting, monitoring and correcting safety issues. These practices have resulted in serious safety incidents in past years. Over the last three years, PREPA has averaged 372 Occupational Safety and Health Administration (OSHA) recordable injuries or illnesses per year, resulting in an average of 2,200 lost days of work per year. PREPA's OSHA Recordable Incident Rate (recordable cases multiplied by 200,000 then divided by number of labor hours) for 2019 was 8.76 compared to an average of 1.78 for T&D utilities in the US (based on data from 39 organizations as reported by the Edison Electric Institute [EEI]). That means for 2019 PREPA's OSHA Recordable Incident Rate was almost 5 times worse than the group average and 2 times worse than the worst performing organization in the EEI data set.

A lack of maintenance practices

PREPA currently lacks effective systems and processes for inspecting, planning and executing preventative maintenance. Reacting to daily system outages and restoration activities consumes the vast majority of PREPA's field resources. Repairs made during service restoration are often provisional and temporary, without documentation that would enable following up with permanent repairs or coordinating more proactive asset management planning prior to the next failure. Restoration processes lack formal operating procedures, quality control and workforce training, resulting in inconsistent and often substandard service restoration quality and creating potential future safety and operational concerns. This lack of accurate and timely documentation has resulted in systemic deficiencies throughout the T&D System maps — a fundamental tool for any utility to ensure the proper safety and operation of its system.

Need for improvement in project management and controls

LUMA observed a need for improvement in project management, control and implementation capabilities to ensure that projects are completed on time and on budget. LUMA identified infrastructure projects that

were left incomplete, software that was purchased without implementation and consistent variance between project budgets and actual expenditures. The utility's organizational structure and management systems require improvement to ensure adherence to the disciplined project management, control and execution procedures required for compliance with FEMA grant management.

Industry standard policies and procedures not created, updated, enforced

Many industry standard operational policies and procedures have not been created, documented, updated, implemented or enforced. This has resulted in a patchwork of inconsistent, unstandardized work with inadequate (paper based) documentation and incomplete transfer of institutional knowledge — preventing an accurate understanding of the current state of the physical infrastructure.

Absence of Accurate Data

LUMA found a lack of accurate data, data collection procedures and data management systems required to make strategic or tactical decisions regarding assets, system and human performance, and risk. The lack of test and inspection activities over the past 10 years has made locating, recording and categorizing the condition of assets to be difficult. Lacking accurate circuit maps, system operators are often unable to identify and isolate specific areas where faults occur and are forced to cut power to large numbers of customers. This poses safety concerns, has a negative effect on worker productivity and makes the planning of repairs more difficult. LUMA will need to conduct significant work to establish the basic foundations of a data-driven organization prior to leading the utility through the digital transformation required to operate the utility of the future.

3.2.2 Summary of Key Asset Health Findings

As previously stated, the assessment and asset health findings were based on multiple reports (e.g., Sargent and Lundy, Navigant Consulting, Siemens PTI and the US DOE) and LUMA's confirmatory site visits. In reviewing the third-party documents, the following S&L reports provided the most useful information on which to gauge asset health.

- T&D condition assessment report: Independent Engineering Report, PREPA Transmission and Distribution System, June 2019.
- Conceptual Transmission and Distribution 10-Year Capital Investment Plan for Reliability, October 2019
- Transmission and Distribution Roadmap, May 2020.

These involved the following inspections of the T&D System:

- 52 of 226 transmission lines (230 kV, 115 kV and 38 kV)
- 21 of 1,155 distribution feeders
- 85 of 339 substations

LUMA undertook confirmatory site visits to determine the extent to which S&L's findings could be relied upon to define improvement programs. In planning and ultimately performing the inspections, consideration was given to: 1) ensuring a realistic view of the system (system-wide sampling), 2) addressing known problem areas (e.g., worst performing feeders and problematic substations and equipment), 3) linking observed conditions with underlying causal analyses and 4) validating S&L inspections. The confirmatory site visits were performed across the T&D System, including:

- Substations and transmission centers

- Electric transmission system
- Electric distribution system
- System technologies and facilities
- Telecommunication systems and networks

Checklists were developed for the major asset categories and were used to guide the LUMA inspections and ensure consistency in the identification and scoring of the assets. Visual inspections employed checklists that outlined criteria for assessing health, repair priority and strategic priority. As an example, the Health Condition (Health) and Frequency-Point System, Strategic Priority Code, and Root Cause Analysis tables provided in Appendix F illustrate the above evaluation criteria for electric distribution lines.

The inspections covered 20 distribution feeders, 24 substations and portions of the 230 kV transmission system via aerial inspection. In reviewing the results of these inspections, LUMA confirmed and substantiated the assessments made by S&L and determined that S&L's approach and criteria for assigning Health Condition scores (shown in Table 3-2) were in line with LUMA's observations during the confirmatory site visits.

Table 3-2. Health Condition Score Value Definitions

Score Value	Health/Condition
4	System like new (replaced or refurbished within the last five years)
3	System has been maintained with general operations and maintenance on a routine basis; no major issues noted
2	Deficiencies were noted or components were out of service
1	Major issues noted causing a safety, reliability or unit output issue
0	End of life or not operational

The S&L and FEMA related damage assessments conducted for the FEMA 428 program funding obligation provided an indication of the quantity of structures with deficiencies and requiring corrective action. The inspections revealed that a significant portion of the T&D System requires some sort of remediation (Health condition score of 2 or less):

- 37 percent of 1,453 transmission structures inspected by S&L (230 kV, 115 kV and 38 kV)
- 65 percent of 805 distribution structures inspected by S&L
- 80 substations inspected in order to submit an application for FEMA funding had damage to 72% of substation equipment and facilities

Similar to previous findings described in other reports, there is abundant evidence of hurricane damage to the T&D System. However, there is also significant damage as a result of decades of inadequate and deferred maintenance. For instance, substation panel doors are left open, allowing rodents to chew and damage control cabling. Further, and of crucial importance, LUMA observed little evidence that critical system assets had been inspected, tested and repaired, and there were no indications that these standard practices were going to be put in place in the foreseeable future.

Rebuilding and hardening are critical and need to be accompanied with prudent utility methods and practices for asset management, operations, maintenance and overall performance. Building new infrastructure without having an adequate utility will only lead to quickly deteriorating physical infrastructure and continued deficient service. As such, the SRP includes inspections, practices and

procedural improvement programs to complement infrastructure repair, restore and rebuild improvement programs.

The following images are examples of observations made during LUMA's line and site visits.

Figure 3-3. Severely leaning pole with transformer
Compromised wood quality at the base of pole, with pole/transformer in contract with overhead distribution circuits located in a publicly accessible parking lot and close to a roadway — causing risks to employee health and safety, public safety, environment and delivery of electric service.

Figure 3-4. Compromised substation structure
Compromised substation structure, with structural support arm broken/disconnected, and potential for a substation outage due to proximity to energized equipment — causing risks to employee health and safety, public safety and delivery of electric service.

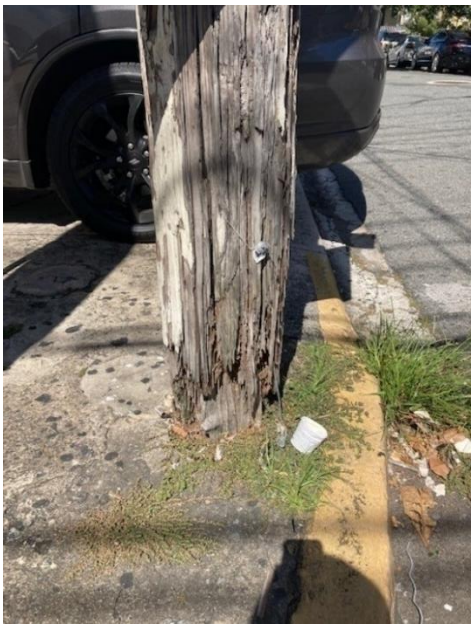


Figure 3-5. Compromised wood pole
Compromised wood quality at base of pole, located near public walkway and roadway — causing risks to employee health and safety, public safety and delivery of electric service.

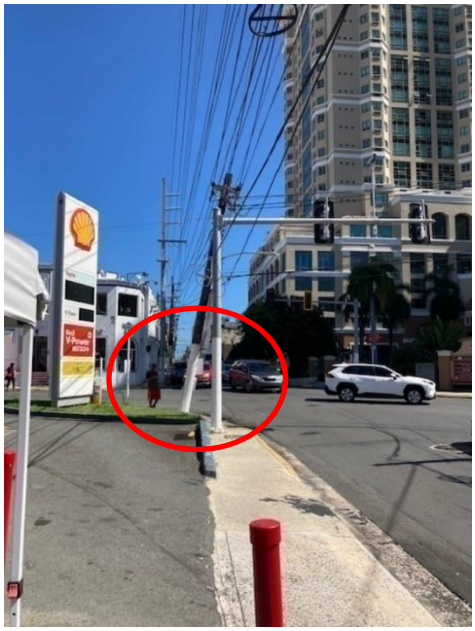


Figure 3-6. Compromised wood pole
Compromised wood quality at base of pole, located near public walkway and roadway — causing risks to employee health and safety, public safety and delivery of electric service.

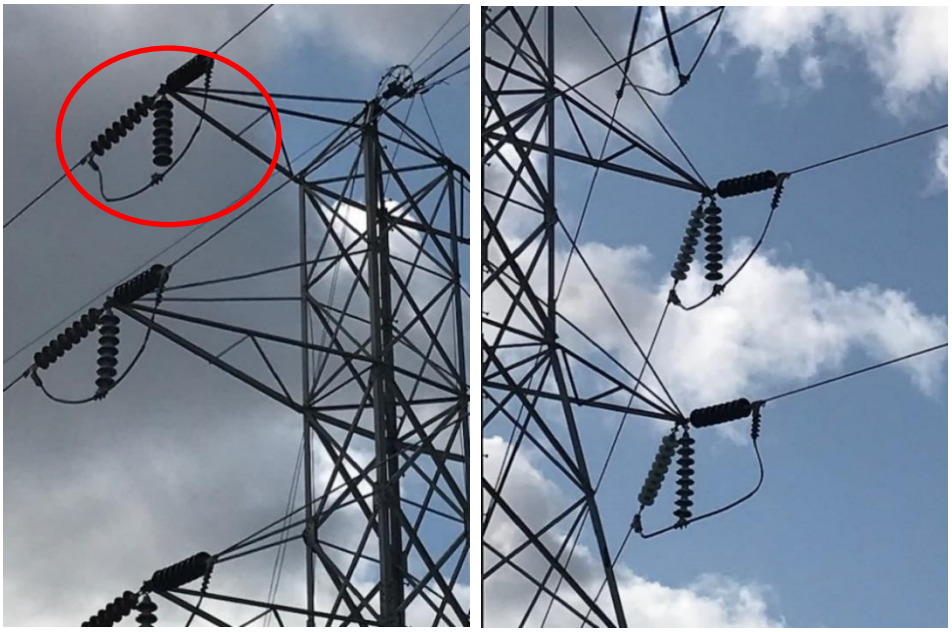


Figure 3-7. Compromised transmission tower
Compromised transmission tower in parking lot; the tower has several connectors that have failed — causing risks to employee health and safety, public safety and delivery of electric service.

Summarizing the results, LUMA recorded the following high-level observations, details of which are further discussed in Appendix F.

- Substation damage, including from hurricane high winds and flooding, and physical damage from earthquakes, includes damaged equipment, control buildings and structures
- Transmission lines including damage from hurricanes and other infrastructure deficiencies, includes structures, conductors, insulators and guying
- Distribution lines, including damage from hurricanes and aging, includes poles and conductors
- Distribution system in need of storm hardening
- Almost 20,000 distribution transformers identified as damaged
- Streetlights across Puerto Rico require repairs or replacement for regulatory compliance and safety.
- Critical IT systems are beyond end of life and lack adequate cybersecurity protection.

From a high-level view, the deficiencies described in the S&L reports and confirmed by LUMA pose significant risk to safety, reliability, system performance and operability, as shown in Table 3-3.

Table 3-3. Examples of High-Risk Deficiencies

Focus Area	Safety	Reliability	Performance & Operability
Distribution & Transmission Lines	▪ Damaged structures, supports and foundations ▪ Clearance to ground vegetation ▪ Unfinished and unsafe construction	▪ Insufficient feeder sectionalizing and protective devices on the mainline ▪ Lack of automation to perform feeder reconfiguration ▪ Insufficient protection on laterals	▪ Vegetation limits loading ▪ System does not meet design reliability standards ▪ Out-of-service line segments limit operability ▪ Operating constraints limit the economic dispatch of generation

Focus Area	Safety	Reliability	Performance & Operability
Substations	▪ Damaged equipment out of service with unsafe conditions ▪ Unfinished construction ▪ Leftover materials and equipment ▪ Inadequate grounding ▪ Oil leaks	▪ Age and condition of high voltage and medium voltage infrastructure leave the system vulnerable to failures with devastating effect on the power grid	▪ Questionable ability to meet planning and design standards ▪ Damaged or out-of-service equipment limits capacity
System Operations Facilities			▪ Loss of the Energy Control Center (ECC) represents a single point of failure ▪ Obsolete hardware and software ▪ Lack of situational awareness ▪ Limited ability to control generation or incorporate renewables

3.3 Development of Initiatives

As described in Section 1.4.2, the results of the gap assessment, along with Puerto Rico's public policy objectives, informed the development of initiatives to improve the system. The full list of initiatives a) address concerns identified through the gap assessment, b) carry out infrastructure repair, replacement or hardening projects, c) meet regulatory requirements (such as the IRP), and d) achieve operational and customer satisfaction improvements.

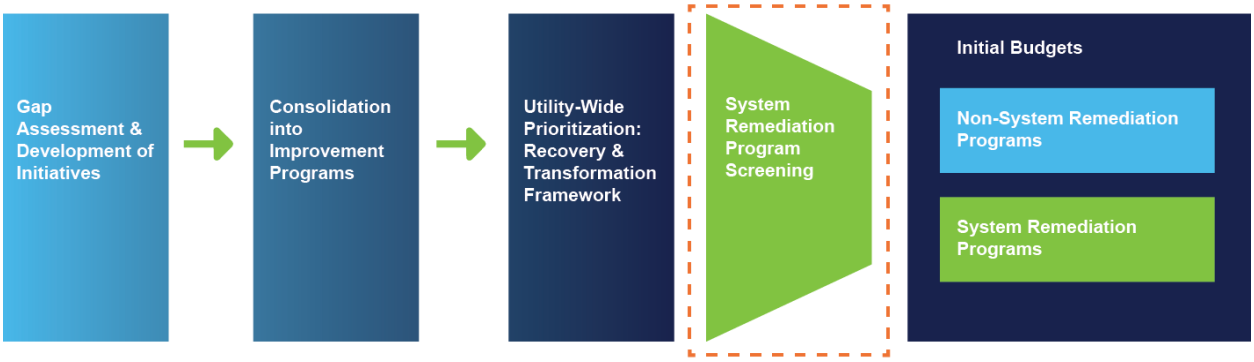
SRP improvement programs were developed as part of a comprehensive set of improvement initiatives to deliver customer centric, reliable, resilient, safe, sustainable electricity at reasonable prices. Focusing improvement initiatives exclusively on remediating gaps would not necessarily result in prioritizing activities with the highest value to the customer. As such, programs within the SRP represent only a subset of LUMA's comprehensive list of improvement initiatives and consequently represent only a portion of the spending LUMA is proposing within its Initial Budgets.

LUMA developed a scope for each initiative, including a description of the solution, criteria defining the successful execution, cost estimates and resource requirements. Interdependencies between initiatives were then identified and used to consolidate initiatives into 69 Program Briefs, as described in Section 1.4.2 (Analysis Phase). These programs were then prioritized and budgeted through the Recovery and Transformation Framework discussed in Section 1.4.3 (Planning Phase).

3.4 Delineation of System Remediation Programs

After carrying out the assessment, developing initiatives and prioritizing within the Recovery and Transformation framework, a utility-wide risk-based screening process was implemented to delineate between SRP and non-SRP initiatives.

Figure 3-8. System Remediation Program Screening Process



The assessment provided LUMA with a snapshot of PREPA — an organization with low maturity scores operating and managing assets, many of which are in poor health. These assessment scores provided an approximation of likelihood/probability that an articulated threat will be realized. To complete the risk assessment, a utility-wide assessment of potential impacts was performed, applying the Component Business Model (CBM), described in Section 4.2. LUMA considered impacts to employee health and safety, public safety, delivery of electric service and physical and cyber security, along with the requirements of applicable law and financial loss to the utility. Once those components of the business were identified as high risk, they were mapped onto the initiatives, facilitating the identification of those that would be included in the SRP.

Restating a previous point, the data available was insufficient (in breadth, depth or accuracy) to support a detailed risk assessment process. LUMA has made estimates based on the information collected during the assessment, in particular the S&L, US DOE and FEMA reports; confirmatory site visits; and partial data provided by PREPA. LUMA acknowledges that a more refined risk assessment process is necessary and that, as LUMA proceeds during the O&M Services period, the data collection and analysis processes will improve and risk assessment methodologies akin to normal industry practices will take hold. The results will be more refined outcomes in subsequent SRP update reports.

4.0 Selection of System Remediation Programs

4.1 Approach to Selecting Programs

LUMA's assessments scored the maturity of different business functions and estimated asset health. In risk terms, these scores approximated the likelihood/probability of failure. The assessment results show that over 80 percent of the organization's components and the majority of asset structures scored low in maturity or in poor health, respectively. This resulted in the identification of over 600 initiatives to address these deficiencies "required to meet Contract Standards" (OMA, Section 4.1(d)). Subsequently and in the spirt and intent of the OMA, LUMA applied a more focused lens to identify the highest risk business functions and assets gaps to be included in the SRP, as illustrated in Figure 4-1. Each dot represents an initiative identified by LUMA. Only those initiatives addressing the highest risk gaps (the dark blue area) are included in the SRP.

Figure 4-1. Conceptual Risk-Based SRP Selection Criteria

4.1.1 Program Development

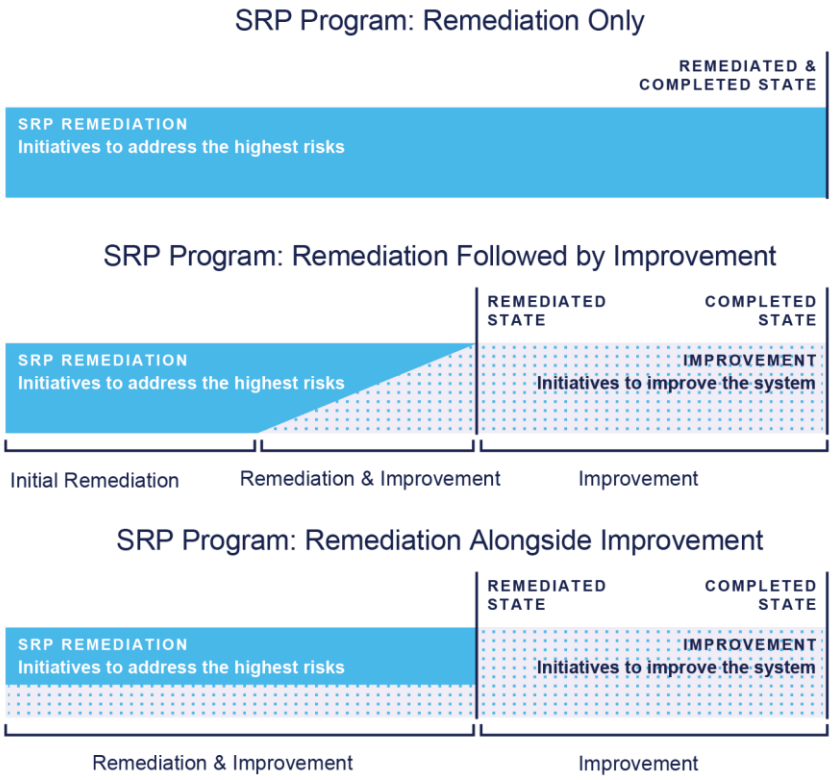
Before describing the role that risk played in forming the SRP, it is important to understand the manner in which SRP-designated initiatives are embedded in the programs.

Programs were initially developed by SMEs to achieve value and address gaps, not exclusively with an eye toward being an SRP or non-SRP program. This means any program could include some work that is part of the SRP and some that is not. For example, the program to repair and refurbish substations includes SRP work for fixing substations as well as near term non-SRP work for relay upgrades. Because in this case the work is so closely related, it is more efficient to proceed with both the SRP and non-SRP portions.

The Program Briefs in Section 6.0 break down each program's activities and spending to reflect this split. For programs that have both SRP and non-SRP initiatives and activities, the Program Brief includes a description of the "remediated state" and the "completed state." The remediated state is the minimum state required to meet Contract Standards. The completed state represents the conditions to achieve optimal operations and targeted maturity levels and asset health scores.

Achieving the remediated state does not necessarily represent optimal operation or use of best practices: it only means that the SRP portion of the work has been completed. The program will continue until completion, when improvements implemented after remediation result in improved service; this allows LUMA to achieve its broader goals discussed in Section 1.4.3. Figure 4-2 below shows how programs will progress from current state to remediation, and finally to completion. As shown in the figure, there are multiple paths for programs. Some remediate before improving, while others, as noted in the example above, improve and remediate simultaneously, with others solely involve remediation.

Figure 4-2. SRP Programs Consisting of Remediation Activities and Potentially Improvement Activities



4.2 Selecting Non-Asset Related Programs — Component Business Model

For the gaps identified in the assessment, LUMA applied the CBM to assess the impact or consequence associated with each gap. The CBM is based on a technique developed and used to strategically model and analyze enterprise competencies. It has been implemented by multiple utilities, including LUMA. The CBM provides a utility-wide platform for LUMA to assess the risks affecting the utility as a whole in order to select the highest risk components and to measure improvements over time.

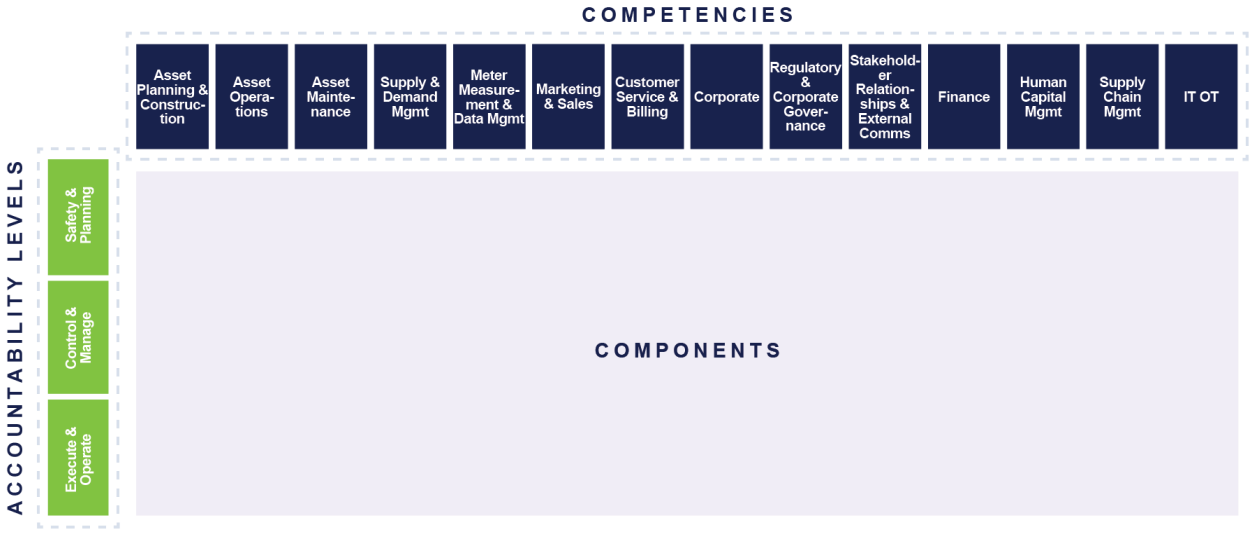
LUMA assessed risk by functional areas across the business, referred to as components in the CBM. Components were evaluated in terms of their current maturity based on the assessment and then in terms of the impact of negative events that may occur due to poor functioning within each component. Next, programs were linked to components, with programs mitigating the most risk (i.e., programs that address components with the lowest maturity and highest impact) were selected for inclusion in the SRP.

4.2.1 Component Business Model Application by LUMA

As part of LUMA's analysis and gap assessment, a standard utility centric framework was selected as a starting point for identifying business competencies and components. These competencies and components formed the basis from which LUMA assessed both the maturity (likelihood/probability) and the impact and consequences of the gaps identified in the assessment. This framework was selected since it focused critical skills and competencies across the utility and shifted away from a siloed departmental view, allowing LUMA to solely focus on the "building blocks" needed to deliver safe and reliable electricity to Puerto Rico. The framework was adjusted to match LUMA's operations, regulatory

environment and scope of services as defined in the OMA. The final framework, for which Figure 4-3 presents the outline, consists of 146 components spread across 14 business competencies and three accountability levels.

Figure 4-3. Component Business Model Framework



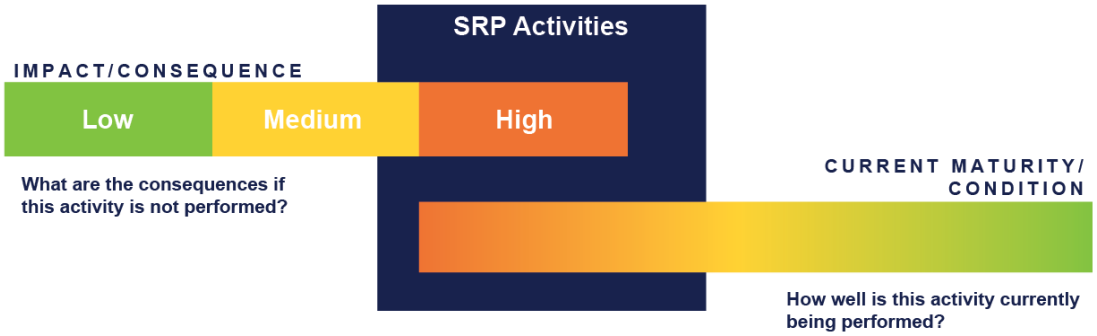
The CBM competencies at the top of Figure 4-3 are the large business areas with similar skills and capability requirements. Components represented in the grey boxed area define the required capabilities to accomplish specific outcomes within the business and accountability levels. The competencies axis characterizes the scope and intent of the activity; for example, one of the 14 business competencies is Asset Operations. Within this competency there are 15 components, each of which is assigned to one of the three accountability levels. Going a step further, for Fleet there are three components, one for each level of accountability — Fleet Strategy (strategy & planning), Fleet Management (control and manage) and Fleet Operations (execute and operate). This ensures that all levels of accountability and activities related to Fleet are both defined and contemplated within the CBM when identifying initiatives and assessing risks.

First, gaps and scoring completed during the gap assessment were mapped onto the business components from the CBM according to the maturity scale. The average maturity for the competencies evaluated was 1.7 and only a few were above 2.0 (Aware). This suggests that the gap between the utility as it currently operates and even the minimally acceptable level is substantial. A description of impact and maturity ratings across all components is included in Appendix G.

Next, business components were rated based on the impact or consequence for the overall utility and delivery of service should this business component not be carried out. For example, the inability to produce timely customer bills across the utility would have significant impact on cash flow. In another example, the impact of no preventative maintenance on the fleet is not meeting requirements of applicable law and serious injuries or potential loss of life. Impact was assessed in multiple risk categories: employee health and safety, public safety, delivery of electric service, physical and cyber security, requirements of applicable law and financial. The result is that every business component is categorized as high, medium or low in terms of estimated potential impact.

Together the maturity score-based likelihood and the component-based impact assessment were combined to determine an overall risk for each component. Those with only a low maturity score and a high assessed impact are included in the SRP as shown in Figure 4-4.

Figure 4-4. Selection of high-risk programs for inclusion in the SRP



Programs were then linked to the CBM based on the gaps the program was charged with remediating. Initiatives within those programs were identified as high risk, meaning they mitigate high risks identified by the CBM risk assessment. For instance, in the Workflow Processes and Tracking program, initiatives related to work methods, processes, preventative maintenance and management are included in the SRP; however, productivity tracking and benchmarking, while essential to providing efficient service, were not included in the SRP.

It is important to keep in mind that we selected those programs that addressed the highest risk for the SRP. In the context of the CBM, this means programs that address components with low maturity (i.e., high likelihood of negative events) and high impact (i.e., high consequence). In practice, this meant that LUMA selected programs that address CBM components evaluated as having a capability maturity of 1 - Unfocused or 2 - Aware and judged as having high impact or consequence.

Appendix G provides further details on LUMA's application of the CBM, including summaries of the maturity and impact assessments, the whittling down of components to those with the highest risk and the linking of programs to high risk functional areas.

4.2.2 Defining the Remediated State

The improvement programs will help mitigate risks over several years. Remediation will be achieved when all the components with high impact are at maturity level "3 – Developing." Developing is defined in Table 4-1. These components (i.e., currently part of the SRP) do not currently meet minimum standards for Prudent Utility Practice, are currently outside of the Contract Standards or otherwise do not comply with applicable law and/or regulatory requirements. At level 3, the utility will not be at the desired level of performance, but it will be functioning well enough that LUMA can identify specific risks or deficiencies and mitigate them. Completing the programs related to these high-risk components will allow LUMA to assume responsibility over these programs as soon after Service Commencement Date as possible and will improve LUMA's ability to provide safe and reliable service to its customers.

Table 4-1. Definition of Remediated State — Criteria to be Considered Remediated (Column 3)

Unfocused 1	Aware 2	Developing 3	Competent 4	Excellent 5
The organization has not recognized the need for the basic elements and/or there is no evidence of commitment to put them in place. Work is performed informally or ad hoc Processes are undocumented and/or undefined Issues present major exposures Required expertise / training does not exist, capacity is insufficient or both Supporting technology is missing or wholly inadequate	The organization has a basic understanding of the need to address these elements and is in the process of deciding how and starting to apply them. Preliminary documentation of processes being compiled Performance is unmeasured Little organizational effort to identify issues Supporting technology is inadequate or under-exploited	The organization has identified the means to address the major elements and some work is progressing on implementation. Basic performance can be measured Performance is minimally adequate Processes are documented and defined Issue identification is performed Competitively sub-par Supporting technology is adequate and exploited reasonably	All elements are in place and are implemented in the day-to-day operations of the business. Major improvements made Performance is adequate and continuously measured/verified Processes are managed (followed consistently) and appropriate controls Disciplined issues identification Competitively at par Supporting technology is largely attuned to business needs, flexes well in response to change requirements	The organization is using processes and approaches beyond the basic requirements, driving to achieve maximum value. Verifiable issues/defect reductions and/or practices continuous improvement Deliberate effort to optimize/ improve processes Competitively well positioned to competitively differentiated Supporting technology is continuously addressed/ deployed for additional strategic advantage

4.3 Selecting Asset-Related Programs — Risk Assessment

Asset risk was assessed based on field inspections and an evaluation using an asset health condition assessment. The health score includes information about condition (i.e., likelihood of failure) and consequence (i.e., impact of failure). Since health includes both likelihood and consequence information, it is a measure of risk and was therefore used as the basis for identifying SRP work. The SRP is intended to include the highest risk assets — those whose mitigation is critical to reaching Prudent Utility Practice and meeting the contractual requirements of the OMA.

4.3.1 Identifying High Risk Programs

Similar to non-asset related programs, asset-related programs such as substation rebuilding or distribution line repairs were assessed based on their risk. However, since each program consists of multiple structures with varying health conditions, one overall program health condition score cannot be ascribed. If an average health score, say “good,” is attributed to a program, then it would be binarily excluded from the SRP even though the program still contains low-health structures. Further, at present LUMA does not have comprehensive or detailed information about infrastructure health across the system in order to make these detailed assessments.

As a result, at the program level, an impact or consequence screen was performed. Consequence was evaluated in terms of employee health and safety, public safety, environmental impact and delivery of electric service. Those programs evaluated as having high impact or consequence of failure are included in the SRP. For instance, the Two-Way Automatic Communication System (TWACS) program is not included in the SRP since the impact of failed meters is less substantial and can be mitigated with meter

readers. However, a program related to transmission substations is included in the SRP; this is because, if a failure occurs, there are significant potential consequences related to safety, the environment and electric service delivery.

4.3.2 Asset Risk Assessment

Programs selected as SRP based on consequence require further risk assessment to delineate SRP selection by asset. Risk assessment programs are proposed as a key part of LUMA's follow-on remediation work and will consist of comprehensive, system-wide field inspections, risk assessments and prioritization and remediation work.

Field inspections will focus on estimating risk, with condition assessments targeted toward estimating probability of failure and including measures to support estimates of consequence of failure. The consequences of failure will be aligned with LUMA's goals and objectives as outlined in Section 1.4.3. These consequences focus on employee health and safety, public safety, environmental impact and delivery of electric service. For example, the consequence of failure for a distribution structure will include whether it is in a populated area (safety), has a transformer (environment) and is a three-phase feeder or a single-phase tap (electric service delivery). The inspectors will note these items when on site. A focus on objective statements will minimize the need for judgments regarding risk on the part of the inspector. Field observations will be supplemented by factors the inspector cannot see, such as whether a transmission line is part of a critical backbone and thus has system stability implications or whether it serves critical customers.

As inspection results come in, they will be entered into a risk-based process for planning risk mitigation. The objectives of this process will be as follows:

- Prioritize and plan mitigation work in a systematic and transparent way using the Recovery and Transformation Framework goals and objectives to provide maximum value to customers.
- Minimize major repair work on a structure to be replaced in the near term where possible. For example, if there is mitigation required on a structure whose line will shortly be fully rebuilt, consider whether the mitigation can wait or be scaled to a minimum.
- Ensure that work to address the highest risks, especially public safety, is performed promptly. Field inspectors will flag extreme safety hazards to move them to the top of the list.
- Compare options to maximize value, such as repair and replacement of damaged equipment, voltage conversion, looping feeders, installation of reclosers, etc.

4.3.3 Identifying High Risk Assets

At present, LUMA's estimate of how much asset-related remediation work is needed is based on field inspections carried out by S&L and validated by LUMA. S&L's methodology returned a health score for each component inspected, which were rolled up to provide an overall health estimate for a structure (T&D lines) or substation. Using the scale applied by S&L, it is estimated that a large fraction of assets would receive a health score of below 3, suggesting that replacement or other mitigation is required. While all asset deficiencies will be recorded and restoration work prioritized and sequenced, if all assets evaluated as having health scores below 3 were included in the SRP, this would generate a backlog of SRP work much too large to be executed within a reasonable period.

Because of this, LUMA has refined its asset health criteria to screen for SRP. The health scores currently include some estimate of risk; however, they are more focused on asset condition than on consequence of failure or even a direct estimate of probability of failure. The refined asset health criteria will include

more granularity at the low end of the health condition and more precise estimates of the consequence of failure. This allows for better differentiation among the highest risk assets in terms of both current condition and criticality. The purpose of this refinement is to ensure that assets whose mitigation is flagged for inclusion in the SRP do not become so numerous that remediation is delayed unnecessarily or that other work to mitigate higher risks is deferred in favor of assets that could potentially be left as they are for the time being.

The intent is that the lowest health scores be reserved for conditions requiring near term remediation to achieve Prudent Utility Practice. For example, the lowest categories of health (i.e., 0 and 1) will not be applied to equipment that is old or in poor condition but nevertheless on a par with infrastructure in similar condition seen at other utilities and still operating within the normal range of industry practices. Rather, 0 and 1 scores will be reserved for assets that have failed or are likely to fail imminently, and where the consequence of such failure is substantial in terms of safety, reliability or environmental impact. The goal of this approach is to identify assets with the potential for substantial consequences from failures. For instance, this will help differentiate between assets that are end of life and currently being operated in a dangerous manner from those assets that are end of life but are currently not operating as a work around has been created to bypass the asset. An example failure of this type is shown in Figure 4-5 below, resulting from a pole failure.

Figure 4-5. Example of High Consequence Failure

Broken pole with a piece of the pole and the transformer feel into a backyard of a home and very close to water — causing risks to employee health and safety, public safety and delivery of electric service.

4.3.4 Defining Remediated State

Assets identified in Health Category 0 or 1 will be considered remediated when they are no longer in either of those categories. Where practical, this will mean repairing or replacing damaged equipment and restoring it to like new or at least normal condition. In cases where there are efficiency concerns, e.g., for

damaged poles on a line that will be replaced for voltage conversion in a few years, mitigation may be something less than full replacement or repair to restore the asset to safe operation but only for a short period of time.

For example, the “remediated state” relative to T&D lines and substations will be characterized as follows.

- Known extreme safety hazards to workers or the public have been identified and effectively mitigated. These risks may be mitigated by repair or replacement, or by other means where appropriate.
- High risks posed by degraded or defective equipment have been identified and effectively mitigated. Risk will be defined in terms of LUMA’s objectives and may be mitigated by repair or replacement, or by other means where appropriate.
- LUMA will have a record of inspection results that can be used to support future improvements, after the SRP, as LUMA is working toward the completed state.

5.0 System Remediation Plan Management

5.1 Pace of Investments

As described above, the number and size of gaps between the utility’s current state and the Contract Standards are substantial. For example:

- The gap assessment identified over 1,000 major gaps across four departments and 69 functional areas.
- 140 components of core competencies were assessed for maturity on a five-point scale. That assessment resulted in an average score between “Unfocused,” the lowest rating, and “Aware,” the second lowest.
- Sampling site and facility surveys conducted by LUMA and S&L have identified a large number of assets in poor condition and in need of immediate remediation. Depending on the specific category of assets and availability of more accurate data, the numbers range between 15 and 65 percent.

The task of achieving a remediated state is formidable in some areas, given existing conditions, and must be executed in a prudent and fiscally responsible manner. Addressing all deficiencies within a one- or two-year period is neither financially nor operationally feasible. The estimated SRP budget by portfolio by year is provided in Section 6.0. The quantity of work, already identified and expected to be established as a result of future asset inspections, cannot be executed in a two- to three-year timeframe. In some cases, funding limitations constrain execution, while in others, the efficient deployment of resources does. For example, the program to rejuvenate fleet assets is unlikely to be federally funded by FEMA since it is not related to storm damage, infrastructure or improving the resiliency of equipment. However, this area constitutes a major gap related to poor service restoration performance and high safety risk to LUMA’s workers and customers. It is a high value program, but one that must be funded from limited, non-federal revenues.

Some SRP work may be deferred beyond the initial years to allow for systematic execution of large-scale improvement programs or to meet goals and requirements beyond the SRP. LUMA must meet its obligations under the OMA and within applicable laws, in particular those directed by PREB, which extend beyond remediation. The inclusion of non-SRP, high value work in the initial years allows LUMA to meet the longer-term objective of normal utility practice when compared to peer utilities and Puerto Rico energy policies. LUMA must balance trade-offs between near term risk mitigation and long-term performance to maximize the total benefit to its customers within a reasonable time and at a reasonable cost. For

example, consider a distribution pole that has been given a health score of 1 after inspection, meaning it should be replaced as an SRP item. In this case, the distribution pole in question is also due to have its circuit voltage converted within a few years. In such a case, it makes sense to perform only temporary mitigating work on the pole to ensure safety, and then to complete remediation work when the circuit voltage is being replaced (possibly one to three years later). This avoids working on the same equipment multiple times, which would unnecessarily increase costs to customers.

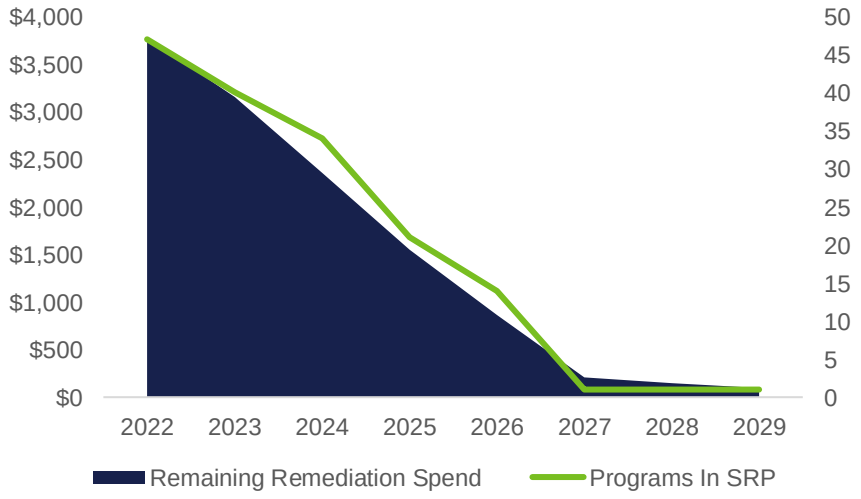
Some non-SRP programs are also proposed in the initial years (included in the Initial Budgets filing) as foundational and necessary to support future work (including SRP work and especially federally funded work). These programs are generally located in the Enabling portfolio of programs. An example is the program to set up a Capital Programs department, including a Project Management Office (PMO); this office is necessary to effectively deliver projects and efficiently deploy capital. This program is categorized as high priority, essential to the effective management of multiple federally funded capital projects, even though it does not meet the criteria for SRP-related work.

5.2 Managing the SRP

LUMA has developed the SRP with the information available and using accepted concepts and techniques to determine areas of high risk where there is insufficient data to support a more traditional and comprehensive analysis. Consequently, LUMA recognizes that there are uncertainties associated with the SRP. The data and assumptions on which the programs are based are lacking and not perfect. Furthermore, LUMA has not yet begun executing work and thus does not have a precise grasp of how quickly it can proceed. Perhaps most importantly, the estimates of scope for the large asset-based programs are based on incomplete and, in some cases, inaccurate information. LUMA anticipates that as work proceeds the true state of the utility's assets and processes, as well as the efficiency with which improvements can be made, will become clearer. On an annual basis, LUMA will review and update the SRP based on ongoing improvements in source data and information so that execution of the SRP programs can be documented and the resulting improvement in maturity and health recorded.

These annual reviews will also keep the programs consistent with Annual Budgets and allow LUMA to identify programs that have been remediated and remove them from the SRP. As such, the number of programs and high risks identified currently will progressively decrease year over year.

Figure 5-1. Profile of Programs within System Remediation Plan Over Time ($ million and #)



6.0 System Remediation Plan Portfolios & Spending Profile

The following section presents the final SRP Program Briefs, which are the result of the analyses described above. The briefs describe the high-risk gaps identified and the program to remediate those gaps — including the resources, timelines, milestones, cost estimates and the remediated state. Cost estimates are based on 2020 dollars and many are initial 4 – 5 class estimates. LUMA will refine estimates as needed once LUMA begins operating the PREPA system and projects progress through the design and engineering process. The estimate of resource requirements will also be refined as needed once LUMA begins operating the PREPA system.

The following table presents total SRP program spending within the Initial Budgets (FY22 through FY 2024) and over the term of the SRP. This spending is required to remediate the system to meet Contract Standards.

Table 6-1. SRP Spending Profile — By Portfolio ($ million)

Portfolio	FY222	FY23	FY24	FY25	SRP Total
Customer Service	39	44	42	84	209
Distribution	166	238	278	640	1,322
Transmission	186	270	220	297	972
Substations	64	74	73	108	318
Control Center and Buildings	17	51	58	219	346
Enabling	128	112	117	198	555
Support Services	21	13	11	7	52
Grand Total	**621**	**801**	**799**	**1,553**	**3,774**

Note:

“Enabling” pertains to those Programs deemed essential to establish the necessary infrastructure to enable the successful execution of operational and capital work.

“FY” pertains to the fiscal year period from July 1 to June 30. Annual references are on a fiscal year basis.

The following table presents total SRP program spending within the first three years compared to the total spending related to improvement of the T&D System. Total spending includes activities that are not related only to the highest risk items, but are all required to deliver customer-centric, reliable, resilient, safe, sustainable electricity at reasonable prices. Within the Initial Budgets period (fiscal years 2022-2024), the SRP comprises over 50 percent of total Recovery and Transformation expenditures and 45 of the 69 improvement programs contain SRP initiatives. All improvement programs are provided in the Initial Budgets.

Table 6-2. Annual SRP Spending Profile as a portion of Overall Program Spending – By Portfolio ($ million)

Portfolio	FY22			FY23			FY24		
	Total Program Spend	SRP Portion	SRP % of Total Program Spend	Total Program Spend	SRP Portion	SRP % of Total Program Spend	Total Program Spend	SRP Portion	SRP % of Total Program Spend
Customer Service	115	39	33%	168	44	26%	165	42	26%
Distribution	237	166	70%	352	238	68%	518	278	54%
Transmission	240	186	77%	463	270	58%	427	220	51%
Substations	115	64	55%	108	74	68%	107	73	68%
Control Center and Buildings	20	17	88%	56	51	91%	68	58	87%
Enabling	149	128	86%	117	112	95%	121	117	96%
Support Services	104	21	21%	104	13	13%	95	11	11%
Grand Total	**979**	**621**	**63%**	**1,368**	**801**	**59%**	**1,501**	**799**	**53%**

Figure 6-1. SRP Spending Profile as a portion of Overall Program Spending – By Portfolio ($ million)

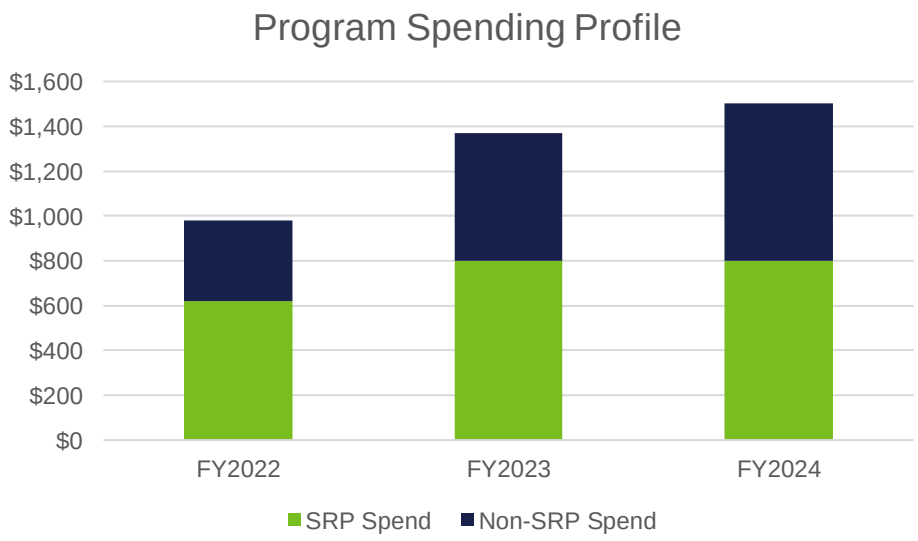
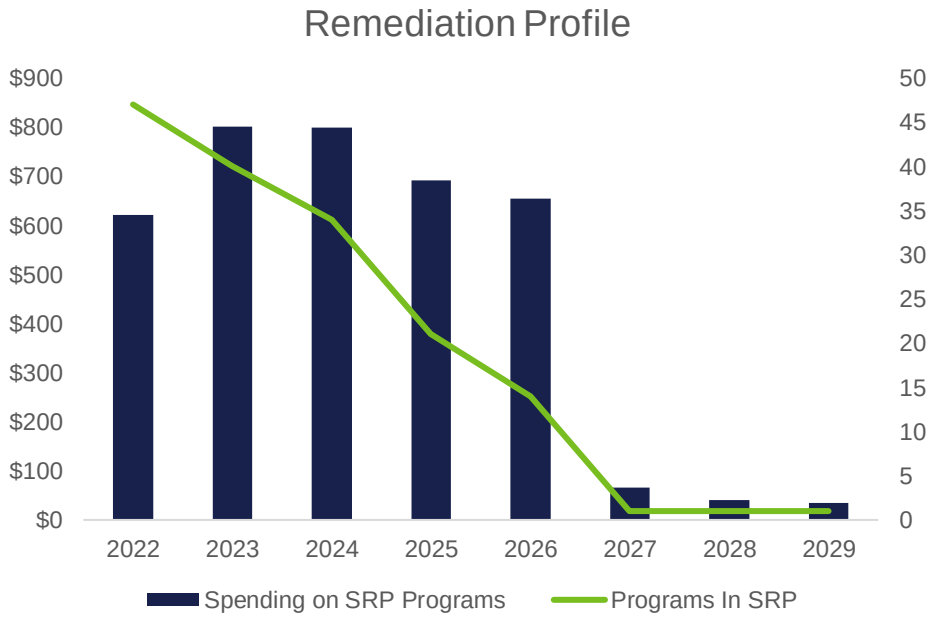


Figure 6-2. SRP Spending and Program Profile Portfolio ($ million and #)



System Remediation Plan

SRP Programs are a subset of our broader Improvement Portfolios described in the Initial Budgets. Below are summary descriptions grouped by portfolio of those programs in the SRP.

SRP activities within the **Customer Service** portfolio include those activities that will improve public safety through repairing streetlights and modernizing customer service technology. Billing systems will be improved to maintain business continuity.

Transmission and **Distribution** assets will be inspected to identify high risk assets. Those identified high risk assets—including damaged or obsolete towers, poles, lines, anchors and guys—will be repaired and restored to currently applicable standards, in compliance with applicable laws and regulations as part of the SRP. Further, the telecommunications system will be restored and modernized. **Substations** will also be inspected to identify high risk assets, those high risk asset will be repaired, rebuilt and made safer to currently applicable standards, in compliance with applicable laws and regulations.

Control Centers, which are critical for the delivery of economic and reliable energy, will be refurbished and will receive critical software upgrades and new technical capabilities required to meet OMA and applicable laws and regulations. New system operating procedures and strategies will be developed alongside the physical, software and technological upgrades. New **buildings** - including a new control center, warehouses and mechanic shops-- with upgrades required for safety and compliance requirements will be completed in order to meet applicable laws and regulations.

The **Enabling** portfolio of investment projects focuses on establishing the necessary infrastructure to enable the safe and successful execution of operational and capital work. SRP programs include the provision of new personal protective equipment and tools, training in skills and safety for all employees, and new data systems to accurately store and manage data on T&D assets gathered through inspections. Further, key programs such as Vegetation Management and Fleet Management are included as SRP programs within the Enabling portfolio.

Support Services are cross functional. This portfolio includes human resources programs for attracting and retaining high performing employees, financial systems and controls for tracking and managing finances, cyber security and other IT OT enablement programs. Several programs focus on public safety, waste management, and safety management. This portfolio also includes activities required for the segregation of generation from transmission and distribution and to meet applicable laws, regulations and OMA requirements.

6.1 Customer Service Portfolio

Table 6-1 and 6-2 below presents spending estimates for the customer service portfolio SPR programs, followed by a short description of each SRP program.

Table 6-1: Total Customer Service Portfolio Spending Estimates by Program ($ millions, real)

Customer Service Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
Distribution Streetlighting	192.0	1,087.0	1,279.0
Billing Accuracy & Back Office	5.0	126.2	131.2
Standardized Metering & Meter Shop Setup	8.0	2.1	10.1
Modernize Customer Service Technology	1.9	18.7	20.6
Streetlight Billing	2.5	-	2.5
Grand Total	**$209.5**	**$1,233.9**	**$1,443.3**

Table 6-2: Annual Customer Service Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Customer Service Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
Distribution Streetlighting	25.0	80.0	42.0	129.8	41.0	128.8
Billing Accuracy & Back Office	5.0	14.6	-	12.9	-	11.2
Standardized Metering & Meter Shop Setup	5.9	6.3	0.8	1.1	0.8	1.0
Modernize Customer Service Technology	1.9	2.0	-	1.8	-	2.5
Streetlight Billing	0.6	0.6	1.3	1.3	0.6	0.6
Grand Total	**$38.5**	**$103.5**	**$44.1**	**$146.8**	**$42.5**	**$144.1**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

Distribution Streetlighting. This program deals with upgrading and replacing distribution streetlights that are a physical safety hazard and are scheduled for repair or replacement based on their criticality. Along with increasing the number of distribution streetlights in service, this process will also include LED replacements and GIS data entry of all streetlights.

Billing Accuracy and Back-Office. This program includes updates to bill print and delivery and other back office systems to ensure LUMA has the ability to continue to produce customer invoices. Current

technology, machines and systems are outdated, creating a financial liability in delayed revenue of ~$12.5M for each day invoices are not produced. This upgrade includes acquisition of new hardware and software to support billing and customer contracts, along with removing redundant bill printing and enveloping equipment. Additionally, the program supports back office processing of service order paperwork and mobilizes resources to address backlogs of estimated and unbilled accounts. The program also implements a customer experience metrics dashboard and agent routing technology for Billing Services to reduce resolution time and increase customer satisfaction.

Standardized Metering and Meter Shop Set Up. This program is targeted at establishing a location for standardized meter testing for LUMA and the provision of appropriate internal and external meter testing equipment. Enhanced procedures are also included, along with operational support for the new facility and equipment.

Modernize Customer Service Technology. The Modernize Customer Service Technology program is primarily focused on remediating the telephony technology through the development and implementation of a new cloud-based contact center platform. Contact center software allows for the management of a high volume of inbound and outbound customer communications across a range of channels. Modernizing contact center procedures will mitigate LUMA's risk of customers being unable to report emergency situations. The program will create real time dashboards and reporting to cover key performance indicators across all of Customer Service, including the contact center, district offices and billing services.

Streetlight Billing. This program is an audit of streetlights and associated billing. PREPA has approximately 500,000 streetlights which should be audited on a regular cycle to be determined based on asset management procedures. This program will require LUMA to complete a physical audit of the streetlights, assigning each with a unique indicator/asset tag. Once this process is complete, updates will be made in the Customer Care and Billing (CC&B) system to ensure customers are being billed accurately for their lights. The program also includes communication with customers on corrections to the street lighting system.

Distribution Streetlighting

1.0 Program Description

This program deals with upgrading and replacing distribution streetlights that are a physical safety hazard and are scheduled for repair or replacement based on their criticality. Along with increasing the number of distribution streetlights in service, this process will also include LED replacements and GIS data entry of all streetlights.

2.0 Program Rationale

2.1 Current State & Identified Gaps

As a result of natural disasters including hurricanes and earthquakes, an estimated 70% of the ~ 500,000 streetlights in Puerto Rico are damaged. Many of these damaged streetlights (estimated at ~343,000) require repair, replacement or upgrade. As per Puerto Rico Energy Public Policy Law No. 17 (April 11, 2019), all existing high-pressure sodium (HPS) lamps must be replaced with LEDs by 2030. All streetlights also require data entry into the GIS system (per local rules), with a longer term need to evaluate and plan implementation of a smart streetlighting system. The OMA also requires that public lighting be maintained and improved and that the operations and maintenance of these lights, including installation of LED lighting, be in accordance with Prudent Utility Practice and applicable law.

Of the 70% damaged streetlights, LUMA estimates that approximately 15 percent of the distribution streetlights are a physical safety hazard that require hazard mitigation to reach remediation. Field inspections will categorize assets according to their health, based on estimates of condition (likelihood of failure) and criticality (consequence of failure) and will assign an asset score from 0 (worst) to 4 (best). Mitigation of risk related to only the highest risk assets will be categorized as a 0 or 1 and performed as SRP work. These deficient assets will exhibit the following:

- Extreme likelihood of failure, or already failed, *and* likely to cause:
  - A safety impact to the workers or the public, and/or
  - Failure to meet applicable legal requirements, including Act 17, which includes requirements related to safe and reliable utility operations.

For the reasons mentioned above this program is included in the SRP.

All deficient assets, including those in the SRP will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

2.2 Description of Remediated State

Field inspections will be performed under a separate program (field inspection's program). High risk findings (asset score of 0 and 1) shall be incorporated into a remediation plan within 60 days of identification. That plan shall take into account a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

Distribution Streetlighting

In the remediated state, the following will be accomplished:

- High level inspection of distribution streetlight assets
- Repair/replacement of approximately 15% distribution streetlight assets that have a high likelihood of failure with a potential to cause damage to public infrastructure or injury to the public.

2.3 Description of Program Completed State

In the completed state, all ~343,000 damaged lights will have been repaired, replaced or upgraded over a period of 10 years. Within six years from project outset, all 490,000 lights would also have been entered and monitored through LUMA's GIS system.

Additionally, as part of the completed state, all HPS lamps would have been replaced by LEDs by 2030. Finally, evaluation of a smart streetlight system would also have been completed.

2.4 Program Activities

- Completion of field audit to locate lights and entered into asset management database
- Establishing plan for replacing lights from a geographic and type of light perspective including evaluation for smart streetlighting
- Issuing requests for proposals (RFPs) for replacement of the lights
- Selecting vendors/contractors to complete the work

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☐ Increase Service Reliability	
	☒ Deliver Electricity at Reasonable Prices	Direct
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☒ Restore Damaged Grid Infrastructure	Direct
	☐ Improve Resilience of Vulnerable Infrastructure	
☒ **Sustainable Energy**	☒ Modernizing the Grid	Indirect

Distribution Streetlighting

Primary Goals	Objectives	Direct or Indirect Impact
Transformation	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Implement Effective Public Safety Practices

This program improves public safety as failed lights can increase public safety and security risks.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Deliver Electricity at Reasonable Prices

This program enables a more positive customer experience by restoring streetlights to working order. This also supports proper billing for them, which results in electric consumption being fairly charged to light owners. Re-establishing revenue from the lights can also postpone or reduce future rate increases for customers.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

This program falls directly within one of the targeted federal FEMA funding areas.

Objective: Restore Damaged Grid Infrastructure

This program replaces lights that are no longer working due to storm damage or wear out.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Modernizing the Grid

Smart streetlighting would satisfy a key component of modernizing the grid, offering the following main benefits:

- Contains sensors that adjust their brightness and achieve significant reduction of energy consumed by dimming each individual fixture where no traffic is present, and also by adaptively adjusting its brightness based on the light sensed (as opposed to on/off only),
- Applies a management system that allows for remote monitoring and control of streetlights, enabling detection of failures and maloperation, and somewhat futuristic, but in use elsewhere,
- Incorporates a variety of other functions ranging from containing a level-1 120V vehicle charger, to monitoring the availability of parking and can even sense mischief (e.g., sense the noise of broken glass and initiate an automatic reporting system)

2.6 Program Risks

The risks of not moving forward within this program include:

- Failure to address public safety/security risks due to non-functioning lights
- Failure to deliver a positive customer experience and deliver safe, reliable electricity at reasonable prices
- Reputational risk to LUMA for not delivering a key service
- Being in non-compliance with Puerto Rico Energy Public Policy Law No. 17, which requires replacement of all HPS lamps with LEDs by 2030

3.0 Program Funding & Timeline

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$80.0**	**$129.8**	**$128.8**	**$940.4**
SRP Expenditures	$25.0	$42.0	$41.0	$84.0

3.2 Program Resource Requirements

- Approximately 343,000 LED lights and associated installation hardware
- Adequate internal resources to complete the light field audit and enter GIS data
- Adequate internal and external resources/contractors to carry out the light replacements

3.3 Estimating Methods & Assumptions

The average cost for field audits/GIS entry and light replacements based on past experiences with similar projects.

For field audit/GIS Data:

- [redacted]
- 50% are joint use with the utility pole program and will be handled with pole GIS data entry. Cost estimates reduced by 50% as a result.
- After project compression, project total = $3.96M spread over 5 years ($792k/yr.)

For light replacements:

- [redacted]

Distribution Streetlighting

3.4 SRP Program Timeline & Milestones

Billing Accuracy & Back Office

1.0 Program Description

This program includes updates to bill print and delivery and other back office systems to ensure LUMA has the ability to continue to produce customer invoices. Current technology, machines and systems are outdated, creating a financial liability in delayed revenue of ~$12.5M for each day invoices are not produced. This upgrade includes acquisition of new hardware and software to support billing and customer contracts, along with removing redundant bill printing and enveloping equipment. Additionally, the program supports back office processing of service order paperwork and mobilizes resources to address backlogs of estimated and unbilled accounts. The program also implements a customer experience metrics dashboard and agent routing technology for Billing Services to reduce resolution time and increase customer satisfaction.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Discussion throughout this program brief will be separated by different projects under this program, e.g., Bill Print and Delivery Outsourcing, Remove Redundant Bill Printing and Enveloping Equipment, etc.

BILL PRINT & DELIVERY OUTSOURCING

For hard copy bills, PREPA currently generates and prints customer bills using an in-house Bill Print & Delivery (BP&D) function, located at its main office building (NEOS). Most bills are issued automatically using the Oracle CC&M platform (v2.7) along with other key IT systems (e.g., Control M, Doc1, Streamweaver, etc.). As part of this in-house function, PREPA manages the process for handling any returned mail (e.g., marked as undeliverable by the US Postal Service). The Bill Print & Delivery function is costly (~$8.5M/yr.) and exposes PREPA to unnecessary risks as it relies on outdated bill printing/enveloping machinery (InfoPrint 4000) and uses unsupported IT software (Doc1). PREPA has no current BP&D emergency backup plan in place (e.g., in the event of a major disaster at NEOS). There is an opportunity to outsource the BP&D function, thereby reducing cost and risk.

REMOVE REDUNDANT BILL PRINTING & ENVELOPING EQUIPMENT

The BP&D function relies on key assets including bill print & enveloping machinery as well as key technology and software platforms. The machinery includes two bill printing machines (InfoPrint 4000 machines) and three enveloping machines (FPS14, RD3W, RD3N). This machinery is old and near the end of its productive life. The base software platform to store customer billing and usage data is Oracle's CC&B platform (V2.7; recently upgraded in Q2/Q3 2020). The following software is also used to control the BP&D function: Control-M (batch scheduling), Doc1 (bill composition/rendering), Streamweaver (bill file separation), E2Vault (indexes/ prepares files for rendering) and Linux SMTP servers (eBill notifications). The Doc1 platform is currently unsupported by the vendor which creates risks for PREPA's Bill Print & Delivery function.

Billing Accuracy & Back Office

USE RESOURCES FOR BACK OFFICE PROCESSING OF SERVICE ORDER PAPERWORK AND MANUAL DATA ENTRY/UPDATE OF CC&B

Currently, service order field work is distributed manually (using paper) to PREPA's field teams on a decentralized basis. Upon completion of service orders, field teams will return completed paperwork to physical locations to be manually entered into systems of record (e.g., CC&B, CUCOH, etc.). Examples of service order work include:

- Cut-off for non-payment orders (current PREPA past due and eligible for cut-off accounts customers >100k)
- Claims-related field work (12-15k meter investigations / exchanges per year)
- Consumption on active meters without an account (~5K backlog)
- Theft orders (~30K meter investigations conducted per year)

The lack of a digital workforce management solution is a major gap for the effective and efficient completion of quality work and also inhibits the timely and accurate recording of work for PREPA (e.g., due to manually data entry errors). Short-term and long-term solutions may be needed to achieve gains in efficiency, quality and costs savings that drive long-term value for PREPA and its customers. In the short-term, solutions may include process redesign, labor, use of technology (scanners, fax, etc.) and/or other digital solutions to minimize paper processing and manual data entry. In the long-term, solutions may include implementation of a digital workforce management solution which will distribute service orders to field teams on an automated basis.

USE RESOURCES TO WORK DOWN OF ESTIMATED, UNBILLED, & OTHER BILLING EXCEPTION-RELATED ACCOUNTS

"Billing exceptions" are defined as customer bills that are unable to be automatically issued / printed via the Oracle CC&B platform due to a breakdown or error in the process, or a bill objected to by customers known as a "Claim". PREPA manages several types of billing exceptions including (backlog amount listed in parentheses):

- unbilled accounts (~$9k)
- estimated bills (~$143k)
- billing error ($TBD-request for backlog made)
- consumption on active meter without account (~$5k), and
- claims (no backlog; ~$12k claims/year).

In addition, it is believed that there are a significant number of streetlights and joint use assets which are not accurately tracked in the asset management and/or billing systems and therefore, are not being billed appropriately.

CUSTOMER EXPERIENCE METRICS DASHBOARDS

As part of the review of documents shared by PREPA, and through key stakeholder interviews conducted in the functional areas of billing, payments, credit & collections and theft, the team has not identified a set of holistic performance metrics and management meetings designed to drive performance at PREPA. PREPA's limited metrics are scattered across many documents. In addition, there are limited performance management meetings, but it is unclear how effective they are in driving performance. No corrective action plans were identified to drive performance (although on a case-by-case basis one-off initiatives were identified).

AGENT WORK ROUTING TECHNOLOGY FOR BACK OFFICE (WORK QUEUE ASSIGNMENT)

Billing exception work (unbilled accounts, estimated bills, etc.) is managed on a partially manual basis by extracting information from CC&B and into reports (e.g., some reports are in Excel or within the True North Dashboard). Improved routing of work to back office agents will improve workforce management and productivity yielding operational improvements for the back office.

GENERAL TECHNOLOGY BILLING

There are other technology gaps within the current billing solution that will be addressed as part of this program (e.g., loose error controls within Oracle CC&B). Within the scope of this program, the team will further evaluate market available CC&B solutions and their fit against LUMA's business requirements, technology requirements, cost and vendor services to implement recommended solutions and required integrations. This program will also decommission the on premise Aclara Meter Data Management (MDM) solution.

Other technology gaps exist relating to billing for key areas including joint use and high load moves. Investments are needed to achieve Payment Card Industry (PCI) compliance related to payments as well as work areas related to theft management and credit & collections. Finally, scanning technology will help support the manual service order dispatch and return process.

This program supports the necessary investments needed to close these gaps.

2.2 Description of Remediated State

In the remediated state, the following will have been implemented in accordance with billing requirements as outlined under Act 17, Act 57, and Annex I of the OMA:

- BP&D function outsourced to and being performed by a third party vendor resulting in a significant reduction of billing exception backlogs (e.g., unbilled accounts, estimated bills, etc.)
- Centralization of back office operations for improved billing exception management and the optimization of the dispatch, return and data entry of field services orders into systems of record
- Improve reporting to identify gaps and make improvements for the bill print & delivery function, billing exception management, payment processing and theft identification/deterrence.

2.3 Description of Program Completed State

BILL PRINT & DELIVERY OUTSOURCING

When the BP&D function is outsourced, the outsourced third party vendor will provide a comprehensive solution to print, batch, render, sort (hard copy printed bills and electronic bills), store images, enable bill image access, etc. The vendor will also be expected to provide address standardization and returned mail services. Finally, the vendor will have a disaster mitigation and disaster recovery plan to manage disaster-related risk.

REMOVE REDUNDANT BILL PRINTING & ENVELOPING EQUIPMENT

After the BP&D function is outsourced, the existing in-house bill printing and enveloping machines will need to be removed and the current space (NEOS, 1st floor) will need to be remodeled for reuse.

Billing Accuracy & Back Office

USE RESOURCES FOR BACK OFFICE PROCESSING OF SERVICE ORDER PAPERWORK AND MANUAL DATA ENTRY/UPDATE OF CC&B

Currently, service order field work is distributed manually (using paper) to PREPA's field teams on a decentralized basis. In the completed state, the back-office service order work will be centrally dispatched (and completed service order notes/details will be returned to the centralized back office).

Resources will be used to generate service order lists across many service order types and to prepare them for LUMA field teams for completion. Upon completion of the work by LUMA field teams, a process will be used by the back office to support field returns of completed service orders (with notes) to be manually entered by the resources in an appropriate system of records (e.g., CC&B). This short-term process will be used until the long-term digital solution can be implemented to reduce manual labor-intensive processes and paperwork.

USE RESOURCES TO COMPLETE BACKLOG OF ESTIMATED, UNBILLED, & OTHER BILLING EXCEPTION-RELATED ACCOUNTS

Significant billing-related backlogs exist at PREPA (e.g., estimated bills, unbilled residential/commercial accounts, unbilled streetlight accounts, etc.). For example, the estimated bill backlog is ~143k or ~10% of 1.47m PREPA customers. Typical estimated bills as a percentage of total customers at well functioning utilities range from 1-2% (a gap of 8-9% exists to be closed).

To close the gap and bring the backlog in line with well-functioning utilities, additional resources will be used to understand root cause drivers, revise/develop key processes, and work-down the backlogs.

CUSTOMER EXPERIENCE METRICS DASHBOARDS

In the completed state, the dashboard will deliver a complete set of metrics prioritized and linked to business objectives and ultimately drive effective performance management for these functional areas. Enhancing the dashboard with metrics for these areas would provide transparency into performance (e.g., YTD actuals vs. monthly / annual targets) and drive focus on identified gaps for development of performance improvement plans (e.g., based on prioritized initiatives with defined scope, timing, cost and responsible parties).

AGENT WORK ROUTING TECHNOLOGY FOR BACK OFFICE (WORK QUEUE ASSIGNMENT)

Currently, billing exceptions (estimates and unbilled accounts) are managed by extracting information from CC&B into reports. While the current reports provide insights into monthly totals and trends, they do not provide visibility into intra-day/month volumes for more effective management of backlogs.

A workforce management solution for back-office work will enable improved work management and increased workforce productivity by automating work distribution and/or productivity tracking.

GENERAL TECHNOLOGY BILLING

The completed state will include acquisition of technologies and/or the implementation of needed upgrades to the current billing solution to address gaps in customer billing and compliance. For example, solutions may include upgrades to the current CC&B system, improvements to ensure PCI compliance and implementation of scanning technology to support the manual service order dispatch and return process.

Billing Accuracy & Back Office

2.4 Program Activities

- Establishment of reliable bill printing, presentment and delivery (SRP)
- Reduction of billing exception backlogs (e.g., unbilled accounts, estimated bills, etc.) to normal industry levels
- Establishment of improved dunning processes to drive increased collections and support achievement of Days Sales Outstanding (DSO) performance metric targets
- Centralization of back office operations to support standardized processes, improved quality and increased workforce productivity
- Establishment and development of billing and revenue protection (collections) policies, procedures, processes and standards
- Implementation of key technologies to support improved billing, payments, credit & collections and theft management

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☐ Increase Service Reliability	
	☒ Deliver Electricity at Reasonable Prices	Direct
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☒ Improve Resilience of Vulnerable Infrastructure	Indirect
☒ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☒ Enable the Digital Transformation	Direct
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

Billing Accuracy & Back Office

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Deliver Electricity at Reasonable Prices

By improving efficiencies and removing billing backlogs, the program will be able to ensure more reasonable prices for customers. In addition, by more efficiently handling billing and associated back office functions, along with increased use of digital platforms to engage with customers, the program will help to ensure better customer relations and deliver a more positive customer experience.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

This program will directly improve the systematic management of the business by actively reducing the number of manual processes, along with helping to support implementation of a fully integrated workforce management system. This will also improve employee efficiency.

This program will directly improve the systematic management of the business by ultimately eliminating the significant backlog of estimated, unbilled and other exception related accounts. This effort will enable management to be more effective in deploying employees and resources to keep accounts current and up to date going forward. Working down the backlog will improve back office efficiency, improve collections metrics and reduce accounts receivable.

This program will improve automated distribution and management of back office work to back office agents, thereby improving employee productivity and work quality.

This program also includes implementing tools which will empower management to actively measure and manage Key Performance Indicators (KPIs). Improved oversight and visibility of KPIs will improve the management, operations, and performance of the business.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Improve Resilience of Vulnerable Infrastructure

Outsourcing the BP&D function to a third party vendor with a reliable emergency response plan and business continuity plan improves resilience of the billing system. Removing redundant bill printing and enveloping equipment will reduce risk and improve overall resiliency as these machines are vulnerable to flooding in their current location.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Enable the Digital Transformation

This program will enable the digital transformation by actively reducing manual processes currently in place and help support the implementation of a workforce management system. As such, the program will reduce manual efforts and their associated risks, enabling effective management and increased use of digital technology.

This program will enable digital transformation by actively improving the automated distribution and management of back office work.

The KPI dashboard supported by this program bolsters the enterprise-wide effort to adopt best in class utility practices, including the effective implementation and use of digital technology.

2.6 Program Risks

Risk associated with delaying the program/projects may include the following.

BILL PRINT & DELIVERY OUTSOURCING

- LUMA fully redesigned and branded bills may not be available at commencement
- LUMA bills may not be produced accurately or at all and/or delivered on a timely basis (e.g., due to relying on current outdated equipment/software)
- LUMA bills may not be immediately available via the LUMA website – Mi Cuenta (e.g., due to relying on current outdated equipment/software)

REMOVE REDUNDANT BILL PRINTING & ENVELOPING EQUIPMENT

- BP&D equipment being rendered useless in the event of a natural disaster and/or flooding
- BP&D equipment could break down due to age of equipment, thereby delaying issuance of bills

USE RESOURCES FOR BACK OFFICE PROCESSING OF SERVICE ORDER PAPERWORK AND MANUAL DATA ENTRY/UPDATE OF CC&B

- Lack of an effective, efficient and quality system for distributing service order field work and returning completed service order work (and manually entering into systems of record) will negatively impact the business
- The lack of an effective system will affect operations by driving inefficient disposition of work (e.g., inhibiting field resource optimization resulting in cost increases) and lowering customer satisfaction (e.g., delays in service order completion will delay new service connections or result in erroneous disconnection of service – both of which result in negative customer experiences
- Current systems, or lack thereof, inhibit the timely and accurate recording of work (e.g., due to delays in entering data or errors associated with uncontrolled manual data entry).

USE RESOURCES TO WORK DOWN OF ESTIMATED, UNBILLED, & OTHER BILLING EXCEPTION-RELATED ACCOUNTS

- Continued building of backlogs of unbilled accounts, estimated bills and other backlogs will lead to increased cost of servicing customers and decreased customer satisfaction.
- Risk of not working down estimated bill backlogs (~143k or ~10% of 1.47m customers) will lead to increased customer confusion due to billing inaccuracy and customer dissatisfaction.
- Risk of not working down unbilled accounts backlogs will lead to delayed revenue recognition and collections.
- Risk of ongoing challenges being unable to send bills to streetlight customers, resulting in unaccounted for energy usage and lost revenue.

CUSTOMER EXPERIENCE METRICS DASHBOARDS

- Risk of having an ongoing lack of transparency into performance (e.g., YTD actuals vs. monthly / annual targets) and inability to drive performance improvement

Billing Accuracy & Back Office

AGENT WORK ROUTING TECHNOLOGY FOR BACK OFFICE (WORK QUEUE ASSIGNMENT)

- Risk of not having visibility on intra-day/ month billing exception volumes for more effective management of backlogs
- Risk of not being able to track and manage productivity for sustained operational excellence

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$14.6**	**$12.9**	**$11.2**	**$92.5**
SRP Expenditures	$5.0	—	—	—

3.2 Program Resource Requirements

To implement and stand up the new BP&D vendor, both vendor and LUMA testing resources are required to ensure timely and accurate bill production.

Collaboration with IT/OT: Collaboration with LUMA IT/OT resources will be required to stand up the new BP&D vendor (e.g., both bill testing and ensuring electronic bill availability on LUMA Mi Cuenta website).

3.3 Estimating Methods & Assumptions

The in-service date for the new BP&D vendor is assumed to be the date of Commencement (which could be impacted by potential delays in contracting and implementation (stand up). Costs for the Billing Accuracy and Back Office program (and projects) were estimated based on historical program information, contract & internal resources, expected estimates received from third-party vendors and estimations of the number of employees and hours required.

3.4 SRP Program Timeline & Milestones

Standardized Metering & Meter Shop Setup

1.0 Program Description

This program to re-establish meter shop and test equipment is targeted at establishing a location for standardized meter testing and the provision of appropriate internal and external meter testing equipment. Enhanced procedures are also included, along with operational support for the new facility and equipment.

2.0 Program Rationale

2.1 Current State & Identified Gaps

The meter shop is currently housed in a temporary location in the hallways of a building in Carolina. These accommodations are entirely inadequate for operations, along with the receiving, cleaning, testing, sealing and storage of meter accuracy equipment.

The management of meters does not currently meet the requirements of Act 57-2014 as amended or the OMA, including requirements for accurate metering and periodic testing. For these reasons, this is a SRP item. The requirements for new and existing meter accuracy testing cannot be achieved with the processes and test equipment currently available. In addition, the requirement to test wholesale account meters every two years is not being followed in the current state.

2.2 Description of Remediated State

In accordance with requirements outlined in Act 57-2014, as amended, and under the OMA, the remediated state will be achieved when a new meter shop is implemented, and minimal test equipment is purchased and functioning to allow for acceptable testing of meters that provides results that its metering products and services provide the customer with accurate metering and reflect a commitment to good professional practice consistent with all applicable contract requirements, laws, or regulations.

2.3 Description of Program Completed State

The completed state includes the achievements of the remediated state along with the following:

- Fully capable meter shop and full amount of test equipment capable of supporting business needs on the metering front
- Development of a process for meter sample selection and meter testing verification
- Quality assurance / control (QA/QC) of the meter handling process
- Documented processes enhanced related to inventory, work orders, and head end system updates
- Onsite test processes developed and documented for instrument meter installations

2.4 Program Activities

The following activities, primarily related to activities required by Act 57-2014, as amended, need to be undertaken:

Standardized Metering & Meter Shop Setup

- Acquisition of a building or finding an existing PREPA building location which can effectively handle meter shipments, warehouse space for meters, test boards and associated office space
- Requisitions for test equipment
- Installation of appropriate test equipment at the new facility
- Transferring of all operations from the Carolina location to the new facility
- Implementation of new and enhanced processes as soon after the Service Commencement Date as possible. This would include QA/QC programs and procedures.
- Implementation of MV90 cell connectivity

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Indirect
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

This program will enable implementation of Advanced Metering Infrastructure (AMI). AMI will improve reliability by providing immediate alerts when outages occur.

Objective: Deliver Electricity at Reasonable Prices

Standardized Metering & Meter Shop Setup

Accurate metering will ensure customers pay their fair share thereby lowering costs to other customers.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

A functioning meter shop building with the proper equipment will improve Operations and Maintenance (O&M) efficiency by allowing more throughput of meters with the same number of people.

Objective: Enable Employees to Execute Operations Systematically

Factory Acceptance Test (FAT) meters will be checked for correct configuration for full-scale deployment, thus allowing employees to execute routine meter tests more efficiently and accurately.

2.6 Program Risks

If this program is not implemented, the ability to perform routine meter tests and the required commercial account periodic testing will still lag behind requirements. In addition, AMI deployment would be heavily affected without the ability to handle the large number of meters involved. Also, Contract Standards would likely not be met.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025 Estimate
Total Expenditures	**$6.3**	**$1.1**	**$1.0**	**$1.7**
SRP Expenditures	$5.9	$0.8	$0.8	$0.4

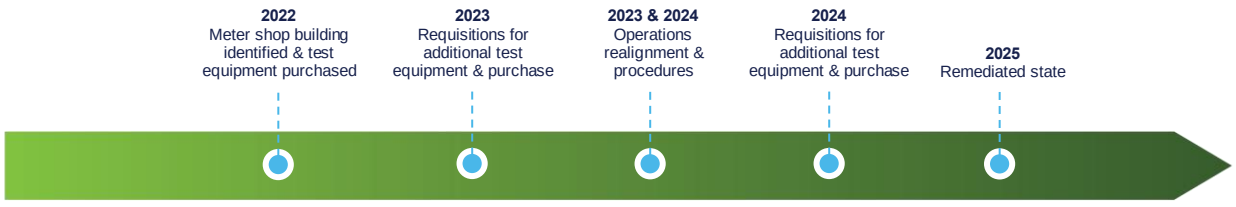
3.2 Program Resource Requirements

If a new building is built, it should be custom designed for the new meter shop requirements. If an existing building is acquired, modifications will be necessary for the specialized services to be provided.

3.3 Estimating Methods & Assumptions

Estimates were performed using vendor estimates for test equipment. A suitable existing PREPA facility has not been determined.

3.4 SRP Program Timeline & Milestones



Modernize Customer Service Technology

1.0 Program Description

The Modernize Customer Service Technology program is primarily focused on remediating the telephony technology through the development and implementation of a new cloud-based contact center platform. Contact center software allows for the management of a high volume of inbound and outbound customer communications across a range of channels. Modernizing contact center and associated procedures will mitigate LUMA's risk of customers being unable to report emergency situations. The program will create real time dashboards and reporting to cover key performance indicators across all of Customer Experience, including the contact center, district offices and billing services.

2.0 Program Rationale

2.1 Current State & Identified Gaps

A new contact center platform is needed to replace the existing Avaya 6.2:

- The existing platform is beyond end of life and no longer supported by vendors, meaning that as the technology degrades, it can no longer be fixed. If the contact center platform is not replaced, LUMA will be unable to take emergency calls from customers which will impact public safety.
- In emergency response situations it is faster and easier for customers to report situations via digital channels (smart phone app, social media, text, etc.). The current platform does not support digital channels.
- The current platform does not support a quality assurance program including call and screen recording; this does not provide visibility to see if contact center agents are following proper emergency and safety processes.
- The current platform does not support management for customer interactions through other digital channels like email, chat, or social media.
- Current outsourced vendors use two separate contact center platforms. As a result, there is no consistent reporting to support key emergency and outage response performance metrics or consistent delivery of customer service. In the completed state, all contact center interactions (phone calls, email, chat, etc.) will be tracked and managed through the new cloud-based platform.

2.2 Description of Remediated State

In the remediated state, agents will be able to reliably take calls using a cloud-based contact center platform in support of emergency operation. This means reporting will be consistent for contact center performance and agents will be able to take calls from any location (e.g., home) to support emergency situations. This new platform will enable LUMA to meet obligations, in accordance with Act 17 and the OMA, including:

- Adopting new technologies to improve and minimize wait times for customer service, as outlined in Act 17-2019;
- Managing all aspects of customer relationships in compliance with Applicable Law as outlined in the OMA;

- Monitoring industry advances and changes in technology related to customer care and related services as outlined in the OMA; and
- Establishing and maintaining customer contact by means of call centers as outlined in the OMA.

2.3 Description of Program Completed State

In the program completed state, a new customer service platform will support:

- The ability for contact center agents to work remotely during storm or emergency situations
- A quality assurance (QA) program to review agent interactions (through call and screen recording) 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)
- Consistent reporting to support our OMA commitments for average speed of answer and abandon rate

2.4 Program Activities

- Execute contract to procure new cloud-based contact center platform
- Deploy and use new cloud-based platform to meet basic requirements for all call routing, IVR, and reporting
- Installing and configuring the new platform with the appropriate users, skills, queues, and routing logic
- Developing the IVR to provide customers with self-service options (e.g. account balance, report an outage)
- Configuring new QA evaluation criteria / scorecards in the platform
- Developing new reports to support all CX departments
- Training contact center agents on the use of the new platform

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☐ **System Rebuild &**	☐ Effectively Deploy Federal Funding	

Modernize Customer Service Technology

Primary Goals	Objectives	Direct or Indirect Impact
Resiliency	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Enabling agents to work remotely during a storm situation or pandemic increases their personal safety.

Objective: Implement Effective Public Safety Practices

The new contact center platform will impact public safety by:

- Providing a reliable supported platform to enable consistent customer communication (i.e., no phone system outages)
- Providing faster response time for customer calls (e.g., to report a dangerous situation)
- Providing flexible staffing/location options (e.g., work-from-home or re-location to other offices) to provide continuous support through storms or other emergencies

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

- The platform will have a direct impact on the customer experience through:
  - Delivering new self-service options
  - Supporting new customer support channels (e.g., email, chat, social media)
  - Supporting efforts to decrease customer wait time before speaking with an agent (i.e., Average Speed of Answer)
  - Enabling QA efforts to improve First Contact Resolution

Objective: Increase Service Reliability

Faster response to outage calls results in faster restoration times.

2.6 Program Risks

Not pursuing this program will prolong current working conditions, including the end of life contact center platform. This entails an operational risk as LUMA will face difficulties in responding to customer needs. Additionally, continued use of the current contact center platform will hamper LUMA's ability to respond to emergency calls, thus impacting public safety.

Modernize Customer Service Technology

Risks associated with implementing the new cloud-based platform include an:

- Inability to secure funding / establish contracts in a timely manner
- Inability to implement and test new platform in a timely manner

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$2.0**	**$1.8**	**$2.5**	**$14.4**
SRP Expenditures	1.9	—	—	—

3.2 Program Resource Requirements

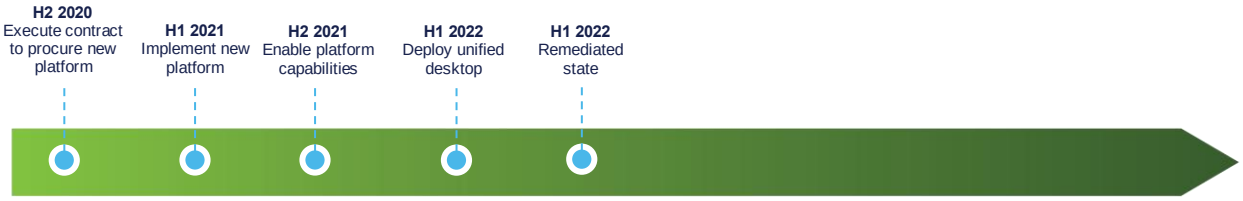
This effort is largely dependent on support from IT for:

- Contracts and vendor management
- Telecom infrastructure
- Laptop/desktop connectivity
- User provisioning
- Cybersecurity reviews
- Integration with other platforms (primarily Oracle CC&B)

3.3 Estimating Methods & Assumptions

Costs for the new cloud-based contact center platform implementation were provided by the vendor as part of a thorough RFP and evaluation process conducted by a team of PREPA and LUMA business and IT representatives.

3.4 SRP Program Timeline & Milestones



Streetlight Billing

1.0 Program Description

This program is an audit of streetlights and associated billing. PREPA has approximately 500,000 streetlights which should be audited on a regular cycle to be determined based on asset management procedures. This program will require LUMA to complete a physical audit of the streetlights, assigning each with a unique indicator/asset tag. Once this process is complete, updates will be made in the CC&B system to ensure customers are being billed accurately for their lights. The program also includes communication with customers on corrections to the street lighting system.

2.0 Program Rationale

2.1 Current State & Identified Gaps

In the current state, PREPA has 500,000 streetlights, but none of these have a unique identifier/asset tag. LUMA's gap assessment shows that a billing audit of these streetlights has not been completed. Without an audit system for streetlights, they cannot be incorporated into KPIs and there is no assurance of correct billing.

2.2 Description of Remediated State

In the remediated state, all streetlights will have been physically audited and updated with a unique identifier and asset tag and processes to identify lights out and dispatch repair crews will have been defined and documented.

Completing the audit and reaching a remediated state will enable the Customer Experience team to meet the billing improvements and accuracy requirements as outlined under the OMA including:

- Implementing and optimizing billing; and
- Implementing accounting and reporting practices for billing, tracking, reporting, management and collections, including for services related to lighting.

To ensure accurate and timely billing of all services, LUMA will comply with applicable laws and regulations and the requirements as outlined under Act 83, Act 17, and Act 57 including:

- Conducting business in a responsible and efficient manner with accurate fiscal and operational practices as outlined in Act 83; and
- Adhering to provisions that pertain to developing the form and content of bills, billing of municipalities, and dealing with billing disputes as outlined under Act 17 and Act 57.

Streetlight Billing

2.3 Description of Program Completed State

In the completed state, the new program outlined above will be completed and LUMA will have:

- Improved customer and company ability to report streetlight outages and LUMA response, which improve traffic safety and visibility, pedestrian safety and personal security by allowing pedestrians and motorists to see one another better
- Updated Oracle CC&B streetlight data with correct address locations, wattage details and asset tag information to provide timelier response and dispatch to outages, including customer requests and complaints
- Improved accuracy and billing of public lighting and billing to municipalities, contributing to better communication and relationships with municipalities

2.4 Program Activities

- Asset Management will complete a physical audit and provide a list of all streetlights including location, owner, wattage and light type
- Billing Services and/or Regional Customer Experience functional areas will update Oracle CC&B such that each light has a unique billing account
- Develop processes between Customer Experience, Asset Management and Operations to identify lights outs, including mechanism to allow customers to report lights out
- Create process for dispatching Operations to respond to lights out
- Identify KPIs related to lights out response times
- Physical and billing audit of streetlights: The billing audit and updates will happen after the physical audit is completed in the field. This may occur in different phases depending on how the physical audit is scheduled. For example, work may start in a specific region following the completion of the physical audit.
- Updates to billing. In year one, the focus will be on quick wins to update the system. The Customer Experience team will then update the billing system. The team will be required to communicate with affected customers.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☒ Implement Effective Public Safety Practices	Indirect
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☐ Increase Service Reliability	
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	

Streetlight Billing

Primary Goals	Objectives	Direct or Indirect Impact
	☐ Enable Employees to Execute Operations Systematically	
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Implement Effective Public Safety Practices

This program enables better streetlight management. Streetlights improve traffic safety, pedestrian safety and visibility and personal security by allowing pedestrians and motorists to see one another better.

Customers will be able to identify lights by their unique identifiers and be able to call to report outages.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Deliver Electricity at Reasonable Prices

This program will help increase customer satisfaction as customers can identify streetlights by their unique indicator, streamlining customer interactions.

This program will help build better relationships with municipalities to be less reactive and more proactive in the maintenance of the streetlights.

Increased revenue from streetlighting put downward pressure on the overall revenue requirement thereby reducing electricity customer's rates.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

This program will increase accuracy in streetlight billing, enabling more systematic management of the business.

Streetlights can also be incorporated as a performance metric which will be reviewed yearly.

Estimated increased revenue: $1,500,000

Streetlight Billing

2.6 Program Risks

If the program is not implemented, LUMA will be unable to meet its commitment under the O&M Proposal T&D 4.2.6. The proposal states:

- Over a two-year operational period, LUMA will complete an audit on all public lighting assets. A unique identifier will be attached to each asset to support the detailed inventory. During this inventory, Transmission and Distribution (T&D) Operations and Customer Service groups will work closely to complete a billing audit.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.6**	**$1.3**	**$0.6**	**—**
SRP Expenditures	0.6	1.3	0.6	—

3.2 Program Resource Requirements

- Thirteen full time Customer Experience representatives
- A scan of the data entered into the asset and GIS databases
- A scan of all public lighting and billing data from the CC&B system

3.3 Estimating Methods & Assumptions

The following assumptions apply:

- 100% of the lights will require updates in the CC&B system to add the unique identifier/asset tag
- An estimated 70% of the streetlights will require billing updates, resulting in debit and/or credit to customers/

3.4 SRP Program Timeline & Milestones

6.2 Distribution Portfolio

The majority of the SRP distribution portfolio spending over the next three years will be focused on inspections of the distribution assets and remediating high risk assets identified through those inspections. Tables 6-3 and 6-4 below presents spending estimates for the distribution portfolio by SRP program, followed by a short description of each SRP program.

Table 6-3: Total Distribution Portfolio Spending Estimates by Program ($ Millions, real)

Distribution Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
Distribution Line Rebuild	427.2	1,738.6	2,165.8
Distribution Pole and Conductor Repair	775.2	2,325.8	3,101.0
Distribution Lines Inspection	119.5	59.7	179.2
Grand Total	**$1,321.9**	**$4,124.1**	**$5,446.0**

Table 6-4: Annual Distribution Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Distribution Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
Distribution Line Rebuild	55.5	87.2	52.8	124.6	52.8	124.6
Distribution Pole and Conductor Repair	85.1	85.1	160.1	160.1	200.0	325.7
Distribution Lines Inspection	25.4	25.4	25.4	25.4	25.4	25.4
Grand Total	**$165.9**	**$197.7**	**$238.3**	**$310.0**	**$278.2**	**$475.6**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

Distribution Line Rebuild. This program replaces damaged or ineffective overhead and underground distribution lines, including the following initiatives

- Perform distribution line upgrades to improve reliability and resiliency
- Restore out of service circuits as deemed necessary
- Complete unfinished circuit construction presently abandoned as deemed necessary
- Perform circuit voltage conversions to improve distribution capacity
- Improve voltage profile to customers and reduce distribution energy line losses
- Build new distribution line extensions to connect new customers
- Install underground cable and / or tree wiring to improve service reliability and resiliency to critical customers

Distribution Pole and Conductor Repair. This program focuses on minimizing the safety hazard caused by distribution poles and conductors that need to be repaired or replaced. Major repairs and replacement will be based on the results of an inspection of the distribution system and an analysis by engineers to schedule the repair or replacement based on the criticality of the pole. Following this process, safety hazard and priority poles will be replaced, along with damaged conductor and hardware.

Distribution Lines Inspection. This program is targeted at the inspection, testing and studying of distribution lines, along with required spot repairs and replacements. Distribution line inspections will first be prioritized by worst performing feeder and highest criticality with the initial assessment focusing on the identification of SRP items. Because of the magnitude of the work, the SRP portion of the inspection program is anticipated to take four years to complete with the remainder of inspections to be completed after the SRP period. Its aim is to help to restore the system and improve reliability and resiliency in line with current codes and standards, including, but not limited to:

- Inspecting and treating poles
- Performing ground rod inspections and minor repairs / replacements
- Inspecting and replacing anchors and guys
- Inspecting conductor condition
- Performing line clearance checks to ensure that distribution assets meet live line clearance requirements under the applicable codes and standards
- Inspection of streetlight heads and poles
- Identification of third party attachments
- Inspection of third party attachments for applicable code violations as it pertains to the electrical system

The identified major repairs and replacements will then be undertaken by a separate program.

Distribution Line Rebuild

1.0 Program Description

This program replaces damaged or ineffective overhead and underground distribution lines. This program includes the following initiatives, a mix of SRP and non-SRP work:

- Perform distribution line upgrades to improve reliability and resiliency
- Restore out of service circuits as deemed necessary
- Complete unfinished circuit construction presently abandoned as deemed necessary
- Perform circuit voltage conversions to improve distribution capacity (non-SRP)
- Build new distribution line extensions to connect new customers (non-SRP)
- Install underground cable and/or tree wiring to improve service reliability and resiliency to critical customers (non-SRP)

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA estimates that approximately 20 percent of the assets comprising overhead and underground distribution lines require safety and hazard mitigation to reach remediation. Field inspections will categorize assets according to their health, based on estimates of condition (likelihood of failure) and criticality (consequence of failure with an asset score from 0 (worst) to 4 (best). Mitigation of risk related to only the high-risk assets categorized as 0 or 1 will be performed as SRP work. LUMA estimates that approximately 20 percent of the assets comprising the transmission line projects will be assessed as high risk (0 or 1 health score) and will require safety and hazard mitigation to reach remediation. These deficient assets will exhibit the following:

- High risk of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

For the reasons mentioned above this program is included in the SRP.

All deficient assets, including those in the SRP will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

Distribution Line Rebuild

LUMA's assessment has identified several areas for improvements, upgrades and replacement of distribution lines and their underlying system. A number of necessary overhead and underground improvements or upgrades to distribution lines have been identified but not yet remediated. As identified in the Sargent & Lundy report (CS-0017 TD 10 Year Capital Reliability Plan, Section 3.2 Underground Distribution Feeder Replacement Program), about 60% of the underground system has been identified as requiring replacement due to poor conditions and system age (note that it is estimated that approximately 20% of the system fall within the SRP scope requiring safety and hazard mitigation in order to reach the remediated state). Switch cubicles and submersible switches in poor condition have also been identified as needing replacement, along with storm-damaged distribution line transformers that are still operating in the system. 86 distribution feeders or portions thereof (comprising a total of 202 miles) are damaged and currently out of service. Another gap identified was eight feeders that have sections of unfinished construction and are also out of service.

A number of new extensions were also identified but have yet to be completed. Similarly, there are systems facing capacity constraints, degraded power quality and excessive conductor losses that will benefit from voltage conversion. Many systems that supply critical loads also require improvements to ensure resiliency and reliability. This will be achieved by undergrounding or installing tree wire.

2.2 Description of Remediated State

High risk findings of the distribution assets, those that have an inspection score of 0 or 1, shall be incorporated into a remediation plan and mitigated. LUMA will take a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

To achieve the remediated state LUMA will have first identified all distribution lines to be repaired and replaced to meet current codes and standards. This work is described and will be performed under the Inspection of Distribution Lines program.

In the remediated state, the distribution line assets identified as high risk with an inspection score of 0 or 1, currently estimated at approximately 20 percent of all transmission poles, structures and conductors, will have been repaired and replaced to meet current codes and standards, and requirements under Applicable Laws and the OMA. This includes, but is not limited to, the portions of the underground system in unrepairable condition, damaged underground switch cubicles and switchgear, and storm damaged distribution transformers. Regarding the underground system remediation, if FEMA funding is available, the damaged portions will be replaced with new underground cables in line with the NESC requirements.

2.3 Description of Program Completed State

In addition to conditions identified in the remediated state, the program completed state includes:

- New extensions identified and executed
- Removal of capacity constraints due to improper operating voltage by upgrading the system voltage class
- Reinforcement of the system by putting in place either underground cables or overhead tree wire to safely and reliably supply critical loads

Distribution Line Rebuild

- All equipment that has been out of service due to damage repaired and restored to service. Non-energized facilities no longer required will also have been salvaged. All abandoned construction for necessary/needed assets is completed.

2.4 Program Activities

- Verify results of studies and inspections justifying the need for improvements, upgrades or replacements on both the overhead and underground segments of the identified feeders
- Prioritize and schedule work based on reliability and condition severity levels
- Complete engineering design/construction plans for each of the projects
- Organize personnel, equipment and materials, acquire all necessary approvals and put projects out to bid as needed
- Schedule internal resources and/or hire contractors to complete the construction work to:
  - Complete overhead and underground feeder improvement/upgrade projects on feeders with already identified needs
- Reconstruct underground systems near the end of their life and those with major concerns that present safety and reliability issues
- Replace approximately 1,800 distribution line transformers that have failed or may fail due to storm damage
- Address majority of asset performance and condition issues within the first five years of the program, with the rest to be completed thereafter.
- Complete new extension projects on feeders with already identified needs; upgrade voltage class on systems with severe capacity constraints
- Improve the supply continuity and reliability of critical customers by defining a mainline or express feed by either undergrounding or tree wiring portions of their supply feeders
- Repair storm damaged feeders that are currently out of service due to extensive damaged
- Complete abandoned construction on feeders with already identified needs but have yet to be completed

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	

Distribution Line Rebuild

Primary Goals	Objectives	Direct or Indirect Impact
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☒ Restore Damaged Grid Infrastructure	Direct
	☐ Improve Resilience of Vulnerable Infrastructure	
☒ **Sustainable Energy Transformation**	☒ Modernizing the Grid	Indirect
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Provides a safe workplace by repairing and/or replacing assets that are in poor or damaged condition and could present a safety risk to those working around them (e.g., arc flash) or to the public (e.g., downed infrastructure).

Objective: Implement Effective Public Safety Practices

Implements effective public safety practices by repairing and/or replacing assets in poor or damaged condition, such as damaged pole-top and pad-mounted transformers, that are located near customer facilities.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

Increases service continuity and reliability to customers by replacing and upgrading facilities that have poor reliability performance and by adding and completing facilities that allow for alternate feeds.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

A large portion of this work is expected to be federally funded.

Objective: Restore Damaged Grid Infrastructure

Restores damaged grid infrastructure by replacing and/or restoring assets damaged by storms (such as distribution line transformers, switch cubicles and submersible switchgear) and other assets in poor condition (e.g., cables and switches).

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Modernizing the Grid

Distribution Line Rebuild

Where practical, replaced assets such as switches will be capable of being incorporated into future distribution automation schemes.

2.6 Program Risks

Risks of delaying or not pursuing this program include:

- Increasing safety hazards for employees and the public as the condition of equipment continues to deteriorate
- Decreasing reliability levels due to increased asset failures, working against achievement of reliability performance targets
- Reliability performance stagnation for critical customers
- Reduced operational flexibility as lines out of service can affect how the system is configured and operated

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$87.2**	**$124.6**	**$124.6**	**$1,829.5**
SRP Expenditure	$55.5	$52.8	$52.8	$266.2

3.2 Program Resource Requirements

Required resources include:

- 256 pad-mounted and submersible switches
- Approximately 1,800 distribution line transformers
- Approximately 2,100 miles of cable for SRP activities plus those required by planning studies for non-SRP
- Overhead conductors and other materials for the overhead work
- Adequate internal and/or external resources to complete the work
- Overhead materials for non-SRP voltage conversions and SRP upgrades
- Tree-wire as determined by planning studies
- Mobilize personnel and source equipment as required by the specific project

3.3 Estimating Methods & Assumptions

DISTRIBUTION OVERHEAD FEEDER REPLACEMENT/UPGRADES:

As per Necessary Maintenance Expenditure (NME) scope & estimates. Project cost: $115M. $18.4M (2022), 2023-2028 - $15.2M/year. 7-year program with high-priority items addressed within the first five years.

Distribution Line Rebuild

DISTRIBUTION NEW EXTENSIONS:

As per NME scope & estimates. Project cost: $7.98M. 10-year program with high-priority items addressed within the first five years.

UNDERGROUND FEEDER REPLACEMENTS/UPGRADES:

As per NME scope & estimates, total project cost: $44M.

10-year program with high-priority items addressed within the first five years.

DISTRIBUTION CABLE REPLACEMENT:

Cost: $750,000 per mile (as per S&L), total program cost $1.026B.

15-year program with high-priority items addressed within the first five years.

VOLTAGE CONVERSION PROGRAM:

Cost: Allocation of $100M for the entire program, which allows converting strategically selected feeders.

10-year program with high-priority items addressed within the first five years.

FEEDER UNDERGROUNDING OR TREE-WIRING:

Cost: $ Allocation of $350M for the entire program, which allows undergrounding or tree-wiring selected feeders that supply critical loads.

10-year program with high-priority items addressed within the first five years.

UNDERGROUND SWITCH REPLACEMENTS:

Cost: 256 switches × $300k / switch. Includes labor. $7.6M / year for 10 years. Project cost 10 × $7.6M = $76M.

10-year program with high-priority items addressed within the first five years.

DISTRIBUTION LINE TRANSFORMER REPLACEMENT COSTS:

$16,800/ transformer × 1,812 transformers = $316M. project cost. $31.6M/yr. over 10 years. 10-year program with high-priority items addressed within the first five years.

LUMA has provided estimates for the different projects assuming ±30% accuracy except FEMA-funded projects and NME projects.

DISTRIBUTION FEEDERS RESTORATION AND CONSTRUCTION COMPLETION:

Estimates based on previous project experience and aligned with numbers provided by PREPA.

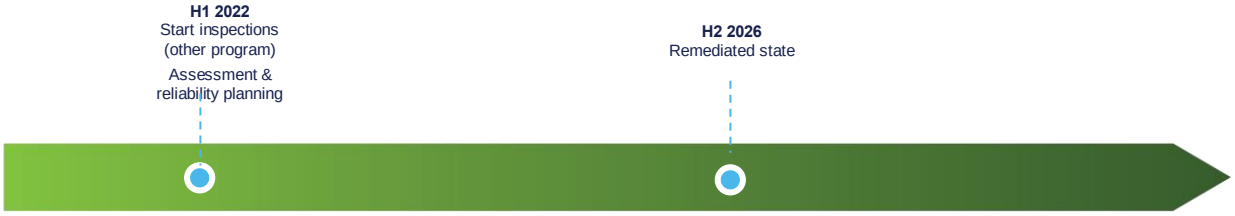
ASSUMPTIONS

Estimating splits based on historical projects

Distribution Line Rebuild

Category	Percentage
Engineering/PM	5%
Material	29%
Construction/Commissioning	50%
Pre-Construction Field Activities	16%

3.4 SRP Program Timeline & Milestones



Distribution Pole & Conductor Repair

1.0 Program Description

This program focuses on minimizing the safety hazard caused by distribution poles and conductors that need to be repaired or replaced. Major repairs and replacement will be based upon the results of an inspection of the distribution system and an analysis by engineers to schedule the repair or replacement based on the criticality of the pole. Following this process, safety hazard and priority poles will be replaced, along with damaged conductor and hardware.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Field inspectors will categorize assets according to their health, based on estimates of their condition (likelihood of failure) and engineers will assess the criticality (consequence of failure) with a score of 0 (worst) to 4 (best). Mitigation of risk related to only the highest risk assets will be categorized and performed as SRP work. LUMA estimates that approximately 20 percent of the assets comprising the distribution lines require safety and hazard mitigation to reach remediation. These deficient assets will exhibit the following:

- High risk of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or

An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects. Initial analysis has uncovered the following issues:

- Distribution structures that are not compliant with applicable laws and policies, specifically under OMA Annex I, Act 17 and Act 57
- Anchors and guys need to be reinforced or replaced. It is known that a large proportion of them need some form of remediation work, but there is no exact data on which ones need improvement
- The frequency of forced outages is much higher than industry norms
- There are insufficient records of what equipment is damaged, the nature of the damage, and its location

A large portion of distribution poles, hardware and conductors require replacement either due to damage from severe weather events or because they have reached the end of useful life becoming more prone to failure. Safety priority poles and associated hardware and conductors are often neglected, contributing to the unsafe operation of the grid by increasing asset failures, failing to address conductor clearance issues, and increasing arc-flash risks.

Distribution Pole & Conductor Repair

2.2 Description of Remediated State

High risk findings of the distribution poles, hardware and conductors, those that have an inspection score of 0 or 1, shall be incorporated into a remediation plan and mitigated. LUMA will take a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

To achieve the remediated state LUMA will have first identified all distribution poles, hardware and conductors to be repaired and replaced to meet current codes and standards. This work is described and will be performed under the Inspection of Distribution Lines program.

In the remediated state, the distribution poles, hardware and conductor assets identified as high risk with an inspection score of 0 or 1, currently estimated at approximately 20 percent of all distribution poles, hardware and conductors, will have been repaired and replaced to meet current codes and standards, and requirements under Applicable Laws and the OMA.

2.3 Description of Program Completed State

After the completion of required repairs and replacements of distribution poles, structures, and conductors (as determined by the inspection activities), LUMA will have established a system resilient to severe weather with higher service reliability and assets that have an extended life span.

2.4 Program Activities

- Perform inspections, as well as compile pole inspection data from various sources to avoid duplication of work already completed
- Ensure adequate pole, hardware and conductor stock for replacements identified through the inspection program
- Replace safety hazard poles and associated hardware
- Replace priority poles and associated hardware
- Replace damaged conductors
- Replace/upgrade guys, anchors and foundations as needed
- Upgrade the structural integrity of the distribution lines by replacing guys and anchors
- Initiate job orders based on the results of the inspections
- Complete engineering designs for the replacements
- Organize employee resource, equipment and materials
- Acquire all necessary permits and approvals
- Schedule work and replace poles to meet the latest safety codes and loading factors as those in alignment with the latest design criteria and Acts 17 and 57

Distribution Pole & Conductor Repair

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

The program increases field personnel and public safety by replacing poor condition poles and associated hardware and conductors that have a high risk of failure and/or are in a hazardous state of disrepair.

The program also contributes to the safe operation of the grid by reducing potential pole, hardware and conductor failures, addressing conductor clearance issues and reducing arc-flash risks.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

The program improves reliability by reducing the number of outages that result from pole and associated hardware and conductor failures.

Distribution Pole & Conductor Repair

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

This work will be completed with a large portion of the federal funds allocated for the remediation of the Puerto Rico electric transmission and distribution system. Funds will be used effectively and their use for this program will deliver significant value for money given the enormous benefits associated with rebuilding the system into a resilient network.

Objective: Restore Damaged Grid Infrastructure

The program replaces distribution poles and associated hardware and conductors that are in poor condition due to damage from severe weather events and aging.

Objective: Improve Resilience of Vulnerable Infrastructure

Poles that need replacing will be replaced with structures that meet the updated design criteria and will be either higher strength wood, concrete, steel, composite or other types of poles that will increase resiliency to harsh weather conditions. While changing poles, guys, anchors and grounds, other equipment on the poles will also be upgraded at the same time.

2.6 Program Risks

Risks related to delaying or not performing this work include:

- Failure to provide a safe work environment for field personnel
- Failure to reduce public safety risks
- Potential adverse consequences for failure to meet the applicable standard or legal requirements or policies
- Pole, conductor or guy and anchor failures could impact adjacent structures creating wider-spread failures
- Continued service unreliability

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$85.1**	**$160.1**	**$325.7**	**$2,530.1**
SRP Expenditures	$85.1	$160.1	$200.0	$330.0

3.2 Program Resource Requirements

- Approximately 38,000 priority (score 0 and 1) poles and associated hardware
- Approximately 1,300 linear miles of conductor (score 0 and 1)
- Personnel — 42 × 6 – 7 person crews. More crews will be needed in subsequent years as amount of work grows.

Distribution Pole & Conductor Repair

3.3 Estimating Methods & Assumptions

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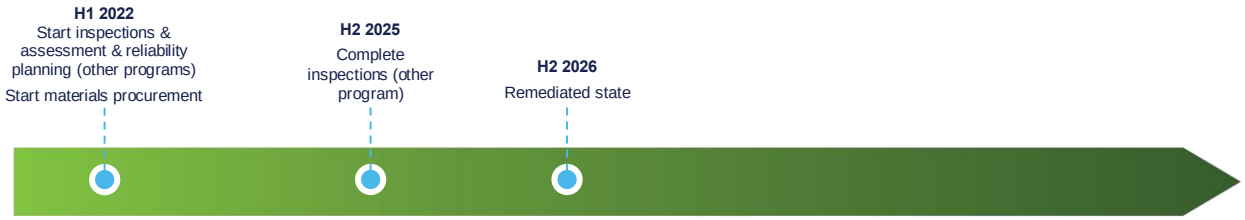
- Estimates are based on average costs for pole, hardware and conductor replacements from parent company experience.
- Use of internal resources is anticipated but will likely need to be supplemented with contract resources, which may increase average costs.
- Availability of pole, hardware and conductors, as well as manufacturing capacity, could also affect material costs.
- Assumptions: Estimating cost splits based on historical projects.

Category	Percentage
Engineering/PM	5%
Material	29%
Construction/Commissioning	50%
Pre-Construction Field Activities	16%

3.4 SRP Program Timeline & Milestones



Distribution Lines Inspection

1.0 Program Description

This program (Distribution Lines Inspection) is targeted at the inspection, testing and studying of distribution lines, along with required spot repairs and replacements. Distribution line inspections will first be prioritized by worst performing feeder and highest criticality with the initial assessment focusing on the identification of SRP items. Because of the magnitude of the work, the SRP portion of the inspection program is anticipated to take four years to complete with the remainder of inspections to be completed after the SRP period.

Its aim is to help to restore the system and improve reliability and resiliency in line with current codes and standards, including, but not limited to:

- Inspecting and treating poles
- Performing ground rod inspections and minor repairs / replacements
- Inspecting and replacing anchors and guys
- Inspecting conductor condition
- Performing line clearance checks to ensure that distribution assets meet live line clearance requirements under the applicable codes and standards
- Inspection of streetlight heads and poles
- Identification of third party attachments
- Inspection of third party attachments for applicable code violations as it pertains to the electrical system

The identified major repairs and replacements will then be undertaken by a separate program.

2.0 Program Rationale

2.1 Current State & Identified Gaps

PREPA does not have a comprehensive health assessment of the distribution system. In recent years, PREPA has not conducted programed pole line inspections (including streetlights). As a consequence, the condition of the distribution field assets is basically unknown and not documented. It is apparent to experienced LUMA utility engineers from visual observations, site visits and an asset health sampling that there exist widespread deficiencies in the distribution system. Field inspections will categorize assets according to their health, based on estimates of condition (likelihood of failure) and engineers will assess criticality (consequence of failure) and assign an asset score from 0 (Worst) to 4 (best). Mitigation of risk related to only the highest risk assets will be categorized and performed as SRP work. These will be assets that exhibit the following:

- High risk of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,

- Failure to meet applicable legal requirements or policies, including Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
- An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

LUMA estimates that approximately 20 percent of the assets comprising overhead and underground distribution lines (including streetlights) require safety and hazard mitigation to reach remediation.

PREPA does not have accurate records of third-party attachments to their poles and has not performed loading analysis for those poles, especially those with multiple third party attachments.

For the reasons mentioned above included in the SRP.

All deficient assets, including those in the SRP will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

Initial analysis has uncovered the following issues:

- Distribution structures that are not compliant with laws and regulations, specifically Act 17
- Anchors and guys needing to be reinforced or replaced. It is known that a large proportion of them need some form of remediation work, but there is no exact data on which ones need improvement
- The frequency of forced outages is much higher than industry norms
- Line designed capacity is currently lacking and needs restoration
- There are insufficient records of what equipment is damaged, the nature of the damage, and its location.
- Very few planning studies and feeder analyses are currently done, and the capabilities/weaknesses of most circuits are unknown.

2.2 Description of Remediated State

In the remediated state, an organized field inspection program of main lines to assess the condition of the asset (likelihood of failure) and then assess the criticality (consequence of failure) will have been completed. Mitigation of risk related to only the highest risk assets (i.e., those scoring a 0 or 1 on the previously mentioned scale of 0 to 4), currently estimated at 20 percent, will have been repaired and replaced to meet current codes and standards, and requirements under Applicable Laws and the OMA.

The asset score will be documented, and high-risk findings shall be incorporated into a remediation plan that will take into account a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

In the remediated state, the main lines of the distribution system will have been fully inspected. The hazard, safety and reliability issues that have been identified through this inspection will have been logged and prioritized. Problems with ground rods, anchors and down guys have been resolved.

In addition, in the remediated state, the third party attachments have been identified and contact has been established with the third-party attachment owners to assure resolution of problems and begin

discussions on the correct attachment fees. Loading analysis have been performed on those poles with multiple third party attachments or those that appear to be overloading the pole and discussion with the third party owners have been initiated to resolve any problems.

2.3 Description of Program Completed State

In addition to what has been noted for the remediated state, the program completed state includes:

- Continued time-based inspection of the distribution system including non-main lines
- Identification of system components to be replaced, such as poles, with Engineering being informed of the prioritized findings
- Completion of remaining non-urgent inspections of the overhead and underground systems
- Completion of planning studies and reliability assessments of all feeders
- Third party attachments have been identified, any pole loading issues caused by these attachments have been resolved and third party attachments are not made without following proper established procedures

2.4 Program Activities

- Create detailed plan and complete inspection of the distribution system within the first five years
- Identify and plan high risk failure items or high-potential safety issues on both overhead and underground feeders in restricted access areas or within public access to be remediated within the first three years
- Identify and plan high risk failure items or high potential safety issues involving grounding, anchors, guying, clearance, etc. on all feeders in vulnerable areas or within public access to be remediated
- Spot repair of imminent deficiencies such as ground line treatment, anchor and ground rod replacement
- Completion of planning studies and near-term reliability assessments for the 75 – 100 worst performing circuits (performance measured on an annual basis) within the first three years
- Identification of midline reclosers and other reliability enhancing devices to be installed within the first five years
- Complete planning and reliability assessments for all 1,010 feeders. Beyond this point, complete planning studies and additions to improve equipment reliability as needed due to load changes and feeder reconfiguration

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	

Distribution Lines Inspection

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☒ Pursue Project Delivery Excellence	Indirect
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Indirect
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Indirect
☐ **Sustainable Energy Transformation**	☒ Modernizing the Grid	Indirect
	☒ Enable the Digital Transformation	Direct
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

The program will promote field personnel and public safety by identifying for mitigation potential safety hazards due to poor equipment conditions on both the overhead and underground systems.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

This program will improve service reliability by identifying damaged equipment requiring mitigation and identifying key locations that would benefit from segmentation/protective and other reliability improvement devices on both the overhead and underground feeders.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence

The collection of data as part of this program will provide the basic information required to execute system planning and asset management systematically. The data will support the identification of projects and lead to data driven investment decisions.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

A portion of this program is expected to be federally funded.

Distribution Lines Inspection

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

The program will facilitate system rebuild and improved resiliency by identifying damaged poles, hardware and conductors for follow-up replacement.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Modernizing the Grid
Objective: Enable the Digital Transformation

The data collected will provide valuable information for decision making with respect to grid modernization. The data will also be used to comply with requirements under the integrated distribution planning principles docket.

2.6 Program Risks

Delaying or not performing this program compromises the ability to adequately perform subsequent repair and replacement work, which include risks such as:

- Lack of compliance with regulations/law — Act 17: Failure to maintain the electric power infrastructure to ensure reliability, resilience and safety for utility workers and the public
- Inability to reach reliability targets under Performance Metrics; failure to meet the required reliability targets set forth in the LUMA's contract
- Potential additional liability exposure to the company

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$25.4**	**$25.4**	**$25.4**	**$103.1**
SRP Expenditures	$25.4	$25.4	$25.4	$43.4

3.2 Program Resource Requirements

- Adequate resources to complete the field work, likely a combination of internal and contractor resources
- Three junior engineers to complete the planning and reliability studies

3.3 Estimating Methods & Assumptions

- Estimates based on average cost for pole and line inspections derived from previous experience
- LUMA anticipates using internal resources but will likely need to be supplemented with contract resources, which may increase average costs
- Assessment and planning studies cost: $0.2M per year for two full-time junior planning engineers

Distribution Lines Inspection

3.4 SRP Program Timeline & Milestones

6.3 Transmission Portfolio

The majority of the SRP transmission portfolio spending over the next three years will be focused on inspections of the transmission assets and remediating high risk assets identified through those inspections. Tables 6-5 and 6-6 below presents transmission portfolio spending estimates by SPR program, followed by a short description of each SRP program.

Table 6-5: Total Transmission Portfolio Spending Estimates by Program ($ millions, real)

Transmission Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
IT OT Telecom Systems & Network	675.4	-	675.4
Transmission Line Rebuild	81.0	1,953.4	2,034.4
Transmission Priority Pole Replacements	182.3	546.9	729.2
Inspection of Transmission Lines	33.3	16.1	49.4
Grand Total	**$972.0**	**$2,516.3**	**$3,488.4**

Table 6-6: Annual Transmission Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Transmission Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
IT OT Telecom Systems & Network	134.7	134.7	204.8	204.8	155.2	155.2
Transmission Line Rebuild	5.0	52.0	19.0	185.0	19.0	185.0
Transmission Priority Pole Replacements	40.0	46.1	40.0	66.1	40.0	79.8
Inspection of Transmission Lines	5.9	7.2	5.7	7.0	5.7	7.0
Grand Total	**$185.6**	**$240.0**	**$269.6**	**$463.0**	**$220.0**	**$427.1**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

IT OT Telecom Systems & Networks. This program includes IT and OT telecom investments to improve and revamp PREPA's mobile radio system, phone exchange and telephone systems and fiber optic and microwave data radio systems. These systems are used to carry all PREPA IT and OT data. Capability enhancements will include improved first responder and emergency response communication, greater resilience of the internal telecommunications network, an enhanced microfiber network and network control center to improve centralized monitoring and control over facilities and IT traffic.

Transmission Line Rebuild. This program includes numerous 230kV, 115kV, and 38kV projects to harden and upgrade the transmission system. This includes rebuilding towers along with reinforcing and

replacing anchors and guys as required over the course of the upgrade process. This program also incorporates an investigation to mitigate corrosion and restore line design capacity. In addition to the overhead transmission line upgrade work, this program includes the 115kV underground cable replacement in the San Juan area.

Transmission Priority Pole Replacements. This program is to replace damaged overhead transmission poles and towers, along with associated hardware and conductors. Repairs under this program will be made based on results of an inspection conducted under a separate program. Major repairs and replacement will be based upon the results of an inspection of the transmission system and an analysis by engineers to schedule the repair or replacement based on the criticality of the pole or structure. Following this process, safety / hazard and priority poles and structures will be replaced, along with damaged conductor and hardware.

Inspection of Transmission Line. This program includes the inspection, data collection, testing of the Transmission Lines. Required repairs and replacements will be identified in order to restore the system and improve reliability and resiliency in line with current codes and standards. Inspections will include, but are not limited to, poles, towers and structures, ground rods, anchors and guys, conductor condition and line clearance checks. During this process, the program will also incorporate minor repairs, but major repairs will be undertaken by a separate program.

IT OT Telecom Systems & Networks

1.0 Program Description

This program includes IT and OT telecom investments to improve and revamp PREPA's mobile radio system, phone exchange and telephone systems and fiber optic and microwave data radio systems. These systems are used to carry all PREPA IT and OT data. Capability enhancements will include improved first responder and emergency response communication, greater resilience of the internal telecommunications network, an enhanced microfiber network and network control center to improve centralized monitoring and control over facilities and IT traffic.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

[redacted]

[redacted]

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

2.4 Program Activities

CONFIDENTIAL

[redacted]

2.5 Program Benefits

CONFIDENTIAL

[redacted]

IT OT Telecom Systems & Networks

CONFIDENTIAL

[redacted]

IT OT Telecom Systems & Networks

CONFIDENTIAL

[redacted]

2.6 Program Risks

CONFIDENTIAL

[redacted]

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$134.7**	**$204.8**	**$155.2**	**$180.7**
SRP Expenditure	$134.7	$204.8	$155.2	$180.7

3.2 Program Resource Requirements

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Contractors will be required for all of the programs. It is not expected that LUMA will have enough internal resources with skill and equipment to complete this work in a timely manner. For example, bucket trucks and fusion splicers will be required to repair the OPGW fiber, and enough of these resources are not available without being supplemented by contractors. Access roads might have to be cleared again requiring contractor expertise.

IT experts and contractors for the deployment of P25 and the phone exchange will be required. Integration into systems is key and vendors have better experience to deploy these systems in a timely and effective manner.

3.3 Estimating Methods & Assumptions

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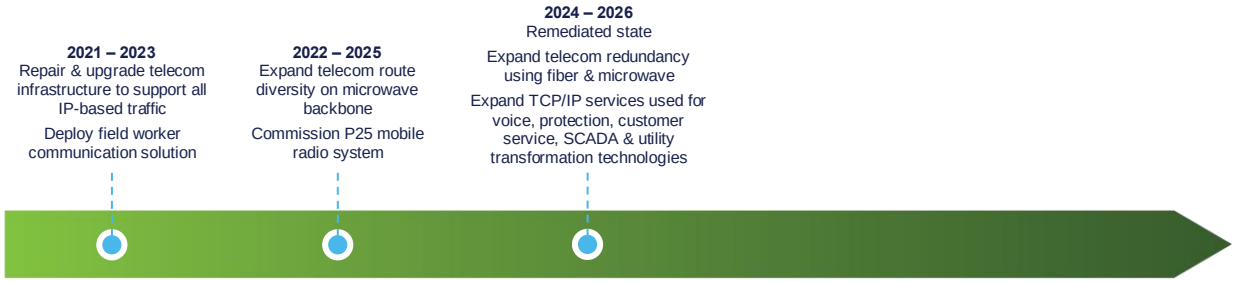
LUMA has reviewed and ascertained that PREPA's cost estimates for this program are reasonable.

Further verification of funding was done using IBM and additional LUMA and parent company resources.

It is assumed that P25 will remain the leader in first responder technologies and will not be replaced by 5G.

It is further assumed that all programs will be built using the LUMA Telecom Design Control Document (DCD) and all its associated standards and requirements.

3.4 SRP Program Timeline & Milestones



Transmission Line Rebuild

1.0 Program Description

This program includes numerous 230 kV, 115 kV and 38 kV projects to harden and upgrade the transmission system. This includes rebuilding towers along with reinforcing and replacing anchors and guys as required over the course of the upgrade process. This program also incorporates an investigation to mitigate corrosion and restore line design capacity. In addition to the overhead transmission line upgrade work, this program includes the 115 kV underground cable addition in the San Juan area.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Field inspections (conducted under the Inspection of Transmission Lines program) will categorize assets according to their health, based on estimates of their condition (likelihood of failure) and criticality (consequence of failure) and assign an asset score of 0 (worst) to 4 (best). Mitigation of risk related to only the high-risk assets categorized as 0 or 1 will be performed as SRP work. LUMA estimates that approximately 10 percent of the assets comprising the transmission line projects will be assessed as high risk (0 or 1 health score) and will require safety and hazard mitigation to reach remediation. These deficient assets will exhibit the following:

- High risk of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including the OMA, Annex I, Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects

Initial assessments performed to date have identified the following gaps related to transmission lines:

- Anchors and guys need to be reinforced or replaced. It is known that a large proportion of them need some form of remediation work, but there is no exact data on which ones need improvement.
- Transmission infrastructure is corroded in places, though again an investigation is needed to provide exact data on where to provide corrosion mitigations.
- The frequency of forced outages is much higher than US mainland industry norms.
- Lines are operating below design capacity and need restoration.
- Hardening of San Juan area 115 kV grid is required to withstand critical loads. U/G line additions are set out as part of the Modified Action Plan in the approved 2020 IRP.

2.2 Description of Remediated State

High risk findings of the transmission assets, those that have an inspection score of 0 or 1, shall be incorporated into a remediation plan and mitigated. LUMA will take a coordinated approach to remediation

based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

To achieve the remediated state LUMA will have first identified all transmission lines to be repaired and replaced to meet current codes and standards. This work is described and will be performed under the Inspection of Transmission Lines program.

In the remediated state, the transmission line assets identified as high risk with an inspection score of 0 or 1, currently estimated at approximately 10 percent of all transmission poles, structures and conductors, will have been repaired or replaced to meet current codes and standards, and requirements under Applicable Laws and the OMA.

2.3 Description of Program Completed State

More specifically, all transmission towers will be able to withstand 150 mph winds and thus align with Act 17, Articles 1.15(a), (b) and (c) which require, in addition to the wind resistance standard, the replacement of temporary transmission towers by single poles and poles with material to prevent overload, replacement and maintenance of transmission infrastructure anchoring systems to maintain resiliency, and implementation of programs to mitigate corrosion in grid infrastructure.

Further, the transmission system will operate with infrastructure of the highest standards, and industry standard maintenance programs will ensure reliability levels are maintained. The San Juan area 115 kV network will be able to withstand N-1 outage criteria without load loss due to transmission forced outages.

2.4 Program Activities

Completion of the following priority projects:

- Rebuild towers to current standards (230 kV)
- Inspection / reinforcement / replacement of anchors / guys / foundations
- Corrosion mitigation investigation to make the transmission system safer and more resilient with subsequent mitigations against identified corrosion
- Compliance — safe operation of grid from avoidance of structure failures and conductor clearance conflicts
- Review pole/structure inspection data collected during the Transmission Inspection and Testing Program and other sources to avoid duplication of work already completed
- Replace safety hazard poles/structures and associated hardware
- Replace priority poles/structures and associated hardware (115 kV, 38 kV)
- Replace damaged conductors
- Restoration of line design capacity (non-SRP)
- Creation of new 115 kV underground paths in the San Juan metro area to improve reliability and maintain critical load support. Terminal additions at affected substations are also required. This will allow generation at Palo Seco and San Juan to better supply the area load following major storm events (non-SRP).

Transmission Line Rebuild

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	Deliver Electricity at Reasonable Prices	Direct
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	Enable the Sustainable Energy Transformation	Direct
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Improvement to anchors, insulators and conductors will harden the system to prevent failures and improve operating conditions for employees, allowing them to work in safety.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

Rebuilt and replaced infrastructure will improve the system's ability to withstand the impact of transmission forced outages.

Objective: Deliver Electricity at Reasonable Prices

Additional line paths described in approved IRP allow for more efficient and reliable supply of electricity, helping to keep prices reasonable.

Transmission Line Rebuild

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Employees to Execute Operations Systematically

Improvement to anchors, insulators and conductors will harden the system to prevent failures and improve operating conditions for employees, allowing them to complete work without interruption. Improved resilience provides additional operational flexibility to the system, reducing the need for non-routine operations to be run by employees.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Restore Damaged Grid Infrastructure

Replacement of line elements helps to restore the grid's performance as a whole by providing functioning infrastructure.

Objective: Improve Resilience of Vulnerable Infrastructure

Towers rebuilt to 150 mph standard will reduce tower failures. Given the climate in Puerto Rico, the strength of towers against high winds is of particular importance and a key vulnerability if not properly addressed. Improved transmission (N-1 and N-1-1) capacity will reduce the impact of forced outages, improving overall system resilience.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Enable the Sustainable Energy Transformation

Additional line paths described in the approved IRP will have a more sustainable design, helping to transform the overall system.

2.6 Program Risks

If this program is either delayed or not carried out, the main risks to the system are the following:

- Safety risk associated with the operation of damaged equipment
- Continued forced outages due to damaged structures and equipment
- Continued forced outages due to reduced design capacity and difficulties in operating in contingency (N-1 and N-1-1) scenarios.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$52.0**	**$185.0**	**$185.0**	**$1,612.3**
SRP Expenditures	$5.0	$19.0	$19.0	$38.0

Transmission Line Rebuild

3.2 Program Resource Requirements

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- Adequate resources to complete the work are likely a combination of internal and contractor resources.
- Construction resources to complete the line projects will likely be contractor including resources from outside Puerto Rico. Commissioning and handover will be done using internal resources.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

230 kV line rebuilds: Average cost $809,000 per mile. $25,124m in year one including labor. Average of $33.7m/year for subsequent years. 10-year program with high priority items addressed within the first three years. Unit pricing breakdown for 100% replacement of components (per mile):

- Structures: $495,000
- Conductor: $537,000
- Insulators/Hardware: $119,000
- Anchors/Foundations: $249,000

115 kV overhead line rebuilds: Average cost $791,000 per mile. $31,574m in year one including labor. Average of $44.1m/year for subsequent years. 10-year program with high priority items addressed within the first three years. Unit pricing breakdown for 100% replacement of components (per mile):

- Structures: $216,000
- Conductor: $508,000
- Insulators/Hardware: $151,000
- Anchors/Foundations: $166,000

San Juan area 115 kV underground line additions: Estimates referenced from IRP.

38 kV line rebuilds: Average cost $1.172m per mile. $80m year in one including labor. Average of $121.3m/year for subsequent years. 10-year program with high priority items addressed within the first three years. Unit pricing breakdown for 100% replacement of components (per mile):

- Structures: $739,000
- Conductor: $500,000
- Insulators/Hardware: $528,000
- Anchors/Foundations: $352,000

Category	Percentage
Engineering & Admin	3%
Material	24%
Pre-construction Activities	26%
Construction & Commissioning	47%

Transmission Line Rebuild

3.4 SRP Program Timeline & Milestones

Transmission Priority Pole Replacements

1.0 Program Description

This program (Transmission Priority Pole Replacements) is to replace damaged overhead transmission poles and towers, along with associated hardware and conductors. Repairs under this program will be made based on results of an inspection conducted under the Inspection of Transmission Lines program. Major repairs and replacement will be based upon the results of the inspection of the transmission system and an analysis by engineers to schedule the repair or replacement based on the criticality of the pole or structure. Following this process, safety /hazard and priority poles and structures will be replaced, along with damaged conductor and hardware.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA has determined that a large quantity of transmission poles need to be repaired or replaced. The number of wood/concrete structures that would need replacement is undetermined. Field inspections performed in the Inspection of Transmission Lines program will categorize assets according to their health, based on estimates of condition (likelihood of failure) and criticality (consequence of failure) and assign an asset score of 0 (worst) to 4 (best). Mitigation of risk related to only the highest risk assets will be categorized and performed as SRP work. LUMA estimates that approximately 25 percent of the transmission poles are within the high risk category (0 or 1) and will require replacement to reach remediation.

These deficient assets will exhibit the following:

- High risk of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

All deficient assets, including those in the SRP, will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

This program will mitigate safety risks to field workers and the public by replacing poor condition poles and associated hardware and conductors that have a high risk of failure. LUMA's assessment has confirmed that a large percentage of transmission poles, hardware and conductors are in poor condition, possibly due to damage from severe weather events and age. The condition of poles and associated hardware pose a safety risk to field workers and the public. Timely replacement of safety priority poles

and associated hardware and conductors will contribute to the safe operation of the grid by reducing potential asset failures, addressing conductor clearance issues, and reducing arc-flash risks.

2.2 Description of Remediated State

High risk findings of transmission poles or structures, those that have an inspection score of 0 or 1, shall be incorporated into a remediation plan and mitigated. LUMA will take a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

To achieve the remediated state LUMA will have first identified all transmission poles, structures and conductors to be repaired and replaced to meet current codes and standards, as described in the Inspection of Transmission Lines program.

In the remediated state, those identified high risk assets with an inspection score of 0 or 1, currently estimated at approximately 25 percent of all poles, will have been repaired or replaced to meet current codes and standards, and requirements under applicable laws and the OMA.

2.3 Description of Program Completed State

In the program completed state:

- Safety hazard transmission poles, associated hardware and conductors identified in the inspection process program will have been repaired or replaced system wide.
- Remaining priority (poor condition) poles/structures and associated hardware and conductors will have been repaired or replaced within one year after they are identified through the inspection process program

2.4 Program Activities

- Compiling pole/structure inspection data from various sources to avoid duplication of work already completed
- Performance of health assessments to ensure proper prioritization and focus on high-risk items
- Completion of engineering design/construction plans for each of the projects
- Organizing personnel, equipment and materials, acquiring all necessary approvals and putting projects out to bid as needed
- Replacement of all safety / hazard and priority wood poles at 115 kV and a majority of the 38 kV wood poles on the island with new poles meeting wind load requirements. This includes:
  - Improved embedment techniques to resist structure uplift in high wind events.
  - Upgrade of insulators and hardware to components meeting wind load and contamination requirements.
  - Restoration of sky wires and structure grounding/bonding
  - Replacement of damaged conductor with that appropriately sized and having necessary tensile strength for anticipated wind loads.
  - Addressing anchor corrosion and tension issues to restore/improve anchoring systems to meet wind load criteria.
  - Repair of compromised lattice structures through member replacements, correcting bolt deficiencies and torquing all connections to specification.

Transmission Priority Pole Replacements

- Selective upgrade of structures at all voltages to improve anti-cascading performance of line segments in high wind zones.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

The program increases field worker and public safety by repairing and/or replacing poor condition poles and associated hardware and conductors that have a high risk of failure. Those failures could otherwise present a safety risk to those working near them (e.g. arc flash) or to the public (e.g. downed infrastructure).

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

The program increases service continuity and reliability to customers by replacing and upgrading facilities that have poor reliability performance and by adding/completing facilities that allow for alternate feeds.

Transmission Priority Pole Replacements

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

This work will be carried out with a large portion of the federal funds allocated for the rebuilding of the system. LUMA will make efficient use of these funds for this crucial aspect of system rebuild.

Objective: Restore Damaged Grid Infrastructure

The program replaces poles and associated hardware and conductors that are in poor condition due to damage from severe weather events and aging.

Objective: Improve Resilience of Vulnerable Infrastructure

Poles will be replaced with higher strength wooden poles, concrete, steel, resin or other types of poles that will increase resiliency to harsh weather conditions.

2.6 Program Risks

Risks of delaying or not pursuing this program include:

- Increasing safety hazards for employees and the public as the condition of equipment continues to deteriorate.
- Decreasing reliability levels due to increased asset failures, working against achievement of reliability performance targets.
- Reliability performance stagnation for critical customers.
- Reduced operational flexibility as lines out of service can affect how the system is configured and operated

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$46.1**	**$66.1**	**$79.8**	**$537.2**
SRP Expenditures	$40.0	$40.0	$40.0	$62.3

SRP total expenditure = $182.3m. Based on the estimate that 25% of findings will be high risk. Hence, 25% of the total program expenditure of $729.2m = $182.3m.

3.2 Program Resource Requirements

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- Approximately 8,100 structures and associated hardware/conductor for 10,000 structures falls into this work scope
- Work expected to be mainly performed by on-island resources.

Transmission Priority Pole Replacements

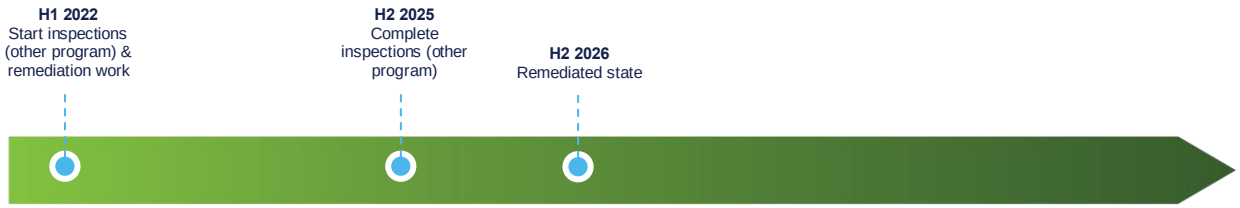
3.3 Estimating Methods & Assumptions

CONFIDENTIAL

- Estimate based on average cost for pole, hardware, and conductor replacements from previous experience.
- Anticipate using internal resources but will likely need to supplement with contract resources, which may increase average costs.
- Availability and manufacturing capacity of poles, hardware and conductors could also affect material costs.

Category	Percentage
Engineering & Admin	3%
Material	24%
Pre-construction Activities	26%
Construction & Commissioning	47%

3.4 SRP Program Timeline & Milestones



Inspection of Transmission Lines

1.0 Program Description

This program includes the inspection, data collection, testing of the Transmission Lines. Required repairs and replacements will be identified in order to restore the system and improve reliability and resiliency in line with current codes and standards. Inspections will include, but are not limited to, poles, towers and structures, ground rods, anchors and guys, conductor condition and line clearance checks. During this process, the program will also incorporate minor repairs, but major repairs will be undertaken by a separate program.

2.0 Program Rationale

2.1 Current State & Identified Gaps

PREPA does not have a health assessment of the transmission system. In recent years, PREPA has not conducted programed transmission line inspections. Consequently, the condition of the transmission field assets is basically unknown and not documented. It is apparent to experienced LUMA utility engineers from casual visual observations, site visits and an asset health sampling that there are widespread deficiencies in the transmission system. Field inspections will categorize assets according to their health, based on estimates of their condition (likelihood of failure) and criticality (consequence of failure) and assign an asset score from 0 (worst) to 4 (best). Mitigation of risk related to only the highest risk assets will be categorized and performed as SRP work. Note that these inspections also include identifying and surveying all high potential safety or imminent failure issues involving grounding, anchors, guying, clearance, etc. all transmission lines in vulnerable areas and/or within public access (high risk).

These deficient assets will exhibit the following:

- High risk of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including the OMA, Annex I, Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

Sargent and Lundy estimates that approximately 22,500 poles (52% of total wood / concrete poles) may require replacement and recommends a pole inspection program to determine the actual number. LUMA estimates that approximately 25 percent of the assets will be assessed as high-risk (0 or 1 health score) and will require safety and hazard mitigation to reach remediation. These include both overhead and underground transmission lines.

For the reasons listed the majority of the work above is included in the SRP.

Inspection of Transmission Lines

All deficient assets, including those in the SRP, will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

Compared to prudently operated utilities, a disproportionately large percentage of the transmission system has deficiencies possibly due to damage from severe weather events and aging.

Initial assessments have uncovered the following issues:

- Anchors and guys need to be reinforced or replaced. It is known that a large proportion of them need some form of remediation work, but there is no exact data on which ones need improvement.
- Transmission infrastructure is corroded in places, though again an investigation is needed to provide exact data on where to provide corrosion mitigations.
- The frequency of forced outages is much higher than US mainland industry norms.
- Line designed capacity is currently lacking and needs restoration.

2.2 Description of Remediated State

High risk findings of the transmission assets, those that have an inspection score of 0 or 1, shall be incorporated into a remediation plan and mitigated. LUMA will take a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

To achieve the remediated state LUMA will have first identified all transmission lines to be repaired and replaced to meet current codes and standards.

In the remediated state, the transmission line assets identified as high risk with an inspection score of 0 or 1 will have been repaired or replaced to meet current codes and standards, and requirements under Applicable Laws and the OMA. High risk transmission line assets are currently estimated at approximately 25 percent of all transmission poles, structures and conductors.

2.3 Description of Program Completed State

In addition to what has been noted for the remediated state, the program completed state includes:

- Continued time based inspection of the transmission system, with minor repairs being completed alongside
- Identification of system components to be replaced, with engineering being informed of the prioritized findings
- Completion of remaining non-urgent identified equipment issues on the overhead and underground lines
- Completion of line clearance checks to ensure that transmission assets meet live line clearance requirements of the applicable codes and standards

Capital projects, such as priority pole and conductor replacements, are under separate programs.

2.4 Program Activities

- Create detailed plan and complete inspection of the transmission system within the first five years

Inspection of Transmission Lines

- Identify and plan imminent failure items or high potential safety issues on overhead transmission systems in restricted access areas or within public access to be remediated within the first five years
- Identify and plan imminent failure items or high potential safety issues involving grounding, anchors, guying, clearance, etc. on all lines in vulnerable areas or within public access to be remediated
- Prioritize new work identified in the inspection process (non-SRP)
- Identify any new safety and security issues, and other quick wins, in the near term
- Schedule remaining work to be completed on a coordinated circuit and/or geographic basis (non-SRP)

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Indirect
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☒ Pursue Project Delivery Excellence	Indirect
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Indirect
	☒ Restore Damaged Grid Infrastructure	Indirect
	☒ Improve Resilience of Vulnerable Infrastructure	Indirect
☐ **Sustainable Energy Transformation**	☒ Modernizing the Grid	Indirect
	☒ Enable the Digital Transformation	Indirect
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

The program will promote field worker and public safety by addressing potential safety hazards such as poor grounding, loose anchors and guying, conductor condition and line clearance issues.

Inspection of Transmission Lines

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

The program will indirectly promote customer satisfaction by identifying repairs that will improve service reliability.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence

The collection of data as part of this program will provide the basic information required to execute system planning and asset management systematically. The data will support the identification of projects and lead to data driven investment decisions.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

The program will indirectly improve service reliability by identifying damaged poles, hardware and conductors for follow up replacement, facilitating system rebuild and improved resiliency.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Modernizing the Grid
Objective: Enable the Digital Transformation

The data collected will provide valuable information for decision making with respect to grid modernization. The data will also be used as part of the digital transformation.

2.6 Program Risks

The main risks to delaying this work are for both people interacting with the system and employees along the system rights of way. The same condition which poses a safety threat may also be associated with the potential loss of reliability and resiliency. An increase in liability is always present when conductors or equipment are below the minimum clearance requirements of the codes and standards adopted by the utility.

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$7.2**	**$7.0**	**$7.0**	**$28.1**
SRP Expenditures	$5.9	$5.7	$5.7	$16.0

Inspection of Transmission Lines

3.2 Program Resource Requirements

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Adequate resources to complete the work are likely a combination of internal and contractor resources.

Specialty inspections such as Xray and Lidar will be carried out by 3rd party contractors.

3.3 Estimating Methods & Assumptions

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- Estimates based on average cost for pole and line inspections derived from previous experience
- LUMA anticipates using internal resources but will likely need to supplement with contract resources, which may increase average costs

Category	Percentage
Engineering & Admin	3%
Material	24%
Pre-construction Activities	26%
Construction & Commissioning	47%

3.4 SRP Program Timeline & Milestones

6.4 Substations Portfolio

Substations will be repaired, rebuilt and made safer and will result in significant improvements to system resilience and safety. Tables 6-7 and 6-8 below presents substations portfolio spending estimates by SRP program, followed by a short description of each SRP program.

Table 6-7: Total Substation Portfolio Spending Estimates by Program ($ millions, real)

Substation Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
Transmission Substation Rebuilds	125.9	462.9	588.8
Distribution Substation Rebuilds	75.0	345.0	420.0
Transmission Substation Security	43.5	26.5	70.0
Compliance and Studies	57.4	37.4	94.8
Physical Security for Distribution Facilities	9.9	4.4	14.3
Transmission Substation T&G Demarcation	6.0	-	6.0
Grand Total	**$317.7**	**$876.2**	**$1,193.9**

Table 6-8: Annual Substation Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Substation Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
Transmission Substation Rebuilds	20.6	33.6	27.3	36.3	27.3	36.3
Distribution Substation Rebuilds	15.0	26.0	15.0	26.0	15.0	26.0
Transmission Substation Security	15.2	16.1	14.8	15.9	13.6	14.5
Compliance and Studies	10.0	11.3	11.7	12.5	11.3	11.9
Physical Security for Distribution Facilities	2.5	3.0	2.5	3.0	2.5	3.0
Transmission Substation T&G Demarcation	0.5	0.5	2.5	2.5	3.0	3.0
Grand Total	**$63.7**	**$90.5**	**$73.8**	**$96.2**	**$72.6**	**$94.7**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

Transmission Substation Rebuilds. This program covers required inspection, repair and rebuilding of damaged substations. This includes upgrades to the latest codes, industry standards and practices to

improve long term reliability. The program also includes installation of gas insulated switchgear, and replacement of electromechanical and electronic relays, along with repairs and rebuilding of transmission and distribution substations impacted by flooding.

Distribution Substation Rebuilds. This program focuses on improvements to distribution substations as a means to strengthen the distribution grid. This includes hardening and modernizing distribution substations, upgrades to the latest codes, industry standards and practices and the replacement of electromechanical and electronic relays.

Transmission Substation Security. This program will focus on a variety of security concerns at transmission substations. The program will replace and add new security technology and hardware to deter, detect and delay security incidents (e.g., intrusion, theft, damage, employee and public safety). Security concerns addressed by this program include fencing and gates including locking devices, lighting, signage, perimeter cleanup and window bars.

Compliance and Studies. This program consists of three major workstreams:

- *Distribution Studies* focused on eliminating major cascading outages caused by lack of proper coordination of protective devices and implementing new procedures and standards to ensure the distribution system complies with regulations and Prudent Utility Practice.
- A group of different projects to ensure *Distribution Substation Grounding Compliance* to IEEE Std 80-IEEE Guide for Safety in AC Substation Grounding and National Electrical Safety Code (NESC). This includes safety and environmental projects including grounding, animal contact mitigation and civil site upgrades (including insulating gravel additions).
- Studies, procedures and standards for *Substations and Transmission Compliance* focused on: identify issues with current infrastructure, developing and implementing new procedures and standards to ensure that transmission lines and substations both comply with codes and regulations and can effectively and safely perform their requirements, field implementation of grounding compliance requirements to ensure the transmission and distribution substations meet proper grounding requirements for safety purposes, in accordance with IEEE Std 80-IEEE Guide for Safety in AC Substation Grounding and NESC.

Physical Security for Distribution Facilities. This program is targeted at the physical security of distribution facilities by replacing and repairing gates and fencing around substations. It also addresses provision of locks for distribution switches and pad mounted transformers in the field and meter locks at customer metering points.

Transmission Substation T&G Demarcation. This program focuses on the demarcation requirements for transmission and generation (T&G) assets. The demarcation between PREPA's generation assets and the T&D System is required under the OMA, specifically the Scope of Services as set forth in Annex I. The demarcation must include high accuracy metering[1] to accurately measure power generation into the network and facilitate communication with the system operator. The accurate measurement will provide transparency of total net power generation and energy losses to the network. The demarcation must also be defined in a non-complicated manner to provide LUMA and GenCo operators sufficient clarity regarding the separation of assets to prevent mis-operation, and subsequent damage to equipment and / or system

[1] High Accuracy Metering is defined as a total metering system, including meters, CTs, PTs with a recommended aggregate accuracy within one percent where possible.

Transmission Substation Rebuilds

1.0 Program Description

This program (Transmission Substation Rebuilds) covers required inspection, repair and rebuilding of damaged substations. This includes upgrades to the latest codes, industry standards and practices to improve long term reliability. The program also includes installation of Gas Insulated Switchgear (GIS) and replacement of electromechanical and electronic relays, along with repairs and rebuilding of transmission and distribution substations impacted by flooding.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA estimates that approximately 30 percent of the transmission substations require safety and hazard mitigation to reach remediation. Field inspections will categorize assets according to their health, based on estimates of their condition (likelihood of failure) and criticality (consequence of failure) by assigning an Asset Score from 0 (worst) to 4 (best). The highest risk assets (categorized as a 0 or 1) will be included in SRP work. These deficient assets will exhibit the following:

- Extreme likelihood of failure, or already failed,
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

For the reasons mentioned above this program is included in the SRP.

All deficient assets, including those in the SRP will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for mitigation and pushed to the top of the priority list.

Several transmission and distribution substations were flooded during Hurricane Maria that in turn affected the components and equipment located in the switchyards and control buildings. Damaged fences, missing grounding components, bent structures, leaking or out of service apparatuses have been identified as common issues throughout the PREPA system.

Flooded substations below the flood plain must also be remediated to comply with legal requirements, including the Puerto Rico Planning Board's Joint Regulation for the Evaluation and Issuance of Permits Related to Development, Land Use and Business Operations, Regulation 9233, effective January 2, 2020; Puerto Rico Planning Board's Special Flood Hazard Areas Regulation, Regulation 9238, effective

January 7, 2021 (and preceding regulation currently in effect); Act 17-2019, as amended; and Act 57-2014, as amended.

There are a total of 18 T&D substations that require remediation including 6 elevated substations, 10 relocated substations, and 2 substation switchgear conversions to GIS. For simplicity of the program, it was decided to keep all the flooded substation projects together under one program to align with the FEMA program.

All substations require high level inspections to assess, prioritize, and plan the remediation work required for transmission substations. The vast majority of the transmission substations require major and minor repairs as a result of the 2018 hurricanes, in which, approximately 30% of the repairs are estimated to require safety and hazard mitigation to reach remediation. This includes major repairs for the four broad based categories:

- Structure: Overhead hazards and unsecure equipment
- Yard: Unsafe yard conditions to equipment and personnel, caused by erosion of the substation pad, vegetation incursion reducing effectiveness of substation insulating gravel etc.
- Components: Imminent failure of high voltage equipment that can cause potential for employee or public harm
- Control house: Leaking roofs or equipment enclosures (including switchgear enclosures)

2.2 Description of Remediated State

High risk findings (Asset Score of 0 and 1) shall be incorporated into a remediation plan within 60 days of identification. The plan shall take into account a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

In the remediated state, the following will have been accomplished:

- Substation inspection for all transmission substations, flood-impacted distribution substations and transmission centers
- Substation restoration, hardening and resiliency for 18 flood prone substations
- The major repairs for the remaining transmission substations with Asset Scores of 0 and 1, will be complete. The remediated work is estimated at 30% of the major repair estimate. This will eliminate critical failure points within the substation including identifying at risk in-service equipment, unsafe structures or overhead hazards, leaking control buildings or switchgear enclosures and unsafe yard conditions.

Flooded substations below the flood plain must also be remediated to comply with legal requirements, including the Puerto Rico Planning Board's Joint Regulation for the Evaluation and Issuance of Permits Related to Development, Land Use and Business Operations, Regulation 9233, effective January 2, 2020; Puerto Rico Planning Board's Special Flood Hazard Areas Regulation, Regulation 9238, effective January 7, 2021 (and preceding regulation currently in effect); Act 17-2019, as amended; and Act 57-2014, as amended.

Transmission Substation Rebuilds

2.3 Description of Program Completed State

In the program completed state, LUMA will have achieved:

- Improved safety, reliability and resiliency by increasing withstand capability from severe weather conditions. This is achieved through substation repairs and by deploying high voltage GIS systems.
- Substation modernization for smart data collection by replacing electromechanical relays with microprocessor-based relays. All electromechanical relays would be replaced during the first 15 years. The old digital relays will be replaced after year 15.

2.4 Program Activities

- 18 substations are required to be relocated or rebuilt
  - 10 substations: to be relocated
  - 2 substations: new drop-in control building
  - 2 substations: new GIS system/building
  - 4 substations: new elevated drop-in building
- Completion of Stage 1 High Level Assessment and Stage 2 Near Term Reliability Plans, and Stage 3 Long Term Reliability and Asset Transformation Plan.
- Completion of major substation repair items (imminent failure and major safety items) based on detailed assessments over the different elements (primary equipment, security, safety and secondary equipment or control room)
- Major GIS deployments for critical substations such as:
  - San Juan substation
  - Bayamon substation
  - Monacillos substation
- At least one substation rebuild per year based on condition and criticality
- Major and minor substation repairs that are not SRP related based on detailed assessments over the different elements (primary equipment, security, safety and secondary equipment or control room)
- Substation upgrades: The upgrade work will include installing a new control building (if applicable), P&C and SCADA upgrades, new cabling, and some high voltage (HV) equipment replacements such as switchgear, breakers, disconnects, etc.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	

Transmission Substation Rebuilds

Primary Goals	Objectives	Direct or Indirect Impact
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

This program will address critical substation issues including missing grounding components, bent structures, etc. that address safety needs for both employees and the public. The repairs under this program will also bring most substations up to optimum safety and reliability levels. The program will also reduce hazards related to flooding of high voltage equipment.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

By replacing damaged equipment, this program will allow for better reliability. In particular, the rebuilds, upgrades and GIS deployment will allow for faster restoration of the grid under failure conditions and will improve substations' ability to withstand major weather events. As a whole, the repairs under this program will also bring most substations up to optimum safety and reliability levels.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Employees to Execute Operations Systematically

Provides employees with repaired infrastructure, thereby improving their ability to execute operations. The program will also provide for more data to support system operations, grid modelling, and asset conditions — all of which improve employee productivity and efficiency.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

This program will deploy a large portion of awarded federal funds to repair and replace substations to improve safety, reliability and resiliency.

Transmission Substation Rebuilds

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

This program restores damaged grid infrastructure, thereby also making the system more resilient by reducing flooding risks and increasing its ability to withstand severe weather conditions.

2.6 Program Risks

- Performing this work will take multiple years to complete. These substations are at risk in the meantime.
- Delaying some of these projects will put employees and the public at risk until critical repairs and replacements are addressed.

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$33.6**	**$36.3**	**$36.3**	**$482.7**
SRP Expenditures	$20.6	$27.3	$27.3	$50.8

3.2 Program Resource Requirements

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- Contract Labor — 40%
- Material Equipment — 60%
- Mobile substations to be used for minimizing the service interruption time during project execution

3.3 Estimating Methods & Assumptions

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Preliminary Methods of Repairs (MORs) have been defined between PREPA and FEMA, such as substation relocation, drop-in control house, and GIS deployments. However, additional assessments will be performed in order to determine the final scope of work (SOW).

Regarding standards and requirements, it is expected that all designs will follow LUMA's engineering standards and the several Puerto Rico codes and regulations, such as the new building code for the drop-in control house design. This plan is expected to be completed in five years.

LUMA has provided estimates for the different projects assuming ±30% accuracy except FEMA funded projects.

Assumption: Estimating splits based on historical projects.

Transmission Substation Rebuilds

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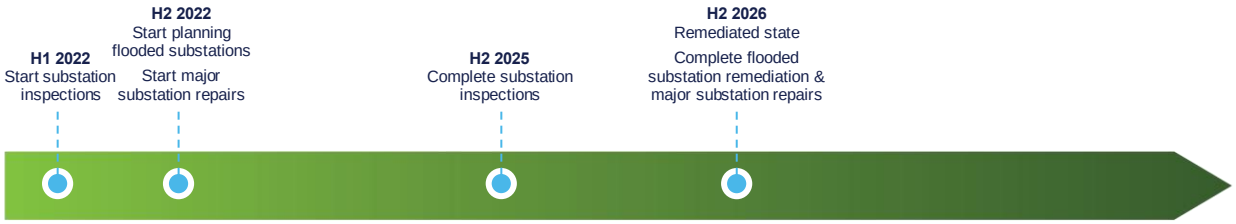
Category	Percentage
Material	32%
Detailed Engineering	10%
Site Preparation & Survey	17%
Construction	35%
Commissioning	5%

3.4 SRP Program Timeline & Milestones



Distribution Substation Rebuilds

1.0 Program Description

This program focuses on improvements to distribution substations as a means to strengthen the distribution grid. This includes hardening and modernizing distribution substations, upgrades to the latest codes, industry standards and practices and the replacement of electromechanical and electronic relays.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA estimates that approximately 30 percent of the distribution substations require safety and hazard mitigation to reach remediation. Field inspections will categorize assets according to their health, based on estimates of their condition (likelihood of failure) and criticality (consequence of failure) and assign an asset score from 0 (worst) to 4 (best). Mitigation of risk related to only the highest-risk assets will be categorized as a 0 or 1 and performed as SRP work. These deficient assets will exhibit the following:

- Extreme likelihood of failure, or already failed
- *and* likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including OMA Annex I, Act 17-2019, as amended (Act 17), and Act 57-2014, as amended (Act 57), which include requirements related to safe and reliable utility operations, or
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

For the reasons mentioned above this program is included in the SRP.

All deficient assets, including those in the SRP will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

Several substations were flooded during Hurricane Maria, which affected the components and equipment located in the switchyards and the control buildings. Damaged fences, missing grounding components, bent structures, leaking or out-of-service apparatus have been identified as common issues throughout the PREPA system. Issues associated with the flooded distribution substations and their remediation will be carried out under the Transmission Substations Rebuild program.

Obsolete protection and control (P&C) and Supervisory Control and Data Acquisition (SCADA) infrastructure do not allow better data collection schemes for asset condition assessments or remote supervision and control. Additionally, the rarity of spare parts for these systems complicates maintenance routines. As a result, emergency replacements with new and updated components are integrated into an archaic scheme that does not provide a real or final solution.

Distribution Substation Rebuilds

All substations require high level inspections to assess, prioritize, and plan the remediation strategies required for distribution substations. The vast majority of distribution substations require major and minor repairs as a result of the 2018 hurricanes, approximately 30% of which are estimated to require safety and hazard mitigation to reach remediation. This includes major repairs for the four broad based categories:

- Structure: Overhead hazards and unsecure equipment
- Yard: Unsafe yard conditions to equipment and personnel, caused by erosion of the substation pad, vegetation incursion reducing effectiveness of substation insulating gravel etc.
- Components: Imminent failure of high voltage equipment that can cause potential for employee or public harm
- Control House: Leaking roofs or equipment enclosures (including switchgear enclosures)

2.2 Description of Remediated State

In order to ensure compliance with the relevant articles of Act 17 and Act 57, and the OMA, high risk findings (Asset Score of 0 and 1) shall be incorporated into a remediation plan within 60 days of identification. That plan shall take into account a coordinated approach to remediation based on severity and risk according to the objectives defined in LUMA's Recovery and Transformation Framework.

In the remediated state, the following will have been accomplished:

- Substation inspection for all distribution substations
- The major repairs for the remaining distribution substations, estimated at 30% of the distribution substations, will be complete. This will eliminate critical failure points within the substation including identifying at risk in-service equipment, unsafe structures or overhead hazards, leaking control buildings or switchgear enclosures, and unsafe yard conditions. All high risk components in the substations will have been repaired or replaced to meet current codes and standards, the NESC, and requirements under Applicable Laws and the OMA.

2.3 Description of Program Completed State

In the program completed state, the distribution grid will have been heavily bolstered, including wide-scale repairs to distribution substations, the enhancement of communication between substations and operation centers through new Intelligent Electronic Devices (IED) and an essential portion of the distribution grid as a whole will be fully upgraded to all applicable codes, industry standards and practices. Specifically, this program completed state includes:

- Substation repairs throughout the distribution grid
- Deployment of high voltage Geospatial Information System (GIS) systems
- Substation modernization for smart data collection by replacing electromechanical relays with microprocessor based relays

2.4 Program Activities

- Rebuild of at least two distribution substations per year based on condition and criticality
- Major and minor substation repairs that are not SRP related based on detailed assessments over the different elements (primary equipment, security, safety and secondary equipment or control room)

Distribution Substation Rebuilds

- Substation upgrades: The upgrade work will include installing a new control building (if applicable), P&C and SCADA upgrades, new cabling, and some high voltage (HV) equipment replacements such as switchgear, breakers, disconnects, etc.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

This program will improve safety standards for both employees and the public by increasing the distribution grid's ability to withstand severe weather conditions. Repairs under this program will also bring substations up to applicable safety codes and standards.

Distribution Substation Rebuilds

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

This program will improve service reliability by increasing the distribution grid's ability to operate under severe weather conditions. Additionally, the repairs and upgrades put in place will enable faster electric grid restoration under fail conditions.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

Provides employees with repaired infrastructure, thereby improving their ability to execute operations. The program will also provide for more data to support system operations, grid modelling, and asset conditions — all of which improve employee productivity and efficiency.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

This program will make use of federal funds to implementing an adequate and optimized solution, which will prevent catastrophic damages if a major weather event happens again.

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

Substation repairs directly restore and replace damaged grid infrastructure.

Improved resiliency by increasing the distribution grid's ability to withstand severe weather conditions.

2.6 Program Risks

- Performing this work will take multiple years to complete. These substations, and as such the distribution grid, are at risk in the meantime.
- Delaying some or all repairs and investments under this program will increase safety risks to employees and the public.

3.0 Program Funding & Timeline

CONFIDENTIAL

Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$26.0**	**$26.0**	**$26.0**	**$342.0**
SRP Expenditures	$15.0	$15.0	$15.0	$30.0

3.1 Program Resource Requirements

CONFIDENTIAL

- External contract labor: The majority of projects will be conducted as EPC projects.
- Mobile substations to be used to minimize service interruption time during project execution

3.2 Estimating Methods & Assumptions

CONFIDENTIAL

Regarding standards and requirements, all designs are expected to follow LUMA's engineering standards and the different Puerto Rico codes and regulations, such as the new Building Code for the drop-in control house design.

LUMA has provided estimates for the different projects assuming ±30% accuracy except FEMA funded projects.

Assumptions: Estimating splits based on historical projects:

Category	Percentage
Material	32%
Detailed Engineering	10%
Site preparation & Survey	17%
Construction	35%
Commissioning	5%

3.3 SRP Program Timeline & Milestones

CONFIDENTIAL

Transmission Substation Security

1.0 Program Description

This program will focus on a variety of security concerns at transmission substations. The program will replace and add new security technology and hardware to deter, detect and delay security incidents (e.g., intrusion, theft, damage, employee and public safety). Security concerns addressed by this program include fencing and gates including locking devices, lighting, signage, perimeter cleanup and window bars.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

Transmission Substation Security

2.4 Program Activities

CONFIDENTIAL

- [redacted]

2.5 Program Benefits

CONFIDENTIAL

[redacted]

Transmission Substation Security

CONFIDENTIAL

[redacted]

2.6 Program Risks

CONFIDENTIAL

[redacted]

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$16.1**	**$15.9**	**$14.5**	**$23.4**
SRP Expenditures	$15.2	$14.8	$13.6	$0

3.2 Program Resource Requirements

CONFIDENTIAL

- Internal planning and construction supervision.
- Tools and equipment for installation of locks.

Major work items will require construction contractors.

Transmission Substation Security

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Estimates for the locks, lighting, signage, clean up, doors and windows, were prepared based on unit count multiplying by purchased cost and estimated time to install.

Estimates for the fences were based on an average estimated cost for average damage multiplied by the number of substations. For implementation of technology to monitor security, the estimates were produced from vendors' unit rates.

The estimates were based on broad understandings of the current state as no real data was available to the estimators. All estimates will be refined as more information becomes available on a site by site basis.

3.4 SRP Program Timeline & Milestones

Compliance & Studies

1.0 Program Description

This program (Compliance & Studies) consists of three major workstreams:

1. Distribution Studies focused on eliminating major cascading outages caused by a lack of proper coordination of protective devices and implementing new procedures and standards to ensure the distribution system complies with regulations and Prudent Utility Practice. This includes performing a review of current applicable PREPA standards in comparison to relevant codes and standards and development of a set of new practices to be applied along with an implementation plan.
2. Studies, procedures and standards for Substations and Transmission Compliance focused on:
   - Performing engineering studies to identify issues with current infrastructure
   - Developing and implementing new procedures and standards to ensure that transmission lines and substations both comply with codes and regulations and can effectively and safely perform their requirements
   - Grounding studies and tests to ensure the transmission and distribution substations meet proper grounding requirements for safety purposes, in accordance with IEEE Std 80-IEEE Guide for Safety in AC Substation Grounding and the NESC
3. Transmission and Distribution Substation Compliance Projects: The implementation of grounding and environmental projects including grounding, animal contact mitigation and civil site upgrades (including insulating gravel additions). The grounding projects will ensure T&D substation grounding compliance to IEEE Std 80- IEEE Guide for Safety in AC Substation Grounding and the NESC.

2.0 Program Rationale

2.1 Current State & Identified Gaps

A thorough review of PREPA's transmission and substation practices indicates that many industry codes and regulations are currently not being followed and these practices are not consistent with applicable Puerto Rico energy law or policies and/or OMA requirements. Significant work needs to be done to achieve Prudent Utility Practice. A more detailed review with needed changes will be performed post commencement of this program.

2.1.1 Transmission and Distribution System Coordination Studies

PREPA currently does not perform protection and coordination or area studies on a regular basis. Typically, utilities perform wide area coordination reviews on a condition based or a time-based system. Lack of protective coordination on the transmission and distribution system can lead to cascading widespread outages and could lead to public safety issues. This includes either slow clearing or a failure to clear high impedance faults on downed powerlines on the electrical system. This creates serious safety hazards to the public, the potential for the ignition of fires, and/or catastrophic failure of distribution equipment. Due to the lack of standards, there is a disconnect between planning and Protection and Control (P&C) in performing distribution protection studies and no uniformity of modeling tools.

Other than the distributed generation (DG) interconnection regulations, PREPA does not have internal distribution planning standards.

2.1.2 Facilities Grounding Compliance

Current grounding at transmission line structures, transmission substations, and distribution substations is poor. Proper grounding at transmission line structures and all substations is critical to protect against shock or electrocution during fault conditions, induced voltages due to overhead electrical circuits, or insulation failure of any electrical equipment along the line or within the substation. This can cause a step potential or touch potential hazard to the public and employees. Grounding system deficiencies are also identified for switches and ground mats. LUMA's gap assessment has identified a number of key gaps related to grounding:

- Substation fencing is inadequate, with a number of corroded or stolen grounding connections
- Substation ground surfaces have been identified as having insufficient gravel as required by IEEE code for limiting step potential hazards
- A lack of adequate grounding currently occurs throughout the transmission grid, though more precise data needs to be obtained
- Animal contact has caused numerous problems across the distribution network. Bird nests have been observed at high-voltage structures that can cause undesired electrical outages. Some of the previous outages have been attributed to iguanas making contact with high voltage live circuits. Distribution lines/feeders and substation equipment have been tripped by rodents eating through protection and control cables.

LUMA estimates that approximately 30 percent of the transmission and distribution substation ground grid systems fall in the high-risk category and require safety and hazard mitigation to reach remediation. Field inspectors will categorize assets according to their health, based on estimates of condition (likelihood of failure) and engineers will assess criticality (consequence of failure) and assign an asset score from 0 (worst) to 4 (best). Mitigation of risk related to only the highest-risk assets (asset score of 0 and 1) will be incorporated into a remediation plan within 60 days of identification. These will be assets that exhibit the following:

- Extreme likelihood of failure, or already failed, ***and***
- Likely to cause:
  - A safety impact to the workers or the public,
  - Failure to meet applicable legal requirements or policies, including IEEE 80 and NESC, which includes requirements related to safe and reliable utility designs,
  - An outage that will be widespread, affecting critical customers, and long duration, such that it is likely to have follow-on safety effects.

All deficient assets will go into a planning process to achieve the objectives defined in LUMA's Recovery and Transformation Framework. The most severe safety risks will be flagged at the time of inspection for immediate mitigation and pushed to the top of the priority list.

For the reasons mentioned above this program is included in the SRP.

2.2 Description of Remediated State

2.2.1 Transmission and Distribution System Coordination Studies

In the remediated state, a protection and coordination study on the whole of the transmission and distribution system will have been performed and the protective equipment settings implemented.

2.2.2 Facilities Grounding Compliance

In the remediated state, transmission line facilities, transmission substations and distribution substations as well as equipment, fences, gates and metal objects at these sites, will be effectively grounded as required for step-and-touch potential hazards in IEEE standards. Corroded or missing fence grounding will have been replaced. The risk to people coming into contact with inadequately grounded surfaces will have been substantially reduced to be in alignment with Prudent Utility Practice. Substation site surfaces will also have sufficient insulating gravel to eliminate hazardous step potentials for utility workers in accordance with IEEE standards.

In the remediated state, the approximately 30% of the transmission line, transmission substation and distribution substation facilities estimated to be in high-risk condition (0 and 1) will comply with IEEE standards.

2.3 Description of Program Completed State

2.3.1 Transmission and Distribution System Coordination Studies

For Transmission and Distribution System Coordination Studies, the program will have achieved a completed state when:

Transmission and Distribution system standards, planning criteria, and best practices are successfully developed and implemented to ensure compliance with codes and regulations and to enable orderly, cost-effective development of the electrical system.

Coordination between Planning and Protection and Control (P&C), in performing the protection studies, is tasked to a single group within LUMA.

Periodic protection coordination review is implemented.

2.3.2 Facilities Grounding Compliance

In the completed state, the following will apply, beyond what has already been noted for the remediated state:

4. Grounding studies are completed: 100% of the transmission substations and distribution substations have ground grid studies and soil resistivity tests completed to meet the minimum acceptable limits of step-and-touch potentials and substation ground potential rise.
5. Identified gaps are addressed: Restoration of fencing and ground grid integrity, required gravel to mitigate step potential risks added. LUMA anticipates that 30% of transmission and distribution substation sites will need this work that we project will be completed over a 5-year period.
6. Insulated coverings and other devices to prevent wildlife from climbing, nesting or touching live circuitry (various types of cover-up such as green jacket, as well as off-the-shelf product for most of the cases) are installed at identified substations over a 10-year period.

2.4 Program Activities

2.4.1 Transmission and Distribution System Coordination Studies

1. Ensuring system-wide protection coordination in the T&D System
2. Wide area protection and coordination:
   - Creating guidelines, validating of models, validating coordination, inputting setting data and conducting periodic area studies
   - Reviewing area protection coordination
3. Distribution coordination and fusing criteria (non-SRP):
   - Creation of guidelines and standards for all feeders with a continuous focus on worst-performing feeders
4. Transmission and Distribution planning criteria (non-SRP) – development and periodic refresh of a set of standards and guidelines for:
   - New feeder capacity
   - Mainline capacity
   - Power quality standard (to be made external)
   - Single Line Drawing (SLD) drawing standard (Planning and Operations)
   - Generator interconnection standard (to be made external)
   - Substation capacity standard
   - Rural alternate feeds
   - Distribution voltage limits requirements
   - Guideline for adding new substation breakers
   - Overvoltage risk mitigation
   - Guideline for large urban areas
   - RMS voltage disturbances
   - Voltage unbalance
   - Distribution overhead line capacity
   - Power quality commissioning standard
   - Generator commissioning standard
5. Review of the current asset management strategy compared to current industry practices, including development and implementation of the new plan. ISO 55000 standard will be considered industry best practice for the asset management strategy (non-SRP).

2.4.2 Facilities Grounding Compliance

1. Thorough review of current applicable PREPA standards and comparison with industry codes, regulations, and best practices including IEEE standards
2. Identification and prioritization as applicable, of the changes to current practices, including the development and implementation of a plan to use the new standards. This will lead to identifying and prioritizing the infrastructure changes that may be required.
3. Engineering studies as covered in these programs, such as grounding studies
4. Correction of grounding at identified substations
5. Procurement of required gravel and deployment across facilities
6. Creation of substation testing plan, wildlife protection plan
7. Obtaining internal and contractor resources to complete the work
8. Completion of grounding studies and identify issues
9. Prioritization and completion of repairs/corrections based on level of hazard

10. Prioritization and completion of wildlife protection measures
11. Placing of additional gravel to occur within one year of completing the studies for the specific substations
12. Installation of insulated coverings and other devices to prevent wildlife from climbing, nesting or touching live circuitry

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Improved grounding and the addition of gravel will have a direct impact on the shock and electrocution risk caused by the present condition inside the substation.

This program will also ensure that protection practices and settings are developed to maximize protection effectiveness, remove blind zones, and minimize incident energy (e.g., arc flash).

Objective: Implement Effective Public Safety Practices

The program will also directly affect people external to the substation, keeping them safe if they come into contact with the fences during fault conditions.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

Improves service reliability by reducing wildlife contact caused outages.

With the implementation of new transmission standards, system reliability will improve over time as the standards are field implemented.

This program will increase service reliability because it will help eliminate major cascading outages caused by lack of proper coordination of protective devices.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

Planners and designers will have better processes and guidelines to perform planning activities such as construction of new lines, interconnection of new loads, Distributed Energy Resources (DERs), DG, etc.

Improve operability by studying load transfers, protection and coordination reviews, etc.

Enhanced grounding will reduce operational requirements at work sites that would otherwise have been required to protect workers.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

Repaired grounding and additional gravel will correct problems caused by hurricanes.

The enhanced transmission standards and studies will improve resiliency as they are field implemented by reducing outages and decreasing time of system restoration due to fewer electrical faults.

The enhanced distribution standards and studies will help to restore damaged infrastructure and improve resiliency as they are field implemented

2.6 Program Risks

1. Improperly protected transmission and distribution systems can cause dangerous potential hazards during electric system faults and other system abnormalities
2. There is also a risk of injury, possibly fatal, to anyone adjacent to deficient facilities during such conditions
3. Substations whose grounding is not corrected can be an immediate risk to the public and employees under fault conditions. This hazard can also be created by induced voltages and phase to neutral load imbalances.
4. Lack of animal guards on high-voltage equipment not only endangers wildlife but reduces the reliability of service.

5. Engineering Studies: Electric disturbances can cause a cascade effect affecting customers and equipment (damage) if the proper wide-area protection study is not completed. This study is even more important for a system that is adding significant DERs. The studies are directly related to the stability of the power grid and the optimization of resources. Without implementation, inefficient management of assets and resources will continue because of the lack of a proper and optimized Asset Management Plan and adequate Transmission Planning Criteria.
6. Inability to meet applicable legal requirements, policies or standards.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$11.3**	**$12.5**	**$11.9**	**$59.1**
SRP Expenditures	**$10.0**	**$11.7**	**$11.3**	**$24.4**

3.2 Program Resource Requirements

CONFIDENTIAL

3.2.1 System Coordination Studies

1. Wide area protection and coordination (Distribution)– 15 full-time senior level employees for the first 2 years of development and 0.5 full-time senior employee on an ongoing basis
2. Wide area protection and coordination (Transmission)– 16 full-time senior level employees for years 3 and 4 and 0.5 full-time senior employee on an ongoing basis
3. Distribution coordination and fusing criteria – One full-time senior level employee for the first year and 0.5 full-time senior level employee on an ongoing basis
4. Distribution planning criteria – eight full-time senior level employees for the first 2 years of development and 0.5 full-time senior level employee on an ongoing basis

3.2.2 Facilities Grounding Compliance

1. Internal and external contractor resources will be used to develop the required documentation and studies
2. Three engineers (two engineering technicians and one surveyor) will be assigned for each year of the program (carry out studies and plan the work)
3. Both internal and external contractors will be used to make necessary repairs.
4. Enough suitable gravel to fulfill program needs

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

3.3.1 System Coordination Studies

1. Estimates for engineering resources prepared based on previous experience, which includes the development of similar standards with other utilities
2. Currently assuming use of internal resources. If it becomes necessary to supplement with consultants, the average labor costs may increase.

3.3.2 Facilities Grounding Compliance

CONFIDENTIAL

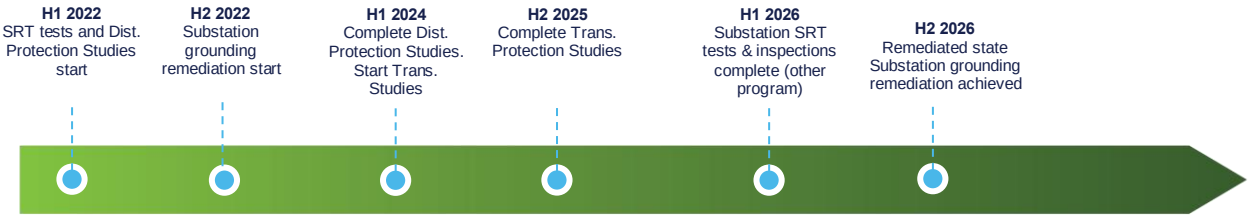
FOR DISTRIBUTION SITES

1. Details of the current state of the grounding systems in the distribution system is not known due to lack of recorded information. An evaluation of electrical facilities will be required to determine the actual state before remedial plans can be implemented. The standards to be used are those outlined in IEEE Std 80- IEEE Guide for Safety in AC Substation Grounding which provides industry guidance on best practices for substation grounding.
2. Program for Grounding with a total cost of $22.6M
3. Gravel cost estimated at $1.1M
4. Animal Mitigation costs estimated at $10.6M

FOR TRANSMISSION SITES

1. Estimates are based on previous experience, adjusted for local conditions.
2. Studies related to existing grounding systems and remediation were estimated at $7M and implementation costs were estimated at $19M
3. Gravel for Transmission and Sub-Transmission Sites estimated at $6.4M
4. Animal mitigation estimated at $8.4M

3.4 SRP Program Timeline & Milestones



Physical Security for Distribution Facilities

1.0 Program Description

This program is targeted at the physical security of distribution facilities by replacing and repairing gates and fencing around substations. It also addresses provision of locks for distribution switches and pad mount transformers in the field and meter locks at customer metering points.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

2.4 Program Activities

CONFIDENTIAL

[redacted]

Physical Security for Distribution Facilities

2.5 Program Benefits

CONFIDENTIAL

[redacted]

Physical Security for Distribution Facilities

CONFIDENTIAL

[redacted]

2.6 Program Risks

CONFIDENTIAL

[redacted]

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$3.0**	**$3.0**	**$3.0**	**$5.2**
SRP Expenditures	$2.5	$2.5	$2.5	$2.5

3.2 Program Resource Requirements

CONFIDENTIAL

The resources required to implement these programs are mainly workers and contractors for fence installation, and the appropriate tools and equipment for authorized locking devices.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Cost estimates were based, in general, on averages for quantity as little recorded data exists regarding which facilities need attention. These estimates will be refined as more data becomes available.

Cost estimates for locks and locking devices were based on unit count multiplying by purchased cost and estimated time to install.

For fences, the costs were based on the average estimated cost of damage multiplied by the number of substations.

3.4 SRP Program Timeline & Milestones

Transmission Substation T&G Demarcation

1.0 Program Description

This program focuses on the demarcation requirements for T&G assets. The demarcation between PREPA's generation assets and the T&D System is required under the OMA, specifically the Scope of Services as set forth in Annex I.

The demarcation must include high accuracy metering[1] to accurately measure power generation into the network and facilitate communication with the system operator. The accurate measurement will provide transparency of total net power generation and energy losses to the network. The demarcation must also be defined in a non-complicated manner to provide LUMA and GenCo operators sufficient clarity regarding the separation of assets to prevent mis-operation, and subsequent damage to equipment and / or system outages.

This program is subject to change based on the recommendations from the Sargent and Lundy Demarcation Study and the plant retirement projections called for in the IRP.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Currently, PREPA is a vertically integrated entity with shared assets between generation and the T&D System without a proper high accuracy metering scheme. This presents challenges to creating a clear point of interconnection and a simple and uniform electrical and physical demarcation between PREPA's generation assets and those that comprise the T&D System.

The substation transformer, breakers and protection schemes were not designed nor are physically located as separately controlled assets with different operators. A shared facility operation agreement will need to be established as part of the overall operating agreement between LUMA and GenCo to address the operation of the high voltage equipment and associated protection schemes, as well as key liability, maintenance and system control issues.

Further driving the need for this program, the OMA Annex I, Section II(G), specifies that LUMA is responsible for the development of necessary interconnection agreements, identification of the interconnection demarcation points, and a work plan to delineate generator interconnection for new plants.

LUMA has made the following assessments regarding the current state of the interconnection points between the T&D System and PREPA's six major thermal generating plants (Costa Sur, San Juan, Palo Seco, Cambalache, Mayaguez, Aguirre) and the peaking / hydro plants:

[1] High Accuracy Metering is defined as a total metering system, including meters, CTs, PTs with a recommended aggregate accuracy within one percent where possible.

Transmission Substation T&G Demarcation

- Demarcation supports compliance with SOP, contributing to system control and operation. The high accuracy metering, separation and operating agreement will need to specify proper separated interactions under normal and emergency conditions for LUMA to respond to events.

- A mis-operation without proper metering and communication with the system operator of the current protection scheme could place LUMA in a high-risk position should the following conditions apply:

    - An outage at the demarcation point could potentially be widespread, affecting critical customers, for long durations. With no clear delineation of assets and responsibilities, response times will be extended and corrective actions will be unclear.
    - Inaccurate metering that is not high accuracy metering compliant, resulting in unbalanced energy interactions and corresponding financial, system operation and commercial risk as well as an inability to accurately determine technical and non-technical losses. It could also result in inaccurate actual generation and energy injected information, with a cascading effect on system operations.

For the reasons stated above this program is included in the SRP.

2.2 Description of Remediated State

In the remediated state, PREPA's major generation plants, peakers, and hydro plants and the T&D System will be demarcated as identified in the interconnection and shared services agreements with each power plant as required under the OMA Annex 1, Section II(G) and will also have high accuracy metering installed to measure the energy flowing into the T&D System.

Electrical interconnection operating agreements will exist between the power plant operator and LUMA for each unit within the power plant. New revenue class meters will be installed, replacing the existing non-revenue meters. The interconnection and operating agreements and the addition of high accuracy metering will reduce the risk of (but not eliminate) control errors that can lead to mis-operation.

Separate, yet shared site access to maintain transmission switchyard assets will exist at the major PREPA generation facilities hydro units and peakers

The demarcation and installation of high accuracy metering will be performed on all generation units. At this time, the program's estimated cost includes replacing the non-revenue meters with revenue meters and entering into interconnection and shared services agreements.

2.3 Description of Program Completed State

The remediated state of replacing the non-revenue meters with revenue meters and entering into interconnection and shared services agreements represents a completed separated demarcation state.

2.4 Program Activities

- Initiate discussions between LUMA and the operator of all PREPA generation units to identify the demarcation points and install revenue meters based on their size and retirement projections
- Prioritize installation of high accuracy metering where it makes sense in sequencing the work
- Define the high accuracy metering and demarcation projects and schedule based on priority, budget and operational impact

Transmission Substation T&G Demarcation

- Develop an operational agreement at all interconnection points to mitigate risk of mis-operation
- Train personnel and document training to avoid sole reliance on institutional knowledge (training requirements for LUMA and GenCo will be part of the operating agreement)
- Perform detailed engineering and construction means and methods to mitigate outage impacts

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

Enhancements to the existing power plant substations (GenCo assets) will have a positive impact on system integrity and will attract new generation siting as part of the renewable and energy storage plan forecasts in the approved IRP.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Improve Resilience of Vulnerable Infrastructure

Transmission Substation T&G Demarcation

Enhancement to the existing power plant substation will have a positive impact on system integrity by optimizing system control and operation which will enhance generation and transmission integration responding to events.

2.6 Program Risks

The risks of not implementing this program include:

- Lack of clear operating responsibility for assets not divided between LUMA and the GenCo
- Higher operational risk and potential damage of major equipment
- Higher risk of worker errors, leading to mis-operation
- Lower substation reliability and resiliency

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

The intermediate high accuracy metering and agreements program will start in 2022 with a completion date in 2024.

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.5**	**$2.5**	**$3.0**	**$0**
SRP Expenditures	$0.5	$2.5	$3.0	$0

3.2 Program Resource Requirements

CONFIDENTIAL

- Contract labor: The majority of projects will be EPC

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

The interim program cost estimates for replacing the eexisting meters with high accuraacy meters on all thermal, hydro and peaking units and enter into agreements:

- Communication with the system operator is accomplished via cable connection from meter to master station, remote terminal units (RTUs), etc.
- The new revenue meter fits in the same location as the existing non-revenue meter with minor modifications.
- Existing wiring is in good status. New wiring included in the estimate is for communication purposes.

The program cost estimates were based on the following factors and elements:

- Sage estimating software is used to determine material, labor, equipment, engineering, and project management as the direct charges. Indirect charges consisting of overheads, taxes, profit, etc., are estimated along with contingency based on maturity of the project.
- Sargent and Lundy (S&L) Report for Demarcation of PREPA Generation Assets from the Transmission and Distribution System, TD-0003, dated October 2019
- Power plants' electrical single line diagrams were gathered covering all thermal, peaking and hydro generation units and utilized as a base for evaluating the feasibility of demarcation.
- Labor cost is based on US labor costs with increased overheads to account for contractor housing and overseas travel. Taxes were included. All costs are for year 2020.
- Project contingency is 30 percent based on maturity level or AACE® International Estimate Class 3 Cost estimate.
- In addition to maturity or project definition, estimate accuracy is also driven by estimator's experience and skill level, familiarity with the technology, and time and effort budgeted to prepare the estimate.

There are no gaps for the intermediate program of installing revenue meters and entering into agreements.

3.4 SRP Program Timeline & Milestones

outages. This program is subject to change based on the recommendations from the Sargent and Lundy Demarcation Study and the plant retirement projections called for in the IRP.

6.5 Control Center and Buildings Portfolio

Tables 6-9 and 6-10 below presents total and annual control center and buildings portfolio spending estimates by SRP program, followed by a short description of each SRP program.

Table 6-9: Total Control Center and Buildings Portfolio Spending Estimates by Program ($ millions, real)

Control Center and Buildings Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
Facilities Development & Implementation	270.1	11.3	281.5
Critical Energy Management System Upgrades	40.7	58.0	98.7
Control Center Construction & Refurbishment	34.0	9.0	43.0
Critical System Operation Strategy & Processes	0.6	0.6	1.3
Critical Energy Management & Load Generation Balancing	0.8	41.2	42.0
Grand Total	**$346.2**	**$120.1**	**$466.3**

Table 6-10: Annual Control Center and Buildings Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Control Center and Buildings Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
Facilities Development & Implementation	14.8	16.3	14.9	18.5	21.0	24.1
Critical Energy Management System Upgrades	0.7	1.0	18.6	18.6	21.4	21.4
Control Center Construction & Refurbishment	1.0	1.0	17.0	17.5	16.1	21.1
Critical System Operation Strategy & Processes	0.6	0.9	-	0.2	-	0.2
Critical Energy Management & Load Generation Balancing	0.4	0.7	0.4	0.4	-	0.2
Grand Total	**$17.4**	**$19.7**	**$50.9**	**$55.2**	**$58.5**	**$66.9**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

Facilities Development & Implementation. This program is focused on the development, implementation, and maintenance of several different areas overseen by the Real Estate, Facility Services and Architectural divisions, including:

- Construction required to remediate facilities and real property (e.g., warehouses, mechanic shops, etc.) damaged by natural disasters
- Implementation of a facility capital improvement program
- Implementation of an asset management system to support facility maintenance and the preventative maintenance program
- Deployment of robust security devices and systems
- Development and implementation of a tenant services program
- Development and implementation of safety training programs for Facilities employees
- Planning and construction to delineate space between LUMA and the GenCo

Critical Energy Management System Upgrades. This program will replace an obsolete and unsupported EMS and add relevant technology to operate the electric system safely and reliably. This program will also implement an Advanced Distribution Management System (ADMS). The EMS is a computer-based system that is used by operators to monitor, control and optimize the performance on the generation, transmission and distribution system.

Control Center Construction and Refurbishment. This program is targeted at construction or refurbishment of buildings to house the main and back-up control centers and all ancillary support services. Since the current control centers have fallen into disrepair, this program will rebuild or relocate them, along with establishing a designated backup control center. At the same time, the program will centralize more control center activities.

Critical System Operation Strategy and Procedures. This program will develop all the procedures and strategies necessary to operate the electrical system reliably and efficiently. This includes procedures and strategies associated with managing blackstarts, load shedding, outage management, transmission lines, substations, distribution and deployment of the Outage Management System. Procedures developed will be consistent with the System Operation Principles including the implementation of Estimated Times of Restoration for customers.

Critical Energy Management & Load Generation Balancing. This program will develop capabilities related to energy management and load / generation balancing. This includes development of strategies and mechanisms for energy balancing and the establishment and implementation of a strategy for operating reserves. Additionally, the program will address technology needs to efficiently manage renewable energy, battery storage and demand response programs, along with defining the role of microgrids within the electrical system as required by the IRP.

Facilities Development & Implementation

1.0 Program Description

This program is focused on the development, implementation, and maintenance of several different areas overseen by the Real Estate, Facility Services and Architectural divisions, including:

- Construction required to remediate facilities and real property (e.g., warehouses, mechanic shops, etc.) damaged by natural disasters
- Implementation of a facility capital improvement program
- Implementation of an asset management system to support facility maintenance and the preventative maintenance program
- Deployment of robust security devices and systems
- Development and implementation of a tenant services program
- Development and implementation of safety training programs for Facilities employees
- Planning and construction to delineate space between LUMA and the GenCo

2.0 Program Rationale

2.1 Current State & Identified Gaps

PREPA's current commercial real estate portfolio consists of:

- 23 warehouses that support T&D operations and customer service
- Four plant warehouses
- 24 mechanic shops
- One helicopter hanger
- One control center
- One backup control center
- 45 technical offices
- 39 commercial offices
- 31 former offices that have been closed
- Five corporate offices
- 23 properties where PREPA is the landlord

The Facility Services and Real Estate department is comprised of four divisions that are siloed. There are no established workflows or practices documented showing inter-departmental collaboration. Facilities management is decentralized across Puerto Rico. 16 out of 197 properties are maintained by the PREPA Facilities team. The remaining 181 facilities are managed independently. LUMA plans to implement a centralized facilities management model to maximize economies of scale.

Significant gaps were identified within the Real Estate, Facilities Services and Architectural divisions during the gap assessment:

- PREPA lacks the experience, programs, processes, training, tools, equipment, assets and infrastructure to adequately, efficiently and safely operate and maintain building assets.
- Existing facilities, fences, security infrastructure and yards are significantly damaged from the hurricanes, lack regular maintenance or capital replacement programs and present employees with unsafe or uninhabitable conditions.
- PREPA is not currently compliant regarding OSHA regulations, the International Fire Code, fire services features, fire protection and life safety systems and building services and systems.
- Certain facilities or properties may be in a hazardous or an environmentally unsafe condition and/or contain hazardous and unsafe materials or products.
- Baseline data to measure key performance indicators, internal benchmarking, service requests and closeout rates are unavailable. There are no observed measurements of performance in any area of Real Estate or Facility Services.

2.2 Description of Remediated State

In the remediated state, the following will have been achieved:

- Construction on sites with damage caused by hurricanes, flooding and earthquakes will have been completed with certificates of inspections and occupancy that meet building code and municipality regulations.
- Upgrades to life, fire, safety, security systems and physical barriers and equipment will have been locked or tagged out, inspected and repaired, providing certificates of approval that meet building code and municipality regulations.
- Site abatement and remediation or legal containment for hazardous materials will have been carried out.
- The organization will have become compliant with all local, commonwealth, federal laws and regulations and training requirements and certifications.

2.3 Description of Program Completed State

The following are aspects of the program completed state:

- The department will be lean, agile, accurate, redundant and able to meet the forthcoming changes required to meet Act 17 renewable energy targets.
- Safety will be embedded in the organization's operating procedures and all equipment will support/enhance a safe working environment.
- Facilities will meet all building code requirements, will be able to adequately support the needs of the organization and be prepared against natural disasters.
- The department will be centralized working collaboratively with internal stakeholders.
- Decisions will be data driven and evidence based, relying on established benchmarks, key performance indicators and industry standards.
- The service requirements of the organization will be exceeded in steady state or emergency operations while remaining fully compliant with all local, commonwealth and federal laws and regulations.
- Assets damaged due to hurricanes such as furniture, building systems, parts and components will have been decommissioned or retired.

Facilities Development & Implementation

2.4 Program Activities

- Development of Real Estate and Facility Services bid, build, design processes, templates and standards. These will be controlled by governing boards comprised of select parties within the organization
- Conducting health checks and sustainability inspections per commercial site
- Carrying out asset compilation of building systems and components, studies of remaining useful life and required capital improvements per commercial site
- Procurement of services and materials to perform repairs/improvements to remediate and reconstruct facilities. Deficiencies include repairs to roofs, walls, drainage, overhead cranes, fences, yards, water distribution systems, internal and external lighting, generators, HVAC, doors, windows and shutters.
- Remediation or legally compliant containment of any hazardous materials found on the properties or within the facilities
- Installation and activation of CCTVs, intrusion detection systems, centralized and company-wide card access systems
- Development of preventative maintenance, training and educational programs to ensure safe work practices are employed across the organization
- Instituting programs and services that promote healthy and safe working conditions for personnel within the facilities across the organization

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Indirect
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Indirect
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☐ Restore Damaged Grid Infrastructure	
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☒ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	

Facilities Development & Implementation

Primary Goals	Objectives	Direct or Indirect Impact
	☒ Enable the Sustainable Energy Transformation	Indirect
☒ **Other**	☒ Other: Environmental	Indirect

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Real Estate and Facility Services employees will have the expertise, training, equipment and knowledge to perform safe work within the facilities.

Any identified hazardous materials will have been remediated or otherwise legally contained and safeguarded.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability
Objective: Deliver Electricity at Reasonable Prices

This program will enable the organization to focus on its core functions delivering service to the customer with greater reliability, at a lower cost, with greater efficiency and a lower safety risk.

Procuring materials and services through an economies of scale model, removing costs from supply chain processes and reducing material unit prices will reduce overall service costs.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

Implementation of defined procedures, processes and performance measurement as well as technology implementation will improve efficiency and allow for data driven decisions. This will also allow employees to execute operations more efficiently.

Objective: Pursue Project Delivery Excellence

Increased facility repairs and maintenance through a centralized team to improve execution of capital projects and reduce risk.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

Enable the execution of critical projects that replace and restore critical infrastructure within yards and facilities, thus allowing for more effective deployment of federal funds.

Objective: Improve Resilience of Vulnerable Infrastructure

This program allows for more efficient replacement and repair of facility systems and their components to prepare for and withstand natural disasters.

Facilities Development & Implementation

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Enable the Sustainable Energy Transformation

These programs help to reduce energy consumption rates within facilities by introducing energy efficiency programs and sustainability initiatives. As such, these programs ensure system infrastructure is rebuilt to accommodate a higher penetration of intermittent distributed resources.

PRIMARY GOAL: OTHER

Objective: Other: Environmental

These programs reduce liability and risk by completing HAZMAT programs and implementing policies and procedures related to acquisition, construction, refurbishment, decommissioning or remediation of real estate and real property.

2.6 Program Risks

RISKS OF DELAYING THE PROGRAM

- Non-compliance with International Building Code
- Loss of life or asset(s) or personal injury due to failed or unavailable life, fire, safety systems or failure to legally contain or remove hazardous substances.
- Loss of life or personal injury due to untrained employees or unsafe work practices
- Risk to meeting fiscal control metrics and internal audits: No visibility of spend, unexecuted lease contracts, run to fail buildings approach
- Increase in employees lost time for unhealthy working conditions
- Insurance and liability risks for faulty building systems and components
- Capital investment could be exponential should another natural disaster occur prior to remediation

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$16.3**	**$18.5**	**$24.1**	**$222.6**
SRP Expenditures	$14.8	$14.9	$21.0	$219.4

3.2 Program Resource Requirements

CONFIDENTIAL

Each project within the program will have its own resource requirements to be identified as part of a project plan. In general, the program will require resources to be hired internally as well as external contractors to complete work required.

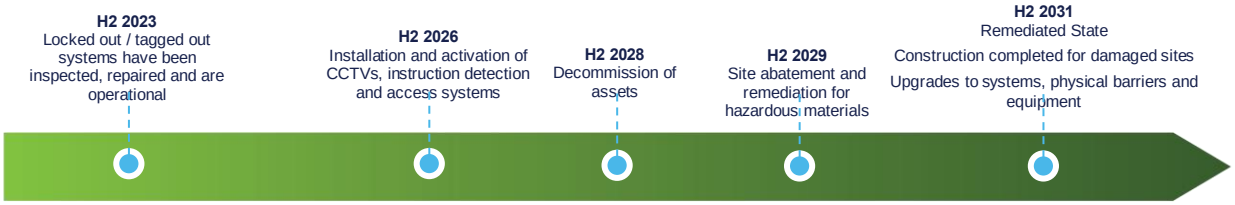
3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Estimating Method/Assumption: (Estimate template available if required)

- Researched materials and equipment costs
- Researched construction costs per square foot for green field, brown field, commercial, residential property types
- Researched vendor labor rates
- Used industry and market average rates for utility consumption estimates
- Assumed loaded hourly rates for full-time employees for employee training
- Used comparable historical proforma costs for facility maintenance and tenant services
- Used comparable historical costs for capital improvement programs

3.4 SRP Program Timeline & Milestones



Critical Energy Management System Upgrades

1.0 Program Description

This program will replace an obsolete and unsupported EMS and add relevant technology to operate the electric system safely and reliably. This program will also implement an ADMS. The EMS is a computer based system that is used by operators to monitor, control and optimize the performance on the generation, transmission and distribution system.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

Critical Energy Management System Upgrades

2.4 Program Activities

CONFIDENTIAL

[redacted]

2.5 Program Benefits

CONFIDENTIAL

[redacted]

Critical Energy Management System Upgrades

[redacted] CONFIDENTIAL

[redacted]

2.6 Program Risks CONFIDENTIAL

- [redacted]

3.0 Program Funding & Timeline CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.0**	**$18.6**	**$21.4**	**$57.7**
SRP Expenditures	0.7	18.6	21.4	—

3.2 Program Resource Requirements CONFIDENTIAL

LUMA will need a project team and a consultant to support the implementation of this program. LUMA will bring on new people to be trained to use the modernized system and be the support team for the next decade (this project will be managed in collaboration with our IT/OT group).

Critical Energy Management System Upgrades

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

LUMA obtained a high-level estimate from IBM for replacement of the existing EMS.

The cost estimates will be adjusted as more detailed information becomes available.

3.4 SRP Program Timeline & Milestones

Control Center Construction & Refurbishment

1.0 Program Description

This program is targeted at construction or refurbishment of buildings to house the main and back-up control centers and all ancillary support services. Since the current control centers have fallen into disrepair, this program will rebuild or relocate them, along with establishing a designated backup control center. At the same time, the program will centralize more control center activities.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

[redacted]

2.4 Program Activities

CONFIDENTIAL

[redacted]

2.5 Program Benefits

CONFIDENTIAL

[redacted]

Control Center Construction & Refurbishment

CONFIDENTIAL

[redacted]

2.6 Program Risks

CONFIDENTIAL

[redacted]

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.0**	**$17.5**	**$21.1**	**$3.5**
SRP Expenditures	1.0	17.0	16.1	—

3.2 Program Resource Requirements

CONFIDENTIAL

LUMA will need a project team and varied expertise throughout the project.

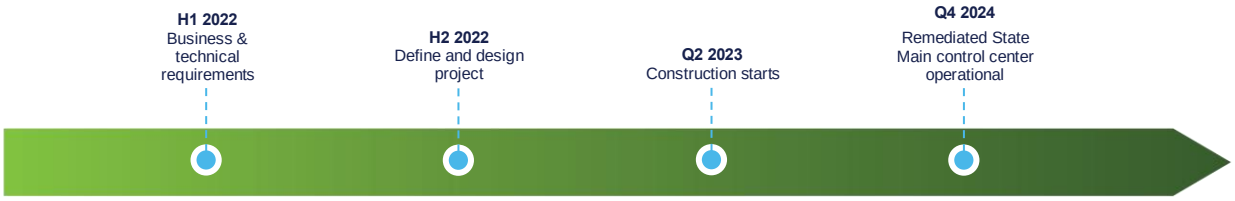
3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Estimation was performed by LUMA's real estate group based on cost per square foot and general requirements. LUMA also obtained an order of magnitude estimate from a consultant that substantially agreed with internal estimates.

This estimate is based on the construction of two new facilities (main control center and back up control center). LUMA is also looking at options to utilize existing buildings that will need renovation or remodeling, and/or renting existing buildings. These options could be less costly and will be part of the initial program assessment.

3.4 SRP Program Timeline & Milestones



Critical System Operation Strategy & Processes

1.0 Program Description

This program will develop all the procedures and strategies necessary to operate the electrical system reliably and efficiently. This includes procedures and strategies associated with managing blackstarts, load shedding, outage management, transmission lines, substations, distribution and deployment of the Outage Management System. Procedures developed will be consistent with the System Operation Principles including the implementation of Estimated Times of Restoration for customers.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Currently PREPA does not have any documented procedures to operate the electric system. Although PREPA does not fall under the jurisdiction of North American Electric Reliability Corporation (NERC), this is a minimum requirement of any utility operation as indicated in the NERC requirements and guidelines (references for industry standards). Currently, operations processes and other knowledge are transmitted informally by experienced employees to others. This method often results in an apparent erosion of institutional knowledge, and expertise is highly individualized. To ensure meeting minimum requirements to operate the system, LUMA will develop a full set of documented procedures that are industry practice for system operations.

2.2 Description of Remediated State

Some procedures are more critical than others and this program will prioritize them accordingly. These procedures are the blackstart, outage management and load shedding. They are required under the System Operation Principles and necessary to ensure the reliability of the system, and safety of employees and the public, therefore they are included in the SRP.

This program will follow the principles set forth in the OMA, Act 17, and Act 57, and will be remediated once the blackstart, outage management and load shedding processes have been developed, tested and adjusted and employees have been formally trained in these processes.

2.3 Description of Program Completed State

In the program completed state, LUMA will have a documented and regimented complete set of procedures to operate the electric system. Employees will be formally trained in these procedures, eliminating key man risk caused by dependence on experienced employees passing knowledge on informally.

2.4 Program Activities

- List all required operating procedures, working with experienced employees and using third party expertise where necessary. LUMA's System Operation Principles will be the overarching principles upon which these procedures will be based.

Critical System Operation Strategy & Processes

- Prioritize development based on procedures' importance
- Develop the procedures working with current operators and engineers and third party expertise as necessary
- Develop plan to enhance outage management plan that connects to customer service interface in real time
- Develop and implement reliability standards

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Indirect
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Having appropriate procedures and enforcing them can have a major positive impact on the safety of field workers. A set of rules that is understood and followed by all will help to ensure employee safety.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

Critical System Operation Strategy & Processes

Having procedures and following them in a difficult situation can help to avoid mistakes leading to service interruptions. Service reliability will benefit from this.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

Having procedures in place, in accordance with Annex I, Section 1(A)(8) and Section 1(B)(6) of the OMA, will ensure standardization of how operations are carried out throughout the system and will provide individual operators with the right tools to make the right decisions when in doubt.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Improve Resilience of Vulnerable Infrastructure

In the event of an approaching weather disturbance, having procedures in place will allow the operators to perform actions (re-route power, adjust dispatch configuration, take elements out of service, etc.) ahead of time and configure the system in a way that will minimize the impact of the storms, increasing system resiliency.

2.6 Program Risks

- The ongoing erosion of knowledge will eventually lead to an inability to operate the system safely and reliably.
- Not having procedures does not provide a benchmark or a reference to measure or assess performance of people and assets. This makes it difficult to develop a culture of improvement. It also leads to making incorrect decisions or improvising with potentially bad results.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.9**	**$0.2**	**$0.2**	—
SRP Expenditures	$0.6	—	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

- LUMA operators and engineers
- Third-party consultants

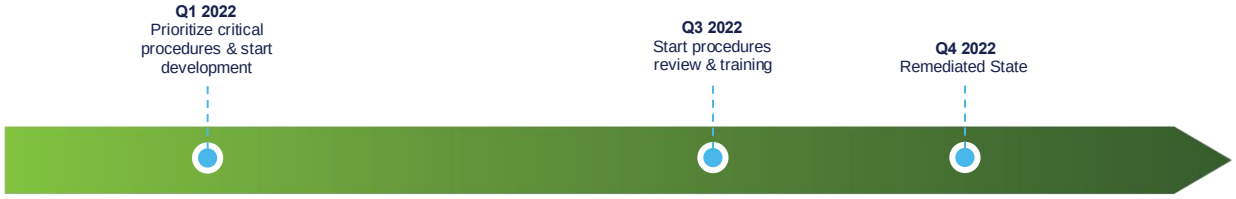
3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Project costs were estimated on a rate per hour basis. Hours were estimated based on the experience of the SMEs.

Critical System Operation Strategy & Processes

3.4 SRP Program Timeline & Milestones



Critical Energy Management & Load Generation Balancing

1.0 Program Description

This program will develop capabilities related to energy management and load / generation balancing. This includes development of strategies and mechanisms for energy balancing and the establishment and implementation of a strategy for operating reserves. Additionally, the program will address technology needs to efficiently manage renewable energy, battery storage and demand response programs, along with defining the role of microgrids within the electrical system as required by the IRP.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

[redacted]

[redacted]

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

2.4 Program Activities

CONFIDENTIAL

[redacted]

2.5 Program Benefits

CONFIDENTIAL

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

2.6 Program Risks

CONFIDENTIAL

[redacted]

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.7**	**$0.4**	**$0.2**	**$40.7**
SRP Expenditures	0.4	0.4	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

Resources to complete this program will be LUMA engineers, consultants and vendors.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

The program costs were estimated on a rates per hour basis. Hours were estimated based on experience of LUMA subject matter experts associated with the program.

For the new technology, costs are estimated as an order of magnitude based on SME experience and discussions with industry experts. These estimates will need to be refined once the scope is more precisely defined.

3.4 SRP Program Timeline & Milestones

6.6 Enabling Portfolio

Tables 6-11 and 6-12 below presents enabling portfolio spending estimates by SRP program, followed by a short description of each SRP program.

Table 6-11: Total Enabling Portfolio Spending Estimates by Program ($ millions, real)

Enabling Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
Vegetation Management	290.0	30.7	320.7
T&D Fleet	142.9	223.8	366.8
Tools Repair & Management	19.9	27.7	47.6
HSEQ and Technical Training	38.0	91.8	129.9
Asset Data Integrity	53.6	31.5	85.1
Permits Processes & Management	2.7	3.9	6.6
Workflow Processes & Tracking	2.8	34.3	37.2
Materials Management	4.1	20.4	24.5
Operator Training	0.5	0.2	0.7
Grand Total	**$554.6**	**$464.4**	**$1,019.0**

Table 6-12: Annual Enabling Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Enabling Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
Vegetation Management	50.0	50.0	60.0	60.0	60.0	60.0
T&D Fleet	48.4	48.4	24.4	24.4	28.6	28.6
Tools Repair & Management	10.9	10.9	3.2	3.2	5.9	5.9
HSEQ and Technical Training	9.9	9.9	10.0	10.0	8.6	8.6
Asset Data Integrity	5.8	6.2	10.9	11.3	9.8	10.2
Permits Processes & Management	0.9	2.2	0.9	2.2	0.9	2.2
Workflow Processes & Tracking	1.1	1.4	1.2	1.3	0.5	0.6
Materials Management	0.7	1.0	0.7	2.2	2.6	4.3
Operator Training	0.3	0.3	0.3	0.5	-	-

Grand Total	**$127.9**	**$130.1**	**$111.5**	**$115.0**	**$117.0**	**$120.4**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

Vegetation Management. This program includes work to abate or mitigate immediate vegetation risk in the most critical locations, along with an ongoing program to clear and re-establish rights-of-way (ROWs) to standard widths. This includes an immediate response for the highest risk sites, along with reclaiming rights-of-way corridors (especially those impacting the transmission and distribution systems). The program will also use a field enabled IT tool to manage the vegetation management program, along with ongoing line clearance, pruning, tree removal, herbicides, etc. and vegetation management training. In addition, the program will evaluate and pilot an advanced artificial intelligence (AI) remote sensing project to improve vegetation management.

T&D Fleet. The T&D Fleet program includes a range of activities and investments to bring the current fleet up to industry standards including vehicles, aircraft and equipment. Additionally, activities will be focused on initializing and improving processes for data collection, repair and maintenance of these assets.

Tools Repair & Management. This program focuses on a personal protective equipment (PPE) and tooling plan to address safety needs along with putting in place a better system for managing PPE and tools. In addition to acquiring the needed PPE and tools, this program includes implementation of a centralized Tool and Equipment Crib system to improve inventory management, tool maintenance, tool supply and coordination and oversight of tool and equipment use.

HSEQ & Technical Training. This program provides health, safety, environment and quality (HSEQ) and technical training to field personnel. During the initial stage, basic technical training will be provided through the LUMA College and HSEQ training conducted by internal subject matter experts and external providers. Personnel will gain technical skills training for field employees to become fully qualified to complete their work safely and efficiently. Subsequent enhanced technical training will be provided through the LUMA College. Enhanced training modules will be developed and administered based on operational needs for the type of technology being implemented but could include areas such as operation of smart grids, work on energized lines (e.g., hot line and barehand programs), splicing of conductors and helicopter work for transmission repairs. This program will help to instill a new safety culture across the T&D System, thus reducing safety incidents, bringing the T&D System into compliance with Contract Standards, including but not limited to OSHA and broader industry standards and improving overall employee efficiency.

Asset Data Integrity. This program is targeted at assuring the integrity of key asset data, with a focus on GIS and Computerized Maintenance Management System (CMMS). The program works with stakeholders to identify data requirements, determine process and templates for storing data and update asset data systems with data gathered from asset inspections. These systems and the integrity of their information are fundamental for accurate modeling, operations and planning of the T&D System.

Permit Processes & Management. LUMA will introduce new systems for managing operational permits to enable the system to comply with permit obligations and to provide support for federal funding requirements. The program will develop new procedures so that responsible parties have the tools to meet permit obligations and identify additional necessary permits, along with introducing training programs to allow those procedures to be implemented effectively. As part of this program, LUMA will

continue to engage with government agencies to adhere to any adjusting permitting procedures or requirements to be implemented after commencement.

Workflow Processes & Tracking. This program includes several initiatives that address gaps between current state and standard industry methods, practices, and processes to manage, track, and report progress on the performance of work in the field. Specific areas include:

- Establishing proper and safe maintenance regimens (preventive, planned and unplanned corrective, and emergency repairs)
- Adherence to design, maintenance, and construction standards,
- Implementing proper inspection and testing procedures,
- Key Performance Indicators (KPIs) / Metric performance management with a focus on measuring and driving improvements in work quality, effectiveness, and efficiency, and
- Implementing technologies to reduce cycle time in identifying and remediating any performance anomalies while concurrently supporting the Asset Management function.

Materials Management. This program covers all aspects of materials management and includes management of:

- Asset recovery
- Oil containment
- Inventory management
- Asset suite reconfiguration
- Demand training
- Implementation and measurement of KPIs related to materials
- Capital plans for material handling and warehousing storage and facility improvements
- Logistics function and related equipment
- Material evaluation and disposition

Operator Training. This program will provide all necessary requirements to support new and existing system operator training along with operator competency assessments. As such, the program will address the need to improve current operator training and allow for new cohort(s) of operators to support the system. This will also improve operator response during an emergency situation.

Vegetation Management

1.0 Program Description

This program includes work to abate or mitigate immediate vegetation risk in the most critical locations, along with an ongoing program to clear and re-establish ROWs to standard widths. This includes an immediate response for the highest risk sites (those that pose hazards to public safety or routinely experience tree-caused service interruptions), along with reclaiming rights of way corridors (especially those impacting the transmission and distribution systems). The program will also use a field enabled IT tool to manage the vegetation management program, along with ongoing line clearance, pruning, tree removal, herbicides, etc. and vegetation management training. In addition, the program will evaluate and pilot an advanced AI remote sensing project to improve vegetation management.

2.0 Program Rationale

2.1 Current State & Identified Gaps

There is no centralized team with the responsibility and authority for maintaining vegetation and managing vegetation-related processes in the existing T&D System, and thus there is no regular vegetation management program in place. In-house employees and contractors do not operate using the most up-to-date utility vegetation management industry standards and best management practices.

Vegetation maintenance has largely been deferred, with the vegetation maintenance work being performed by in-house personnel conducting predominantly reactive or corrective maintenance (a.k.a., “hot spotting”). Some preventive vegetation maintenance work is being performed by contractors working under PREPA’s PMO.

Current pruning practices are not very effective, mostly resulting in excessive regrowth and wounding of trees, which increase the likelihood of structural failure.

Many personnel rely on the use of machetes and do not have access to more useful tools. The equipment that is used by in-house personnel is in poor repair, without the use of specialized vegetation management equipment. There is little use of herbicides and no use of tree growth regulators. The lack of appropriate tools and equipment contributes to low productivity of in-house personnel.

Insufficient tree clearance and lack of vegetation maintenance in general is a significant contributor to system unreliability, especially in extreme weather events such as hurricanes. This also creates a public safety hazard- directly in the form of fallen wires or children climbing trees too close to energized lines and indirectly in the form of power outages.

These findings indicate possible failure to meet applicable legal requirements, policies or standards or the OMA requirements including Prudent Utility Practice. Specifically, these are:

- Act 57-2014, providing that PREB will oversee the compliance of the T&D operator with a vegetation plan in accordance with industry best practices

- Act 17-2019, which establishes priorities for the maintenance of infrastructure of the electric system and create vegetation management plans)
- The OMA which requires LUMA to implement a vegetation management plan in accordance with Prudent Utility Practice and applicable laws.

2.2 Description of Remediated State

In the remediated state, the following will apply:

- A centralized vegetation management team will have been created and staffed by professionals who will establish procedures and practices aimed at eliminating public endangerment and promoting a safe and efficient work environment.
- The reestablishing of maintainable tree-conductor clearances on the T&D System, including:
  - Initially, reactive maintenance response that will target specific locations that pose the greatest risk to public safety, reliability, and system capacity (i.e., address the “worst of the worst”)
  - Reclamation of the ROWs that are currently overgrown and out of control and pose a risk to public safety, service reliability and system capacity. This will include being in compliance with Act 17-2019. In the remediated state, LUMA will set a baseline from which LUMA will establish reasonably maintainable conditions.
- Establishment of steady state ongoing preventive vegetation maintenance practices (versus reactive response practices), as individual circuits are reclaimed (consistent with the principles of integrated vegetation management)
- Being in compliance with Section 1.15 of Act 17-2019

2.3 Description of Program Completed State

Vegetation related functions will be centrally managed by a dedicated vegetation management (VM) team composed of utility vegetation management industry subject matter experts (SMEs) with the responsibility and authority to complete the work in a timely and effective manner. The program will be guided by the Vegetation Management Plan (VMP) based on current industry standards and in compliance with the requirements of Act 57-2014, Act 17-2019, and the OMA.

The VMP will be based on the principles of integrated vegetation management, which is an approach for sustainable management of vegetation over the long term rather than simply controlling vegetation currently in conflict with overhead lines.

Technical specifications will establish vegetation maintenance work expectations, and process flows will be used to define standard approaches to more efficiently manage the necessary types of maintenance work. Performance measurement and quality systems will be used in managing vegetation maintenance work. A range of specialized vegetation maintenance services will be used to complete the work.

2.4 Program Activities

The program includes two major elements. This first involves reclamation of the existing ROWs, planned to occur over approximately the first three years. As individual circuits are reclaimed, they will transition to long term preventive maintenance. The second element is a program of rapid reactive response to address the most critical locations.

Vegetation Management

A field enabled IT tool will be implemented and used to manage vegetation maintenance work, including planning, scheduling, executing and evaluating the effectiveness of vegetation maintenance activities. The data collected using this tool will be used to support defining resource requirements and budgets, based on quantitative estimates of the vegetation maintenance workload to be completed. Performance measurement and quality-control systems will be established and used to manage vegetation maintenance work.

The VM team will be staffed with SMEs who will act as mentors, assisting in developing SME level of knowledge among the VM employees. A range of specialty vegetation maintenance services will be engaged in executing the work.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Indirect
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Implement Effective Public Safety Practices

Correcting the backlog of untrimmed trees will mitigate public safety risks due to power outages, fallen wires and people climbing onto energized lines.

Vegetation Management

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Increase Service Reliability

The primary benefit of effective vegetation management is to reduce outages caused by vegetation-caused line faults. This is a substantial contributor to the current poor reliability of the system. Improved reliability will improve customer experience. Cleared ROWs will also make it easier to assess storm damage and access sites to make repairs, shortening the duration of outages.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

Current vegetation management practices are focused on reactive and corrective work, i.e., addressing problems after they arise. A well functioning program will trim vegetation systematically, increasing the efficiency of the workforce and the reliability of the system. A clear VMP will also enable employees to work more effectively and efficiently.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

The poor current conditions of ROWs hampers access to much of the T&D System. By reclaiming these ROWs, access will be improved, thus making Utility Transformation projects financed by federal funds easier and cheaper to build.

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

Rights of way currently contain debris deposited during the hurricanes which will be cleared through a better vegetation management process. Reclaiming rights of way will reduce outages in future hurricanes or weather events.

2.6 Program Risks

- The primary risk to delaying the program is that there will be no meaningful improvement in system reliability, and perhaps a further decline resulting in an exceedingly poor level of service for customers. Resources would continue to be wasted on disorganized reactive or corrective maintenance such as hot spotting.
- Inability to meet contractual performance requirements.
- Inability to meet requirements of Vegetation Management Plan required under Act 57-2014, as amended and standards under Act 17-2019, as amended and meet other legal requirements, policies, OMA requirements including Prudent Utility Practice.

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$50.0**	**$60.0**	**$60.0**	**$150.6**
SRP Expenditures	$50.0	$60.0	$60.0	$120.0

3.2 Program Resource Requirements

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- Recruitment and inclusion of experienced VM SMEs in LUMA's VM team to address any gaps in knowledge and skills to support development of an effective program based on industry standards and best practices
- To the extent dictated by workload and VM related system performance engagement of experienced providers of core and specialized vegetation maintenance services
- IT Tool to support application of performance management techniques across the VM program
- Training of VM workforce on industry standards and best management practices to build required knowledge and expertise

3.3 Estimating Methods & Assumptions

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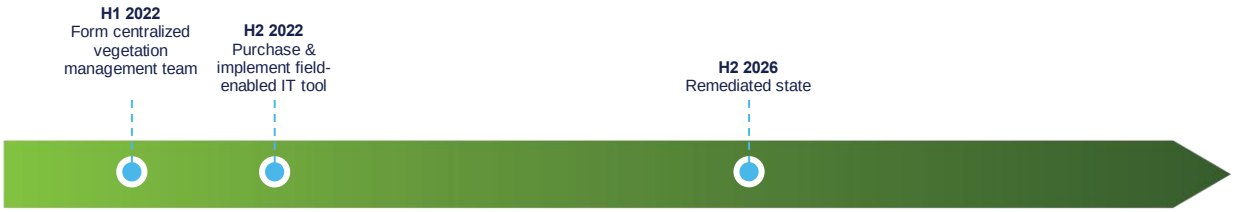
The cost estimate is based on spatial analysis to define the VM workload. Satellite imagery (at two-meter resolution) and other remote sensing data sets were used to develop an initial assessment of VM related field conditions. This was supplemented with high resolution, near real time satellite images of the entire T&D System, which were used to refine the estimate and to evaluate the need for "boots on the ground" field validation, which is ongoing.

3.4 SRP Program Timeline & Milestones



T&D Fleet

1.0 Program Description

The T&D Fleet program includes a range of activities and investments to bring the current fleet up to industry standards including vehicles, aircraft and equipment. Additionally, activities will be focused on initializing and improving processes for data collection, repair and maintenance of these assets.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA will be charged with the overall management of approximately 3,725 vehicles and four aircraft. The vehicles range from light and heavy-duty vehicles to equipment for construction and material handling. As summarized in the following table, the vehicles range from light and heavy-duty vehicles to equipment for construction and material handling.

Category	Description	Count
0	**Jeeps, Small SUV**	515
1	**Medium, Large SUV**	49
2	**Small/Med Pickup**	340
3	**Large Pickup, Other**	294
4	**Platform Truck, Other**	112
5	**Pickup w/ Bucket**	222
6	**Bucket Truck, Digger Derrick**	632
7	**Trailers, Other**	604
8	**Small/Medium Pickup**	448
9	**Heavy and Other Equipment**	509
Total		**3,725**

There are also 25 land maintenance and repair shops distributed across the island, and one air maintenance and repair shop located at Luis Muñoz Marín International Airport in San Juan. Based on LUMA's gap assessment, the current state of facilities and the maintenance and operation of the fleet reflects an overall maturity rating ranging between "unfocused" and "aware." The "aware" maturity rating, at the upper end of the current assessed range, means that in some cases PREPA exhibits a basic understanding of the need to address these areas and may or may not be in the process of deciding how best to or starting to apply them. While some of these maturity ratings are due to underinvestment, many

are related to processes and controls that are not in place. In several areas (most notably those areas pertaining to compliance with the Puerto Rico Commission on Public Safety (CSP) /US Department of Transportation (DOT), OSHA and/or American National Standards Institute (ANSI) requirements), there is currently no evidence of plans to put processes and controls in place to work toward meeting the standards required.

The current fleet is mainly comprised of aging and deteriorating assets and facilities. In fact, 90 percent of the fleet is beyond the industry standard for expected life (e.g., 6-7 years for trucks and 10 years for heavy duty vehicles). This has led to ineffective and increasingly costly maintenance, exacerbated by poorly maintained or missing tools, ineffective and inconsistently applied practices and standards, and increasing training requirements for employees. Maintenance of the fleet has also suffered due to an outdated and unused fleet management information system which has led to a lack of information regarding the fleet condition, maintenance needs, inspections due, maintenance records and additional difficulties in meeting regulatory mandates for maintenance inspections and record keeping. Gaps exist in all areas of fleet management.

Of critical concern are:

- Currently most, if not all the assets in the fleet do not meet Puerto Rico CSP / US DOT or OSHA / ANSI requirements.
- Maintenance and inventory management practices, processes and procedures are inadequate, outdated and require major overhauls.
- Short- and long-range fleet capital lifecycle planning is ineffective, both in process and execution.
- The general level of training for basic fleet management activities is low or non-existent.
- Annual inspections of the fleet are not current and therefore data regarding the condition of specific fleet assets (i.e., inspection and maintenance records) are broadly inaccurate, and in most cases missing.
- PREPA also reports an urgent need for more trained mechanics. Based on the Utilimarc Standard for maintenance or repair hours required per vehicle, the number of mechanics within the PREPA Fleet Management organization totals only 70 percent of the average for other North American utilities. There also appears to be, at least in the short term, no indication that the requisite number of qualified mechanics will be engaged to make up this shortfall or to outsource the appropriate amounts of work necessary to properly maintain all equipment.

LUMA notes that the above statements are based on a high level review (i.e., not a detailed inspection) of approximately half of PREPA's fleet assets. From this, lacking any detailed testing and maintenance records, LUMA has determined the general state of these assets from a condition and operability perspective, and projected estimated repair vs. replacement percentages across PREPA's entire fleet. These projections / assumptions will continue to be reviewed and revised as LUMA proceeds towards revitalizing the fleet.

2.2 Description of Remediated State

The following parameters define the remediated state for fleet operations, addressing the activities required to comply with applicable laws and regulations and assure the safe operation of fleet assets:

- Compliance with all of Puerto Rico's Department of Transportation and Public Works (DTOP), CSP and federal requirements including US DOT, Occupational OSHA and ANSI regulations or standards.

- Related to the above, performance of all applicable inspections and maintenance in accordance with manufacturer recommendations.
- Verification of successful dielectric testing on all operating boom trucks.
- Full implementation of inspection and maintenance records collection and storage procedures in compliance with US DOT requirements. This includes the use of a Fleet Management Information System (FMIS) that stores the records but also enables communication with fleet cost coding and digital connection with telematics, fuel purchasing and other fleet management systems.
- Completion of applicable training and qualification of all mechanics and operators maintaining, driving or using fleet assets. Mechanic training will include hydraulic maintenance certifications.
- Reduction of maintenance backlog to where less than 10 percent of the trucks are in the shop at any given time.

2.3 Description of Program Completed State

The fleet program addresses the major deficiencies identified in the gap assessment and expanded upon in the fleet operational plan. Included in the plan are funds for replacement and refurbishment of an aged fleet in poor condition, projects to enhance data acquisition and tools to support better decision making and management in the future.

In the completed state, the fleet will be operating in accordance with industry norms. This includes conforming with all applicable laws and regulations, regular inspections and maintenance of fleet equipment, full training of all mechanics and refresher training for operators, implementation of fuel management practices and owning assets that operate within their useful lives (i.e., a steady and consistent replacement cycle for aging fleet assets).

2.4 Program Activities

There are 14 key activities that comprise the overall fleet program.

The T&D Fleet program includes activities to implement regimented testing and inspection processes for all fleet assets, assuring compliance with Puerto Rico's DTOP, CSP, US DOT, OSHA, and ANSI standards, along with recommended inspection and maintenance requirements recommended by the equipment manufacturers. This project will address practices for both daily inspection and testing activities (preventive maintenance) and develop / apply criteria and applicable steps to affect major repairs.

Additionally, capital acquisition of new vehicles to replace those that have passed the point where they can be operated reliably, safely, and cost-effectively is required. This is the largest cost activity and is in response to a substantial backlog of vehicles that are already beyond end-of-life expectations. To make this expenditure feasible, this program must spread replacements over a period of ten years. PREPA's current expenditure levels are less than $3 million per year. We estimate that capital acquisitions of about $42 million per year over ten years is required to bring the current fleet makeup up to industry standards.

We must suspend the use of all deteriorated or aging fleet assets that are untested or uninspected, or in an otherwise analogous state until they can be thoroughly inspected, tested, and repaired in a manner that brings them into the minimal legal requirements set forth in regulation by DTOP, CSP, US DOT, OSHA, and ANSI. There would be an ongoing unacceptable risk associated with operating such assets

prior to all testing and inspections being completed, and all aged or deteriorated fleet assets are repaired or replaced.

Additional near-term projects in the T&D Fleet program include:

- Improvement of the current process for sourcing parts, approving third-party repairs, approving purchase orders for parts and repairs, and the usage of third-party vendors that will reduce the current maintenance backlog.
- Implementation of a regimented fleet fuel management and purchase program.
- Full deployment of a regimented fleet telematics system.
- Implementation of programs and associated processes for handling vehicle and equipment waste.
- Installation and/or repair of hoists, mechanics' tools and equipment at fleet shops.
- Assessment of all fleet shops to identify deficiencies and perform facility and structural improvements at all fleet shops.
- Ensure compliance with DTOP, CSP, US DOT, OSHA and ANSI standards, along with recommended inspection and maintenance requirements from the equipment manufacturers.
- Deployment of an FMIS to track maintenance records for all fleet vehicles and preventative maintenance programs.
- Removal from fleet shops of end-of-life fleet, obsolete inventory, all other non-functional equipment, hazardous waste, and other detritus.
- Rebranding of PREPA fleet to identify it as part of LUMA, as specified by US DOT (i.e., that commercial motor vehicles display the company name and US DOT number).
- Installation of double-walled fuel tanks at all 25 fleet shops to serve as an emergency supply for day-to-day operations, aimed at improving efficiency for line workers, as well as reducing the risk of theft at the retail. This will also allow for additional fuel to be stored for use during storm seasons.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☒ Increase Service Reliability	Indirect
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☒ Pursue Project Delivery Excellence	Indirect
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☒ Restore Damaged Grid Infrastructure	Indirect

T&D Fleet

Primary Goals	Objectives	Direct or Indirect Impact
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Reduced risk of safety related incidents since vehicles are routinely inspected and properly maintained, operator and mechanic training is improved, and the oldest and worst condition fleet assets are retired.

Objective: Implement Effective Public Safety Practices

Fewer accidents and equipment malfunctions due to better maintained fleet assets and well-trained operators.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

Improved response time for customer service due to more efficient routing via telematics (e.g., routing of the closest available crew to address a customer outage).

Objective: Increase Service Reliability

Reduced service restoration times, as measured by SAIDI (average customer minutes out of service) and improved fleet responsiveness, particularly during major events.

Objective: Deliver Electricity at Reasonable Prices

Proper maintenance and fleet lifecycle replacement practices will reduce required spending on fleet maintenance as well as decreasing the labor downtime associated with inefficient means of transportation for line crews.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

The implementation of a FMIS provides visibility to key elements that define the operability (current state) of fleet assets.

Objective: Pursue Project Delivery Excellence

Improve crew operating efficiency by providing the right vehicle and/or equipment for the job.

Objective: Enable Employees to Execute Operations Systematically

Reduced overtime due to availability of functioning fleet assets during regular working hours. Current work rules allow line workers to go home with pay when their trucks are undergoing repairs since spares are not available to use while trucks are in repair. By bringing vehicles up to industry standards, truck downtime will be reduced, thereby increasing efficient use of standard working hours for line crews.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Restore Damaged Grid Infrastructure

Improve crew operating efficiency by providing the right vehicle and/or equipment for the job.

2.6 Program Risks

Absent this program, the current condition of fleet assets, lack of basic staff training and inconsistent and ineffective maintenance practices pose a substantial and continuing risk of safety related incidents. Given the need to continue to operate poorly maintained assets over an extended replacement and repair period, provisions for improved basic training and industry standard operating and maintenance practices can partially mitigate these risks. These provisions will be substantially reduced over time, once the fleet and its associated maintenance and repair practices are aligned with the US DOT regulations regarding driver / operator safety, and/or applicable ANSI or OSHA Standards for testing and inspecting major equipment have been met.

The necessary continued operation of a deteriorating fleet over a phased implementation period also has risk implications, which again will be mitigated as aging fleet assets are replaced and effective maintenance and repair practices are put in place.

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$48.4**	**$24.4**	**$28.6**	**$265.3**
SRP Expenditures	$48.4	$24.4	$28.6	$41.4[1]

3.2 Program Resource Requirements

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LUMA anticipates a shortage of mechanic trainers in Puerto Rico. In the short-term, LUMA plans to import trainers, while in parallel exploring the option of establishing courses and certifications needed for mechanics at a local mechanic college.

[1] **Per Timeline presented in Section 3.4 (below), LUMA is projecting reaching the remediated state during the second half of FY 2025.**

For equipment with long-lead times, we are working with Materials Management and Procurement to determine optimum approaches for ordering and maintaining inventory of such equipment for our most critical fleet assets.

3.3 Estimating Methods & Assumptions

The ongoing capital replacement and refurbishment project, which represents the bulk of this program, is estimated using a Lifecycle-Based Replacement Forecast by asset class. LUMA's estimates assume an economically useful life for various fleet asset classes based on normal industry practice. The actual replacement values originate from Appendix G1 of Sargent and Lundy's Conceptual Transmission and Distribution 10-Year Capital Investment Plan for Reliability.

3.4 SRP Program Timeline & Milestones

Tools Repair & Management

1.0 Program Description

This program focuses on a PPE and tooling plan to address safety needs along with putting in place a better system for managing PPE and tools. In addition to acquiring the needed PPE and tools, this program includes implementation of a centralized Tool and Equipment Crib system to improve inventory management, tool maintenance, tool supply and coordination and oversight of tool and equipment use.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA is responsible for the safe operation of the Puerto Rico T&D Electrical System which includes the safety of employees and the general public. Through our gap assessment and site observations we identified PREPA's T&D Operations current tooling system is well below prudent utility safety, OSHA and IEEE standards. This wide gap leaves both employees and the public at risk of injury or fatality. PREPA lacks both an adequate tool maintenance program and a dielectric insulated tool program, a basic requirement to be OSHA compliant and keep employees safe. PPE and tools are a foundation for all workers in safety sensitive positions and current PPE and tools are not sufficient to keep LUMA employees safe.

LUMA's new T&D Operations organization will consist of approximately 1,100 field based employees that require safe PPE and tooling for approximately 80 fleet units. Listed are some examples of PPE and tools: Fire retardant clothing (FRCs), rubber gloves, potential indicators, metering testing equipment, live line sticks and rubber goods, ground chains, jacks, grips, tampers and jackhammers.

LUMA plans to purchase all the highest safety priority PPE and tools to ensure the employees can work safely and follow all OSHA rules as early as possible in the commencement period, and then every year after, targeting worn-out / failed tools or lower priority tools.

Currently PREPA operates their own dielectric testing facility with the intent to provide dielectric testing of rubber gloves, rubber goods, live line tooling and fleet equipment (booms). This department currently operates well below the needs of the organization due to factors such as the following:

- Lack of adequate employee training and testing equipment
- Inadequate size of facilities
- Inadequate processes, practices and inventory

In August 2020, the recertification of the dielectric testing equipment expired. This prevented recertification of all rubber gloves throughout PREPA. Personnel could not work on the system until the situation was rectified. This situation led to increased cost, negative employee morale and increased customer outages, all due to an inability to carry out planned maintenance.

PREPA uses significant tool and fleet resources to carry out their capital, operations and maintenance programs. Currently, workgroups of field personnel throughout Puerto Rico are responsible for the initial

supply, ongoing maintenance and testing of their tools. Each workgroup also manages a significant inventory of equipment with specialized items that are required to perform certain work on an ad hoc basis, but are not necessarily used in day-to-day activities.

The lack of a department/function to oversee and manage the tools department is a leading cause of the current inefficiencies, added costs and inability to respond to customer needs. Due to lack of inventory management and control, tools are frequently lost, stolen, misplaced, hoarded and poorly maintained.

2.2 Description of Remediated State

This PPE and tooling plan will address the major safety and OSHA deficiencies identified in the gap assessment and site assessments. Included are funds to replace aged and purchase missing PPE and tooling that will allow LUMA to meet Prudent Utility Practice and OSHA standards.

In the remediated state, T&D field employees will have the required necessary PPE and tools to safely operate the complex and hazardous electrical system which complies with LUMA and OSHA standards. This includes conforming with all applicable laws and regulations, along with regularly inspecting, testing and completing annual certifications on tools which will keep employees safe and increase the life expectancy of those tools. This will reduce the need for replacements, lowering operating costs. The PPE and tools will also be key for LUMA to quickly respond to any large-scale events or disasters that affect the electrical utility system.

As part of the remediated phase, LUMA will also implement a dielectric testing program for testable tools that will ensure all rubber gloves, rubber goods, live line tools and fleet equipment (booms) will be ready and available for LUMA teams. This program will include a requirement to migrate the physical testing of these goods to a third-party vendor.

2.3 Description of Program Completed State

In addition to the aspects of the remediated state above, the completed state will include implementation of the tool inventory and tracking management program, which proposes implementing a centralized Tool and Equipment Crib system to improve:

- Management of inventory levels
- Tool maintenance programs
- Tool supply and coordination
- Use of certain tools and equipment

This program will develop a tool and equipment management system that promotes cost efficiencies by securing competitive pricing for tool purchase, delivery, maintenance, refurbishment, and testing. It will also implement new initiatives, such as a barcode scanning system and inventory management system (IMS) to track these items and their maintenance programs. The program will introduce efficiencies and improve utilization factors for common use items by implementing a centralized system to manage inventory levels and maintenance programs for tools and equipment.

The first phase of implementation will focus on inventorying all tools and prioritize the purchase of required tooling.

Tools Repair & Management

The introduction of a tool inventory management system will allow for:

- 10% improvement to General Plan and Elevation (GP&E, i.e., capital) budgets
- Improved use of high criticality tools
- Improved visibility of low use tools
- Reallocation of some tasks from field workgroups to the dedicated Tool & Equipment Crib
- Reduced cost for testing (~50% reduction)
- Development of a purchasing agreement for new tools
- Tracking of assets using a barcode scanning program
- Regular pickups and deliveries to the field locations

The introduction of an equipment inventory management system will allow for:

- Improved visibility and use of specialized equipment (low use equipment)
- Coordination and dispatch of equipment to field locations as required
- Single point of contact with LUMA Fleet Services for specialty equipment maintenance

2.4 Program Activities

- Complete a current employee PPE inventory and health assessment
- Complete a current equipment tool inventory and health assessment
- Compare current PPE and tool inventory against LUMA's new requirements
- Prioritize damaged or missing PPE and tools
- Implement a dielectric test program on all dielectric tools and equipment. Immediately test all tools that have not been tested to LUMA standard required timelines.
- As per OSHA, ensure all rated equipment meets manufacturers recommendations
- Purchase all high priority PPE and equipment necessary for the employee to work safely
- Replace worn-out or missing equipment to increase further employee safety and increase worker productivity
- Implement training program to safely operate and maintain PPE and tools
- Develop tool work methods
- Track and inventory all tools
- Purchase FRC uniforms for all field-based employees
  - Purchase of a tool management program
  - Inventorying of all tools, which includes barcoding certain types of equipment
  - Completing an analysis of current and future work to determine tooling needs versus the number of trained personnel, followed by comparing this to industry best practices
  - Setting up and hiring a team to manage the program
  - Competitively tendering a contract for a third party organization to complete all required dielectric testing needed for LUMA
  - Development of a required list of dielectric tools for annual certification programs and purchasing them
  - Relocation of specialized/less frequently used tools and equipment to central locations for maintenance, storage and redeployment
  - Set up of vendors for high volume / low cost tools
  - Development of efficiency metrics such as amount of deployment, transportation, lost or missing tools, and damaged tools (including cost of repair)
  - Develop an annual tools maintenance, replacement and additions budget

Tools Repair & Management

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☒ Increase Service Reliability	Indirect
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☒ Pursue Project Delivery Excellence	Direct
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Indirect
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

The acquisition of safe and proper PPE and tools for employees will enable compliance with laws and regulations as well as LUMA's and OSHA's own rules.

This program will lead to a reduction of risk of incident or fatality to employees.

Using the correct tools will increase correct worker ergonomics and reduce numerous minor injuries.

By using appropriate PPE (e.g., FRCs, fall arrest, rubber cover up, etc.), employees are better protected.

Dielectric tools and equipment tested to meet LUMA's dielectric testing protocols will help improve safety for employees.

Tools Repair & Management

Objective: Implement Effective Public Safety Practices

Appropriate PPE and tooling will allow employees to respond quickly and efficiently to downed lines, traffic accidents, etc.

The correct PPE and tools will allow LUMA to be better prepared for a safer response to future emergencies or disasters.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

Improved customer service serving to improve the LUMA brand – the tool crib can dispatch required tools to personnel upon request, allowing them to complete jobs for customers faster.

Reduction of third-party damage due to climbing on customer's property.

Increased positive visibility through use of appropriate PPE, uniforms and employees not borrowing customers tools to complete work.

Objective: Increase Service Reliability

Better tools lead to better, longer lasting repairs, reducing faults and contributing to service reliability.

Having the correct tools at the right time will allow employees to deal with situations such as outages much quicker.

In the event of an emergency, disaster or catastrophic event, correct tooling will aid the LUMA employees to be better prepared to respond to outages and make the necessary repairs to restore the customers quicker than past events.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

Decreased O&M maintenance budget as tools are maintained in a controlled environment.

Decreased amount of stranded tool assets (every location has a specific tool that is only used a few times a year).

Less downtime for employees due to inadequately operating tools.

Objective: Pursue Project Delivery Excellence

Decreased capex tooling budget for replacements and end of life equipment.

Objective: Enable Employees to Execute Operations Systematically

Reduced overtime due to availability of tools, employees having the right tools with them or able to find them quickly.

Increased productivity due to tools working better and reduced time wastage due to lack of correct tooling or lack of timely certification of equipment life.

Tools Repair & Management

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

Added benefit of correct and available tooling is their deployment on projects that use federal funding. Increased productivity of employees, reduced time wastage and work done more effectively increases the efficiency with which funding is deployed by reducing waste and inefficiencies.

Objective: Restore Damaged Grid Infrastructure

The adequate and approved live line PPE and tooling available will also help decrease the number of planned outages that customers will face as crews make the necessary repairs to the system.

Objective: Improve Resilience of Vulnerable Infrastructure

Correct and available tooling will assist LUMA to respond to outages quicker and make the necessary repairs which will lower SAIDI.

2.6 Program Risks

There is a substantial downside risk to failing to pursue this program. Employees will not have the PPE and tools to safely operate and maintain the electrical system. LUMA will not be in compliance with current laws and OSHA regulations. In this scenario LUMA anticipates the following specific outcomes:

- Increased customer wait times for outage resolutions
- Increased O&M costs due to employee downtime and lack of repairs
- Increased cost of contractors due to higher demand
- Dielectric tools not being tested as per LUMA's dielectric testing practice and OSHA's rules
- Purchasing of duplicate tooling due inadequate inventory tracking
- Increased failure of specialized tools due to lack of training and poor maintenance

Furthermore, the lack of safe and correct PPE and tooling will hinder LUMA's emergency response readiness and, in the event of a large scale event, the length to time to make critical repairs to the system will not improve.

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$10.9**	**$3.2**	**$5.9**	**$27.7**
SRP Expenditure	$10.9	$3.2	$5.9	—

3.2 Program Resource Requirements

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Funding to purchase tools and conduct the necessary training.

3.3 Estimating Methods & Assumptions

- Applicable Standards and Codes:
  - OSHA
  - IEEE
  - LUMA's Safety Practices, Programs, Work Methods
  - Prudent Utility Industry standards
  - Labor law
  - State Law
  - Manufactures recommendations
- In-Service Date:
  - 2 weeks after commencement, then prioritized spend over the calendar year. Then annually at the beginning of the fiscal year.
- Program Standards or Requirements:
  - LUMA's safety standards
  - LUMA's Safety Management Systems
  - LUMA's work methods
  - LUMA's training programs
- Contract or internal resources:
  - Approximately 1,134 field/technical employees
  - 800 pieces of fleet that will need to be properly tooled
- Historical program information:
  - PREPA tool inventory (waiting on RFI)
- Support from scheduling and estimating

3.4 SRP Program Timeline & Milestones

HSEQ & Technical Training

1.0 Program Description

This program provides HSEQ and technical training to field personnel. During the initial stage, basic technical training will be provided through the LUMA College[1] and HSEQ training conducted by internal subject matter experts and external providers. Personnel will gain technical skills training for field employees to become fully qualified to complete their work safely and efficiently.

Subsequent enhanced technical training will be provided through the LUMA College. Enhanced training modules will be developed and administered based on operational needs for the type of technology being implemented but could include areas such as operation of smart grids, work on energized lines (e.g., hot line and barehand programs), splicing of conductors and helicopter work for transmission repairs.

This program will help to instill a new safety culture across the T&D System, thus reducing safety incidents, bringing the T&D System into compliance with contract standards (including but not limited to OSHA and broader industry standards) and improving overall employee efficiency.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Gap assessments have uncovered the following:

- HSEQ training provided to employees is minimal. Many current safety processes are not OSHA compliant.
- A need to improve the overall safety culture, with existing practices leading to many safety incidents that could have been avoided.
- Expectations and requirements for employees are unclear, contributing to a lack of accountability.
- Currently, a lack of workforce development measures contributes toward non-compliance with industry standards.
- The skilled labor workforce is undertrained (line workers, fleet mechanics, power system electricians, techs, etc.).
- A framework of technical training standards does not currently exist, including lack of apprentice programs, competency assessment programs and in-house training experts:
  - In particular, no line worker apprenticeship program exists, generally a four-year program with 8,000 hours that is registered with the US Department of Labor (DOL).
  - Since basic technical training is lacking, employees also do not have the prerequisites for enhanced technical training and such programs do not currently exist.
- No continuing education is completed.
- Current practices may not meet requirements, policies or standards under OMA, Act 57-2014, as amended, or Act 17-2019, and Prudent Utility Practices.

[1] LUMA College for Technical training, LLC will be a separate entity from LUMA but will work in close alignment with LUMA.

2.2 Description of Remediated State

The primary characteristic of the remediated state is that all field personnel will have received basic HSEQ and technical training to be able to perform their respective functions safely and effectively. Additionally, the following will apply:

- Field practices across LUMA will be in compliance with OSHA standards.
- An Apprentice 1 program will have been established and registered with DOL. All line workers will be actively participating in it or have received the equivalent journey level by grandfathering. This program would include entry-level training and the program would be filled on regular basis to replace turnover workforce.
- Initial onboarding to LUMA safety and work practices for all skilled trade employees will be taking place.

2.3 Description of Program Completed State

In addition to the characteristics noted for the remediated state, the completed state will include the following characteristics:

- Safe work processes are in place and employees are trained and execute work safely and efficiently.
- Employees are more engaged and safety conscious, resulting in a reduction in incidents and OSHA recordable rates, meeting performance metric targets.
- Accurate data is reported, analyzed and used to identify leading indicators and support ongoing HSEQ campaigns.
- Basic technical training will be administered on an ongoing basis across field employees.
- LUMA would be consistently filling pre-apprentice, apprentice, and advanced / continuing education and training, with all line workers and field personnel continuing to be actively in or having completed an apprenticeship.
- LUMA would have successfully achieved implementation of continuing education to meet regulatory requirements and improve workforce safety and efficiency.
- Enhanced technical training programs will be available for employees on an ongoing basis. The administration of these programs will be agile, meaning that the trainings can be upgraded, modified and tailored to employee functions, technology requirements and the needs of the organization as new technologies are added and implemented. Potential training modules include operation of smart grids, control/operation of Advanced Metering Infrastructure (AMI), splicing of conductors, energized line operations (e.g., hot line and barehand programs) and helicopter work for transmission. Most of these programs will be administered through the LUMA College and supplemented by subject matter experts (SMEs) based on training needs.

2.4 Program Activities

- Initially establish a process to select employees for priority HSEQ training and subsequently train those employees
- Ensure work processes align with training objectives
- Implement documented work processes
- Develop an HSEQ standard training curriculum including criteria, objectives and outcomes that meets industry standards and best practices
- Training of employees according to the new HSEQ training curriculum

HSEQ & Technical Training

- Determination of internal groups' HSEQ and technical training needs and expectations as determined by working closely with them
- Identify, prioritize, and complete onboarding training (year one)
- Consistently fill pre-apprentice program by recruitment throughout Puerto Rico
- Develop, register, and operate DOL apprenticeship
- Register and complete apprenticeships for line workers
- Prioritize training with internal campaigns
- Commit internal resources toward refresher training and continuing education; run programs continuously
- Develop course work for enhanced technical training across LUMA functions including technical services, vegetation management, fleet and material management
- Develop specific training programs for enhanced technical training for line workers and other field personnel
- Administer both basic and enhanced technical training on an ongoing basis for employees based on their functional requirements

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Indirect
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☒ Increase Service Reliability	Indirect
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☒ Pursue Project Delivery Excellence	Direct
	☒ Enable Employees to Execute Operations Systematically	Direct
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☒ Restore Damaged Grid Infrastructure	Indirect
	☒ Improve Resilience of Vulnerable Infrastructure	Indirect
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

HSEQ & Technical Training

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

Basic HSEQ training across the workforce leads to a safer workplace. Improving safety culture results in a reduction in incidents and OSHA reportable claims.

Technical training programs will increase safe work processes and efficiency by upskilling all skilled labor employees through delivering training focused on knowledge, skills and behaviors of LUMA employees. Courses include grounding, bucket truck rescue, OSHA, and others. A better trained work force will also allow for more timely identification of public safety issues.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Increase Service Reliability

This program will enable employees to respond to outages and customer needs more efficiently, delivering both better service and an improved customer experience.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence
Objective: Enable Employees to Execute Operations Systematically

Properly trained employees will be able to deliver higher quality project work in a more systematic manner. Better trained employees through this program will also reduce downtime and overtime requirements and increase employee productivity, along with reducing the amount of error and re-work. Training programs will further help improve work quality which will translate into better project delivery.

Increasing data tracking and reporting on HSEQ training will lead to increased accuracy of performance metrics. Clarifying training expectations and requirements will increase accountability and contribute to better causal analysis and follow-up. Improving workforce development will allow LUMA to comply with industry standards.

PRIMARY GOAL: SYSTEM REBUILD AND RESILIENCY

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

Better trained employees will help to restore damaged infrastructure and allow for greater resilience in the event of an emergency.

2.6 Program Risks

An unskilled workforce is a danger to itself and others working near them. Providing training for all employees from novice to skilled personnel is essential to ensure the safety of employees and the general public. With current health and safety metrics far worse than industry averages (nine times worse than average utility standards) and the lack of basic HSEQ training being a primary contributor to this situation, continuing with the status quo poses a major safety risk likely to result in serious injury or

fatality. At best, reducing safety incidents and meeting performance targets will be difficult without a trained and competent workforce.

In the event of an emergency, correct training will allow LUMA employees to be better prepared to respond to outages and make the necessary repairs to restore service to customers quicker than in past events. Without this program, employees could remain underprepared for such an emergency.

Additionally, statutory and OSHA regulatory compliance may be adversely affected.

Lack of training would also not allow LUMA and its employees to make much needed customer service gains, and customers will continue to see extended wait times for outages. Not pursuing a strong training program will also result in increased costs of service due to employee downtime and contractor costs.

There is also a substantial downside risk of failing to pursue enhanced technical training (i.e., top quartile) programs. As new technologies are implemented throughout the LUMA system, employee needs will continue to evolve, and enhanced training will be required to adapt.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$9.9**	**$10.0**	**$8.6**	**$101.4**
SRP Expenditures	$9.9	$10.0	$8.6	$9.6

3.2 Program Resource Requirements

CONFIDENTIAL

Employees will use their personal tools, equipment and Personal Protective Equipment (PPE) for training. Training manager and coordinators (internal and external) will administer training programs. LUMA College will provide technical training. Particular training modules will require trainers, writers and training consultants, along with training materials, props and training specific technologies. Specific training modules may have dedicated location requirements, with overnight stays and travel depending on the training location.

3.3 Estimating Methods & Assumptions

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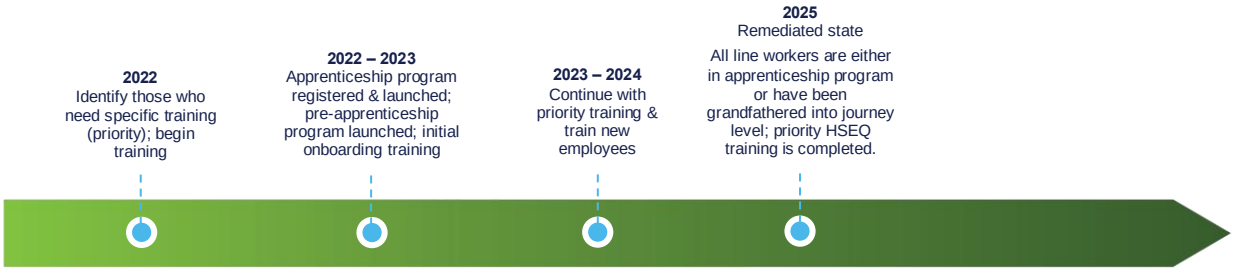
These programs and estimates were developed by comparing LUMA's completed future state to a typical US utility training program. Approximately 2,000 – 2,500 LUMA employees will need HSEQ and technical training. This estimate could change based on recruitment levels.

Based on costs at other campuses, these estimates were developed using the number of LUMA employees, the LUMA College's expected capacity and typical costs for training services at parent companies and outside vendor costs. Estimates were also informed by applicable standards and codes, including OSHA, the Institute of Electrical and Electronics Engineers (IEEE), prudent utility industry standards, manufacturer recommendations and planned LUMA safety practices, programs and work methods. Training frequency was based on industry standards or regulatory requirements.

HSEQ and technical training requirements may change over time and shifting priorities could potentially result in the development or removal of course contents.

3.4 SRP Program Timeline & Milestones



Asset Data Integrity

1.0 Program Description

This program is targeted at assuring the integrity of key asset data, with a focus on GIS and CMMS. The program works with stakeholders to identify data requirements, determine process and templates for storing data and update asset data systems with data gathered from asset inspections. These systems and the integrity of their information are fundamental for accurate modeling, operations and planning of the T&D System.

2.0 Program Rationale

2.1 Current State & Identified Gaps

There are significant gaps in PREPA's existing GIS and associated processes. There is a large backlog of work stretching back a decade that has not been captured in the GIS. The accuracy of some of the existing GIS asset and connectivity data is in question. This negatively affects the function of downstream systems that depend on this data, such as outage tracking, planning models, protection coordination models, reporting and mapping requirements. The GIS data base is the key source of data for all other modelling programs. Without accurate data, the ability to effectively plan, coordinate and protect the T&D System is compromised. Key processes, automations, and integrations are not in place, greatly reducing work efficiency. The lack of accurate GIS data and maps has the potential to result in incorrect mainline switching or improper identification of circuits leading to safety issues.

PREPA currently lacks a CMMS for tracking assets and maintenance, and instead perform this through manual informal processes and an MS Access database that are unreliable and have outdated information. Asset practices are run to failure with no systems in place to enable preventive maintenance programs. There is no evidence of asset costing being tracked.

The fleet management system is out of vendor support and capabilities are not fully leveraged.

Overall, there is no central repository in use to manage assets and compatible units, and data in the repositories that do exist are not considered reliable.

Act 17-2019, as amended, requires the modernization of the T&D System be achieved through specific improvements to the T&D System which will require obtaining system data through an effective and accurate GIS system. This in turn provides information for accurate modeling, operation and planning of the T&D System. Additionally, safe operation of the T&D System is not possible without a fully functioning GIS system. The GIS system will ensure that the correct asset and connectivity data will be available for safe operation and maintenance of the grid.

2.2 Description of Remediated State

This program will follow the requirements set forth in the OMA, Act 17, and Act 57. The remediated state will have been reached when a CMMS has been implemented, and when GIS and CMMS data have been validated and entered for transmission lines and the priority distribution lines as determined by the

inspection and assessment work. This includes all critical asset information, including switching, line length, conductor size, structure type, etc. This information is required for accurate modeling, operation and planning of the T&D System.

2.3 Description of Program Completed State

The program completed state will have been reached when key standards, processes, templates, and tools have been put in place, and when one hundred percent of the validated data from switchable assets and main lines has been entered into the GIS and CMMS. This includes all critical asset information, including line length, conductor size, structure type, etc. This information is required for accurate modeling, operations and planning for the T&D System.

2.4 Program Activities

- Configuration of an enterprise asset management solution for transmission and distribution assets – leverage a phased approach to implementation based on asset criticality and then extend to other asset categories
- Development and tracking of asset management programs to enable the transition from run-to-failure to preventive maintenance based on asset criticality
- Entry of all GIS and asset data gathered in the line and pole inspection programs and, for selected lines, into the GIS and CMMS using newly developed LUMA processes, templates and tools
- Entry of all GIS data in the project backlog using newly developed processes, templates and tools
- Working with stakeholders of downstream systems to determine data requirements for the GIS and CMMS
- Development of processes, templates and tools for storing this data in alignment with the GIS and CMMS plan
- Entry of all GIS and asset data gathered in the line and pole inspection programs into the GIS and CMMS using these new processes, templates and tools
- Upgrade the fleet management system to vendor supported level and then enable additional capabilities within the solution

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Indirect
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Direct

Asset Data Integrity

Primary Goals	Objectives	Direct or Indirect Impact
	☒ Enable Employees to Execute Operations Systematically	Direct
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

This program directly promotes a safe workplace through the accurate representation of T&D System elements and their locations.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

Since up-to-date GIS data is a key input to public-facing applications, this helps ensure a more transparent outlook to the public. Additionally, better GIS data enables employees to respond more quickly to requirements, thereby improving service and, as a result, the customer experience.

Objective: Increase Service Reliability

This program improves service reliability by accurately identifying assets that serve customers, thereby speeding up the service restoration process.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

Accurate GIS data results in accurate system representations in the Energy Management System (EMS), the Outage Management System (OMS), the Advanced Distribution Management System (ADMS, as planned for the future) and in system planning models designed to improve the operation, service restoration, maintenance and planning processes. It also directly enhances operational excellence by allowing operations to be executed systematically.

Accurate CMMS data allows for systematic management of assets.

Asset Data Integrity

Objective: Pursue Project Delivery Excellence

Project delivery excellence is also enhanced because having accurate data is key to ensuring that projects consider all relevant factors during planning and design. Asset data is a key input into various analytics and reports that support business decisions.

Objective: Enable Employees to Execute Operations Systematically

The GIS connectivity model is a key input into employee applications, such as an up-to-date outage map. As such, this allows employees to execute operations more systematically.

2.6 Program Risks

The main risk to not completing accurate and flexible GIS and CMMS systems is that lack of data negatively impacts the planning, operation, maintenance and service restoration processes of the whole T&D System, which affects overall reliability of the T&D System. Not implementing GIS and CMMS standards and data verification impacts multiple other programs which may not function correctly without GIS data.

Without this program, assets will continue to be maintained in an ad hoc and manual manner, limiting LUMA's ability to monitor, maintain, and replace assets prudently and efficiently. These manual processes will negatively affect performance levels and increase the risk of human error. This will directly affect LUMA's reputation in the marketplace through an inability to respond to customer requests in a timely and appropriate manner.

A secondary risk is that the continued use of non-supported software and methods increases vulnerability to security breaches and prolonged system outages.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$6.2**	**$11.3**	**$10.2**	**$57.4**
SRP Expenditures	$5.8	$10.9	$9.8	$27.1

3.2 Program Resource Requirements

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- 22 full-time employees to identify GIS data requirements and complete data collection, validation and entry.
- Four full-time employees additional in year 1 to perform critical prerequisite activities, such as developing standards, processes, tools, training, etc.
- Six full-time employees ongoing for T&D System operation and maintenance (one senior and one junior in the first year then adding a junior for each year after up to five juniors in total)
- Asset management solution system integrator
- Asset management solution software licensing
- Additional sufficient resources to complete non-SRP projects

- Continued IT/OT lifecycle funding (beyond what is included in the funding table above) to upgrade / replace systems as they come to end of life

3.3 Estimating Methods & Assumptions

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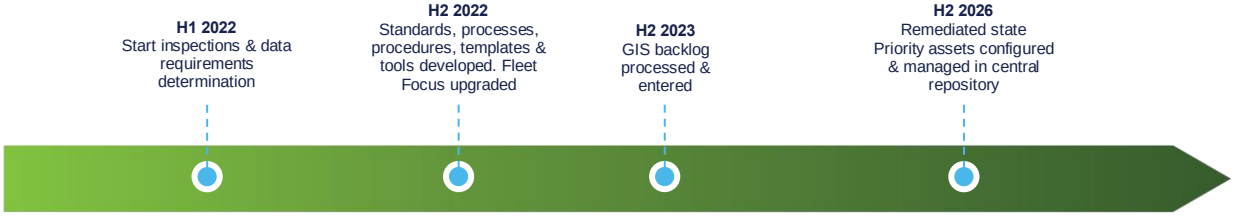
Estimates were based on SRP items and key prerequisites in starting years. Because of a lack of existing data, these estimates are subject to change as data is collected and recorded.

- The overall assumption is one hour per structure for recording all asset data, including third-party information.
- The total of 725,000 structures is assumed from a previous GIS report, and includes stand-alone streetlights, as well as transmission and distribution structures.
- Additional time is assumed in the first year to do critical activities, such as developing standards, processes, tools, training, etc.
- Field data collection costs were based on other projects.
- The costs associated with the implementation of asset management and work order management processes and tools is estimated using the International Business Machine (IBM) Project Cost Estimator for implementing a Gartner-recognized industry leading IT Service Management (ITSM) solution. Pricing assumptions are based on the implementation of AssetSuite for a medium-large sized enterprise as this solution is currently implemented at PREPA to support generation asset and work order management.

3.4 SRP Program Timeline & Milestones



Permit Processes & Management

1.0 Program Description

LUMA will introduce new systems for managing operational permits to enable the system to comply with permit obligations and to provide support for federal funding requirements. The program will develop new procedures so that responsible parties have the tools to meet permit obligations and identify additional necessary permits, along with introducing training programs to allow those procedures to be implemented effectively. As part of this program, LUMA will continue to engage with government agencies to adhere to any adjusting permitting procedures or requirements to be implemented after commencement.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Compliance with permit obligations for operational permits is required and currently is not being consistently met. A centralized permit system for the LUMA organization will allow for more consistency and standardization of practices.

LUMA's gap assessment has shown that:

- There does not appear to be a quality management system in effect.
- There is a reliance on worker experience in performing tasks and there are no documented systems or procedures in place.
- Job procedures and training programs are lacking
- The documentation of work completed is not sufficient to demonstrate compliance with permit obligations. LUMA needs to mitigate the risk of noncompliance with requirements, which could result in fines, potential work interruptions and other adverse impacts.

2.2 Description of Remediated State

According to the Act 17, Article 1.5(6)(a) and Article 1.10(g) of the OMA, establishes as public policy that LUMA is required to be in compliance with applicable environmental laws and regulations.

According to Section 5.6 (b) of the OMA, LUMA is required to make all filings and applications and submit all reports necessary to obtain and maintain all Governmental Approvals in the name of PREPA, or if required by Applicable Law. In addition, LUMA must:

(i) prepare the application and develop and furnish all necessary supporting material, data and information that may be required;
(ii) familiarize itself with the terms and conditions of such Governmental Approvals;
(iii) attend all meetings and hearings required to obtain such approvals; and
(iv) take all other action necessary or otherwise reasonably requested by the P3 Authority in order to assist and support PREPA in obtaining, maintaining, renewing, extending and complying, as may be relevant, with the terms of such Governmental Approvals.

Finally, according to the Annex I, Section I(G)(2) of the OMA, LUMA is responsible for environmental compliance, maintenance of documentation and acquisition of permitting required for Transmission and Distribution (T&D) operations.

As defined in the above conditions and under the OMA, in the remediated state, LUMA will have a system in place to obtain required permits to operate in compliance with the law. Areas of noncompliance will have been identified, with a remediation plan underway to solve critical issues in a timely manner.

A basic understanding of the permitting requirements will have been established in the organization. Training programs to improve work practices will be in development, but implementation of such training programs will not yet have fully occurred.

2.3 Description of Program Completed State

At program completion, the organization will have implemented a quality management system, developed job procedures and completed training programs related to obtaining and managing permits. This will ensure work is completed in compliance with permit obligations and that consistent documentation of such work can prove this compliance. Ongoing activities include ensuring that the permits are obtained, renewed and amended on time, ensuring that associated reporting to regulators is made on time, and ensuring that activities covered under the permits (e.g., construction, vegetation management, etc.) are carried out in accordance with the permit requirements, and other permit requirements are met, so as to minimize noncompliance.

2.4 Program Activities

- Obtaining, maintaining, renewing, extending and complying with necessary permits as quickly as possible, including maintaining a full list of operational permits
- Defining of obligations for operations to meet permit compliance and full requirements to obtain new permits
- Continuing engagement with government agencies to adhere to operator permitting procedures and requirements implemented post commencement
- Evaluating current facilities and operational practices to ascertain new additional necessary permits. in obtaining, maintaining, renewing, extending and complying with permit requirements
- Establishing basic operational performance levels relative to required standards as quickly as possible
- Documentation of procedures and distribution to work groups
- Developing training programs
- Establishment of a quality management system
- Development of job procedures and training programs in accordance with the guidelines of the quality management system and as necessary to address work practices required to demonstrate compliance
- Implementation of a records system such that documentation of work completed will demonstrate compliance with requirements

Permit Processes & Management

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Direct
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Development of a quality management system supported by work procedures is integral to a safe workplace. Such a system forms the foundation of a safety program.

Objective: Implement Effective Public Safety Practices

More consistency of permit practices will improve the quality of related work, thereby improving public safety for any installation.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

Strict compliance with permit obligations will reflect positively upon the company with the agency issuing a permit.

Permit Processes & Management

Objective: Increase Service Reliability

Improved work practices will lead to a superior quality product or installation, thereby improving the reliability of the system.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence
Objective: Enable Employees to Execute Operations Systematically

The quality management system, as supported by detailed work procedures, form a foundation for systematic management of the business. This system is also essential to the pursuit of project delivery excellence as these measures provide the baseline from which to evaluate the performance of work. The quality management system will also enable employees to consistently complete work to the necessary standards while complying with permit obligations.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

Proof of compliance with permit obligations will contribute to evidence that requirements for federal funding have been met.

2.6 Program Risks

The risk in not proceeding with the program is to continue with the present system, which is inadequate. The present system does not meet compliance requirements and generates noncompliance fees. Current practices are insufficient to meet contractual requirements for operation of the system. Current methodologies could put contractual arrangements at risk and could result in a loss of federal funding due to the inability to demonstrate compliance with permit obligations. Without this program, LUMA runs the risk of being in violation of permits and not maintaining awareness of ongoing changes to permitting requirements, which could result in further fines, potential work interruptions and other adverse impacts.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$2.2**	**$2.2**	**$2.2**	**—**
SRP Expenditures	0.9	0.9	0.9	—

3.2 Program Resource Requirements

CONFIDENTIAL

The permits program will require IT support for the records system.

Legal resources will be required to obtain permits and to determine the obligations under the different permits.

Permit Processes & Management

The Permit Processes & Management Program will require a contractor to help write the procedures and schedule the training.

The Permit Processes & Management Program will require a contractor and HR support to develop the training programs.

3.3 Estimating Methods & Assumptions

LUMA pay scales have been assumed for internal employee resources.

Previous rates for external contractors have been assumed.

APPLICABLE STANDARDS & CODES

Federal legislation, local legislation, industry best practices, international and local codes.

SUPPORT FROM SCHEDULING & ESTIMATING

Operational permits will require scheduling support to complete and file reports, renew existing permits and complete applications for permits. Different fees are associated with each of the permits. In the case of noncompliance with permit obligations fees may be payable. Estimating fees in this case will also be required.

3.4 SRP Program Timeline and Milestones

Workflow Processes & Tracking

1.0 Program Description

This program includes several initiatives that address gaps between current state and standard industry methods, practices, and processes to manage, track, and report progress on the performance of field work. Specific areas include:

- Establishing proper and safe maintenance regimens (preventive, planned and unplanned corrective, and emergency repairs)
- Adhering to design, maintenance and construction standards
- Implementing proper inspection and testing procedures
- Implementing KPI / metric performance management with a focus on measuring and driving improvements in work quality, effectiveness and efficiency
- Implementing technologies to reduce cycle time in identifying and remediating any performance anomalies while concurrently supporting the Asset Management function

2.0 Program Rationale

2.1 Current State & Identified Gaps

The Workflow Process and Tracking Program is intended to improve the performance of the critical T&D assets and approximately 2,000 employees assigned to T&D Operations[1]. More specifically, it is targeted at addressing those workflow related gaps that are required to address deficiencies noted in the recently conducted gap assessment, namely:

Work Planning and Execution with 21 gaps, summarized as follows:

- Work is largely reactive, overriding any attempt to implement a properly prioritized work plan
- Virtually no preventive maintenance is performed, resulting in a “run-to-failure” mode of operation and subsequent focus on emergency maintenance
- Lacking a strong work planning and scheduling cadence that “protects the schedule” on a daily / weekly basis
- Current systems are not able to address the requirements of an effective work management program
- Inability to accurately measure / implement initiatives to improve worker productivity
- Outside contracting lacks clarity in scope and any semblance of quality assurance
- Significant shortfalls with respect to public and employee safety. Field lacks appropriate communications and reporting tools: Laptops, cell phones (including data plans), mobile data collection devices, radios, satellite phones, and vehicle GPS for visibility

Technical Services with 11 gaps, summarized as follows:

- Absence or ignorance of well-documented lockout / tagout procedures and protocols,

[1] Note that similar challenges, prevalent in Fleet and Materials Management / Warehousing, are addressed within other Programs.

- Inconsistent approach to training, largely on the job, dependent of the expertise and priorities of each supervisor
- Lack of mapping documents / single-line diagrams to facilitate the work

Reliability (Service Restoration) with 21 Gaps, summarized as the follows:

- Repairs be they partial, provisional, or permanent, are rarely revisited post-outage
- Line crew staffing is rigid in terms of size (typically 4-person crews independent of the task) and location (strong regional focus)
- 24/7 coverage applies in only two of the seven regions
- There is a general lack of technology, both at the system level to restore service more rapidly to large pockets of customers, and the administrative / managerial level to expedite the processing of damage assessments from initial review to final closeout of repairs.
- Restoration process is not substantiated with formal operating procedures and checklists

System Performance Management with 6 Gaps, summarized as follows:

- Unavailability of complete and accurate data in key performance domains and limited capability to perform advanced analytics
- To the extent that corrective action plans are implemented, there is a high dependence on intuition and gut feel in choosing among options
- Skepticism regarding PREPA's willingness to take decisive action should an analysis of data indicate a clear performance improvement opportunity

These gaps combined with a general lack of technology enablement noted above has several implications:

- Work requests are delayed weeks or months before finally making their way to field personnel to complete the work
- Missing, inaccurate or out-of-date records creates gaps regarding the state of system, impacting worker productivity at the least with a high likelihood of creating an unsafe environment for the public and employees
- Undocumented or inconsistently applied work methods result in varying levels of quality and completeness and potentially create unsafe working conditions
- An antiquated work management system (no longer vendor supported) creates the need for workarounds and provides on partial automation in the generation of work orders and performance reporting

2.2 Description of the Remediated State

In the remediated state, compliance with the relevant articles of Act 17 and Act 57, and the OMA provisions specified in Contract Standards, Annex I will require that:

- A work planning and execution process and tracking system is in place, driving the use of scheduling to align the organization around the performance of work
- Procedures and training exist to address the safety deficiencies identified in the review of Distribution Operations, contingent measures are in place to offset the effects of outdated and inaccurate documentation, and a plan is developed and underway to produce a more permanent solution.

- A quality management system is in place to ensure compliance with applicable regulations or standards: Inspection and Test Plans (ITPs) have been created and quality control documentation has been developed for critical T&D assets, with full compliance to quality control / quality assurance requirements.
- Preventive maintenance programs are established for all critical substation, transmission and distribution line, fleet and material handling assets, and T&D Operations achieves an overall 75 percent completion rate.
- Systems and processes are in place to track, monitor and report test and inspection completion rates for those activities required by the above listed regulations and standards.
- Sufficient communications and reporting tools (e.g., laptops, cell phones (including data plans), mobile data collection devices, radios, satellite phones, and vehicle GPS) be purchased and distributed to assure worker safety

2.3 Description of Program Completed State

In the completed state, interval preventative maintenance plans will be scheduled and executed on a regular basis. The implementation of regular preventative maintenance will help to steer the organization from a predominantly reactive approach to one that operates in a more planned fashion.

Concurrently, more formalized work management processes and procedures will ensure resources are dispatched in an organized, prioritized and planned approach, focused on regulatory and legal compliance while providing safe and reliable electric service to all customers. Employees will be equipped with systems and processes to work across the system both efficiently and safely in accordance with LUMA work methods. Completed work will be performed to the correct standards and specifications, as monitored and guaranteed by the implemented quality program, ensuring that the system is built and operated as designed and intended.

The above systems and processes will be the norm rather than the exception, and minimal oversight and enforcement will be required to achieve compliance with targeted outcomes.

2.4 Program Activities

WORK METHODS

- Define a template and list of required work methods across Operations
- Develop all of the required work methods in English and Spanish
- Implement a work method electronic document storage solution, likely on existing document management software or procure software
- Develop site training material for critical work methods, likely through a third party vendor
- Perform training on work methods for all employees in Operations

PROCESS, PRACTICES, DOCUMENTATION & PROCEDURES — QUALITY

- Define ITP template and master list of all required ITPs within Operations
- Implement a document storage solution, management process and supporting software, likely through the procurement of a commercially available software solution
- Identify and develop procedures and processes required to address potential safety gaps and conduct training, as appropriate to ensure proper implementation.
- Address out-of-date and inaccessible drawings and related documentation

Workflow Processes & Tracking

PREVENTATIVE MAINTENANCE

- Develop the preventative maintenance program and procedures
- Procure or develop a software solution to manage the preventative maintenance schedule, maintenance records and documentation
- Develop and roll out user training on how to follow the program and use the software

PRODUCTIVITY TRACKING

- Develop a consistent work management and dispatch system by improving functionality in existing systems (Outage Management System [OMS], in-service, Storms, iNET, etc.) or procuring a new software solution
- Develop and roll out training on the new software and processes
- Define and implement scheduling protocols and regimens to drive organizational alignment around the performance of work
- Develop KPIs / metrics and reporting regimen to increase transparency of worker productivity and resulting system performance

GENERAL TECHNOLOGY WORKFORCE MANAGEMENT

- Define business requirements and assess available software solutions against business requirements, technical fit and cost
- Define work priorities and associated competencies for the tool
- Adopt core configuration of selected product
- Perform initial implementation of workforce management solution (18 months) and establish competencies for performing transmission, distribution, and substation work.
- Purchase and distribute balance of communications and reporting tools (e.g., laptops, cell phones [including data plans], mobile data collection devices, radios, satellite phones, and vehicle GPS) to support worker productivity

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Indirect
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Indirect
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Indirect
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild &**	☒ Effectively Deploy Federal Funding	Indirect

Workflow Processes & Tracking

Primary Goals	Objectives	Direct or Indirect Impact
Resiliency	☒ Restore Damaged Grid Infrastructure	Indirect
	☒ Improve Resilience of Vulnerable Infrastructure	Indirect
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

This program will reduce the risk of incidents and fatalities in the performance of work by building work plans that are interwoven with LUMA's emphasis on safety (including proper use of PPE), limiting injuries and avoiding fatalities. With respect to fleet and materials handling, well-planned work, planned and executed in accordance with applicable laws and regulations is analogous to these considerations for safety.

Objective: Implement Effective Public Safety Practices

Overall improved work methods and quality will create a better constructed and maintained system, which contributes to overall public safety. In essence, the public will be safer because the overall system operates as intended and any maintenance is planned to account for any interface with other facilities and the public at large.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Increase Service Reliability
Objective: Deliver Electricity at Reasonable Prices

A well-orchestrated work management process will alleviate several sources of customer-related issues: third-party damage, unplanned intrusions onto a customer's property, and rework resulting from poor quality. Better maintained assets, including those that support fieldwork (e.g., fleet), and improved work planning and execution translate directly to shorter, less costly outages and an overall improved customer experience.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence
Objective: Enable Employees to Execute Operations Systematically

Software solutions will support a more systematic approach to work management, thus improving quality, shifting the emphasis from reactive corrective maintenance to better planned preventive maintenance, and enabling the tracking of and resulting improvements in productivity.

Workflow Processes & Tracking

Clarity of expectations with respect to work methods and mandatory standards, all part of an effective work management process, inevitably leads to improved productivity. Improved work planning leads directly to availability of equipment and tools (including less downtime on material and fleet), thus improving efficiency / increasing effectiveness of field personnel in the normal performance of work. In doing so, the organization is also better able to respond to emergencies (including system outages), with reduced reliance on overtime.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding
Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

Work methods, vehicles and equipment will be used to complete FEMA work more safely and efficiently, one of the outcomes of which is improved outage response and system restoration timelines.

Efficient deployment of the workforce will result in improved worker productivity, leading to better use of federal funding (i.e., increased productivity).

Control of the workforce and efficient dispatch of available resources will assist LUMA in responding to outages quicker, thus reducing the time required to restore damaged infrastructure and, as a result, service (as measured by SAIDI or CAIDI).

In the event of an emergency, disaster or catastrophic event, control of the workforce (planning and dispatch) and proper fleet and equipment (the result of effective preventative and corrective maintenance practices and enabling software), will aid LUMA employees in being better prepared to respond to outages and effect repairs to restore power quicker than previously experienced. Adherence to consistent quality standards, part and parcel to a more robust work management process and system, is consistent with and a necessary prerequisite to LUMA's objective for a more resilient grid.

2.6 Program Risks

There is a substantial downside risk in failing to pursue this program. Without it, employees will not have established work methods, quality standards, safe vehicles and equipment, or coordinated dispatch to safely operate and maintain the electrical system as a prudent utility. Workforce management will continue to be managed in an ad hoc and inconsistent manner limiting LUMA's ability to actively manage the maintenance and replacement of assets. Manual processes are too cumbersome to consistently identify and trend performance. As such, risks of not pursuing this program include issues related to the realities of human error, possible degradation of LUMA's reputation (particularly if deemed out-of-compliance with applicable laws and regulations), difficulties in meeting customer service expectations (during "blue sky" or major storm events) and higher than acceptable O&M costs.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.4**	**$1.3**	**$0.6**	**$34.0**
SRP Expenditures	$1.1	$1.2	$0.5	—

3.2 Program Resource Requirements

CONFIDENTIAL

Several people will be required from within the Operations department to carry out the implementation of these improvements, as well as support from IT/OT, HR and Utility Transformation.

3.3 Estimating Methods & Assumptions

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Applicable Standards and Codes considered included:

- OSHA
- IEEE
- LUMA's safety practices, programs, work methods
- Prudent Utility Industry standards
- Labor law
- Puerto Rico law
- Manufacturer recommendations

We assumed an in-service date of two months from commencement, followed by prioritized spend over the balance of the calendar year, and then annually at the beginning of the fiscal year.

Applicable program standards and requirements included:

- LUMA's safety management systems and standards
- LUMA's work methods
- LUMA's training programs
- LUMA's engineering and design specifications and standards
- LUMA's system operations, switching and outage guidelines
- LUMA's Operations department standard operating procedures manual

Assumptions on contract or internal resources:

- Approximately 1,000 field / technical employees
- 800 fleet and equipment assets to be incorporated into the maintenance programs
- Executive and senior management staff, dozens of supervisors and over approximately 1000 technical employees who will require training on dispatch and the work management system, any new work methods and LUMA's quality and preventative maintenance programs.

Historical program information is based on the following systems: STORMS, OMS and iDispatcher, iNet and existing customer care and billing software.

3.4 SRP Program Timeline & Milestones

Materials Management

1.0 Program Description

This program covers all aspects of materials management and includes management of:

- Asset recovery
- Oil containment
- Inventory management
- Asset suite reconfiguration
- Demand training
- Implementation and measurement of KPIs related to materials
- Capital plans for material handling and warehousing storage and facility improvements
- Logistics function and related equipment
- Material evaluation and disposition

2.0 Program Rationale

2.1 Current State & Identified Gaps

PREPA manages a warehousing network consisting of one central distribution center, six regional, and 16 district warehouses to support T&D operations across the island. They also manage four warehouses that support generation plants located in Costa Sur, Aguirre, central San Juan, and Palo Seco. Their inventory distribution uses a hub and spoke model, essentially a decentralized approach. They manage their own transportation fleet and distribute their own internal/external mail.

Looking across the entire Materials Management function, significant deficiencies were identified during the gap assessment:

- PREPA lacks the critical experience, tools, equipment, and infrastructure to adequately, efficiently and safely serve operations.
- The organization lacks the processes, programs, procedures, structure and assets to adequately serve the operational materials management needs of the transmission, distribution and generation systems.
- There is a visible lack of support from the executive level of the organization to make improvements.
- Each region of the organization operates in a siloed manner leading to disparities in how company resources are managed across Puerto Rico.
- There are no standardized training programs, and formal documented processes are generally not available or have not been effectively implemented across the organization.
- Existing facilities, material and equipment are significantly damaged from the hurricanes or well past usable life, creating unsafe working conditions.
- There is an overwhelming amount of surplus and scrap material as well as general garbage/debris in every facility.
- Safety is not embedded in the responsibilities of each employee and part of their working environment.

Materials Management

- Warehousing storage equipment is not properly installed, labeled or supporting safe operating conditions.

Examining each of the four functional areas that define Materials Management, the following gaps substantiate our overall view that standardized and formal inventory management, asset recovery, warehousing, and logistics functions do not currently exist at PREPA:

INVENTORY MANAGEMENT

- Current inventory management practices tend to be sub-optimal
- Lack of forecasting/integration with upstream demand
- Inventory balance does not accurately reflect usable physical inventory
- Inventory controls do not conform with industry best practice
- Critical spares do not exist
- Inventory management decisions/strategy are made informally and can be influenced by political considerations
- Long-term supply agreements/relationships are non-existent, leading to spot procurement for all material purchases
- Material is purchased at Delivered Duty Paid without sufficient regard to the cost of material vs. freight and any other hidden costs
- Material lifecycle is not a consideration in standards/procurement decisions
- Puerto Rico wide material strategy/control is lacking, without clear strategies and direction across the warehouse network since inventory standards are separately managed at each location
- KPIs have not been developed
- There is a large volume of non-standard material that is spread across Puerto Rico

ASSET RECOVERY

- Surplus material is not returned to inventory, remains with Operations personnel. This leads to non-standard material being used in the field, lack of inventory control, inaccurate material forecasting and demand management.
- Scrap/salvage/recyclable/garbage is managed with a fragmented approach. There is no contract management function to address performance deficiencies, reconcile invoices, perform audits, etc.
- The approach to salvaged/burnout oil-filled equipment does not comply with Federal/Commonwealth regulations and in some cases will require a significant and costly cleanup effort to remediate.
- There is a significant amount of salvage/scrap/garbage/debris in most facilities and yards that presents, at best, an extremely negative view to the public, at worst, a safety and environmental hazard.
- PREPA lacks the equipment and material to manage the waste stream: mobile and stationary secondary containment, crates, bins, etc.
- PREPA lacks the knowledge, training and experience to manage the waste stream.

WAREHOUSING

- The existing facilities and equipment are aged, damaged, and largely inadequate for the needs in most sites. Significant damage from Hurricane Maria and the earthquake still exists at some facilities rendering them:
  - Unusable

  - Usable, but causing damage to material and infrastructure due to rain/flooding and introducing safety hazards into daily operations
- There are no existing standards for storage of goods by category (such as cable reels, copper, transformers, etc.). This presents a safety hazard and leads to wasted material due to physical/environmental damage (rust/rot). As a result, storage equipment/infrastructure varies by location and is insufficient for safekeeping of the material in most locations.
- Storage equipment is either unavailable, improperly installed, or improperly used, leading to safety hazards and process inefficiencies.
- Processes are poorly defined and not implemented across the organization.
- Standardized training programs are not in place (e.g., for forklift/transportation of dangerous goods, etc.). The same applies to specialized training needs (e.g., for lifting, rigging or tele-handling).

LOGISTICS

- The existing transportation equipment is aged/damaged and doesn't comply with DOT regulations. Most transportation equipment would not be considered "road-worthy" by North American standards and some present a serious safety risk to both PREPA personnel and the public.
- There is no dispatch or management for transportation of materials or other freight, leading to poor utilization of resources across the island.
- Both standardized (e.g., safety, forklift and transportation of dangerous goods) and specialized (e.g., load securement, rigging and lifting) training programs are not in place
- Formalized documentation procedures are not in place (e.g., pre-trip inspections, bills of lading, packing slips, trip logs, etc.)

2.2 Description of Remediated State

- In the remediated state, LUMA's material management capability will:
  - Meet the daily operational requirements of the organization in steady state and emergency operations, complying with local, state, and federal regulations (DOT/FMCSA and OSHA/ANSI, particularly the applicable parts and section of CFR 49 and CFR 27)
  - Have safety embedded in the organizations operating procedures and have most of the equipment required to support a safe working environment
  - Have facilities that adequately and safely support the needs of the organization
  - Carry an inventory of material that is ordered, processed, stored and delivered in safe and efficient manners
  - Utilize existing systems and controls to support accurate transaction of data, complying with internal and external policies and regulations
  - Manage material salvage/scrap/return in a process that complies with local and federal regulations
  - Have a management and training program regarding oil-filled equipment management and spill containment in place per environmental requirements. Minimum required equipment and structures will be in place and regularly used and maintained. Contracts for equipment repair, refurbishment, disposal will be in use.

2.3 Description of Program Completed State

In the completed state, LUMA's material management capability will:

- Contribute toward an efficient, professional, and safe organization that fully complies with all local, state, and federal laws and regulations

- Exceed the service requirements of the organization in steady state or emergency operations while remaining fully compliant with all local, state, and federal laws and regulations
- Be lean, agile, accurate, and able to meet the forthcoming changes required in order to meet Law 17 Renewable Energy targets
- Have safety embedded in the organizations operating procedures and have all equipment supporting/enhancing a safe working environment
- Have facilities that adequately support the needs of the organization, are hurricane ready and are scalable to future demands
- Have the systems and controls in place that support efficient and accurate transaction of data, as well as compliance with all internal and external polices and regulations
- Collect data on all key processes, monitoring, reporting, and increasing performance through continuous improvement initiatives
- Carry the optimum amount of Inventory that is ordered, processed, stored and delivered with care and attention, maximizing organizational investment while adhering to all specifications and quality requirements
- Manage material salvage/scrap/return in a process that is efficient and environmentally and fiscally responsible and complies with local and federal regulations
- Fully manage the transportation of all organizational freight from point of shipment to final site receipt, maintaining visibility and control through all carriers and transportation modes
- Have a culture of responsibility and an institutional knowledge regarding oil-filled equipment management and spill containment. All relevant equipment and structures will be in place and regularly used/maintained. Effective contracts for equipment repair, refurbishment, disposal will be in place.

2.4 Program Activities

- Set up and implementation of Asset Recovery function –
  - Development and implementation of processes and facilities for a fully functioning Asset Recovery department – Salvage/scrap/return of materials, training for warehousing and field construction personnel.
- Implementation of Warehouse Oil-Filled Equipment and Oil Containment Management Program –
  - Procurement of spill cleanup/containment equipment and oil containment structures where required.
  - Development and implementation of training program for all personnel handling or transporting oil-filled equipment, responsible for cleanup of spills and spill reporting.
  - Program will include examination of and potential retendering of existing agreements to obtain best service and value.
  - Engagement of ATCO / Quanta knowledge and expertise as required to determine best path forward for construction/implementation of mitigation measures.
- Asset Suite Reconfiguration Assessment –
  - Procurement of services to assess existing utilization of asset suite inventory and recommend configuration changes to align with upcoming strategic plans for materials management and LUMA overall.
  - Addition of bar code scanners for warehouses coordinating with Asset Suite Inventory.
- Asset Suite Reconfiguration Execution –
  - Reconfiguration of asset suite to utilize all relevant features and maximize operational efficiency including bar code scanner technology.

Materials Management

  - Ensure segregation of duties issues are removed and minimum checks/balances are in place to maintain efficiency and protect LUMA.
- Planned Demand Training Program –
  - Development and implementation of processes for requisition and request of materials using asset suite - program includes process design, training package development, training of field engineering and construction personnel, training of field warehousing personnel, standardizing communication methods.
- KPI implementation and measurement –
  - Implementation of a program and associated processes, for regular measurement and reporting of KPIs and auditing of key processes
- Material Handling Equipment Capital Plan –
  - Procurement of materials handling equipment to resolve deficiencies in existing equipment within the warehousing network - reach lifts at L1, L2 warehouses where applicable, indoor counterbalance forklift replacements, rough terrain forklifts at all warehouses handling poles
- Warehousing Storage Equipment Capital Plan –
  - Procurement of materials storage equipment to resolve deficiencies within the warehousing network - heavy grade plastic pallets for all locations to replace wooden pallets, racking improvements (floor bolted bumper guards on all legs, weight ratings on all crossbeams, leg replacements, all legs bolted to the floor), pole bunks in all warehousing locations with poles, outdoor/indoor labeling for all stock items and indoor hazardous materials cabinets
- Warehousing Facility Improvements Capital Plan –
  - Procurement of services to perform repairs/improvements to existing warehouse facilities and to erect covered storage and numerous locations that have deficient/damaged covered storage. Deficiencies include repairs to roofs, walls, overhead cranes, replacement of lighting, air conditioning units, installation of overhead fans or lighting.
  - New installation of covered storage to provide protection for material from the elements i.e., wood reels, transformers, crates of miscellaneous material. Installation of flood prevention measures at specific sites, loading docks at sites with high volumes of cube vans/highway vans.
  - Addition of WI-FI to all warehouse locations and amplifiers to insure full coverage of warehouse and yards
- Logistics Equipment Capital Replacement Program –
  - Assessment and replacement of logistics equipment to align with LUMA logistics strategy. Examples of equipment to be procured: flat deck trailers, tractors with knuckle-boom pickers, cube vans.
- Logistics Function Implementation –
  - Procurement and implementation of a logistics management tool to receive requests, track and dispatch the fleet of logistics equipment
  - Procurement and installation of GPS tracking units on all existing equipment to align with implementation of the tool
- USACE Material Evaluation and Disposition –
  - Evaluation of USACE material across the Warehousing network for alignment for existing and future LUMA standards
  - Evaluation of disposition and transportation to the Centers of Disease Control (CDC) as required for sale/salvage/remanufacture (transformers)

Materials Management

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Indirect
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Indirect
	☒ Enable Employees to Execute Operations Systematically	Direct
☐ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Indirect
	☒ Restore Damaged Grid Infrastructure	Indirect
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

Standardized procedures for inventory management, asset recovery, etc. will help to ensure safe working practices across the organization, both for a safer workplace and better public safety practices.

Availability of equipment and tools ensure that work tasks can be performed effectively and efficiently, and with reduced safety risk.

Effective materials management and asset recovery processes support rapid restoration in case of a major event such as hurricane, thereby reducing safety impacts of power outages.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability
Objective: Deliver Electricity at Reasonable Prices

Materials Management

Better processes for logistics, inventory management, asset recovery, etc. will help streamline internal operations, thus improving service reliability. These processes will also help to make spending on these areas more efficient, thus allowing for electricity to be delivered at more reasonable prices.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence
Objective: Enable Employees to Execute Operations Systematically

Standardization of processes will help to systematize business operations, both for overall management, and as applied to how employees conduct themselves within functions under Materials Management. As a whole, this will help to improve major outage event readiness and emergency materials management, thus contributing to improved project delivery

Measurement of process efficiency will track progress to performance targets and identify gaps in process, fostering continuous improvement and improving project delivery.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

A robust Materials Management framework will ensure that all material purchases and deployment to federally funded projects will be at the lowest possible cost while maintaining quality and service, utilizing existing materials agreements established for regular operations requirements.

Objective: Restore Damaged Grid Infrastructure

The improvements in materials management supported under this program will help to restore damaged grid infrastructure by ensuring construction materials are available for use, follow specifications and quality requirements, and efficiently and effectively deployed to project sites.

2.6 Program Risks

Risks to delaying the program:

- Non-compliance with Federal and Commonwealth regulations (e.g., OHS, DOT, EPA)
- Increased risk to employee safety in daily operations
- Risk to upcoming project demands on the Materials Management organization (unable to support increased workload, affecting project schedules/completion)
- Risk to meeting fiscal control metrics and external audits: no visibility of spend, material requirements within the organization, lack of material accuracy (write-offs)
- Lack of readiness for Major Outage Events

Risks related to commencement and execution:

- Non-compliance with Federal and Commonwealth regulations (e.g., OHS, DOT, EPA)
- Safety risks exist for employees and the public
- Material availability for projects
- Material adherence to newly implemented design standards
- Lack of relationships with suppliers (supply agreements)

- Sub-standard service contractors on-island within certain categories

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditure	**$1.0**	**$2.2**	**$4.3**	**$17.0**
SRP Expenditures	$0.7	$0.7	$2.6	—

3.2 Program Resource Requirements

CONFIDENTIAL

A number of people will be required from within the Operations department to carry out the implementation of these improvements, as well as support from IT/OT, HR and Utility Transformation.

3.3 Estimating Methods & Assumptions

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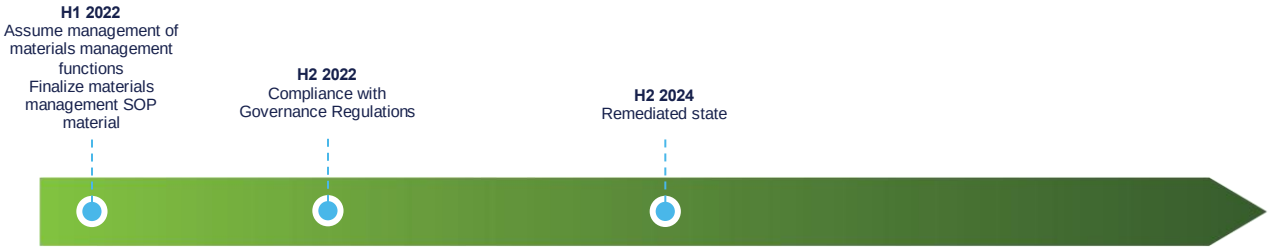
Estimating methods/assumptions (estimating template available if required):

- Assumed loaded hourly rates x full-time employees per activity
- Researched materials & equipment costs (market quotes)
- Historical information from ATCO program

3.4 SRP Program Timeline & Milestones



Operator Training

1.0 Program Description

This program will provide all necessary requirements to support new and existing system operator training along with operator competency assessments. As such, the program will address the need to improve current operator training and allow for new cohort(s) of operators to support the system. This will also improve operator response during an emergency situation.

2.0 Program Rationale

2.1 Current State & Identified Gaps

PREPA does not have enough operators, requiring some employees to perform 16 hour shifts for extended periods of time - potentially affecting their judgement due to accumulated fatigue. Further to this, some operators are eligible for retirement. Since it typically takes about 12-14 months to train an operator and since such trained personnel are not readily available in Puerto Rico, LUMA must develop a proper training program for onboarding operators as soon as possible. Further, competent operators are essential to ensure safe operation of the electric system and the utility reliability performance can be impacted. For all these reasons, the development of an operator training program is required as part of the SRP.

PREPA does not have a formal operator training program. Typically, training is performed through transmission of knowledge informally from experienced operators. This method typically takes about 4-6 months longer than a structured training program. Operators also do not have periodic competency assessments and “readiness” is determined on a judgement call from management. To compound this, operators do not practice on the system or conduct emergency drills to prepare for emergency weather events. PREPA does not have a system simulator for trainees and experienced operators to practice on.

2.2 Description of Remediated State

The program will follow the principles set forth in the OMA and will be remediated when the first version of the training program is complete. This means the outline, the structure and the modules will have been defined, the content has been completed and the first cohort of new operators has been trained. It also means that a competency assessment matrix has been developed and made available.

2.3 Description of Program Completed State

The program will have been completed when the first version of the operator training program is developed and a cohort of new operators has been trained, evaluated for competencies and made available for deployment. Ideally the simulator will also be available to enable this training program. The drills and training protocols will have been completed and tested at least once.

Operator Training

2.4 Program Activities

Before making the simulator operational, a benefit/cost analysis will be performed before serious funds are committed. Depending on the availability of a simulator, an appropriate training program will be developed, which will be leveraged from industry standard practices that utilize current employees to document specific requirements.

The training program will be developed in parallel with the first cohort of new operator and adjusted based on the feedback and performance of the recruits.

Drills will be developed and tested in preparation for the hurricane season.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Having competent operators will improve safety by reducing the risk of injury for field personnel in a hazardous situation involving live high voltage conductors or equipment at ground level.

Operator Training

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Employees to Execute Operations Systematically

Well trained and competent employees will make better decisions and will be able to solve problems more effectively. This can also translate to faster service restoration.

2.6 Program Risks

The basic risks involved with delaying or not carrying out this program are related to system and people safety. Untrained or poorly trained operators are far more likely to make inappropriate decisions regarding operations, especially during high stress emergency conditions. Poorly trained operators, working long hours under normal circumstances, cannot be expected to make safe decisions in an emergency. This situation creates major liability exposure if training is neglected.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.3**	**$0.5**	**—**	**—**
SRP Expenditures	$0.3	$0.3	—	—

3.2 Program Resource Requirements

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- A simulator consultant capable of making a benefit cost analysis
- LUMA employees to develop the training program

3.3 Estimating Methods & Assumptions

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Program costs were estimated on a rate per hours basis. Hours were estimated based on the experience of subject matter experts. Costs will be reevaluated as part of a benefit/cost analysis for the simulator.

3.4 SRP Program Timeline & Milestones

6.7 Support Services Portfolio

Tables 6-13 and 6-14 below presents support services portfolio spending estimates by SRP program, followed by a short description of each SRP program.

Table 6-13: Total Support Service Portfolio Spending Estimates by Program ($ millions, real)

Support Services Programs	*SRP portion*	*Non-SRP Portion*	Total Program Estimate
HR Programs	0.5	715.3	715.8
IT OT Asset Management	9.3	22.0	31.3
IT OT Cybersecurity Program	14.7	54.6	69.3
IT OT Enablement Program	9.7	6.4	16.0
Critical Financial Controls	3.8	-	3.8
Critical Financial Systems	3.9	9.9	13.8
Land Record Management	3.0	1.5	4.5
Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking	1.3	-	1.3
Improvements to Systems Dispatch for Increased Reliability and Resiliency	1.2	-	1.2
Waste Management	2.0	7.0	9.0
Update to Third Party Use, Audit, Contract and Billing Procedures	2.1	2.3	4.4
Safety Equipment	0.3	0.7	1.1
Integrated Safety & Operational Management System	0.2	5.8	5.9
Public Safety	0.3	3.0	3.3
Grand Total	**$52.3**	**$828.5**	**$880.8**

Table 6-14: Annual Support Services Portfolio Spending Estimates within Initial Budgets Period ($ millions, real)

	FY2022		FY2023		FY2024	
Support Services Programs	SRP Portion	Total	SRP Portion	Total	SRP Portion	Total
HR Programs	0.5	63.5	-	70.6	-	73.1
IT OT Asset Management	4.0	5.5	1.5	3.1	1.0	2.8

IT OT Cybersecurity Program	4.6	4.6	5.1	5.1	5.0	5.0
IT OT Enablement Program	2.2	4.0	2.5	2.6	2.5	3.1
Critical Financial Controls	2.8	2.8	1.0	1.0	-	-
Critical Financial Systems	1.7	1.8	0.4	2.3	0.3	2.5
Land Record Management	1.0	1.5	1.0	1.5	1.0	1.5
Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking	1.3	1.3	-	-	-	-
Improvements to Systems Dispatch for Increased Reliability and Resiliency	1.2	1.2	-	-	-	-
Waste Management	1.0	1.0	1.0	1.0	-	0.3
Update to Third Party Use, Audit, Contract and Billing Procedures	0.7	0.7	0.7	0.7	0.7	1.5
Safety Equipment	0.2	0.2	0.2	0.2	-	0.0
Integrated Safety & Operational Management System	0.2	0.2	-	0.2	-	0.5
Public Safety	0.1	0.1	0.1	0.1	0.1	0.1
Grand Total	**$21.4**	**$88.3**	**$13.3**	**$88.3**	**$10.5**	**$90.2**

Note: Spending estimates include federally funded and non-federally funded capital expenses and program-specific operational expenses. General operations and maintenance expenses not directly allocated to specific programs are not included here and are presented in LUMA's Initial Budget filing.

HR Programs. This Program Brief covers four separate programs to support the LUMA Human Resources (HR) department. This includes the following programs:

- **Employee benefits**. LUMA will implement industry competitive benefits programs for its employees such as an Employee Assistance Program (EAP), Long term Disability (LTD), Short term Disability (STD), Life Insurance, and a defined contribution plan (401(k)).
- **Employee engagement**. LUMA will launch an employee engagement strategy to ensure all employees feel part of the new LUMA family, and they feel engaged with decision making and their long-term career progression. The comprehensive employee engagement strategy includes employee activities, regular employee surveys, volunteerism, town halls, career growth opportunities and spaces where employees can express their feedback.
- **Training**. LUMA will implement core compliance training programs to ensure employee understanding and compliance with all Corporate policies and procedures, State Laws and Regulations, to prevent any inappropriate conduct. In addition, all functions in LUMA will implement a training program inclusive of at least the minimum requirements necessary to improve employee skill sets to bring performance to Contract Standards. This comprehensive functional training program will be applied across all functions in LUMA.

- **Support software**. The scope of the General Technology Human Capital Management program is to introduce standardized processes for management of employee data, employee performance management, talent management, succession planning, recruitment on-boarding and off-boarding management, learning management and compensation management. It will also provide employee and manager self-service capabilities

IT OT Asset Management. LUMA will introduce industry standard IT OT asset management procedures and provide the necessary system upgrades to ensure secure business operation and continuity, as well as improved customer responsiveness. The scope of the program includes assessing PREPA's application and infrastructure portfolio and beginning a series of software and infrastructure upgrades that drive toward a transition to cloud-based technology. IT OT resilience in this program also extends to the establishment of a new backup data center to ensure reliability and resilience of technology systems.

IT OT Cybersecurity Program. The program centers on enabling the business and protecting key organizational assets, including people, resources and technology to ensure that cyber risk, internal and external threats, vulnerabilities, and natural disasters are identified and mitigated based on risk and readiness factors. Improving cybersecurity is a critical part of hardening the Transmission and Distribution (T&D) system and ensuring business continuity. Cyber risks could severely impact T&D operations to the extent of widespread failure. This program will design and implement the people, processes, and technologies essential for effective cybersecurity governance, cybersecurity operations and monitoring, vulnerability identification and management, and cloud security.

IT OT Enablement Program. This program will implement capabilities to deliver and maintain IT OT services and systems enabling LUMA operations through the implementation of industry best practices and standardized processes and tools. Fit for purpose devices will be deployed to carry out business operations enabling near real-time access to electric network data providing a safer work environment. Industry best practices for Information Technology Service Management (ITSM) will be implemented so that technology assets are managed, provisioned and maintained securely. Processes will be implemented to establish end user device standards along with mobile application management (MAM) to control how end user devices are used. Enterprise Architecture (EA) and project management frameworks will be implemented to ensure software and infrastructure assets are implemented, maintained and disposed of in accordance with vendor support requirements including patching and upgrades. This will mitigate the risk of prolonged system outages on non-vendor supported software and infrastructure. By the end of the program LUMA will have developed and executed an operational data strategy, developed foundational enterprise architecture guidance and outlined a cloud strategy. LUMA's IT and OT organization will be able to design, plan, deliver, operate and control the lifecycle of IT OT services, projects and assets. An IT service management tool will ensure that technology is managed, provisioned and maintained securely to reduce risk to the organization and enable users.

Critical Financial Controls. The Critical Financial Controls program focuses on two key areas, internal control and internal audit. These two areas will build skills and capabilities in financial reporting and audit; and will update and enforce industry standard policies and procedures that comply with the latest laws and regulations. Internal Controls will address various internal control items, including obtaining and reviewing service organization controls for major vendors, the implementation of key transaction controls, reconciliations, validation, physical inspections, documentation evidencing performance of control tasks, disclosures, enforcement of applicable policies and procedures for employees to identify deviations, the establishment of a formal plan for communications with the audit committee and the revamp of the

internal audit department. Internal Audit builds the foundation of the internal audit team as well as the development of the methodology and process, along with building and retaining the required skills and technology base.

Critical Financial Systems. This program covers the technology projects for Finance and Facilities, including financial management systems and technology, risk management systems and supply chain management technology. The initiatives cover areas within budgeting, reporting, consolidation, risk management, time tracking, employee expenses, fixed asset subledger, procurement, and a major life cycle upgrade for the Oracle E-Business Suite (EBS) system. These initiatives are required to maintain a supported version of the financial applications or to address gaps identified in the financial management area.

Land Record Management. LUMA will develop a new record management system that allows for land information to be found easily and managed to utility industry standards. This allows compliance with legal requirements to be documented and shown to satisfy regulators. It also allows user groups to have efficient access to information. In particular, such a system lets Operations and Construction perform their work while respecting land rights agreements.

Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking. This program focuses on planning studies for dispatch of existing thermal units, along with new processes to audit costs included in the purchased power and fuel cost adjustment mechanism tariffs administered by LUMA in accordance with Section 5.6 of the OMA. The program includes creation and implementation of reasonable prudent administrative procedures for reporting of those related fuel and other generation costs as described in the OMA and being able to accurately present these costs to the PREB. The program does not include the management or oversight of fuel purchasing or of any Genco functions. Improved information on fuel costs, inventory, and availability will support resource planning as well as the more efficient and reliable dispatch of peaking power plants and other thermal plants. The program aims to improve resource adequacy and lower energy supply costs. As described in Exhibit H, Section 2.2. of the OMA and subject to the final reorganization plan for PREPA, fuel procurement and management responsibilities for PREPA's generation units will remain with PREPA's Genco unit. According to Section 5.13(b) of the OMA, LUMA shall have the right to reasonably access "... information consistent with Prudent Utility Practice required to perform the dispatch and scheduling of Power and Electricity, which includes fuel availability, fuel cost, fuel inventory, unit availability, unit marginal cost, unit outage schedules, electric system reliability requirements, reserve requirements, identification of must-run generation resources and any other information reasonably requested by Operator consistent with prudent Utility Practice required to perform the dispatch, scheduling, and coordination of Power and Electricity." Under the OMA, LUMA has the responsibility of presenting adjustments to the fuel adjustment and purchased power tariff clauses. Under the OMA, LUMA will manage and administer all existing and future PPOAs.

Improvements to Systems Dispatch for Increased Reliability and Resiliency. This program deals with the repair of non-functioning equipment and processes to allow for the System Operator to have data to carry out economic dispatch of generation assets, in accordance with the System Operation Principles and applicable procedures, and to allow for the safe and reliable operation of the system.

Waste Management. In accordance with the requirements of the OMA Section 5.10 and the scope of OMA Services specified in Annex I, LUMA will install new equipment and implement management processes to comply with environmental statutory requirements and support safe and efficient operations.

System Remediation Plan

The program includes installing secondary containment to prevent contamination, ensuring proper containers are in place to store wastes and, when required for site operations, processing or removal of accumulated waste debris. LUMA will take actions with respect to pre-existing environmental conditions, including accumulated waste, in accordance with the OMA Section 5.10(b).

Update to Third Party Use, Audit, Contract and Billing Procedures. This program is focused on updating procedures for third party use of land, use of infrastructure, audits, contracts, and billing. The program will include:

- Developing consistent processes and agreement templates to ensure compliance with legislation;
- Streamlining and improving customer service for third parties who wish to use pole infrastructure;
- Establishing annual billing to third parties to ensure they are paying the associated fee to attach to each individual structure (either overhead or underground);
- Completing updates and corrections to the CC&B system to ensure data accurately reflects the current asset management joint use attachment numbers and identifies responsible billing parties; and
- Implementing necessary changes to the billing process for joint use billing, which may include contract updates and renegotiation.

Safety Equipment. To improve employee and public safety LUMA will procure critical safety equipment and associated supplies such as automated external defibrillators (AEDs), portable eye wash, lone worker/confined space entry monitors and audiometric testing equipment. These items critically improve employees' current state of work-related injuries and illnesses as per OSHA requirements/recommendation.

Integrated Safety & Operational Management System. LUMA will centralize policy and procedure creation by using a fully integrated, efficiently managed internal safety and operational management system that will allow communication of requirements to all employees and monitor health, safety and environmental compliance organization wide. The system will have clear operational procedures and controls and will be easy to use and easily updated.

Public Safety. LUMA will introduce an organizational strategy to engage and educate the public on safety around electric equipment and installations, thereby reducing public safety incidents. The program will include the procurement of public safety related materials for training awareness and public outreach, the development and complete roll out of a communications plan and a continuing maintenance plan for the program.

HR Programs

1.0 Program Description

This program brief covers four distinct areas to support the LUMA HR department. This includes the following.

EMPLOYEE BENEFITS

LUMA will implement industry competitive benefits programs for its employees, including competitive benefits such as an EAP, LTD, STD, Life Insurance, and a defined contribution plan (401(k)).

EMPLOYEE ENGAGEMENT

LUMA will launch an employee engagement strategy to ensure all employees feel part of the new LUMA family, and they feel engaged with decision making and their long-term career progression. The comprehensive employee engagement strategy includes employee activities, regular employee surveys, volunteerism, town halls, career growth opportunities and spaces where employees can express their feedback. Communication is key for employee engagement

TRAINING

LUMA will implement core compliance training to ensure employee understanding and compliance with all Corporate policies and procedures and Commonwealth Laws and Regulations, to support and promote appropriate conduct. In addition, all functions across LUMA will implement comprehensive training programs meeting the minimum requirements necessary to improve employee skill sets, bringing performance to Contract Standards.

SUPPORT SOFTWARE

The implementation of Human Capital Management software is to introduce standardized processes for management of employee data, employee performance management, talent management, succession planning, recruitment on-boarding and off-boarding management, learning management and compensation management. It will also provide employee and manager self-service capabilities. This is a key element that will support contemporary HR practices.

2.0 Program Rationale

2.1 Current State & Identified Gaps

The current state and identified gaps across different areas of HR include the following:

EMPLOYEE BENEFITS

PREPA offers a large and out of date benefit program including a severely underfunded defined benefit pension system. The system is complex, not well understood by employees and very expensive and difficult to administer. The various programs and systems have not evolved as the industry has changed and evolved.

HR Programs

LUMA has the opportunity to offer an industry leading set of health and welfare benefits and then in addition provide further options for employees for items like supplemental benefits such as life or disability insurance. A professionally managed 401k will support employees to save for retirement and provide opportunities for financial education and literacy, all of which serves to create more engaged and loyal employees.

EMPLOYEE ENGAGEMENT

PREPA does not have a structured employee engagement strategy and therefore, does not measure employee engagement. They do not carry out activities that allow for employees to feel their voices are heard, or that help them feel part of a wider corporate community. Not only does effective engagement have the potential to significantly affect employee retention, productivity and loyalty, it is also a key link to customer satisfaction, company reputation and overall stakeholder value.

TRAINING

PREPA training programs are not up to industry standard nor meet the minimum requirements for LUMA to perform in accordance with Contract Standards. The LUMA training program will include over 100 specialized training courses to meet mandatory legal requirements and help employees gain the minimum essential knowledge and learning experience for all functions.

SUPPORT SOFTWARE

The current support systems exhibit the following:

- Lack employee self service capabilities
- Lack performance, compensation, talent management and learning management strategy
- Lack career planning and succession planning program
- Lack documented policies and processes
- Lengthy manual processes are used for for benefits enrollment, training compensation, performance management, onboarding, and HR metrics
- Lack data on employee engagement levels and HR metrics

2.2 Description of Remediated State

TRAINING

In the remediated state, core compliance training will have been administered to all LUMA employees to ensure understanding and compliance with all Corporate policies and procedures, Commonwealth and Regulations, to prevent inappropriate conduct. The remediated state within the first year of operations post Commencement Date whereas all employees hired into LUMA at time of Commencement will be required to partake in specific training as part of the onboarding process.

The following are examples of core compliance training required to achieve a remediated state:

- Workplace Bullying and Harassment
- Sexual Harassment
- Drug and Alcohol Awareness
- Equality and Diversity
- Social Media, Email and Online Etiquette
- Anti-Bribery & Anti-Corruption

Core compliance training for employees is a priority for the organization to reduce the risk of harassment claims, motivate employees to recognize, report and prevent misconduct, and help create a respectful, inclusive workplace culture. Upon completion, all employees in LUMA will have received the required trainings and knowledge they need to perform their job safely and conduct themselves appropriately in the workplace. This is an essential step for effectively addressing and preventing misconduct. This training will be taken yearly. However only the need to complete the initial training will be part of the SRP.

2.3 Description of Program Completed State

The program completed state will include the following.

EMPLOYEE BENEFITS

In the completed state all employees will have access to a competitive benefits suite which will include supplemental benefits such as life insurance, disability insurance, an EAP, and a defined contribution plan. These industry competitive benefits will help solidify LUMA's reputation as an employer of choice in Puerto Rico, helping LUMA attract and retain the best talent.

EMPLOYEE ENGAGEMENT

LUMA will have implemented a comprehensive Employee Engagement Strategy. The most important aspect of this strategy will be implementation of better communication with all employees.

The strategy also includes employee activities, regular employee surveys, volunteerism, town halls, career growth opportunities and spaces where employees can express their feedback. Employees will feel that management values and takes note of their views, and that they are part of a wider LUMA family. Through its employee engagement, LUMA will be seen as following through on its ambition of being an employer of choice in Puerto Rico. Talent that has been hired or developed will be more easily retained. Potential highlights include:

- Periodic ongoing events, e.g., onboarding touchpoints & focus groups which will allow employees to provide feedback on their onboarding and recruitment process
- Prescribed scheduled events, such as quarterly Town Hall meetings, focus groups, employee appreciation events & volunteerism to provide opportunities for open discussion and interaction with fellow employees and the community
- Roll out a formal engagement program that includes formal Engagement Surveys that will identify areas of improvement to be incorporated into LUMA action plans

TRAINING

Upon training program implementation, a learning platform will be available for all LUMA employees, which includes training modules for a wide range of functions. Specific courses and learning paths under this platform will be assigned to eligible employees based on their roles, with specific training programs administered by subject matter experts (SMEs) as needed. The learning platform will track completion of the different trainings for employees such that completion and performance can be monitored on an ongoing basis. As such, all employees in LUMA will receive the required education to perform their jobs securely. Employees will recognize that management has invested in their career development and this will improve employee engagement levels as well as provide a safer workplace, efficient service delivery and improved customer experience.

HR Programs

SUPPORT SOFTWARE

Upon implementation, all HR processes will be managed in a single, modern platform, eliminating excess physical documentation, improving process control and avoiding duplication of labor.

2.4 Program Activities

EMPLOYEE BENEFITS

- Engagement of a welfare plan vendor to administer the life, accidental death and dismemberment (AD&D), short-term and long-term disability plans
- Development of an implementation and roll out strategy for each set of benefits
- Development and subsequent implementation of an internal communication strategy to educate PREPA legacy employees newly employed at LUMA about the new benefits structure
- Development and subsequent implementation of an external communications strategy that forms part of the hiring strategy to make LUMA an attractive employer of choice in Puerto Rico

EMPLOYEE ENGAGEMENT

- Development of an overall strategy for employee engagement including:
  - Approval, planning and execution of events and activities
  - Engagement plan through surveys, town halls and other feedback media
  - Volunteerism plan
  - Communication of career growth opportunities
  - Employee survey development and configuration

TRAINING

- Implementation of a learning platform through Workday Human Capital Management (HCM)
- Identification of required learning for all functions
- Courses or learning paths are assigned to eligible employees
- Required courses are completed
- Performance and learning monitoring on an ongoing basis

SUPPORT SOFTWARE

- Definition of the HR Information System (HRIS), benefits, compensation, recruitment and learning modules implementation project teams
- Development and monitoring of project plans
- Testing of modules
- Training of employees on use of the platform
- Formal launch of the modules

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Indirect
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Direct
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☒ Pursue Project Delivery Excellence	Indirect
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☒ **Other**	☒ Other	Direct

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

Training: Well-trained employees will directly impact workplace safety by putting into practice acquired skills and practices

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Increase Service Reliability

Employee engagement: Better engaged employees will be indirectly incentivized to provide better service to customers and improve service reliability.

Training: Trained employees will directly impact service to customers by providing excellent customer service skills acquired through LUMA's training program

HR Programs

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Pursue Project Delivery Excellence
Objective: Enable Employees to Execute Operations Systematically

Employee engagement: Engaged employees have higher morale and are more motivated employees. Raising moral is critical to raise employee performance and achieve company goals.

Training: Well-trained employees will directly impact delivery and execution of services by applying learned skills.

Support software: A modern Human Capital management platform and the appropriate training to users, will directly impact Human Resources processes, enabling better project delivery and supporting employees in their work, thereby supporting operational excellence.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Restore Damaged Grid Infrastructure
Objective: Improve Resilience of Vulnerable Infrastructure

Training: Well-trained employees will be able to restore and improve resiliency of the grid infrastructure by applying specialized learned skills.

PRIMARY GOAL: OTHER

Objective: Other: Attract Talent, Increase Employee Retention & Provide Incentive for Improved Performance

Employee benefits: Offering a competitive benefits program is critical to maintain employee engagement, leading to improved performance. Structured the right way, the benefits program will be a crucial pillar in building LUMA's reputation as an employer of choice. The benefits program should also result in higher morale and better incentives for improved performance.

2.6 Program Risks

- **Employee benefits:** Not introducing competitive benefits risks higher turnover, and an inability to create and cement a reputation as an employer of choice, weakening LUMA's ability to attract talent.
- **Employee engagement:** The lack of employee engagement can lead to increased turnover, which results in increased hiring costs. It can also lead to lower morale and motivation, which can lead to lower performance standards.
- **Training:** The lack of specialized, modern and up to industry standard training can lead to workplace safety incidents, which can severely impact performance and company brand. Customer service can also be directly impacted as employees without proper training will not be able to provide the expected service delivery.
- **Support software:** The primary risk of not proceeding with this software implementation is that human capital management will continue to be managed in an ad hoc and manual manner limiting LUMA's ability to monitor employee activities. The processes will continue to be lengthy and manual which will negatively affect performance levels and increase the risk of human error. This limits the ability to respond to employee requests in a timely and appropriate manner.

HR Programs

Another risk is the lack of compensation management and learning management for employees which impacts the employee experience at LUMA and LUMA's reputation as an employer. Not proceeding with this program may cause employees to seek different employment opportunities in Puerto Rico.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$63.5**	**$70.6**	**$73.1**	**$508.6**
SRP Expenditures	$0.5	—	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

EMPLOYEE BENEFITS

- HCM system for administration of programs
- LUMA internal and external communications resources

EMPLOYEE ENGAGEMENT

- Internal communications resources
- IT OT support for communication

TRAINING

- Implementation of Workday HCM Learning module
- Identification of required education external resources
- Training programs will be administered by the Workday HCM Learning Module or Training managers and coordinators (internal and external). Particular training modules will require trainers, writers and training consultants, along with training materials, props and training specific technologies. Specific training modules may have dedicated location requirements, with overnight stays and travel depending on the training location.

SUPPORT SOFTWARE

- Identification of required modules for the HC management system to be acquired
- Resource requirements are as follows:
  - System integrator
  - Project manager
  - Systems analysts / business analysts
  - Subject matter experts

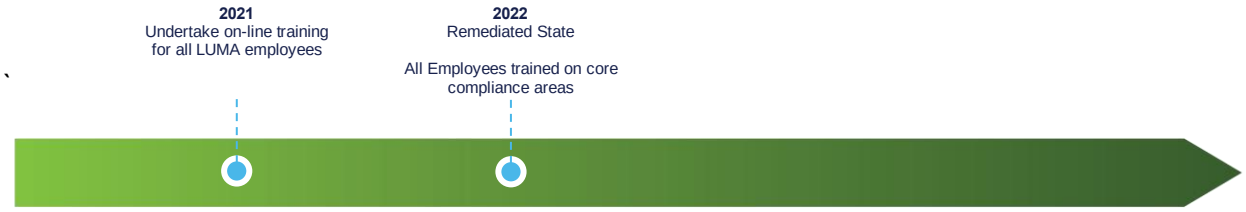
3.3 Estimating Methods & Assumptions

CONFIDENTIAL

- [redacted]
- **Employee engagement:** Costs per annum vary according to planned events.

- **Training:** Costs vary per function based on learning needs.
- **Support software:** The costs associated with the implementation of the Human Capital Management solution is estimated using the International Business Machines (IBM) Project Cost Estimator for implementing a leading Human Capital Management solution. Pricing assumptions are based on experience with utilities of similar size to implement human capital management solutions.

3.4 SRP Program Timeline & Milestones



IT OT Asset Management

1.0 Program Description

LUMA will introduce industry standard IT OT asset management procedures and provide the necessary system upgrades to ensure secure business operation and continuity, as well as improved customer responsiveness. The scope of the program includes assessing PREPA's application and infrastructure portfolio and beginning a series of software and infrastructure upgrades that drive toward a transition to cloud-based technology. IT OT resilience in this program also extends to the establishment of a new backup data center to ensure reliability and resilience of technology systems.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA is charged with the overall management of over 200 enterprise and operational technology assets, including the backup of technology assets in a safe and secure manner. A significant number of the software solutions are customer standalone systems with 90% of the infrastructure being at end of support/end of life. This includes substation RTU and SCADA related equipment. Another significant gap and safety concern is the absence of a fully functional voice radio system for work force management.

The current state of the IT OT Asset Management processes and the maintenance of technology assets corresponds to a low maturity score in the gap assessment. This indicates that PREPA is aware of the need to address the elements that define competent IT OT Asset Management and is starting to apply them in specific areas of critical IT OT Assets that enable key business functions. Gaps requiring remediation exist in all areas of IT OT Asset Management. For example:

- There is no formal documented IT OT asset management strategy, nor are there processes or tools aligned to an industry best practice.
- There is no centralized repository for tracking and managing software solutions and infrastructure, resulting in end-of-life assets and increased risk of security breaches. Additionally, there is an absence of IT principles (infrastructure refresh cycles, license policies, environment management etc.)
- Mission critical systems are dated and not vendor supported (e.g., SCADA, Energy Management System [EMS], work management [STORMS], fleet management [Fleetfocus]).
- The connectivity model is outdated and not synchronized between the steady state in and the operational state in the OMS and poses a liability and safety risk.
- Current processes do not utilize the capability of the OMS to capture ETRs because the outdated connectivity model and lack of accurate GIS data limit the accuracy of the ETR output
- The capabilities provided by technology solutions are not fully leveraged or integrated (e.g., no integration between the automated meter reading system and outage management system to support the prediction of outage locations).
- The network infrastructure is dated and not supported. There is little telecom equipment integration present, which results in extended outages, possible equipment damage and risk to employees and the public.

- The controls in place to ensure identities and credentials are managed for authorized devices, users and processes across assets/locations are inconsistent.
- The disaster recovery site at Aguirre and the back-up control center (Ponce) do not support critical functions due to environmental and security risks.
- Current on-premise hardware is out of date.
- Compliance and governance software to adhere to NERC-CIP requirements is absent[1].

The IT OT department's ability to ensure secure business operations and deal with potential issues preemptively is severely limited due to:

- End of life and non-maintained software and infrastructure assets
- Immature IT OT asset management processes and
- A lack of IT OT asset management performance

2.2 Description of Remediated State

In the remediated state business critical applications (i.e., hardware, software, databases and infrastructure) required to keep the business operating will be upgraded to vendor support level. The business-critical application and infrastructure portfolio will be vendor supported to mitigate the risk of prolonged system outages. In accordance with Act 17, maintaining vendor support mitigates operational risk to technology assets and business operations.

Backup control center and technology disaster recovery capabilities will be relocated to a secure and resilient facility. The facilities and technologies are critical to the resilience and continuity of technology services. In accordance with Act 17, the remediated state will ensure secure and reliable controls are in place to prevent and manage continuity of technology and business operations in the event of a disaster.

Enterprise architecture standards will be established along with the implementation of enterprise architecture capabilities within the organization.

Field mobile devices will be enrolled in the FirstNet First Responder system to improve response capabilities and resiliency by ensuring communications and access to systems, data and electrical network map during cellular connectivity disruptions.

LUMA's IT OT Asset Management procedures are compliant with the OMA and ensure IT OT assets used to operate and maintain the T&D system are managed and maintained in accordance with Contract Standards by using strategies and risk optimization to achieve combined technical performance, life cycle cost, safety, customer satisfaction and regulatory compliance (OMA Annex I, Section II(A)).

2.3 Description of Program Completed State

The IT OT Asset Management program addresses the major deficiencies in enterprise and operational technology asset management identified in the gap analysis. Included in the program are:

[1] [1] Though Puerto Rico does not fall under the jurisdiction of NERC, LUMA opts to apply the appropriate sections of NERC to the extent they are reflective of industry best practices.

- Funds for replacement of end-of-life hardware, software, databases and infrastructure assets to mitigate the risk of security breaches
- Implementation of IT OT Asset Management, processes and practices
- Implementation of a secure and reliable backup data center
- Up to date cyber security systems and licenses for physical security monitoring
- Up to date DNP3 compatible substation controllers for controlling the electrical grid and supporting grid modernization

In the completed state, software, databases and infrastructure will be upgraded in accordance with vendor lifecycles or decommissioned when no longer required. The application and infrastructure portfolio will be vendor supported to mitigate the risk of security breaches. The backup data center facilities will be remediated to ensure resiliency and reliability of technology systems to enable business continuity and disaster recovery in the event of an incident or natural disaster. Recovery time objectives (RTOs) and recovery point objectives (RPOs) will be defined for business applications and will be supported. The IT OT Technology and Infrastructure team, along with the Technology Enablement and Sustainment team, will operate according to industry best practices. This includes conforming with established enterprise architecture standards and a technology refresh cycle, the implementation of enterprise architecture practices, and the ownership and operation of technology assets only within their useful lives.

The electrically connected model will be up to date and visible to Operations, giving them the ability to monitor, control and orchestrate field crews for emergency response and restoration efforts. Accuracy of the connected model is essential for public and worker safety.

2.4 Program Activities

There are 17 projects that comprise the overall IT OT Asset Management program.

The IT Application and Infrastructure Portfolio Optimization and IT Operational Systems projects represent the upgrade or replacement of enterprise and operational software applications as well as that of the underlying hardware or infrastructure to reach vendor supported levels. Where possible enterprise applications will be moved to cloud-based solutions and end of life hardware will be replaced. These programs will see upgrade/replacements begin in 2022, with most of the upgrades/replacements occurring by 2025.

The remaining expenditure addresses requirements to remediate inadequacies of the current backup data center. This remediation will help to ensure the resiliency and reliability of technology systems for business continuity and disaster recovery in the event of an incident or natural disaster.

Activities to achieve remediation include:

- Design the IT OT Technology and Infrastructure team and the Technology Enablement and Sustainment team based on leading technology industry standards
- Define business critical systems
- Recruit resources to operate and support business critical systems
- Recruit enterprise architecture resources to define architectural standards and governance processes to ensure compliance with established standards
- Develop upgrade/replacement plan to upgrade/replace software and infrastructure for business-critical applications

- Complete upgrade/replacement projects for business critical applications and substations
- Assess available sites for backup data center and establish backup data center in recommended location
- Relocate infrastructure supporting business critical applications to new backup data center location.

The following approach is required to ensure success and completion of the program:

- People
  - Develop a training and certification program for resources
- Process
  - Examine the application portfolio to develop a picture of long-term business and technical viability; establish a set of dispositions and criticality of action for transitioning the application portfolio (to cloud, for example, or for replacement)
  - Identify the sequence of actions that should be pursued to "remediate" the application portfolio, ensuring that actions are sequenced and right sized to optimize business value while minimizing the risk of application failure
  - Standup application environments to support development, testing, user acceptance testing, training, and disaster recovery testing.
  - Develop processes and protocols to enable collaboration with field operations teams.
  - Ensure proper training for support staff
- Tools and Technology
  - Define LUMA architecture standards and guiding principles
  - Use LUMA engineering standard for substation controller and RTU replacements
  - Extend the service management toolset to manage the application and infrastructure portfolio in accordance with the technology asset management strategy enabling lifecycle planning and supporting disaster recovery and business continuity planning
  - Establish a new backup data center and relocate all backup and disaster recovery infrastructure
  - Integrate siloed telecom management systems
  - Provide communication tools like cellular phones to field workers

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Indirect
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Direct
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☐ Pursue Project Delivery Excellence	

IT OT Asset Management

Primary Goals	Objectives	Direct or Indirect Impact
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☒ Improve Resilience of Vulnerable Infrastructure	Indirect
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

This program reduces the risk of safety-related incidents by maintaining applications and the underlying infrastructure that provides access to business-critical information including the electrical network.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

The program ensures customers have access to accurate and timely information provided by secure and reliable applications and infrastructure.

Objective: Increase Service Reliability

Replacement of end-of-life software, databases and other IT OT infrastructure assets will allow for better performance and monitoring of the O&M contract, improving reliability.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Enable Employees to Execute Operations Systematically

The use of more secure and reliable enterprise and operational applications and their supporting infrastructure will enable more systematic management of the business. These will also help employees to operate systems more efficiently and effectively.

This program reduces the risk of prolonged outages of critical business applications by maintaining the systems and infrastructure at vendor supported levels.

PRIMARY GOAL: SYSTEM REBUILD AND RESILLENCY

Objective: Improve Resilience of Vulnerable Infrastructure

The program provides the necessary system upgrades to ensure secure business operation and continuity of the T&D system, as well as improved customer responsiveness.

2.6 Program Risks

The primary risk of not proceeding with this program is that applications and integration will become unstable and vulnerable to security breaches. This allows for critical customer and asset data to be compromised with the potential for significant financial penalties. Not proceeding with the program will lead to an increased risk of prolonged system outages and the need to invoke emergency and manual processes as defined in the LUMA Business Continuity Plan. These manual processes will negatively affect performance levels and increase the risk of human error. This will directly affect LUMA's reputation in the marketplace through an inability to respond to customer requests in a timely and appropriate manner.

We cannot immediately upgrade/replace all unsupported software and infrastructure for commencement day so there will be an ongoing risk until all software and infrastructure supporting GridCo business functions are upgraded or replaced and GenCo specific systems are no longer operating on the network.

Key identified hardware pieces are critical to the operation of the electrical grid. Failure of these will result losing control and visibility to the electrical network which can put employees and the public at risk. Equipment damage can also occur during this time. The same risks are applicable to incomplete map migrations of the OMS system.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$5.5**	**$3.1**	**$2.8**	**$20.0**
SRP Expenditures	$4.0	$1.5	$1.0	$2.8

3.2 Program Resource Requirements

CONFIDENTIAL

- System integrators
- Software and infrastructure vendors
- Software solutions and required infrastructure
- Data center building
- Control System vendors and integrators

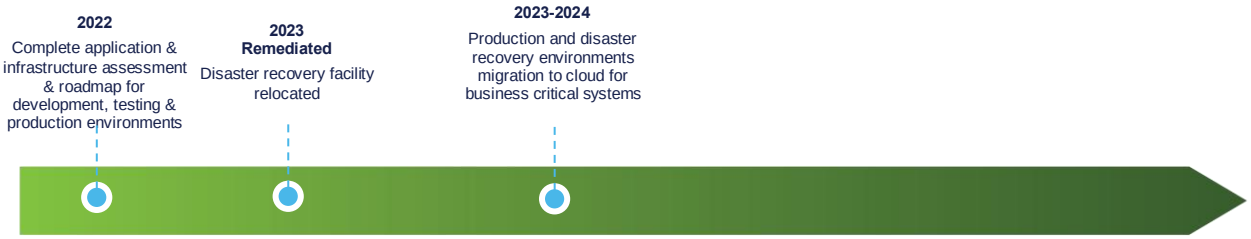
3.3 Estimating Methods & Assumptions

CONFIDENTIAL

The costs associated with implementation of this program is estimated using the International Business Machines (IBM) Project Cost Estimator for the upgrading/replacing utility business applications and the supporting infrastructure, based on Gartner recognized industry leading solutions in the specific areas and the use of cloud-based solutions (when possible).

ITOPS estimation was done based on the 2020 FEMA documentation presented by PREPA

3.4 SRP Program Timeline & Milestones



IT OT Cybersecurity Program

1.0 Program Description

This program focuses on the establishment of a cybersecurity program that protects key organizational assets including people, resources and technology. The program will ensure that cyber risk, internal and external threats, vulnerabilities and natural disasters are identified and mitigated based on risk and readiness factors. Improving cybersecurity is a critical part of hardening the T&D System and PREPA business continuity. Cyber risks could severely affect T&D System operations potentially even to the point of widespread failure. The program will design and implement the people, processes and technologies essential for effective cybersecurity governance, cybersecurity operations and monitoring, vulnerability identification and management, and cloud security.

Key to this program is the ability to defend against cyber incidents. A cyber incident is an event that has a negative impact on the organization. This includes but is not limited to data breaches, damage to systems (physical or digital), loss of system control or operations, lack of confidence in or accuracy of data, ransomware, phishing, theft, natural disaster (loss of ability to operate), equipment/system failure and unauthorized access. By ensuring the confidentiality, integrity and availability of assets in compliance with Section 13 of the OMA, the cybersecurity program will proactively mitigate risk and enable business operations by identifying and reducing the risk and impact of a cybersecurity incident to the organization.

2.0 Program Rationale

2.1 Current State & Identified Gaps

CONFIDENTIAL

[redacted]

[1] Though Puerto Rico does not fall under the jurisdiction of NERC, LUMA opts to apply the appropriate sections of NERC to the extent they are reflective of industry best practices.

CONFIDENTIAL

[redacted]

2.2 Description of Remediated State

CONFIDENTIAL

[redacted]

[redacted]

2.3 Description of Program Completed State

CONFIDENTIAL

[redacted]

IT OT Cybersecurity Program

2.4 Program Activities

CONFIDENTIAL

[redacted]

2.5 Program Benefits

CONFIDENTIAL

[redacted]

IT OT Cybersecurity Program

CONFIDENTIAL

[redacted]

CONFIDENTIAL

[redacted]

2.6 Program Risks

CONFIDENTIAL

[redacted]

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$4.6**	**$5.1**	**$5.0**	**$54.6**
SRP Expenditures	$4.6	$5.1	$5.0	—

3.2 Program Resource Requirements

CONFIDENTIAL

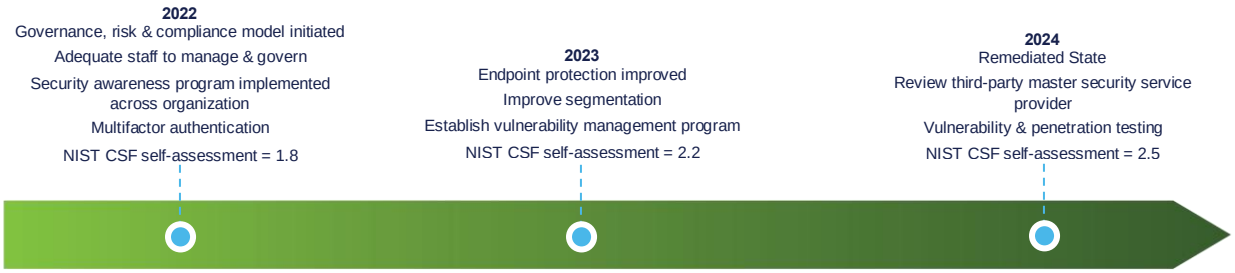
Staff augmentation to manage and operate the Information Security Office and Cybersecurity program has been included in the OpEx budget estimate. Contracted resources to implement the projects and program are included in the CapEx estimate.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

- Contract or internal resources
  - Licensing and implementation costs
  - Rates/hour or FTEs and hours assumed
- In-service date (lifecycle refresh dates — industry best practice)
- Historical program information
  - Experience/knowledge

3.4 SRP Program Timeline & Milestones



4.0 Abbreviations

CIA Triad	Confidentiality, Integrity, Availability Triad
IAM	Identity and Access Management
IT	Information Technology
KPI	Key Performance Indicator
MSSP	Managed Security Service Provider
NERC-CIP	North American Electric Reliability Corporation – Critical Infrastructure Protection
NIST	National Institute of Standards and Technology
NIST CSF	NIST Cybersecurity Framework
OT	Operational Technology
PAM	Privileged Access Management
PLC	Programmable Logic Controller
RACI	Responsible, Accountable, Contributor, Informed
RPO	Recovery Point Objectives
RTO	Recovery Time Objectives
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SIEM	Security Information and Event Management
SLA	Service Level Agreement

IT OT Enablement Program

1.0 Program Description

This program will implement capabilities to deliver and maintain IT OT services and systems enabling LUMA operations through the implementation of industry best practices and standardized processes and tools.

Fit for purpose devices will be deployed to carry out business operations enabling near real-time access to electric network data, providing a safer work environment.

Industry best practices for Information Technology Service Management (ITSM) will be implemented so that technology assets are managed, provisioned and maintained securely. Processes will be implemented to establish end user device standards along with mobile application management (MAM) to control how end user devices are used.

Enterprise Architecture (EA) and project management frameworks will be implemented to ensure software and infrastructure assets are implemented, maintained and disposed of in accordance with vendor support requirements including patching and upgrades. This will mitigate the risk of prolonged system outages on non-vendor supported software and infrastructure.

By the end of the program LUMA will have developed and executed an operational data strategy, developed foundational enterprise architecture guidance and outlined a cloud strategy. LUMA's IT (information technology) and OT (operational technology) organization will be able to design, plan, deliver, operate and control the lifecycle of IT and OT services, projects and assets. An ITSM tool will ensure that technology is managed, provisioned and maintained securely to reduce risk to the organization and enable users.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA is charged with:

- Overall management of approximately 4,000 users with access to enterprise and operational systems
- Management of end user devices ranging from mobile phones, to tablets, desktops and peripherals distributed across Puerto Rico
- Management of business projects that introduce, extend and maintain technology assets

The current state of service management, project management and enterprise architecture processes and the maintenance of end user devices corresponds to a low maturity score based on LUMA's gap assessment. This indicates that PREPA is aware of the need to address the elements that define a competent IT OT service organization and end user device program and is starting to apply them in specific areas of ITSM.

Gaps requiring attention exist in all areas of service management, for example:

- There are no formal documented service management processes aligned to an industry framework for the management of incidents, problems, request fulfillment and performance.
- There are no certified service management professionals within the PREPA organization nor is there a training and development plan in place to achieve certification.
- There is no established IT OT service catalogue, associated service levels, services, prioritization or escalation mechanism for IT OT services. Incidents are responded to on a “first come, first served” basis without analysis of risk level to the organization.
- PREPA is using a project defect management tool in an attempt to manage the core capabilities of ITSM, which are request fulfillment and incident, problem and performance management processes. As this is not the vendor’s intended use of the tool the capabilities are limited. The tracking of requests, incidents and problems is simply through lists with no workflow or analytics.
- There is no centralized repository for tracking and managing end user devices, software and infrastructure.
- Resource constraints within the IT OT team have resulted in a lack of capacity to conduct analyses on incidents or to develop improvement plans.
- Current PREPA systems do not comply with an end user device refresh practice resulting in end of life devices that present a clear cybersecurity risk. The use of such devices would negatively affect LUMA’s operations, regulatory compliance, employee safety and customer satisfaction
- End user device security patching processes and practices require significant improvement
- PREPA has an immature data management strategy — a Proof of Concept (PoC) is underway on data lake and analytics (which are covered in other initiatives), but there are no actions underway or planned with respect to operational data. This initiative is intended to address that shortfall, articulating a first set of policies / principles concerned with critical data subjects, defining: critical data subjects' ownership / custodianship, definitive persistent stores (Books-of-Record) rules of consumption, replication, persistence data sensitivity, protection, integrity and availability rules / standards
- PREPA has very limited architectural capability — this initiative will introduce foundational artefacts / capabilities: enterprise architectural mandate operating model (governance, interactions), foundational models (e.g., Component Business Model [CBM]) and foundational building code for the implementation of a tool
- There is no integrated software development or implementation lifecycle methodology; nor is there a project initiation, prioritization, approval and funding process. There is also limited project planning, scheduling, execution and closeout processes or standardized tools and templates for each project phase. The gap assessment also indicated a lack of standards for project document storage, folder organization, naming convention or defined lessons learned process nor integration of lessons learned into future project planning.
- Project management methodologies are not integrated with business relationship management, enterprise architecture and technology.

As a whole, the IT OT department’s ability to support and enable business operations in a secure manner has been hampered by end of life and poorly maintained end user devices, immature service management processes, lack of properly skilled / trained personnel, lack of transparency on service management performance and the lack of an enterprise architectural and data management strategy.

2.2 Description of Remediated State

In the remediated state LUMA end user device standards and tools for device imaging and management will have been implemented. All end user devices deemed end of life will have been replaced. Information

architecture will have been strengthened and service management processes, practices and tools will have been implemented.

2.3 Description of Program Completed State

The IT OT Enablement program addresses major deficiencies in the End User Device Management and Technology Operations Practices that were identified through LUMA's gap assessment. This program includes:

- Replacement of end of life end user devices, thus mitigating the risk of security breaches
- Implementation of service management certification standards
- Implementation of service management processes and practices
- Implementation of a service management tool to support improved request fulfillment, incident, problem and performance management
- Implementation of project management certification standards
- Implementation of project management processes, practices tools and templates across the service delivery lifecycle

In the program completed state, end user devices will be maintained and refreshed on a schedule set by the IT OT Service Management group according to industry best practices. This includes conformance with Information Technology service management standards, regular patching and refreshing of end user devices, full training for all service management personnel, implementation of service management practices and owning end user device assets that operate within their useful lives.

2.4 Program Activities

There are 21 projects that comprise the overall IT OT Enablement program.

The largest project is for capital acquisition of new end user devices to replace those that are end of life and unsecured. This includes approximately 2,000 laptops, 550 desktops, 1,200 ruggedized tablets and 2,300 mobile devices that need to be replaced. This project aims for device refresh to occur during 2022 and early 2023. We estimate that $4.3 million over the two years is needed to complete the refresh of devices.

The other major expenditure addresses the requirement to implement an industry standard IT OT service management toolset to manage all service requests including:

- User access
- Software
- End user device
- Hardware and peripherals
- Information Architecture
- Architectural Strengthening

Additionally, the IT OT service management toolset will record and manage incidents, problems and performance across these areas.

IT OT Enablement Program

The resulting program will encompass the people, processes and technology required to ensure the success of the comprehensive program.

PEOPLE

- Design the IT OT Service Management group based on leading industry service management standards
- Develop a training and certification program for resources
- Design an Enterprise Architecture strategy that formalizes leading technology resource interactions

PROCESS

- Develop IT OT Service Management Catalogue and associated service levels based on leading industry IT service management standards
- Develop level three business process models and standard operating procedures for request fulfillment, incident management, problem management and performance management
- Develop end user device asset management strategy including refresh period and patch management process
- Develops and operationalizes a critical IT capability concerned with strategic leadership of technology
- Develop standardized project management processes including project deliverable set based on the project type and project phase

TOOLS & TECHNOLOGY

- Define LUMA end user managed device standards (including provisioning, securing and imaging) and user profiles
- Evaluate and implement recommended service management toolset with core configuration service management toolset based on the IT OT Service Management Catalogue and service levels enabling service level reporting and data driven decision making
- Extend the service management toolset to manage LUMA end user devices in accordance with the end user device asset management strategy
- Establishes the Building Code as the basis by which technology work will be conducted
- Establish project deliverable templates

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Indirect
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Indirect
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☒ Pursue Project Delivery Excellence	Indirect

IT OT Enablement Program

Primary Goals	Objectives	Direct or Indirect Impact
	☒ Enable Employees to Execute Operations Systematically	Direct
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Reduce risk of safety-related incidents by providing access to electrical network data via functioning and secured end user devices, and by resolving business critical application and infrastructure incidents on a priority basis.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

Enable the field workforce access to the electrical network and customer request data.

Objective: Increase Service Reliability

Eliminate manual work orders reducing the time to respond to network outages.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

Use of secure end user devices will enable more systematic business management.

Provides standards and associated governance for LUMA's most important technology commodity: operational data. This ensures that critical operational data features managed with integrity, and that owners / custodians own key decision-making.

Objective: Enable Employees to Execute Operations Systematically

Since employees will have access to more functional end user devices, they will be better positioned to systematically execute operations.

IT OT Enablement Program

2.6 Program Risks

The primary risk of not proceeding with this program is the continued access to the IT OT networks by unsecured devices and the increased risk of a cybersecurity attack. This represents a significant risk of breach of customer and/or corporate data.

We cannot immediately suspend the use of all end of life end user devices so there will be an ongoing risk until all end user devices used by LUMA are refreshed and devices used by the Generation Company (GenCo) and any other users are removed from the network. This includes both a cybersecurity risk due to outdated security standards of the end of life devices, and an operational risk since the continued use of end of life devices may result in operational delays and difficulties.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$4.0**	**$2.6**	**$3.1**	**$6.4**
SRP Expenditure	$2.2	$2.5	$2.5	$2.6

3.2 Program Resource Requirements

CONFIDENTIAL

- ITSM Tool system integrator
- End user devices
- Enterprise architectural strengthening and data management

3.3 Estimating Methods & Assumptions

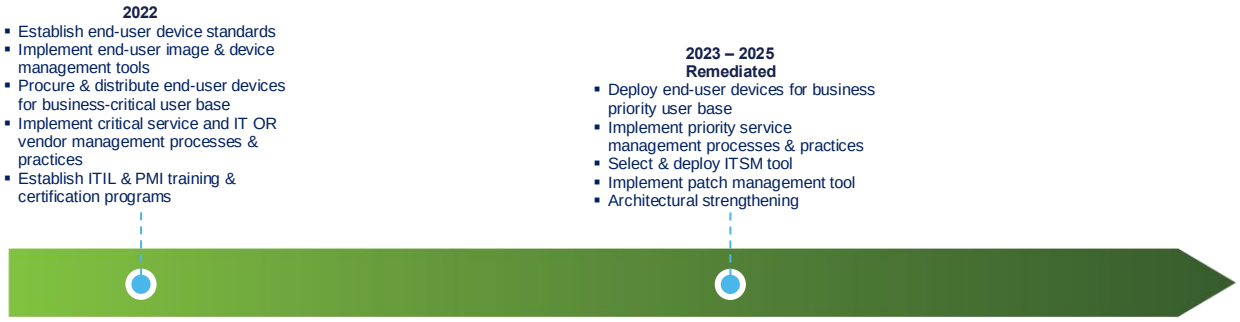
CONFIDENTIAL

The end user device replacement project, which represents the bulk of this program, is estimated based on quotes from various service providers available within Puerto Rico and the mainland United States.

The costs associated with the implementation of service management processes and tools is estimated using the IBM Project Cost Estimator for implementing a Gartner recognized industry leading ITSM solution. Pricing assumptions are based on the implementation of ServiceNow for a medium-large sized enterprise.

IT OT Enablement Program

3.4 SRP Program Timeline & Milestones



Critical Financial Controls

1.0 Program Description

The Critical Financial Controls program focuses on two key areas, internal control and internal audit. These two areas will build skills and capabilities in financial reporting and audit; and will update and enforce industry standard policies and procedures that comply with the latest laws and regulations. Internal Controls will address various internal control items, including obtaining and reviewing service organization controls for major vendors, the implementation of key transaction controls, reconciliations, validation, physical inspections, documentation evidencing performance of control tasks, disclosures, enforcement of applicable policies and procedures for employees to identify deviations, the establishment of a formal plan for communications with the audit committee and the revamp of the internal audit department. Internal Audit builds the foundation of the internal audit team as well as the development of the methodology and process, along with building and retaining the required skills and technology base.

2.0 Program Rationale

2.1 Current State & Identified Gaps

In the review of current processes and controls a list of 63 critical SRP gaps were identified. These gaps covered multiple areas and were summarized into key areas of findings:

- Accounting policies
- Approval controls
- Physical asset reviews
- Reconciliation and review
- System enforced controls
- Timely recording of transaction and accruals
- Evidence of review and approvals
- System access & segregation of duties
- Budgeting processes
- Accuracy of subledgers
- Customer service policies
- Recording of cash
- Control over master data & reports

To have a control environment which mitigates the risk of material misstatement of the financial statements, provides for the reporting of consistently reliable financial information, provides reasonable assurance that transactions are properly processed without error, and assists in the mitigation or detection of fraud, these control gaps need to be remediated.

Overall, the analysis confirmed a lack of clarity regarding roles and responsibilities which has led to an ineffective financial decision-making process. Much more clarity is required on roles and responsibilities related to financial transactions, reconciliations, validation, physical inspection and disclosure steps. This includes complex decisions that require judgement.

Critical Financial Controls

Enforcement of policies and procedures, as well as employee training in policies and procedures, is greatly lacking. Both training and enforcement are critical to identify deviations and root causes, to assess impact, and to determine corrective actions in key areas such as cash, procurement, capital assets, revenue & account receivables, accruals and inventory.

There is a need to identify and document key areas of focus and to mitigate risks of significant changes in business, system and overall processes or fraud.

Follow up on deficiencies and other matters identified internally and/or by external auditors is not prompt. Finally, there is a lack of documentation of key findings and corrective actions taken to address those.

The existing financial management and reporting processes and procedures are inadequate to manage the complex business of running an electric utility. There will therefore be a need to review, update, remediate and implement new policies and procedures to ensure controls are in place and operating as needed. This will provide reasonable assurance that risks are mitigated and help to ensure accurate and complete closing of accounting records, financial statements and reporting on deliverables.

The Audit department requires an increase in overall skills and capabilities. There is no formal assessment of the Internal Control Framework. In addition, the existing internal audit procedures appear in need of updating to effectively manage and control the risks associated with the high capital and operating costs of a large utility company.

Gap assessments of the existing financial management procedures and policies have identified there are significant problems and inconsistencies in how the system has been managed. Any deviations from expected answers in the annual ethics certification process in the work environment and workplace are not properly followed up on for compliance. Current policies and procedures must be routinely examined to ensure they comply with the latest laws and regulations. Additionally, these policies and procedures need to be aligned with the latest technology and the latest thinking in the industry to increase their consistency and effectiveness.

The employee skill levels needed to properly execute policies and procedures that are required for the financial management systems are not fully available, and PREPA lacks the internal controls to assess effectiveness. Currently there is no process in place to obtain and review specific organization controls for services provided by major outsourced vendors as well as the review of the interface of those to the Oracle E-Business Suite (EBS) system.

2.2 Description of Remediated State

Items included in this section have been identified as significantly below operating practice and requiring remediation (dates are contingent upon available funding for resources to remediate) prior to the transfer of liability. Once the gaps have been remediated the following should have been achieved:

- All 63 of the identified internal control gaps discussed above have been remediated.
- Policies and procedures exist and are reviewed for updates and all employees and contractors are knowledgeable of relevant policies and have access to a current "Administrative Manual".
- Policies and procedures are in place to ensure key risks are mitigated and accurate and complete closing of accounting records, financial statements and reporting on deliverables are achieved.

- Transparency and necessary skills on key financial roles and responsibilities with employees able to identify deviations, assess the impact, and take appropriate actions to ensure compliance with laws and regulations.
- Basic skills and consistent application of industry standards for financial tasks and decisions that are complex and require a high level of judgment.
- Consistent information and communication across the organization supports a forward-looking and solution-oriented audit approach.
- Establishment of more frequent and fluid audit cycles on key areas of focus, and review of the Internal Control Framework.

2.3 Description of Program Completed State

Internal Controls addresses the major deficiencies identified as part of the assessment of internal controls over financial reporting, such as review, update, and enforcement of applicable policies and procedures; review of external contractors for compliance; and assessment of skill and capabilities. In the completed state, the Finance department will have policies and procedures updated to comply with laws and regulations, relevant to the latest technology, and industry best practices. They would be regularly reviewed for consistent and effective approach, which will help to identify and address the necessary continuing development of skills and capabilities, support strong internal controls, and ensure accountability and consistency in daily transactions and financial reporting.

In the completed state, financial errors or omissions, material weaknesses and significant deficiencies will be mostly avoided by the presence of sound controls.

Revamping Internal Audit addresses the need for building the foundation for the internal audit team and subsequently retaining the skills and technology required. In the completed state, more frequent and fluid audit cycles will be established on key areas of focus, such as legal and compliance, finance, federal and non-federal procurement, payroll, and operations. Also, the new policies and procedures established by this program will require prompt communications across the Audit Committee, Finance/Operations departments, and external auditors.

The completed state will also include a routine process whereby audit findings will be discussed with management of the audited department, followed by required formal remediation actions. The completed state will include follow-up audits by the internal audit department to verify remediation actions have been completed.

There will be a link between strategic objectives and the risk assessments of the Finance and Operations groups, who must mitigate, monitor, and report on risks associated with their day-to-day activities. Understanding how the business works and its major objectives, will help them to establish a clear link from those objectives to the information they collect and the controls they establish to mitigate risks. This approach also gives risk management personnel the ability to aggregate, visualize, and assess data consistently, since all risks will be related to the same corporate objectives.

2.4 Program Activities

- Monitor and address deviations on ethical values and compliance. Corroborate common ethics challenges and establish a compliance process to follow up on deviations.

Critical Financial Controls

- Obtain service organization control reports from a major vendor. This is a Prudent Utility Practice (PUP) and provides assurance of control objectives and improves the strength of internal controls.
- Link risk management from top to bottom. Create a framework to ensure alignment between corporate objectives and the risk assessments of the finance and operations groups.
- Develop processes needed to ensure policies and procedures exist and are reviewed for updates, and to communicate and ensure that all employees and contractors are knowledgeable of relevant policies and have access to a current "Administrative Manual".
- Develop and implement an industry standard approach and identify the necessary skills for financial tasks or decisions that are complex and require a high level of judgment.
- Define and implement key roles and responsibilities so employees can identify deviations, assess the impact, and take appropriate actions to ensure compliance with laws and regulations.
- Establish a formal plan for Internal Audit to communicate any deficiencies to executive management and the Audit Committee. Deficiencies may be identified internally or by external auditors. The plan will describe actions to be taken to assess the root cause and dependencies, along with the remediation plan.
- Implement standard business planning processes for budgeting, which need training and support.
- Addressing and training people on any interdependencies on the design and effectiveness of internal controls within EBS & Job Costs.
- Build the foundation for the internal audit team, including identifying and acquiring necessary skills and technology, establishing more frequent and fluid audit cycles on key areas of focus, assessing the Internal Control Framework, improving information and communication across the organization and facilitating a forward-looking and solution-oriented audit approach.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Indirect
	☐ Implement Effective Public Safety Practices	
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Direct
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Indirect
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	

Critical Financial Controls

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

A safer workplace will be provided through new procedures, culture and training. Having an ethics and compliance program to follow up on deviations is a powerful tool for reducing pressure to compromise standards. Such a program also supports observations of misconduct, increasing employee reporting if misconduct occurs and decreasing retaliation against whistleblowers. Fewer employees would feel pressured to break the rules and fewer infractions would take place. When they do occur, employees would feel safe enough to tell management so the problem can be addressed internally.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

Documentation and enforcement of policies and procedures will strengthen internal controls and ensure accountability and consistency in daily transactions and financial reporting.

Objective: Pursue Project Delivery Excellence

Effective internal controls reduce the risk of asset loss, ensure that plan information is complete and provide for reliable and accurate financial statements. As such, more effective internal controls promote smooth project delivery in accordance with the provisions of applicable laws and regulations.

Objective: Enable Employees to Execute Operations Systematically

With the requisite training and capabilities support, employees will be able to display increasingly improved judgement in more complex cases. This will be of direct benefit.

Reviewing and providing guidance on key roles and responsibilities will better enable employees to identify deviations, assess the impact of those deviations and take appropriate actions. This helps ensure the overall accuracy of financial statements and compliance with laws and regulations. This will become routine - again of direct benefit.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

Proper controls are central to managing any organization effectively. They contribute to the ability to safeguard assets, use resources efficiently and produce accurate and reliable financial information. This capability is key to managing federal funding.

2.6 Program Risks

Failure to implement internal controls would increase pressure to compromise standards and create the opportunity for financial misconduct. Plans and financial statements would not be complete or reliable and might not be conducted in accordance with applicable laws and regulations. The utility would be unable to properly and routinely close its books, and the review of actual versus forecast financial performance would have to wait for the annual audit.

In the near term, accurate and timely performance data could not be distributed to operational management to assist them in making quality business decisions in a timely manner. The lack of financial management of major outsourced projects makes mismanagement a higher risk and timely delivery of project completion unlikely- leading to increased costs along with an increased risk of asset loss.

If the revamping of internal audit was not implemented or was delayed there would be no assurance of achievement of control objectives relating to operations, reporting and compliance, or mitigation of risks due to significant changes and or fraud. There would be no proper follow up on deficiencies and other matters identified internally and or by external auditors. There would be no process for continual improvement, and performance would likely degrade over time.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$2.8**	**$1.0**	**—**	**—**
SRP Expenditures	$2.8	$1.0	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

Costs related to the two programs are mostly related to internal labor and consulting support for specialized topics.

3.3 Estimating Methods & Assumptions

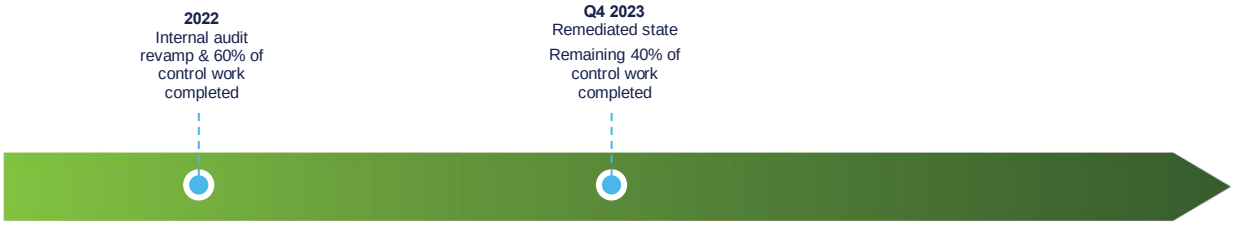
CONFIDENTIAL

Each project was estimated individually based on the expected resource requirements. Resources and the hours of effort were costed at average labor rates.

Critical Financial Controls

3.4 SRP Program Timeline & Milestones

Each project within the two programs will have its own timeline and milestones based on a project plan. Depending on funding availability the entire program is estimated to be completed over 2 years. The items requiring remediation will be complete by the end of 2023.



Critical Financial Systems

1.0 Program Description

This program covers the technology projects for Finance and Facilities, including financial management systems and technology, risk management systems and supply chain management technology. The initiatives cover areas within budgeting, reporting, consolidation, risk management, time tracking, employee expenses, fixed asset subledger, procurement, and a major life cycle upgrade for the Oracle EBS system. These initiatives are required to maintain a supported version of the financial applications or to address gaps identified in the financial management area.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Gap assessments have identified several gaps that impact the ability to produce accurate and timely financial results. Such financial results are required to meet an independent audit or management certification standard, provide data to support key business decisions, automate processes to lessen manual risk of fraud and error and track and report on enterprise risks. The specific gaps identified were as follows.

A. TIME MANAGEMENT:

- Total hours worked by employees are recorded using biometrics; however, the time tracking or costing component is disconnected from that data. This means that timecard data which is manually collected could have variances from the actual biometric time. To ensure that any variances do not cause an overall misstatement, the actual timecard data is calculated into percentages that is applied to actual pay. This is a significant gap where there is a requirement to cost actual hours worked that are traceable to a timecard such as FEMA-funded or non-federally funded capital projects.
- Current systems have not been developed to track time for project tracking using a work breakdown structure. The existing tool does not have project task structures available to record time against.

B. EMPLOYEE EXPENSE REIMBURSEMENT:

- The current process is manual and relies on manual review and approvals which exposes the organization to fraud and human error that could be reduced with the use of automation.
- The current process does not allow for the costing of expenses to a project or work break down structure
- There is no tool to support the use of corporate purchase cards which could be used to streamline small purchases.

Oracle has an expense module that would support automated approvals, charging to projects and the use of corporate purchase cards.

Critical Financial Systems

C. PROCUREMENT:

- Currently, there are two systems used for procurement; Oracle EBS for purchases under $5,000 and Asset Suite for purchases over $5,000. The use of two separate systems for procurement does not allow for optimal contract and process management.
- Asset Suite has not been developed to support the use of a project work breakdown structure which represents significant gaps in the ability to manage projects.
- Asset Suite has not been integrated into Oracle Financial in a way that would record commitments to projects. The ability to review committed costs against projects provides the project manager with valuable information that helps to forecast cashflow and track progress toward completion and against budget. This would currently have to be done manually with a report from Asset Suite.

D. PROJECT COST CONTROL

- The Oracle Project Accounting module that is used to collect costs in the financial system is not integrated with any project management, cost management, or scheduling tools. As a result, Oracle Project Accounting is unable to provide project managers with the necessary information to monitor, analyze, or forecast costs on large scale projects.

E. FIXED ASSETS

- A system upgrade of the fixed asset module, which tracks the asset base and depreciation amounts, was improperly performed a few years ago and never completely remediated. This affected the ability to record retirement transactions in the system and forced manual entries to be done in the General Ledger. This issue means that the fixed asset subledger does not have the correct asset balances and therefore does not correctly calculate depreciation. This has been an issue on many audits and will take a substantial amount of time and effort to resolve both the system issue as well as the recording of all top side entries into the fixed asset subledger. The overall recording and maintenance of asset data will be assessed as part of the asset management initiative included in the IT/OT area.

F. BUDGETING & FORECASTING

- The budgeting system used for producing operation and maintenance budgets needs some enhancements to close the gaps in the overall budgeting process. The review of budgets and the tracking of those budgets to actuals provide organization controls on expenditures and highlight areas of concern. The system and the processes supporting this process must have controls around approvals and the ability to have a monthly amount projected accurately to compare to actual costs.

G. REPORTING & CONSOLIDATION

- The use of a consolidation and financial reporting tool. This tool will provide three primary benefits 1) automation of the current manual financial reporting process which is prone to error, 2) support PREPA going from a one organization enterprise to multiple entities which will require consolidation and further complicate reporting, and 3) provide automated linkage to an enhanced forecasting tool.

H. OPERATIONAL REPORTING

- Financial data is important to business decisions and there is currently no ad hoc reporting tool in place. This requires that every request for data either be manually created in excel or an Oracle custom report created. The use of custom reports for ad hoc data analysis is not efficient from a cost

or effort perspective. PREPA has started this project to bring data into a data lake for analysis. This reporting tool would enhance work on this project for the Finance area.

I. RISK MANAGEMENT

- There is an identified gap due to the lack of risk management software which would ensure that enterprise risks are identified, exposure data is properly accumulated and tracked and that claims data is captured and monitored through to claim closure. This system would also be utilized by the Health, Safety and Environment (HSE) department to record near misses, analyze trends in claims and record other vital safety information.

J. FACILITIES MANAGEMENT

- There are a couple of gaps identified in the management of our facilities; including the lack of software to accurately project costs related to building upgrades. This will be a major area of focus in the coming years.

K. GENERAL TECHNOLOGY

- Meeting rooms need to have technology installed to allow for collaboration and sharing.

2.2 Description of Remediated State

Five gaps noted in Section 2.1 are identified as needing remediation. Gaps are remediated when the following is achieved:

- Time can be recorded to projects and task structures and will be accurate and traceable to an approved timecard which will meet the requirement for FEMA funding and our standard for Non-federally funded projects. (gap A)
- Employee expenses can be recorded to a project and task structure. (gap B)
- Procurement can record cost of materials and services to a project and task structure. (gap C)
- Fixed asset subledger will reflect correct balances and produce correct depreciation amounts for financial statements. (gap E)
- Risk management exposures and the ability to manage insurance claims will be captured in the software database. (gap I)

2.3 Description of Program Completed State

Items included in this section have been identified as gaps and require work to bring the program to a completed state. Once the gaps have been addressed the following should have be achieved:

- Employee expenses and per diems will be approved using automation and the roll out of corporate purchase cards will be complete.
- Procurement and contract management processes have been consolidated into one system and one process supporting the organization.
- Oracle project accounting, project management, cost management and scheduling are fully integrated providing a robust project support system for the large capital programs required.
- Budgets will be relied upon by the organization for tracking and control of actual expenditures.
- A reporting and consolidation tool will be in place allowing the organization to meet reporting requirements and consolidate multiple organizations.

- An ad hoc reporting tool will be available to support analysis of financial transactions for audit, decision making and regulatory filings.
- Estimating software is in place to support the major facilities work that is required with accurate forecasts and tracking of progress.
- Meeting rooms are equipped to support collaboration and communication.
- Financial application will be upgraded as required to maintain vendor support and to take advantage of new functionality releases.

2.4 Program Activities

- A new time tracking system needs to be implemented that is tied to biometric data that allows users to charge hours directly to activities and allows users to charge to project and task structures as required.
- Either changes will be completed in Asset Suite to allow costs to be recorded to project and task structures as required or major project procurement will be moved to Oracle EBS.
- Either changes to the existing process for employee expenses which allows the coding to project and task structures as required or the implementation of Oracle Expenses is completed.
- A team will be created to develop a capitalization policy, assess and correct the fixed asset broken functionality and then to review all manual top side entries and book their impact into the subledger.
- A new software system will be implemented to track insurance exposure data, insurance claims data and safety data components.
- Evaluate asset suite and Oracle procurement systems for best fit and consolidate processes into one system.
- Work with the PMO office on the implementation of a project management tool that is integrated with financial data from Oracle.
- A project team will review and identify changes to be made to the existing budgeting system to resolve gaps identified. An external consultant will be engaged to make changes to the system, complete testing and roll out.
- Implement a consolidation and financial reporting tool
- Finance will support the larger project to move financial data into a data lake for ad hoc reporting.
- New estimating software for building will be implemented.
- New meeting room technology will be installed.
- Team will be formed to review, test and implement a major Oracle upgrade.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☐ Implement Effective Public Safety Practices	
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct

Critical Financial Systems

Primary Goals	Objectives	Direct or Indirect Impact
	☒ Pursue Project Delivery Excellence	Direct
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☒ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☒ Enable the Digital Transformation	Direct
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

- Financial statements can be produced timely and accurately in accordance with Generally Accepted Accounting Principles.
- Business users will have the ability to access financial data for analysis to support business decisions.
- Risks will be logged, reviewed and measured for impact on the business.
- Budgets will reflect expected results and provide tracking and control of the business.
- Results in the fixed asset module can be relied on for timely analysis and accurate depreciation amounts.
- Project managers will have detailed cost information allowing them to identify root causes of budget variances and improve cost forecasting.

Objective: Pursue Project Delivery Excellence

- The ability to track detailed hours for activities performed and enforce timecard approvals.
- Provide detail labor costing for FEMA and non-federally funded projects without large amounts of manual effort.
- The use of an estimating tool for buildings will allow for better execution of a large capital program.

Objective: Enable Employees to Execute Operations Systematically

- The automation of employee expenses will ensure system enforced approvals and timely transfer of data through the process.
- The use of procurement cards will streamline the process for employees who need small materials or supplies.

Critical Financial Systems

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

- Accurate recording of time is required for Federal Funding.
- Deployment of building estimating software will support the spending of Federal Funded dollars on buildings.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Enable the Digital Transformation

Since this program is made up of technology related projects most areas will contribute to enabling digital transformation. The automation of time tracking and cost tracking, including employee expenses, would be heavy in this area.

2.6 Program Risks

The risks without the execution of this program would be a material misstatement of financial results and the loss of federal funding. Inaccurate financial results could lead to bad business decisions, materially misinform internal and external stakeholders and damage the reputation of LUMA. Inaccurate labor reporting and job costing could ultimately lead to unexpected budget variances and potentially losing eligibility for federal funding.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.8**	**$2.3**	**$2.5**	**$7.2**
SRP Expenditures	$1.7	$0.4	$0.3	$1.6

3.2 Program Resource Requirements

CONFIDENTIAL

Costs related to this program include internal labor, external IT resources and consulting support for specialized areas.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Each project was estimated individually based on the expected resource requirements. Resources and the hours of effort were costed at average labor rates.

Critical Financial Systems

3.4 SRP Program Timeline & Milestones

Each project within the program will have its own timeline and milestones based on a project plan. Depending on funding availability, the entire program is estimated to be completed over 5 years. The items requiring remediation will be complete by the end of 2026.

Land Record Management

1.0 Program Description

LUMA will develop a new record management system that allows for land information to be found easily and managed to utility industry standards. This allows compliance with legal requirements to be documented and shown to satisfy regulators. It also allows user groups to have efficient access to information. In particular, such a system lets Operations and Construction perform their work while respecting land rights agreements.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Current organization of property records make identification of PREPA owned or otherwise acquired property difficult. An improved file format will allow user groups, such as Operations and Construction, better access to pertinent information so that tasks can be completed while respecting the land agreement. This will allow for better efficiency in completing the work and minimize the potential for conflict with the landowner.

LUMA's gap assessment has identified the following areas to be addressed:

- The historical reliance on judicial processes to acquire land rights means that land files are full of court filings and resolutions but may lack important technical information.
- Files are not organized in a manner that allow for a review of maps identifying property rights acquired through each agreement.
- Operations has difficulty determining the limits of the land rights that exist and therefore has difficulty in respecting land agreements during the performance of work.
- Disputes with landowners may arise unnecessarily as a result of neither party having clear information about the land agreement.

2.2 Description of Remediated State

According to OMA, Annex I, Section I(G)(2), LUMA is responsible for maintenance of documentation and acquisition of Easements as required for T&D System operations.

According to OMA Annex I, Section II(A), LUMA is required to manage and maintain all T&D System assets, including easements. In addition, Section 5.19(a) requires LUMA to identify areas to be encumbered by easements for operation, maintenance, repair, restoration, replacements, improvements, additions and alterations of the T&D System and take the necessary actions to acquire and constitute it.

In the remediated state, LUMA will have:

- Developed a land file structure so that information pertinent to the Construction and Operations departments is easily located and accessed
- Ensured that all new files are organized as per the new land file structure

- Completed the assessment to convert the existing files and defined the project requirements

2.3 Description of Program Completed State

In the completed state, LUMA will have:

- Converted existing land files to the new structure and remedied information gaps in existing land files
- Integrated all land files into a land management system

2.4 Program Activities

- Review of existing land files
- Determination of the structure necessary for the land files, potentially made with the assistance of legal experts
- Assessment of IT and other requirements for a land management system
- Acquisition of land management system
- Full implementation of the new land management system
- Complete conversion of existing files to new file structure and the land management system

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☒ Implement Effective Public Safety Practices	Indirect
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☒ Increase Service Reliability	Indirect
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Direct
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☒ Effectively Deploy Federal Funding	Direct
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	

Land Record Management

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Implement Effective Public Safety Practices

Through better landowner management and communications, and as supported with correct and accessible documentation, encroachments onto current rights of way can be mitigated and threats to public safety minimized.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience

More efficient use of information and records systems will allow for better relationships with landowners and a reduction in associated disputes, which contributes to better customer perceptions.

Objective: Increase Service Reliability

Access to right of way documentation for maintenance and emergency response is key for reliability of the system and the efficient performance of work.

Objective: Deliver Electricity at Reasonable Prices

More efficient use of information and records systems will aid in delivering the required services and will help minimize the cost of delivering the services.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

The records system to support land management will enable systematic management of the business by reducing time to administer land rights and by improving resource efficiency.

Objective: Pursue Project Delivery Excellence

The ability to use support documentation in an efficient manner to manage land acquisition and settle claims efficiently will improve the execution of capital projects.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Effectively Deploy Federal Funding

Proof of land rights is a condition for obtaining any federal funding for capital projects, and the records system is integral to providing the necessary documentation.

2.6 Program Risks

The risk in not proceeding with the program is to continue with the present system, which is inadequate. This system has led to poor management of land acquisition and administration and has contributed to inefficient operational work and unnecessary conflicts with landowners.

Land Record Management

The risk in proceeding with the program is that it will represent a change from past policy. It will take a change in thinking to execute and complete the file formats in a manner that serves the needs of users and the public rather than the strict legal needs of the land file.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.5**	**$1.5**	**$1.5**	**—**
SRP Expenditures	1.0	1.0	1. 0	—

3.2 Program Resource Requirements

CONFIDENTIAL

The land file structure will require an integrated land management system as one element, complete with the necessary IT software and hardware.

Legal resources may be required to develop the file structure.

3.3 Estimating Methods & Assumptions

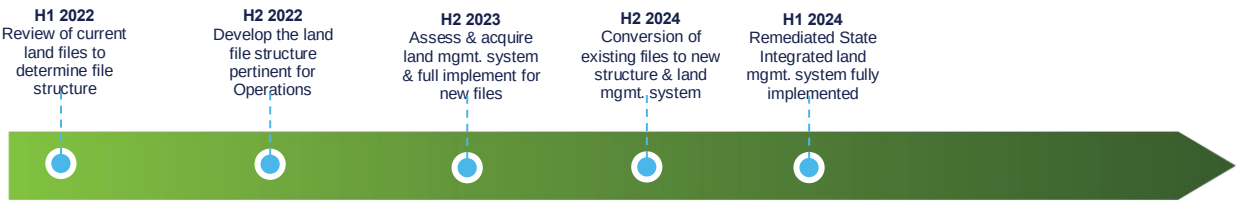
CONFIDENTIAL

Applicable Standards and Codes: Right of way legislation in Puerto Rico, file requirements (“Ley de Archivo” and associated regulations), PREPA’s Regulation of Easements for the Puerto Rico Electric Power Authority Regulation 7282.

Internal resources from PREPA Catastro office.

LUMA pay scales have been used for internal employee resources.

3.4 SRP Program Timeline & Milestones



Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking

1.0 Program Description

This program focuses on planning studies for dispatch of existing thermal units, along with new processes to audit costs included in the purchased power and fuel cost adjustment mechanism tariffs administered by LUMA in accordance with Section 5.6 of the OMA. The program includes creation and implementation of reasonable prudent administrative procedures for reporting of those related fuel and other generation costs as described in the OMA and being able to accurately present these costs to the PREB. The program does not include the management or oversight of fuel purchasing or of any Genco functions. Improved information on fuel costs, inventory, and availability will support resource planning as well as the more efficient and reliable dispatch of peaking power plants and other thermal plants. The program aims to improve resource adequacy and lower energy supply costs.

As described in Exhibit H, Section 2.2. of the OMA and subject to the final reorganization plan for PREPA, fuel procurement and management responsibilities for PREPA's generation units will remain with PREPA's Genco unit. According to Section 5.13(b) of the OMA, LUMA shall have the right to reasonably access "... information consistent with Prudent Utility Practice required to perform the dispatch and scheduling of Power and Electricity, which includes fuel availability, fuel cost, fuel inventory, unit availability, unit marginal cost, unit outage schedules, electric system reliability requirements, reserve requirements, identification of must-run generation resources and any other information reasonably requested by Operator consistent with prudent Utility Practice required to perform the dispatch, scheduling, and coordination of Power and Electricity." Under the OMA, LUMA has the responsibility of presenting adjustments to the fuel adjustment and purchased power tariff clauses. Under the OMA, LUMA will manage and administer all existing and future PPOAs.

2.0 Program Rationale

2.1 Current State & Identified Gaps

The current state includes the following gaps:

- Poor administrative controls and quality control of data related to fuel procurement and consumption, resulting in inadequate tracking of costs and justification of changes in the fuel adjustment clause.
- Fragmented and sub-optimal contract management systems for PPOA administration and inefficient tracking of costs for purchased power clauses which has resulted in criticism from regulator and allegation of errors in public media

Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking

2.2 Description of Remediated State

The remediated state will result in:

- An appropriate understanding and accounting of fuel expenses and tracking to fuel adjustment clause in order to comment to PREB. This does not reflect any level of managing the fuel procurement program, but rather defining the information and validity checking processes to be performed by GenCo. The requirements can be defined in the Plant Level Agreements if a new GenCo Operator is responsible for fuel procurement.
- A resource strategy to deploy peaking resources in the most effective dispatch process in order to comply with the Modified Action Plan in PREB's final IRP order and to facilitate least cost dispatch
- A planning review and approval program for generation capacity based on industry practice with a focus on resource adequacy and system reliability and minimizing load shedding events. Program may need to be further refined to be consistent with future role of Administrator and Generator Operator when those roles become more widely known
- Improved planning for dispatch of peaking units to support increased renewable energy penetration required by the IRP

2.3 Description of Program Completed State

The completed state is the remediated state.

2.4 Program Activities

DEVELOP PROGRAM FOR FUEL COMPLIANCE MONITORING AND PPOA CONTRACT MANAGEMENT

- Note that some steps may need to be refined after details of future role of Administrator and GenCo Operator are more widely known.
- Define steps in tracking of fuel procurement and reporting for existing and future contracts to provide LUMA with reasonable prudent information on these costs consistent with Exhibit H of the OMA
- Define audit and reporting requirements for fuel procurement and usage cycle
- Develop financial reporting and reconciliation program requirements to report on actual fuel expenditures and to accurately incorporate to the fuel adjustment clause
- Establish contract management process for management of all PPOA, tracking and verification of costs for accurate incorporation in the purchased power clause and to provide LUMA with reasonable prudent involvement with administering these costs in accordance with existing PPOAs

DEVELOP STRATEGY TO UTILIZE PEAKING RESOURCE DISPATCH IN COMPLIANCE WITH PREB'S FINAL IRP ORDER

- Review the utilization of peaking units within system operations and dispatch function
- Evaluate opportunities to improve dispatch, outage planning, and other practices
- Development of periodic assessment and audit program commensurate with the level of expenditures involved

Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☒ Deliver Electricity at Reasonable Prices	Direct
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☒ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☒ Enable the Sustainable Energy Transformation	Indirect
☐ **Other**	☐ Other	

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

This program will help to improve power plant dispatch and resource adequacy, thus lowering total cost to customers and improving overall service reliability across the system.

By improving the review and prioritization of maintenance and other generation investments, this program will improve resource adequacy and resiliency of the existing PREPA generation fleet and utilization of the existing fleet of peakers.

Objective: Deliver Electricity at Reasonable Prices

By prioritizing NME investments, the cost of forced outages can be avoided. Improvements in tracking of fuel costs and administration of PPOAs will help to provide increased confidence mechanisms for changes in fuel adjustment and purchased power clauses.

Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

Contract management for PPOAs, better quality data on fuel costs and consumption and improved resource and capital planning will all contribute to management improvements.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Improve Resilience of Vulnerable Infrastructure

By implementing an optimal gas peaker utilization strategy, the availability and utilization of these assets can be increased, thereby increasing system resilience.

PRIMARY GOAL: SUSTAINABLE ENERGY TRANSFORMATION

Objective: Enable the Sustainable Energy Transformation

By prioritizing NME investments and improving peaker performance, the grid will be better able to integrate new renewables.

2.6 Program Risks

Risks of delaying or not implementing this program include:

- Without an improved fuel monitoring programmatic capability, excess fuel expenditures or inaccurately tracked costs can be passed on to customers through the fuel adjustment clause. This will contribute to continued criticism by PREB and media.
- Poor allocation of capital Necessary Maintenance Expenditure (NME) investments in PREPA generation fleet, excess cost to customers and failure to maintain appropriate resource adequacy levels.
- Without a peaker strategy, PREPA will not adequately implement recent PREB orders in the final IRP order, and will forgo an opportunity to increase resiliency.

3.0 Program Funding & Timeline

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3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.3**	—	**—**	**—**
SRP Expenditures	$1.3	—	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

Program resources will be required for third party engineering services and technical experts.

Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking

3.3 Estimating Methods & Assumptions

- Estimates were calculated based upon a gap assessment of the existing capabilities and application of industry best practices
- Estimates are primarily hourly T&E costs to define and deliver necessary end results
- Hourly rates from existing table of rates included in OMA which varied by position and by function
- Detailed person-hour estimates were developed for specific sub-tasks

3.4 SRP Program Timeline & Milestones

Improvements to Systems Dispatch for Increased Reliability and Resiliency

1.0 Program Description

This program deals with the repair of non-functioning equipment and processes to allow for the System Operator to have data to carry out economic dispatch of generation assets, in accordance with the System Operation Principles and applicable procedures, and to allow for the safe and reliable operation of the system.

2.0 Program Rationale

2.1 Current State & Identified Gaps

LUMA is required to dispatch, schedule and coordinate power and electricity from available generation assets and coordinate the scheduling of load requirements and power with IPPs (pursuant to their generation supply contracts) and with GenCo (pursuant to the GridCo-Genco PPOA). LUMA is also required under the OMA to implement and apply the System Operations Principles and perform any other services related to the dispatch, scheduling or coordination of power and electricity from existing and future available generation assets.

PREPA does not have verified data on plant performance parameters to estimate heat rate and performance curve data for baseload units.

There is no functioning automatic generation control (AGC) capability for several of PREPA's northern plants, which is the general standard for most operating generation fleets in the fifty US states. Although some AGC equipment was previously installed and had functional capabilities in the past, this capability has not been adequately maintained and/or no longer exists.

It has been described to LUMA, although not verified in any engineering report or assessment, that the components and equipment necessary for AGC have essentially been installed but are not being utilized for a variety of reasons. This program involves an initial effort to improve estimated performance by utilizing installed, but not operational AGC and Plant Information (PI) system capabilities. The PI System is a data collection and analysis product. It remotely captures data from sometimes several hundred probes installed at different plant locations to provide real time understanding of performance and other operational indicators throughout the plant.

If this capability cannot be quickly achieved then another, more extensive effort will be needed to conduct performance tests and implement AGC capability. At the time that this decision will need to be made, a cost justification assessment will also need to be completed that reflects LUMA's improved understanding of the cause and impact of existing deficiencies. The more detailed estimate of the costs of performing the required test to achieve those capabilities is needed to confirm the benefits of acquiring full AGC capability and accurate heat rate performance information.

Information exchange between PREPA generation units and system operations, and quality of data are all below minimum industry standards. Communications between generators and control dispatch center is also inadequate.

2.2 Description of Remediated State

In the remediated state, the control center, operating in accordance with the System Operation Principles and the applicable procedures, will:

- have access to accurate, reliable data such as heat rate and operating performance curves for the major PREPA generation units,
- receive remote data of major interconnected generators due to improved data monitoring and improved communications procedures, and
- have appropriate AGC capabilities that are operable and allow for enhanced stability of the bulk power system where this is cost-justified.

LUMA should be able to set system operating parameters within defined levels to ensure safe, reliable and resilient operations, and to monitor and maintain metrics such as power quality and voltage control levels.

2.3 Description of Program Completed State

The completed state is the same as the remediated state.

2.4 Program Activities

ESTIMATE PLANT AND SYSTEM PERFORMANCE METRICS

- Assess the root causes for loss or lack of AGC capability and control capability from central dispatch center
- Review existing PI systems data collection and communication with system operations center.
- Resolve data collection and reporting discrepancies where possible
- Validate and/or estimate parameters using PI System and other data
- Identify any additional tasks to facilitate more efficient dispatch by improving precision of date to estimate heat rate and performance curve data for baseload units

VALIDATE PLANT PERFORMANCE METRICS

- Reassess the cost and benefits of acquiring improved performance data after LUMA's review of the estimated performance of existing plants and a more detailed estimate of costs to perform such tests
- Conduct heat rate test, mass balance and incorporate validated performance parameters into dispatch model. If the new GenCo Operator has been selected at this time, it is feasible that they could conduct such tests or PREPA can arrange for such tests if the GenCo Operator has not been selected, with reasonable involvement by LUMA to ensure validated information in compliance with ASME Power Test Codes is acquired.
- Identify any repairs of any non-functioning telemetry or SCADA system equipment

ENABLE AGC BETWEEN BASELOAD PLANTS AND SYSTEMS DISPATCH CENTER

- Assess root causes for why AGC is not currently operable, and define what is needed to restore capability
- Identify costs required to enable AGC and make a reassessed decision on the cost and benefits of acquiring full AGC capability on major baseload plants or if manual operation has a better cost benefit ratio

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☐ **Prioritize Safety**	☐ Promote a Safe Workplace	
	☐ Implement Effective Public Safety Practices	
☒ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☒ Increase Service Reliability	Direct
	☒ Deliver Electricity at Reasonable Prices	Direct
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☒ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

The real-time monitoring and correction capability installed through this program will help to improve the safety of overall operations primarily through improved situation awareness.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Increase Service Reliability

This program will improve service reliability by providing real-time monitoring and situation awareness, along with implementing automatic corrections remotely before system failures occur.

Objective: Deliver Electricity at Reasonable Prices

By more effectively dispatching generation plants, this program will help to lower costs

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Employees to Execute Operations Systematically

By automating more interactions between dispatch center and generation units to a faster, more precise manner than the existing manual processes, this program will enable employees to execute operations more efficiently.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Improve Resilience of Vulnerable Infrastructure

By adding automated response capability, this program will allow adjustments to be made to the system to avoid larger problems and load shedding events, thus improving overall resilience.

2.6 Program Risks

The risks associated with not moving forward or delays associated with this program include:

- Increasing costs as maintenance costs rise from advancing operational degradation
- Degradation of reliability from increased reactive maintenance requirements
- Risk of outages increased since the system response will be too slow to avoid load shedding events due to the current manual process and restoration after a storm event will be less effective
- Increasing challenges of managing frequency and voltage on the northern half of the island with a totally manual system as increased solar resources are added.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.2**	**—**	**—**	**—**
SRP Expenditures	1.2	—	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

The funds will be primarily used to pay for third party engineering and consulting services and equipment refurbishment

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

- Estimates were calculated based on third party costs to implement similar modifications and equipment seen at other power production facilities
- Estimates are primarily hourly T&E costs to define and deliver necessary end-results
- Hourly rates are from the existing table of rates included in OMA and market rates for engineering services which varied by position and by function
- Lump sum estimates were developed for specific sub-tasks which total at approximately $1 million of the total $1.2 million estimated costs

3.4 SRP Program Timeline & Milestones

Waste Management

1.0 Program Description

In accordance with the requirements of the OMA Section 5.10 and the scope of OMA Services specified in Annex I, LUMA will install new equipment and implement management processes to comply with environmental statutory requirements and support safe and efficient operations. The program includes installing secondary containment to prevent contamination, ensuring proper containers are in place to store wastes and, when required for site operations, processing or removal of accumulated waste debris.

LUMA will take actions with respect to pre-existing environmental conditions, including accumulated waste, in accordance with the OMA Section 5.10(b).

2.0 Program Rationale

2.1 Current State & Identified Gaps

Many facilities are not currently in compliance with EPA requirements under the Resource Conservation and Recovery Act and the Clean Water Act (specifically, Title 40, parts 112 and 273) and DNER requirements under the Non-Hazardous Solid Waste Management Regulation. Processes and practices are not in accordance with Prudent Utility Practice. Many sites have accumulated mixed wastes collected over long periods of time. Accumulated wastes include decommissioned transformers, poles, used oil drums, light ballasts, scrap wire, and miscellaneous equipment and building debris. The accumulated wastes are not properly segregated, labelled, stored, and removed. Often, the accumulated wastes are stored immediately outside a building or beside constructed containment areas, preventing access or use of containment areas. Universal wastes are being collected and stored at sites for longer than one year. Liquid wastes are frequently stored without required secondary containment. Many facilities lack maintained spill response equipment to respond to incidents.

2.2 Description of Remediated State

In a remediated state, LUMA operations will comply with the regulatory and legal requirements listed above. LUMA will have established processes and procedures on proper handling. LUMA employees will have improved awareness of appropriate waste management practices and will have appropriate tools and equipment on site to dispose of wastes and respond to spills while minimizing environmental impact.

Waste streams will have appropriately constructed and labelled storage containers. Newly generated wastes will be removed at regular intervals. Liquid storage will also have required secondary containment. Appropriately sized waste bins will be in place for routinely generated wastes. Routine waste streams will be clearly labelled and stored. Site spill kits will have been restocked allowing operations to adequately respond to spills. The potential for future environmental liabilities will be reduced due to properly handled wastes.

2.3 Description of Program Completed State

Upon completion of the program, facilities will be well organized and have the appropriate tools and equipment to prevent environmental impact from the management of waste. Accumulated wastes will be removed or mitigated in accordance with the plan between regulators and LUMA and according to OMA Section 5.10(b). Used spill kits will be restocked after use ensuring timely and immediate response to any spill.

LUMA operations will employ leading industry practice in waste management via programs and processes that encourage regular recycling and reuse of materials. LUMA employees will be knowledgeable on how to handle new waste streams.

2.4 Program Activities

- Taking into consideration the Baseline Environmental Study that will be completed during the Front-End Transition Period by PREPA as required under Section 4.10 (f) of the OMA, complete assessment of high usage sites to quantify accumulated waste volumes and determine appropriate containment in accordance with EPA and DNER regulations
- Engage with regulators to provide information and receive feedback on improvement plan
- Removal of accumulated wastes will occur when required for site operations (for example, to enable access to a containment or storage area or when accumulated wastes prevents mobility within a site), all following the procedures specified in OMA Section 5.10
- Procure additional waste containment bins and install secondary containment at facilities storing liquids when required
- Replenish or replace spill kits first at high-usage sites then at all locations to encourage timely spill response and clean-up

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Indirect
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	

Waste Management

Primary Goals	Objectives	Direct or Indirect Impact
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Well organized and managed sites with use of waste storage and containment equipment will reduce the likelihood of injuries and equipment damage that are more commonplace in congested and disorganized work environments lacking proper equipment.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business

Proper waste and liquid storage equipment and processes will ensure waste management contractors can easily and routinely remove waste.

2.6 Program Risks

This program reduces potential and actual environmental liability and puts in place processes to avoid or minimize future environmental liabilities. Not proceeding with the program increases the risk of potential environmental contamination. The program also promotes worker safety and efficient work practices. Lack of the program will delay improvements regarding worker safety and improving operation practices to industry standard levels.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$1.0**	**$1.0**	**$0.3**	**$6.7**
SRP Expenditures	$1.0	$1.0	-	-

3.2 Program Resource Requirements

CONFIDENTIAL

- A project manager and contractors to complete work.

- Procurement representatives to establish contracts and purchase spill clean-up and secondary containment materials.

3.3 Estimating Methods & Assumptions

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It is assumed that 300 sites have some degree of accumulated wastes, of which 35 sites require a very high amount of clean-up, 115 sites require a high amount of clean-up, 75 sites require a moderate amount of clean-up and 75 sites require a small amount of clean-up. These estimates were based on information collected from site visits and from Sargent & Lundy site reports.

The following assumptions were used to support estimates:

- Local landfill costs were used to generate estimates for tipping and landfill fees.
- Costs from US providers were used for estimates of spill containment equipment.
- [redacted]
- Estimated 10% overhead for project management, contract administration, waste assessments and logistics.

Detailed site assessments will be completed in the first year to define waste streams, storage options, and disposal requirements in accordance with Section 5.10(b) and enable us to refine cost estimates.

3.4 SRP Program Timeline & Milestones

Update to Third Party Use, Audit, Contract and Billing Procedures

1.0 Program Description

This program is focused on updating procedures for third party use of land, use of infrastructure, audits, contracts, and billing. The program will include:

- Developing consistent processes and agreement templates to ensure compliance with legislation;
- Streamlining and improving customer service for third parties who wish to use pole infrastructure;
- Establishing annual billing to third parties to ensure they are paying the associated fee to attach to each individual structure (either overhead or underground);
- Completing updates and corrections to the CC&B system to ensure data accurately reflects the current asset management joint use attachment numbers and identifies responsible billing parties; and
- Implementing necessary changes to the billing process for joint use billing, which may include contract updates and renegotiation.

2.0 Program Rationale

2.1 Current State & Identified Gaps

PREPA has obligations to allow third party use of pole infrastructure in defined circumstances. Act 17, Arts. 1.5(9)(b); 1.15(a); and 1.17 and OMA, Annex I, Section 2. A. 2. require a full inventory of pole attachments and a plan to add revenues for pole attachments.

Procedures and processes for requests to use the pole infrastructure are below minimum acceptable levels. LUMA's review indicates a lack of documentation for third party pole attachments.

The program will require working with operating groups who will complete an assessment of this infrastructure and as part of that process record data on existing pole attachments. From the data a full inventory will be created. The assessment process will include the review of adherence to loading standards so as to ensure resiliency of the system. This work will be coordinated with the distribution inspection program and GIS mapping. From this review and assessment process, the program will assist in creating agreements for existing pole attachments and to develop new procedures and agreement templates so that the reliability of the system can be maintained, and the work can be performed safely.

Identified gaps are as follows:

- Agreement templates are currently not available
- Response times are inconsistent and often not reasonable
- Procedures for installation by third parties are not consistently monitored and may result in unsafe installation or unplanned interruption in service
- Lack of a permitting process for pole attachments has resulted in a high share of poles with attachments from third parties, resulting in physical loading of many distribution poles beyond

prescribed limits. This increases the risk of structural failure of poles, reducing reliability and increasing public safety risk.

- Improper third party pole attachments can block proper maintenance practices and increase safety risk to maintenance workers
- Excess third party equipment not removed and unused, or obsolete equipment is often left attached to poles
- Lack of clarity on obligation of third parties to provide payment for use of electric utility infrastructure. The systems and processes for tracking and updating joint use attachments are unclear or do not exist. Although PREPA has stated that they do bill for some joint use attachments today, data has not yet been provided.
- As noted in post-disaster reports, overloaded poles are more vulnerable to structural damage or failure in windstorm conditions. Restoration times are increased.

2.2 Description of Remediated State

In accordance with requirements of Act 17 and the OMA, in the remediated state all poles will have been inspected to properly document third party attachments. Any issues arising from third party attachments affecting pole integrity will be identified and a plan to remove or resolve an issue will have been developed.

Upon completion of the Remediated State, LUMA will have completed agreements for third party usage of poles in accordance with legislation. These agreements will clearly document standards required for third parties to attach to electrical infrastructure. Use of agreement templates will support consistency and efficiency, in a manner that is timely and meets the needs of the outside party. The templates will be used to enforce standards and requirements for the safe installation of third party infrastructure on company land and structures and to clarify LUMA's obligations with respect to third party use of land and infrastructure.

Joint use billing is not part of the SRP. Updates to the joint use billing system will be achieved in the Completed State.

2.3 Description of Program Completed State

This program will be completed once the Remediated State has been reached and the additional joint use billing updates have been completed. All joint use attachments will be invoiced to third parties annually. LUMA will have completed updates and performed corrections in the CC&B system to ensure that data accurately reflects the current asset management joint use attachment numbers and the associated responsible billing parties. In addition, necessary changes to the billing process (as it relates to CC&B administration of joint use billing) will be updated, which may include contract updates and renegotiation.

In the completed state, there would only be exceptional existence of loading of distribution poles over prescribed structural limits. This would also include minimum interference with maintenance practices and a low safety risk to maintenance workers and public. Minimal service interruptions would be caused by improperly installed third party attachments and/or structural failure due to overloading.

2.4 Program Activities

- Review the current legislation and establish communication with the regulating agency, finalize requirements within agreements
  - Develop agreement templates that are compliant with legal requirements and allow consistency of application with the outside parties
  - Establish, communicate and enforce agreements with third parties for use of electric infrastructure. This potentially includes payment for such use, as permitted by law and regulation.
- Analyze the current state of contracts related to pole attachments
- Establish methodologies within the contract that define the responsibilities of the outside parties so that communication takes place and work can be monitored by Operations and be completed safely
- Develop procedures for processing and managing requests received from third parties with defined timeframes so as to improve customer response times
- Develop and implement procedures and practices in conjunction with pole replacement and rehabilitation programs
- Asset Management will provide an audit list of joint use attachments and identify unsafe attachments
- Customer Experience will update all joint use attachments into Oracle CC&B
- Customer Experience will create annual billing cycle for third party partners
- Complete updates and correct CC&B system billing data to ensure data accurately reflects the current asset management joint use attachment numbers
- Make necessary changes to the billing process as it relates to CC&B administration of joint use billing to ensure effective and timely future updates

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☒ **Improve Customer Satisfaction**	☒ Deliver a Positive Customer Experience	Indirect
	☐ Increase Service Reliability	
	☒ Deliver Electricity at Reasonable Prices	Indirect
☒ **Operational Excellence**	☒ Enable Systematic Management of the Business	Direct
	☒ Pursue Project Delivery Excellence	Direct
	☒ Enable Employees to Execute Operations Systematically	Indirect
☒ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☒ Restore Damaged Grid Infrastructure	Direct
	☒ Improve Resilience of Vulnerable Infrastructure	Direct
☒ **Sustainable Energy**	☐ Modernizing the Grid	

Primary Goals	Objectives	Direct or Indirect Impact
Transformation	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☒ **Other**	☒ Other: Provide Additional Revenue	Direct

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace
Objective: Implement Effective Public Safety Practices

Decluttered poles make it much safer for employees as they climb them.

Standard form agreements that take into account the work to be completed and the necessary communications with Operations will improve safety for both employees and the public.

PRIMARY GOAL: IMPROVE CUSTOMER SATISFACTION

Objective: Deliver a Positive Customer Experience
Objective: Deliver Electricity at Reasonable Prices

Improved efficiency in responding to requests from outside parties will lead to improved customer experience and an improved image of the company within the business community in Puerto Rico.

Increased accuracy in third party customer billing. Potential for increased customer satisfaction as third party customers will receive accurate billing.

Increased revenue from third party customer billing will put downward pressure on the overall revenue requirement thereby reducing electricity customer's rates. This involves a review of appropriate and justifiable rates with the advent of 5G technology.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Systematic Management of the Business
Objective: Pursue Project Delivery Excellence
Objective: Enable Employees to Execute Operations Systematically

Increased visibility to third party attachments on structures will improve ability to complete planning activities.

The procedures to complete agreements with outside parties to comply with requirements to use existing poles will increase employee effectiveness and productivity by allowing employees to make decisions within established guidelines with clear standards.

Reduced process administration by eliminating manual tracking systems for joint use data.

Improved ability to query financial data related to joint use revenue will streamline processes for employees.

PRIMARY GOAL: SYSTEM REBUILD & RESILIENCY

Objective: Restore Damaged Grid Infrastructure

This program helps to repair damage to pole integrity caused by the current system for managing third party attachments.

Objective: Improve Resilience of Vulnerable Infrastructure

New processes with enforceable contracts and standards will control the proliferation of third party attachments and make sure they are safe and do not harm pole integrity.

PRIMARY GOAL: OTHER

Objective: Provide Additional Revenue

Potential annual revenue generated from up-to-date joint use attachments billing. The table below details breakdown of revenue generated.

Attachment Type	# of Assets	% of Joint Use (~75%)	% of Unbilled (~25%)	Annual Attachment Fee	Annual Revenue
Overhead	~334,000	~250,000	~60,000	$15	~$900,000
Underground	~100,000	~75,000	~20,000	$5	~$100,000
				Total	**$1,000,000**

2.6 Program Risks

The risk in not proceeding with the program is to continue with the present system, which is inadequate. The current system will result in compromising the pole structures and potential unsafe installations, which could result in unplanned service outages on the system. The current system has led to poor relations in the business community and has contributed to a level of mistrust between the public and the company. Not pursuing this program will also result in lost attachment revenue and non-compliance with regulator.

The risk in proceeding with the program is that it will represent a marked change from past practices. A customer service oriented approach will have to be established to be effective. There are potential stakeholder management issues that may arise if joint use billing significantly increases for attached third parties that may require escalation management.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025 Estimate
Total Expenditures	**$0.7**	**$0.7**	**$1.5**	**$1.5**
SRP Expenditure	$0.7	$0.7	$0.7	—

3.2 Program Resource Requirements

CONFIDENTIAL

- Technical writing resources will be required to aid in developing and writing the detailed procedures for pole attachments.
- Legal resources will be required to develop the template agreements.
- Customer experience resources to perform billing updates and assist in reporting progress and development of process and procedure updates
- Third party billing information including billing address, contact information and contract terms
- Post audit up to date asset data extract from asset management system (GIS) including structure type, location and attached third party company name

3.3 Estimating Methods & Assumptions

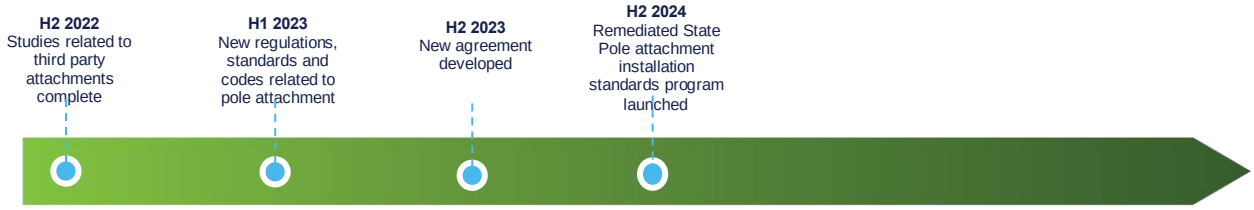
CONFIDENTIAL

Standard LUMA pay scales assumed for internal resources and previous benchmarking of external resources such as contractors and legal assumed.

Methods and assumptions used to develop the joint use billing update program estimate include the following:

- Estimated $15.00 annually per overhead attachment
- Estimated $5.00 annually per underground attachment
- Joint use data has not been updated or billed accurately in some time which will result in increased revenue post audit
- Estimated 75% of overhead structures have joint use attachments
- Estimated number of pedestals based on 3,005 padmount transformers
- No overtime required
- PREPA is not billing fees for unauthorized attachments

3.4 SRP Program Timeline & Milestones



Safety Equipment

1.0 Program Description

To improve employee and public safety LUMA will procure critical safety equipment and associated supplies such as AEDs, portable eye wash, lone worker/confined space entry monitors and audiometric testing equipment. These items critically improve employees' current state of work-related injuries and illnesses as per OSHA requirements and recommendations.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Gap assessments have revealed the following needs in the current state:

- Lone worker/confined space entry monitors to reduce the amount and severity of injuries
- Increased audiometric testing and monitoring in the field to prevent or reduce noise exposure
- Access to AEDs to prevent serious injury and death to workers.
- Portable eyewash kits

2.2 Description of Remediated State

Under the remediated state, LUMA will comply with employer duties under the OSHA Act Section 5 by providing equipment to mitigate hazards that could result in death or serious physical harm to employees. Workers conducting high risk or remote work will have access to required lone worker and confined space entry monitors and audiometric testing, and monitoring equipment and life-saving AEDs. The remediated state will include training for the use of the critical additional safety equipment for workers who regularly conduct high risk or remote work.

2.3 Description of Program Completed State

Under the completed state, all field crews will have access to lifesaving safety equipment when conducting work. The completed program would include the acquisition of additional AEDs and portable eyewashes to ensure they are always available. All field workers will be fully trained and knowledgeable in the proper use and specifications of additional safety equipment and LUMA will be industry-leading in relation to the deployment of safety equipment.

2.4 Program Activities

- Develop strategy on what safety equipment would be a priority based off a risk assessment and health, safety and environmental (HSE) data
- Develop supporting policy documentation to align with specified safety equipment
- Train selected employees on specified equipment care, maintenance, use and inspection
- Establishment of policies and procedures that support the use of safety equipment
- Development of inspection and calibration criteria for safety equipment according to manufacturer recommendations

Safety Equipment

- Development of training programs to orient users on the safety equipment
- Determination of internal groups' needs and expectations

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☒ Implement Effective Public Safety Practices	Direct
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☒ Pursue Project Delivery Excellence	Indirect
	☒ Enable Employees to Execute Operations Systematically	Indirect
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Providing workers access to potential lifesaving equipment reduces the risk of injury and creates a safer working environment.

Objective: Implement Effective Public Safety Practices

Lifesaving equipment will be available for members of the public should an emergency arise.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Pursue Project Delivery Excellence

Safety Equipment

Proper maintenance of equipment purchased will contribute to desired results associated with capital expenditure.

Objective: Enable Employees to Execute Operations Systematically

The workforce will have the supplies to complete work more efficiently and safely.

2.6 Program Risks

Failure to complete this program exposes to LUMA to potential consequences of lifesaving equipment not being available for the public or an employee in a time of emergency (e.g., AEDs).

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.2**	**$0.2**	**$0.0**	**$0.7**
SRP Expenditures	$0.2	$0.2	—	—

3.2 Program Resource Requirements

CONFIDENTIAL

Requires the purchase of approximately 600 AEDs, 200 portable eyewash units, 50 lone workers/confined space entry monitor devices and 7 sets of audiometric testing equipment.

Requires training on care, use and inspection of safety equipment.

3.3 Estimating Methods & Assumptions

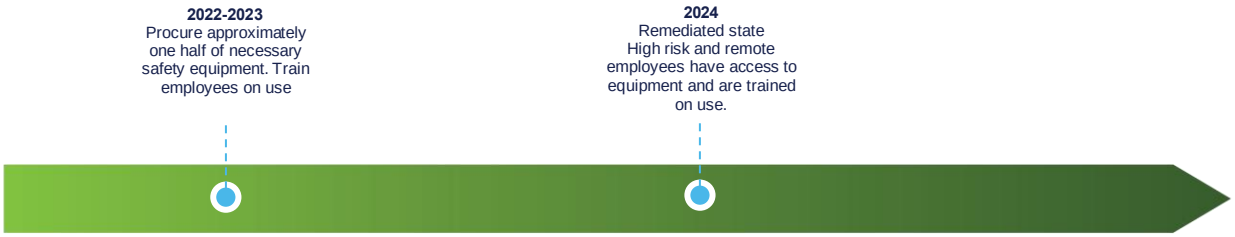
CONFIDENTIAL

- Used historical purchase prices for the AEDs
  - Assumed a small amount for annual replacement of lost/damaged AEDs
  - Replacement of batteries every four years (manufacturer specifications)
  - Parent company has seen great success with the use of AEDs on the job site. Since approximately 2011, Quanta Services has saved over 28 lives with the use of AEDs, including both employees and the public.
- Portable eyewash bottles
  - Estimated for placement in large trucks and in hazardous areas such as battery rooms in communications or substations areas.
  - It was noted in job observations that eye wash stations were not readily accessible in hazardous locations.
  - There is evidence in historical PREPA incident data (2018-2020) of eye injuries that required the use of eye wash and no evidence to support that any eyewash was available at the time of injury. There have been 16 eye related recordable injuries since 2018.
- Lone workers/confined space monitor devices
  - Monthly fee for use on each device has been accounted for based on historic ATCO data
  - Increases operational efficiency (replace two workers with one worker with a lone-worker device)
- Audiometric testing equipment

Safety Equipment

- This equipment is used to assess noise exposure of worker and supplement the audiometric conservation program.
- There is evidence in historical PREPA incident data (2018-2020) of hearing loss and noise exposed workers.

3.4 SRP Program Timeline & Milestones



Integrated Safety & Operational Management System

1.0 Program Description

LUMA will centralize policy and procedure creation by using a fully integrated, efficiently managed internal safety and operational management system that will allow communication of requirements to all employees and monitor health, safety and environmental compliance organization wide. The system will have clear operational procedures and controls and will be easy to use and easily updated.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Currently, policies and procedures are decentralized, making it difficult to communicate requirements and monitor compliance. Centralizing policy and procedure creation with automated data collection will allow for easier communication of requirements and monitoring of compliance. Documenting operational procedures will allow for consistency and repeatability and improves employee awareness of requirements and responsibilities.

An Integrated Safety and Operational Management System will allow the company to prioritize safety risks and mitigations across business functions and enable a culture of safety, compliance, and continual improvement, all of which the current organization is falling behind in.

Automating HSE data collection and analysis will allow for improved efficiency and data integrity, particularly as it relates reporting incidents in accordance to legal requirements and to KPIs; the current systems are manual and require significant data manipulation. Use of automated software for data collection is considered industry best practice.

2.2 Description of Remediated State

In the remediated state, LUMA will have systems and processes to accurately and consistently track and report incidents. Occupational injuries and illnesses will be reported in compliance with the United States Occupational Safety and Health Act (OSHA) 29 CFR Part 1904 and Puerto Rico OSHA 2 CFR Part 1904. Environmental spills and releases will be reported in compliance with the Emergency Planning and Community Right-to-Know Act 40 CFR 355 and the Clean Water Act 40 CFR 117.

As a result of improved reporting processes, LUMA will be able to accurately and consistently report Safety Performance Metrics outlined in the OMA. Sufficient data will be stored in a software system to provide dashboards and identify trends in safety and environmental data, determine causal factors and root causes and develop corrective actions to allow for continuous improvement.

2.3 Description of Program Completed State

In the completed state, company policies and procedures will be located in a central location and be easily searchable. All processes are documented and regularly updated. Company HSE records will be kept in accordance to statutory requirements.

The software system will be capable of handling additional HSE systems and services, including inspection forms, sustainability metrics, audits, waste tracking and permitting. Systems are automated when possible.

Easy to use systems will be in place to encourage reporting and investigation of incidents and near misses, identification of root causes and trending of corrective actions to proactively identify issues and risks.

2.4 Program Activities

- Implementation of a document library with key company policies and procedures.
- Selection, procurement and implementation of a software system for incident management and corrective action management
- Development of preliminary training materials and completed rollout of systems
- Implementation of policies and procedures supporting software systems and describing data trending and analysis
- Enhancement of selected software to include additional modules
- Software compliance with IT architecture and cybersecurity requirements
- Updating policies and procedures to automation of data collection and analysis
- Development of training programs to orient users on automated systems
- Working with internal groups to ensure systems meet their needs and expectations
- Implementation of additional HSE programming (e.g., human performance, sustainability, internal auditing) based on a cost-benefit analysis and engagement with other departments

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Direct
	☐ Implement Effective Public Safety Practices	
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☒ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☒ Enable Employees to Execute Operations Systematically	Direct

Primary Goals	Objectives	Direct or Indirect Impact
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy Transformation**	☐ Modernizing the Grid	
	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

Simple, automated systems will allow for easier identification of root causes and corrective actions to prevent incident and injury recurrence.

PRIMARY GOAL: OPERATIONAL EXCELLENCE

Objective: Enable Employees to Execute Operations Systematically

Automation will reduce the amount of paperwork and time required to complete reports and investigations.

2.6 Program Risks

- **Contract risk**: Current KPI data collection processes are manual and time-consuming. Maintaining the current system increases likelihood of errors.
- **Compliance risk**: Not documenting key policies and procedures in a centralized location may lead to regulatory non-compliance as it will be difficult to communicate expectations to all employees.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.2**	**$0.2**	**$0.5**	**$5.1**
SRP Expenditures	$0.2	-	-	-

3.2 Program Resource Requirements

CONFIDENTIAL

- Successful implementation of a commercial off-the-shelf HSE software system.
- A project manager and training for any newly developed software modules.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

Integrated Safety and Operational Management System will be based on requirements of associated ISO standards (9001, 14001, 45001).

For software implementation and training costs, estimates were based on implementation costs at parent companies. Cost estimates assume software system will be in service soon after commencement.

Additional program/module development cost estimates were based on an annual fully burdened internal labor/contractor rate of $100k/year.

3.4 SRP Program Timeline & Milestones

Public Safety

1.0 Program Description

LUMA will introduce an organizational strategy to engage and educate the public on safety around electric equipment and installations, thereby reducing public safety incidents. The program will include the procurement of public safety related materials for training awareness and public outreach, the development and complete roll out of a communications plan and a continuing maintenance plan for the program.

2.0 Program Rationale

2.1 Current State & Identified Gaps

Currently, there is no organizational strategy for public safety, with limited tracking of public safety incidents. The strategy is needed to reduce the number of safety incidents involving members of the public. Without a public safety strategy there is also no clear organizational direction around public safety communications.

Creating a policy and program for public safety will provide guidance and an overall organizational strategy for engaging with our customers and communities regarding safety around the electrical grid. A public safety strategy will allow for prioritizing risks and mitigations and allow for stakeholder input across business functions (operations, communications, legal, and customer service). Such a strategy should also include implementation of a communications plan to ensure better education and awareness of powerline safety; this will help to reduce public injuries and litigation. Collecting and analyzing public safety related incident data will support better targeted communications.

2.2 Description of Remediated State

In the remediated state, LUMA will have measures in place to ensure electrical service can be provided while ensuring public health and safety is protected in accordance with Annex I of the OMA. A program will be established that align with the initiatives and mission of the Electric Safety Foundation International. Public safety incidents that occur will be tracked, investigated, and the information shared within the organization and with the public. The company will initiate an awareness program to engage and educate the public and other government agencies including schools and emergency responders. Summaries of public safety incidents will be shared with emergency agencies and stakeholder interest groups.

As a result of education, there will be fewer and less severe public safety incidents because the public is better informed about the risks of living and working near electrical utilities.

2.3 Description of Program Completed State

In the completed state the company will be able to implement electrical utility public safety best practices to develop and continuously improve initiatives to help promote powerline awareness through communications, education and awareness training. LUMA will work proactively with emergency agencies

and stakeholder interest groups in responding to incidents, establishing incident prevention measures, and updating the public safety program.

The effective implementation of the public safety program will result in a further reduction in public safety incidents and litigation. The company will also be actively engaged with the public and other government agencies and participates in joint initiatives to improve public awareness.

2.4 Program Activities

- Develop a public safety policy
- Establish a comprehensive public safety program and key processes including a communications plan based on incident details and trends
- Train employees on identifying a public safety incident and on reporting requirements
- Report accurate public safety data and analyze for trends
- Develop a presentation to address powerline safety for the public
- Development of displays, training, awareness presentations and other materials aimed at different potential target audiences (schools, emergency responders, contractors, and general public).
- Purchase of visual powerline awareness displays
- Complete regularly public engagement through different venues (advertisements, public notices, and engagement in events).
- Work with internal groups to ensure the public safety program meets their needs and expectations.

2.5 Program Benefits

Primary Goals	Objectives	Direct or Indirect Impact
☒ **Prioritize Safety**	☒ Promote a Safe Workplace	Indirect
	☒ Implement Effective Public Safety Practices	Direct
☐ **Improve Customer Satisfaction**	☐ Deliver a Positive Customer Experience	
	☐ Increase Service Reliability	
	☐ Deliver Electricity at Reasonable Prices	
☐ **Operational Excellence**	☐ Enable Systematic Management of the Business	
	☐ Pursue Project Delivery Excellence	
	☐ Enable Employees to Execute Operations Systematically	
☐ **System Rebuild & Resiliency**	☐ Effectively Deploy Federal Funding	
	☐ Restore Damaged Grid Infrastructure	
	☐ Improve Resilience of Vulnerable Infrastructure	
☐ **Sustainable Energy**	☐ Modernizing the Grid	

Public Safety

Primary Goals	Objectives	Direct or Indirect Impact
Transformation	☐ Enable the Digital Transformation	
	☐ Enable the Sustainable Energy Transformation	
☐ **Other**	☐ Other	

PRIMARY GOAL: PRIORITIZE SAFETY

Objective: Promote a Safe Workplace

A comprehensive public safety training and awareness would be given to LUMA contractors to ensure awareness of powerline safety is top of mind. This would be a part of the contractor management requirements as well.

Objective: Implement Effective Public Safety Practices

Educating the public on powerline safety will increase awareness and reduce public incident contacts and litigation claims.

2.6 Program Risks

The following risk areas have been identified:

- **Liability risk:** More awareness and campaigning will increase powerline safety awareness and reduce the frequency and severity of public incidents and litigations, which LUMA could otherwise be liable for.
- **Corporate reputation risk**: More communication, education and public engagement around safety will benefit LUMA's reputation, which may suffer without such engagement.

3.0 Program Funding & Timeline

CONFIDENTIAL

3.1 Program Funding ($ millions)

Description	2022 Estimate	2023 Estimate	2024 Estimate	2025+ Estimate
Total Expenditures	**$0.1**	**$0.1**	**$0.1**	**$3.0**
SRP Expenditures	$0.1	$0.1	$0.1	—

3.2 Program Resource Requirements

CONFIDENTIAL

- Successful procurement of visual demonstrations and materials.
- Establish communication strategy.
- Operational field employees to assist with community engagement.
- Legal department coordination of investigations and trending incidents.

3.3 Estimating Methods & Assumptions

CONFIDENTIAL

- For equipment and material costs, estimates were based on historical parent company costs.
- Implementation costs were estimated based on operations personnel assisting with community engagement across the island.

We have assumed the following:

- All related communication costs and materials would be in the communications department budget.
- Program development would be completed by two designated employees (Public Safety Manager and Communications Specialist).
- An incident tracking system would be in place to collect, analyze and follow up on public safety related incidents. This information would be used to target audiences for communications and awareness.

3.4 SRP Program Timeline & Milestones

Appendix A: System Reliability Performance

Decades of inadequate maintenance and capital improvement, along with subsequent storm damage, have left the electric grid in poor condition, as reflected in PREPA's annual reliability performance indices. During the FET, LUMA assessed and analyzed PREPA's reliability data collection methods and performance indices. Grid operators monitor and track reliability indices to gauge the health and safety of the grid. Recent reliability benchmarks (discussed in detail below) show that PREPA's reliability performance indices are considerably lower than the lowest performing utility benchmarked by the IEEE PES Distribution Reliability working group.

In its current state, PREPA's electric power grid by far underperforms its industry peers in terms of reliability. The electric power industry uses the System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) as a standard method of measuring the grid performance of electric utilities. SAIFI and SAIDI are the most tracked and reported reliability indices. 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 is a SAIFI of 1.12 interruptions per year and a SAIDI of 126 minutes per year.

As shown in Figure A-1 and Figure A-2 below, PREPA's 2019 SAIDI is 1,097 minutes and SAIFI is 8.8 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 on their Cause Code list in their published reliability metrics. The numbers that PREPA publish 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). With both transmission, substation and distribution outages and all but Planned Outages included, reliability metrics are literally off the chart. These results imply that the electric grid has been deteriorating over a long period.

Figure A-1: IEEE 2020 SAIDI Benchmark Report – PREPA Comparison

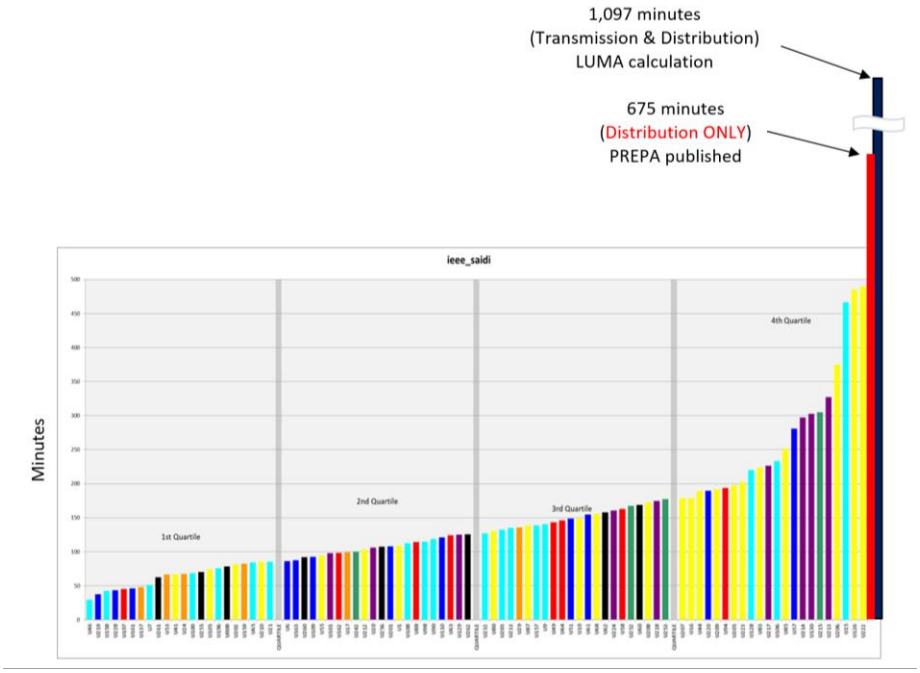
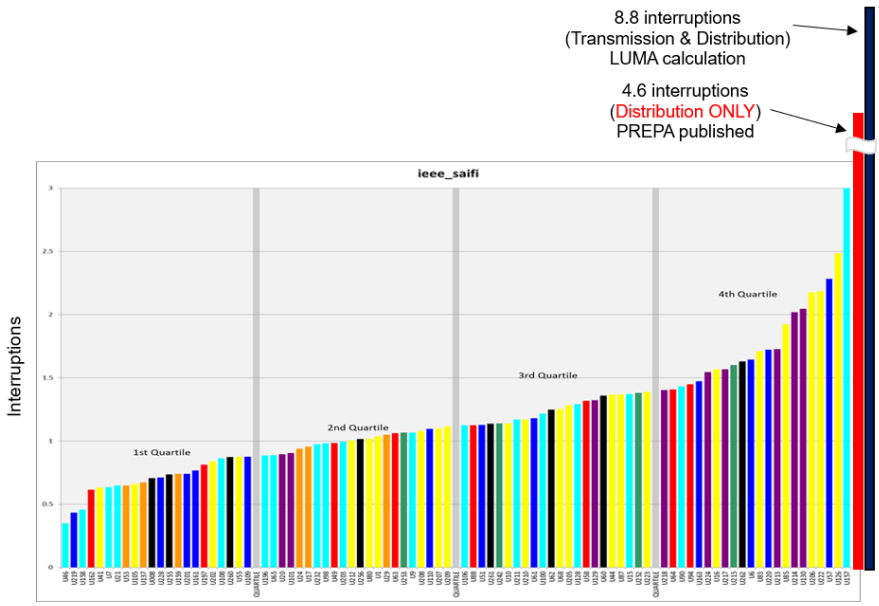


Figure A-2: IEEE 2020 SAIFI Benchmark Report – PREPA Comparison



Reliability performance 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. The electric power grid is a combination of thousands of electric and mechanical parts that must operate flawlessly and seamlessly in a healthy system. Over time these components age and deteriorate naturally as they are exposed to the elements, which increases the probability of failure or mis-operation. Therefore, many of the contributors to system reliability are connected to the operational health of its primary assets. It is important to understand the electric grid is built to operate safely, and reliably without interruption; moreover, it has safety features built in to protect valuable assets and to maintain public safety. For example, the electric grid is built to

withstand short circuit faults caused by foreign objects (e.g., vegetation, debris, wildlife) contacting the energized components and momentarily clearing the fault by deenergizing and reenergizing. In cases where the fault cannot be cleared automatically by protection equipment, such as circuit breakers or fuses, the grid will deenergize itself until the fault can be cleared by electric power workers.

There are instances where the electric grid will experience faults and outages due to aging, normal wear and tear, faulty equipment due to lack of maintenance or equipment mis-operation or malfunction. Most utilities want to avoid, or at least minimize, these faults as they can be avoided by good maintenance practices. The frequency, number and severity of outages is an indicator of the health of a grid. 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 its 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, it is an indicator that the system is deteriorating and requires attention and remediation. If unattended, the problems increase not linearly, but exponentially.

Future Trend of Reliability

PREPA's reliability metrics (SAIDI and SAFI) have been trending worse before and after the hurricane event in 2017. This performance trend will not change without strategic investments and operational improvements. With current practices of deferring maintenance, failure rates will increase exponentially, so the frequency of failure will increase faster than normal repairs can be made.

In 2020, SAIDI and SAIFI have further degraded 29% and 20%, respectively, as shown in Figure A-3 and Figure A-4. While this substantial change in SAIDI and SAIFI does not form a long-term trendline, it is certainly a concern that the PREPA's electric grid continues to deteriorate. These concerning performance metrics call for timely, substantial and targeted investments in the electric grid. Otherwise, as system performance continues to worsen over time, not only reliability, but safety will also be adversely affected.

Figure A-3: 2019 – 2020 SAIDI Comparison

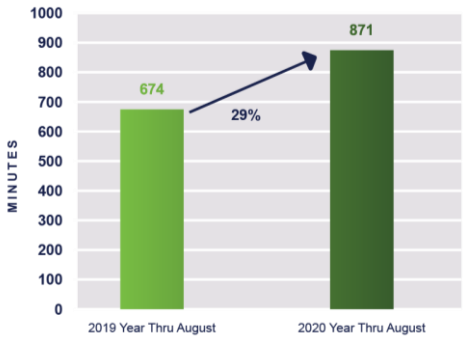
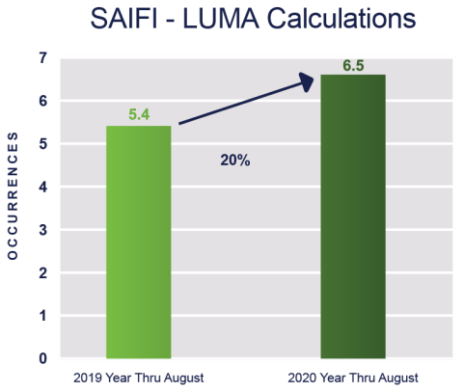


Figure A-4: 2019 – 2020 SAIFI Comparison



Appendix B: Detailed Goals & Objectives

Table B-1 breaks down each Recovery & Transformation Goal into its component Objectives that articulate the activities LUMA will need to conduct to reach each Goal. The OMA Performance Metrics relevant to each Goal have been included for reference.

Table B-1: Goals and Objectives

Goal	Objective	Performance Metrics
Prioritize Safety	▪ **Promote a safe workplace.** Implement procedures, controls, training programs, increase PPE, and awareness. ▪ Implement effective public safety practices. Reduce public exposure to safety risks.	▪ OSHA Recordable Incident Rate ▪ OSHA Fatalities ▪ OSHA Severity Rate ▪ OSHA DART Rate
Improve Customer Satisfaction	▪ **Deliver a positive customer experience.** Improve customer service quality, accessibility and reliability. ▪ **Increase Service Reliability.** Reduce the frequency and duration of interruptions to customers' electricity service. ▪ **Deliver electricity at reasonable prices.** Reduce operating costs, technical and non-technical line losses, and reduce days sales outstanding and write-offs.	▪ J.D. Power Customer Satisfaction Survey – Residential Customers ▪ J.D. Power Customer Satisfaction Survey – Business Customers ▪ Average Speed of Answer ▪ Customer Complaint Rate ▪ Abandonment Rate ▪ SAIFI ▪ SAIDI
System Rebuild and Resiliency	▪ **Effectively deploy federal funding.** Ensure efficient management of funding, in compliance with FEMA guidelines for reimbursement. ▪ **Restore damaged grid infrastructure.** Focus first on critical loads, severely damaged infrastructure, and vulnerable community lifelines. ▪ **Improve resiliency of vulnerable infrastructure.** Identify and assess infrastructure and systems for vulnerability and health, to focus near-term investment.	▪ Capital Budget – Federally Funded ▪ Distribution Line Inspections & Targeted Corrections ▪ Transmission Line Inspections & Targeted Corrections ▪ T&D Substation Inspections & Targeted Corrections
Operational Excellence	▪ **Enable systematic management of the business.** Improve information systems and processes to enable systematic, data-driven, and efficient management. ▪ **Pursue project delivery excellence.** Improve execution of capital projects (on time, budget, scope), carefully manage risk. ▪ **Enable employees to execute business operations systematically.** Increase employee effectiveness (engagement, productivity) and learning (quickness to adjust, performance improvement).	▪ Operating Budget ▪ Capital Budget – Non-Federally Funded ▪ Overtime ▪ Days Sales Outstanding - General Customers ▪ Days Sales Outstanding - Government Customers

Goal	Objective	Performance Metrics
Sustainable Energy Transformation	▪ **Modernize the grid.** Incorporate smart grid technologies into rebuilding efforts**,** increase hosting capacity, reduce load-shedding events, increase deployment of AMI and new DER interconnections. ▪ **Enable the digital transformation** Upgrade IT OT capabilities, enhance cybersecurity capabilities, replace all end of use devices, upgrade software to manage the T&D System as well as economic dispatch. ▪ **Enable the sustainable energy transformation.** Ensure system infrastructure is rebuilt to accommodate higher penetration of intermittent distributed resources**,** increase penetration of renewable resources and battery storage, reduce consumption through energy efficiency and demand response programs.	

Appendix C: Organizational Gap Assessment

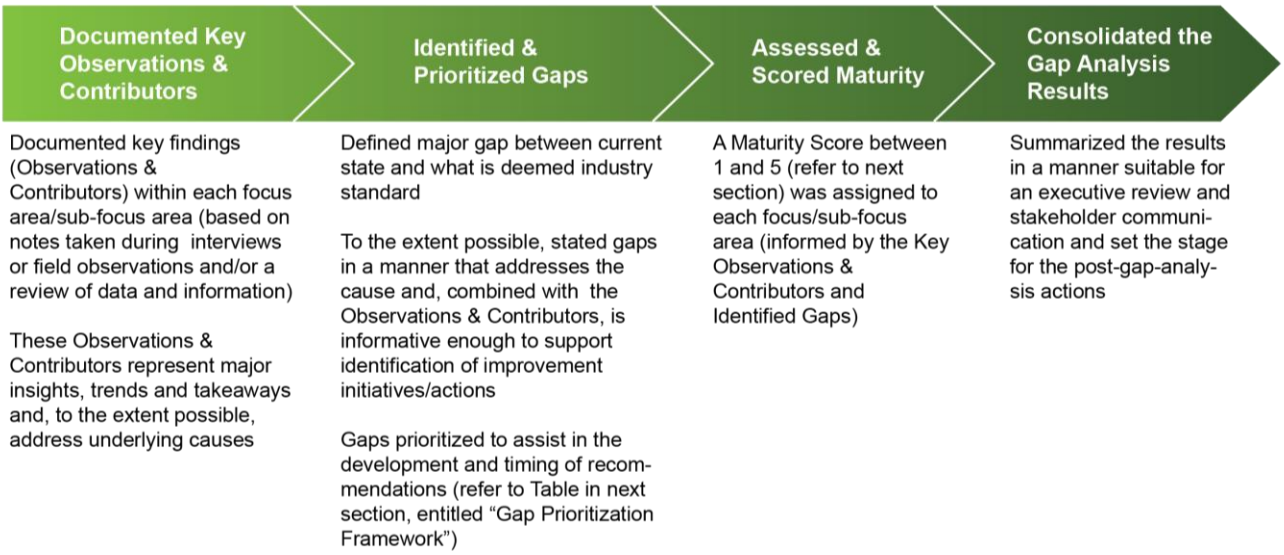
In assessing the state of the organization, LUMA reviewed all functions within the PREPA, which are organized into four categories corresponding to LUMA's organizational structure: Utility Transformation, Operations, Customer Experience and Corporate Services. LUMA's assessment team recorded observations, identified gaps (i.e. deficiencies) and evaluated organizational health and maturity using a qualitative rating system. The following sections outline the approach and scope of this review and provide a discussion of the results.

C.1 Approach and Scope

Figure C-1 outlines the four-step process used for the Organization Gap Assessment effort. The process began with a structured review of pre-defined organizational performance domains (referred to as "Focus Areas"). Focus Areas consist of Core Business Focus Areas and General Management Focus Areas. The Core Business Focus Areas were developed by SMEs and specifically related to the key functions and components of their business area, whereas the General Management Focus Areas were generally applicable to all departments and evaluated by each department within LUMA.

This structured review consisted of LUMA SME attendance at several workshops, targeted interviews with key LUMA personnel, reviews of an extensive amount of information and data and impressions from site and facility visits. During the review, observations were made and recorded using industry standards and applicable regulations as guides. Each observation was then evaluated and used to characterize an organizational gap or deficiency. The process resulted in a consolidated listing of organizational and process gaps that informed the creation of corresponding improvement programs presented in LUMA's Initial Budgets and SRP filings.

Figure C-1. Organization Gap Assessment Process



C.2 Rating System

As gaps between the current state and industry standards were defined, they were categorized, prioritized, and subsequently aggregated by "Focus Area" for the assignment of a maturity score rating Table C-2 below presents the criteria used to qualitatively assess organizational "maturity."

Table C-2. Organizational Maturity Scoring Criteria

Score	Unfocused 1	Aware 2	Developing 3	Competent 4	Excellent 5
Scoring Criteria	The organization has not recognized the need for the basic elements and/or there is no evidence of commitment to put them in place. Work is performed informally or ad hoc Processes are undocumented and / or undefined Issues present major exposures Required expertise / training does not exist, capacity is insufficient or both	The organization has a basic understanding of the need to address these elements and is in the process of deciding how / starting to apply them. Preliminary documentation of processes being compiled Performance is unmeasured Little organizational effort to identify issues	The organization has identified the means address the major elements and some work is progressing on implementation. Basic performance can be measured Performance is minimally adequate Processes are documented and defined Issue identification is performed Competitively sub-par	All elements are in place and are implemented in the day-to-day operations of the business. Major improvements made Performance is adequate and continuously measured / verified Processes are managed (followed consistently) with appropriate controls Disciplined issues identification Competitively at par	The organization is using processes and approaches beyond the basic requirements, driving to achieve maximum value. Verifiable issues / defect reductions and or practices continuous improvement Deliberate effort to optimize / improve processes Competitively well positioned to competitively differentiated.

The Organizational Maturity Scoring Rating System LUMA used is similar in construct to those used in performing ISO 55000 (the International Standard for Asset Management) and PMBOK (the industry accepted Standard for Project / Portfolio Management) assessments. This system was adopted to assure consistency in aggregating the major gaps and translating them into scores / ratings that connote competence within a specific area / function in the business. This scale will serve several other purposes during the action phase of this transformation, including assisting in prioritizing specific initiatives, benchmarking with other utilities, and demonstrating progress towards meeting Contract Standards including demonstrating Prudent Industry Practice.

The scope of this assessment included a review of 69 core business functions within the four organizations that will define LUMA (i.e., Utility Transformation, Operations, Customer Experience and Corporate Services), and nine General Management categories across the entire PREPA operation. Table C-3 summarizes the number of major gaps identified across each Focus Area.

Table C-3. Core Business Focus Areas Major Gaps

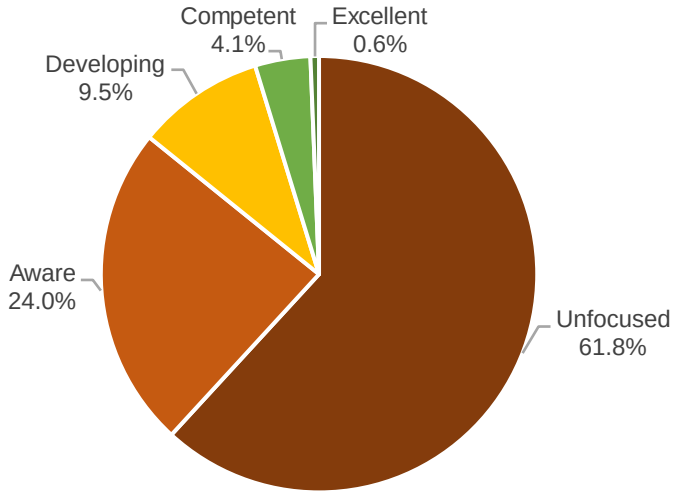
Organization/Function	No. of Major Gaps
Utility Transformation	210
Operations	238
Customer Services	195
Corporate Services	432
Total No. of Major gaps	1,070

C.3 Assessment Results

It is important to note that the assessments, subsequent analyses and the development of improvement projects and programs are based on the best available information, often without the benefit of accurate and complete data to assure precision. Therefore, the information contained herein should be viewed as "directionally appropriate," with the level of precision appropriate for a general assessment of this nature.

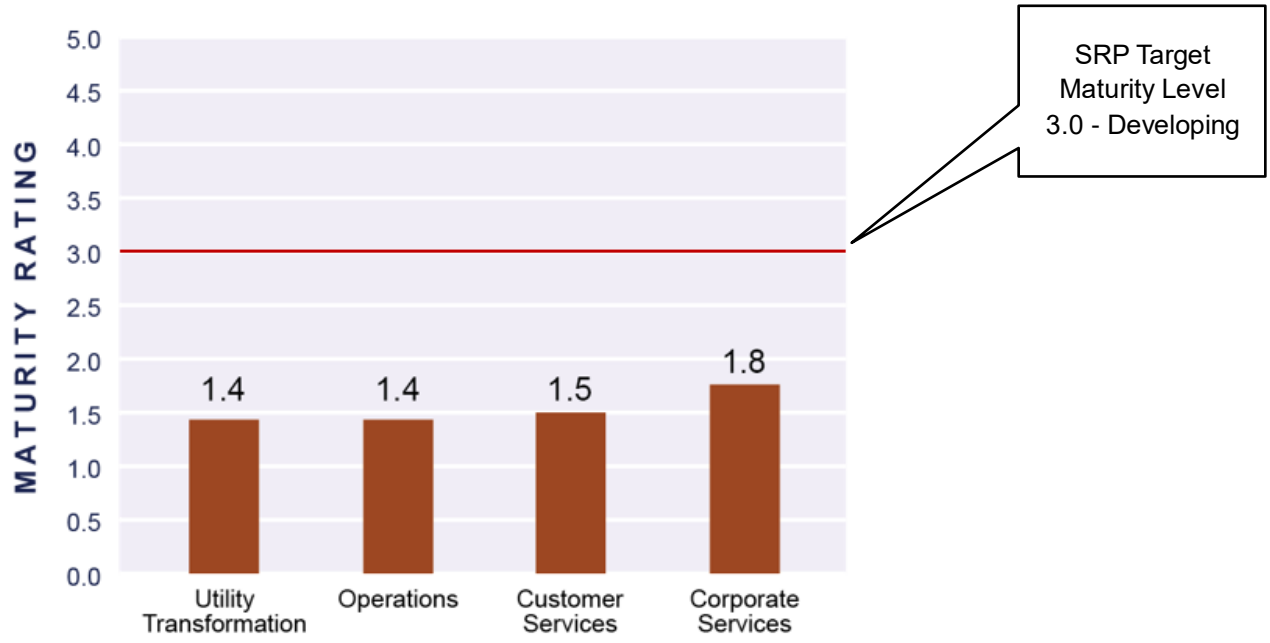
Based on the results of the organizational assessment, the organization's overall maturity rating (see Figure C-2) ranged between "unfocused" and "aware," meaning, at best, PREPA exhibited a basic understanding of a need to resolve noted deficiencies and is in the process of starting or deciding how best to address them. However, in several of the areas, there was no recognition of the need for the basic elements that define a specific part of the business, and/or there was no evidence of plans to put them in place. Deficiencies ranged from cases where individuals were not aware of applicable standards or the processes in place were inadequate to actions not necessarily in the customer's best interests.

Figure C-4. Maturity Scale Ratings Profile Core Business Focus Areas (Percent of Areas Assessed)



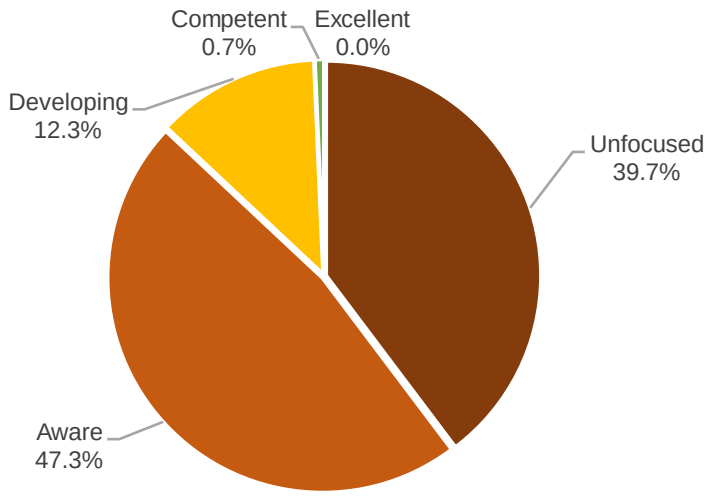
An overall maturity rating of 1.6 (i.e., between "unfocused" and "aware" in Figure C-2) reflects the composite of the following scores assigned to the Core Business and General Management Focus Areas within each reviewed group. Putting this rating in perspective, a maturity rating between 3 ("Developing") and 4 ("Competent") characterizes the norm for a North American electric utility.

Figure C-5. Core Business Maturity Ratings (Organization / Function)



A similar profile of levels of maturity is noted within General Management, where an overall rating of 1.73 was evaluated.

Figure C-6. General Management Maturity Ratings



The implications of the current state of the utility assessment are significant:

- Though the due diligence activities leading up to the contract revealed major shortcomings, their full extent in terms of pervasiveness, severity and failure to comply with industry standards exceeded even the most pessimistic expectations.
- A large number of gaps (and related low maturity ratings) in the areas of systems, processes and training infer that investment focused solely on PREPA's aging and deteriorating electric infrastructure (i.e., rebuilding and improving grid resiliency and improving the customer experience through improved

reliability) will not be sufficient to sustain the transformation necessary to assure public and employee safety, demonstrate operational excellence, improve customer satisfaction and lay the framework to modernize the grid.

- The current state poses large risks to any operator, mitigation of which will span years. This means that there will be an abnormally high amount of embedded risk during the initial commencement activities as LUMA addresses not only (1) those items required to bring the electric T&D system up to industry standards, but also (2) a broad array of people and process issues akin to a major business culture transformation.

Appendix D: Guidance from Key Previous Reports

LUMA used previously completed reports and plans to guide its development of the SRP. These documents provided guidance relative to the system conditions, scope of work needed to address these conditions, initial cost estimates, and philosophies and approaches relative to establishing a more resilient and reliable power delivery system. Below is a summary of key information provided within each report:

Puerto Rico Integrated Resource Plan 2018-2019, Draft for the Review of the Puerto Rico Energy Bureau, Siemens PTI Report Number: RPT-015-19, Rev 2, 6/7/2019

The first of these document's outlines PREPA's proposed IRP filing to the PREB and the second document is the PREB's final resolution and order on the filing, which ordered modifications to the original plan, particularly proposals related to the establishment of mini-grids. LUMA reviewed both documents and developed initiatives targeting compliance with the IRP Modified Action Plan, including:

- Conversion of open-air substations to Gas Insulated Substations (GIS). Prioritize completing lowest voltages first since lower voltages tend to correlate with age
- Potential undergrounding of certain feeder mainlines serving critical customers
- Completion of study, design and implementation of a pilot mini-grid including T&D infrastructure replacements and improvements
- Activities to establish energy efficiency and demand response programs
- Initiation of an offshore wind energy study, distribution hosting capacity study, Locational Net Benefit Study (LNBA) at distribution level to identify economical and optimal capacity and location of PV, ESS (energy storage), PV/ESS and transmission locational marginal value methods study for renewable generation
- Technical support for renewable and energy storage procurement processes

Conceptual Transmission and Distribution 10-Year Capital Investment Plan for Reliability Rev 2, 10/31/2019. Prepared by Sargent & Lundy

- System conditions, scope of work and initial cost estimates for remediating asset condition issues and improving the T&D System infrastructure, including wood poles, 230 kV line materials such as insulators, substation transformers, substation grounding and security, substation breakers and relay panels and underground distribution cables
- Proposed projects to resolve constraints and improve economic dispatch, such as new line interconnections, conductor replacements, transmission center/substation reconfigurations, etc.
- Initial guidance on other system needs and proposed technologies such as wildlife mitigation measures, distribution automation technologies, and AMI deployment
- Initial recommendation on vehicle fleet replacements, and activities to evaluate and address unauthorized third-party use of the distribution system for distributed resources and related energy theft

Transmission and Distribution Roadmap (TD-0004) V Final, May 29, 2020. Prepared by Sargent & Lundy.

- Identification of improvements to specific 4.16 kV, 8.32 kV, and 13.2 kV feeders, both overhead and underground

- Identification of improvements to specific sub-transmission lines
- Identification of improvements to specific T&D substations
- Identification of improvements to specific substation SCADA technologies and system control centers

Build Back Better: Reimagining and Strengthening the Power Grid of Puerto Rico - December 2017, and Grid Modernization Plan for Puerto Rico - Jan 29, 2020 (Facilitated by Navigant Consulting)

The Build Back Better report provided recommendations at a higher level than the Grid Modernization report, which is more specific in its recommendations. There were many extracted commonalities, including recommendations to:

- Replace and/or relocate poles, rewire, selectively underground parts of the T&D System to improve resiliency to wind damage and flooding, insulator compromise; improve accessibility, improve operability with Distribution Automation
- Selectively install submersible equipment; elevate equipment and terminations; spot replace underground with overhead; install engineered protection of cables and conduit in washout areas
- At substations, improve resiliency to wind and water damage: hurricane rated fencing, control buildings, bus structures, higher insulation level, Cat4 strength, watertight enclosures, relocation/elevation of subs, installation of water barriers, etc. Improve command and control by replacing damaged & high-risk SCADA, install synchronization and black start relay systems. Improve reliability of operation by replacing high risk circuit breakers, repairing ground systems, SPCC containment, redundant battery systems/back-up generators, replacing damaged transformers, installing high side switches or circuit breakers. (Note: LUMA uses the Puerto Rico Building Code where the Category IV loading mandated for buildings is based on the International Building Code. Here Category IV refers to essential services like hospitals and other facilities of importance. The corresponding wind speed for Puerto Rico is 190 mph which is acceptable for buildings in substations but not for transmission lines and other substation structures)
- While both reports provided recommendations relative to the establishment of microgrids, LUMA relied on the PREB approved IRP for this direction
- Other recommendations derived from Grid Modernization Report include:
- Steps to improve the emergency preparedness and response process, including, system spares, trucks and equipment, staging areas, emergency response and mutual assistance plans, and supply/logistics planning
- Establishing regulatory and policy framework and initiatives to enable development and implementation of recommended investments and activities for each category (federally and non-federally funded)

US Department of Energy: Resilience Solutions for the Puerto Rico Grid - Final Report, June 2018

This report provides guidelines and recommendations for improving T&D System resiliency which were reflected in some of the above reports (Grid Modernization in particular) and in LUMA's formulated project design standards. Most notably these guidelines include:

- Substation assets should be hardened, including transformers, circuit breakers, associated switchgear, and especially control equipment, including protective relays and communications gear. Revised Flood Insurance Rate Maps (FIRM) should be used to site substation assets to avoid Base Flood Elevation (BFE) + 3.0 feet or 0.2% flood elevation, whichever is higher. In addition, siting should be outside of the floodplain whenever possible and existing critical stations should be raised and/or waterproofed

accordingly. Besides relocation, detailed power system simulation will provide insights on which assets to harden and in what priority.

- All replaced poles and towers should be of a design and material to survive 150 mph sustained winds. If funds are available, electricity transmission towers installed specifically for temporary emergency restoration after Hurricanes Irma and Maria should be considered for replacement as soon as practicable, potentially by monopoles. Many round monopole structures rode through the storm effectively.
- For the benefit of both day-to-day and in-event scenarios, recovery plans should include a strong modern Energy Management System (EMS), Remote Terminal Units, and other equipment providing real-time information and control capability to utility operators. For example, AMI for metering to serve as an operational tool providing real-time information that can, if implemented appropriately, improve service to industrial customers and reduce non-technical losses (caused by actions external to the power system such as theft) by enabling targeted inspections of anomalous readings. Also, this intelligence could empower a predictive maintenance program.
- Analysis of the existing communication infrastructure available to support grid monitoring and control functionality should be performed. This analysis would include: inventory and document the existing fiber optic cable plant; research ownership of existing cables; determine fiber connections and fiber terminations availability for secure utility applications; analyze availability and functional performance and cybersecurity of the existing communication termination equipment at the substations; identify suitable solutions to support "last mile" communications to enable system monitoring and control functions, sensors and other equipment; distribution automation, support; AMI data backhaul; and other applications and functions.

PREPA 10-Year Infrastructure Plan, December 2020

The PREPA 10-Year Infrastructure Plan was developed for FEMA and the Puerto Rico Central Office of Recovery, Reconstruction, and Resiliency (COR3), in connection with the obligation of approximately $10.5 billion in permanent work Public Assistance funding under FEMA 4339-DR-PR administered via Section 428 of the Stafford Act. The plan outlines projects by asset type and a general schedule of near-term, mid-term, and long-term projects, relying heavily on third-party damage assessments based on sampling and cost estimates previously prepared for the obligation of funds under Section 428 of the Stafford Act. The plan is a stand-alone document that is not a legal requirement for official approval from FEMA. It is an administrative policy requirement established by FEMA officials in order to understand PREPA's overall strategy for permanent work projects.

LUMA has reviewed PREPA's 10-Yr Infrastructure Plan submitted to FEMA in December 2020 and found the near-term federally funded projects related to the T&D System to generally align with LUMA's plans for federally funded projects for the same time period, as both seek to address the damage caused by Hurricane Maria to critical infrastructure. Many of these activities — for example, reconstruction of severely damaged key substations, or repair and upgrade of the critical transmission system backbone — LUMA views as foundational and enabling to the core recovery of the grid. LUMA is working to ensure activities PREPA undertakes prior to commencement will remain aligned with LUMA's post-commencement recovery and remediation activities, preventing duplication of work.

However, based on LUMA's gap analysis and observations, PREPA's plan does not outline a process for planning and prioritizing energy infrastructure investments and is not guided by a comprehensive, long-term strategic approach to power system planning to ensure safe, efficient, and reliable energy infrastructure based on system loading, performance, vulnerabilities, and other requirements. Nor does it

appear to provide an overarching strategy for transforming the grid architecture to cost-effectively address Puerto Rico's long-term energy policy and IRP objectives.

PREPA's plan describes a narrow, piecemeal approach that at times focuses only on one piece of equipment, lacking the identification of system-wide improvements that provide more overall value and efficiency. It is mostly composed of projects that will repair and rebuild damaged infrastructure within the existing grid-architecture. Furthermore, to date LUMA has not seen that these projects are supported by updated processes, controls and systems to ensure the efficient, timely and effective deployment of capital.

PREPA's project planning (i.e., prioritization and sequencing) methods are not described in detail and discussion is based mostly on anecdotal evidence and institutional knowledge of asset conditions provided by PREPA engineers and operators. To be clear, this experience provides a valuable input, but should not be the primary basis for strategic investment decision-making. These capital projects should not be developed and implemented in isolation, but rather as part of a strategic recovery and mitigation plan for Puerto Rico, with an eye towards the interdependencies between the energy infrastructure and other key sectors such as sewer and water, transportation, education, communications, health and medical, and others.

Considering the catastrophic damages resulting from Hurricanes Irma and Maria and Puerto Rico's aggressive push for transformation, an updated view of the fundamental grid architecture is needed to prevent stranded assets and to ensure historical infrastructure vulnerabilities are not repeated. This could include consolidating substations and using DER to provide resiliency and flexibility as a non-wires alternative to avoid the expense of rebuilding underutilized sub transmission lines, while still meeting load demands and power quality requirements. PREPA's anecdotal approach to system planning is not adequate to accomplish a fully reimagined grid architecture and achieve cost-savings through avoided T&D investment.

LUMA will work with PREB and other stakeholders to develop this modern grid architecture for both recovery and transformation. This needs to be developed systematically, using an approach that is comprehensive, stakeholder supported, and data-driven, with an eye towards the ever-changing demographics and technological needs of customers and vulnerable community lifelines. LUMA's plans incorporate the technical inspection, data collection and analysis activities required as a starting point for a more data-driven approach to optimizing investment guided by a new vision for Puerto Rico's electric grid architecture.

Appendix E: Inspections

SUBSTATION INSPECTION CHECKLIST

LUMA		Substation/Line Name:	Doc. #: Page: 1 of 15
Date (yy-mm-dd):	Voltage Level (KV):	Address:	Completed by:

SUBSTATION INSPECTION CHECKLIST

1. **Assessment Criteria**

1.1. **Available S&L Report: YES ☐ NO ☐:**

Report Scores:

Overall:	_____	Overall Access Road Condition:	_____	Local Control Cabinet Condition:	_____
Overall Bus Structure Condition:	_____	Overall Bus Structure Condition:	_____	Overall Entry Gate Condition:	_____
Overall Perimeter Fence Condition:	_____	Overall Transformers Condition:	_____	Gas Insulated Substation Condition:	_
Overall Yard Condition:	_____	Overall Grade Condition:	_____		

1.2. **Health Condition (Health) - Point Scoring System:**

Score Value	Health Condition
4	System like new (replaced or refurbished within the last five years)
3	System has been maintained with general operations and maintenance on a routine basis, no major issues noted
2	Deficiency were noted or components were out of service
1	Major issues noted causing a safety, reliability or unit output issue
0	End of life or not operational

1.3. **Repair Priority Code**

HIGH	MEDIUM	LOW
< 30 days	< 12 months	> 12 months

1.4. **Strategic Priority code**

Strategic Priority Code	Description
A	Compliance/Safety: Work scope required to achieve or maintain compliance with applicable codes and standards for safe operation of facilities and regulatory conformance.
B	Reliability: Work scope required to achieve or maintain minimum reliability metrics.
C	Efficiency: Work scope required to improve operating productivity. This includes asset life extension, maintenance cycle offsets, on-line monitoring/diagnostics and asset replacements.
D	Growth & Sustainability: Maximizing grid capacity and the integration of renewable energy sources.

1.5. **Root Cause Analysis**

Vegetation	☐ Trees in right-of-way ☐ Trees out of right-of-way ☐ Tree contacting line ☐ Creeping plants
Poles	☐ Broken/rotten pole ☐ Leaning pole
Lines and conductors	☐ Clearance issues ☐ Lines close to buildings ☐ Low sag ☐ Long span ☐ Conductor degradation (multiple splices)
Insulation	☐ Broken insulation ☐ Contaminated insulation ☐ Arcing insulation
Hardware	☐ Loose guy wire ☐ Missing guy wire/anchor
Crossarms	☐ Broken/rotten crossarm ☐ Leaning crossarm ☐ Missing/loose bracket

Equipment (reclosers, switches, fuses, voltage regulators, capacitor bank, etc.) and service transformers	☐ Leaking equipment ☐ Missing arresters ☐ Insulation ☐ Broken insulation ☐ Contaminated insulation ☐ Arcing insulation
Wild life	☐ Crossarm nesting ☐ Pole pecking

2. Assessment.

2.1. Site Access/Civil

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Road condition				
☐ Vegetation management				
☐ Site drainage/flood risk				

2.2. Fence

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Fence and barbed wire section are in good shape				
☐ Gates are properly adjusted				
☐ Gate padlocks are in good working order				
☐ Fence is properly bonded and grounded				
☐ Fence is secure with no opening greater than 2 inches.				
☐ High voltage signs are in place according to standard				

☐Substation identification is in place				
☐Other				

2.3. Yard

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Surface is adequately graveled				
☐ Drainage is adequate with no erosion.				
☐Area is clear of unnecessary debris/materials				
☐ Equipment (i.e. spares) is properly identified and stored				
☐ Vegetation control is adequate, control is contained to ATCO property				
☐ Yard lighting is adequate and well maintained				
☐Recyclable items are segregated from waste items and hazardous from non-hazardous				
☐Other				

2.4. Structural and Foundations

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Rust and corrosion in steel poles				
☐ Lightning spires / sky wires				
☐ Building integrity				
☐ Animal presence				
☐ Plumbness of structures				
☐ Site grading at foundations				
☐ Condition of concrete foundations				
☐ Cable tray / ducting				
☐ Conduits loose, broken or joints separated				

2.5. Anchors

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Guy guard				
☐ Guy wire tension, integrity and bonding				
☐ Anchor				

2.6. Grounding

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Standard compliant				
☐ Ground wire integrity				
☐ All bonding in place				
☐ Insulating gravel				
☐ Rod attachment				

2.7. Insulation

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Condition of insulators, including contamination and signs of flashing				
☐ Alignment				

2.8. Hardware

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Bus pipe connector integrity				
☐ Flex bus connector integrity				

5

☐ Bolts, nuts, washers or lock nuts missing				
☐ Loose bolts				

2.9. Conductor

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Oxidation; corrosion; bird caged				
☐ Correct sag, tension, clearances				

2.10. Disconnect Switches

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Age, manufacturer, operating location				
☐ Overall condition				
☐ Ground mat, drive pipe bonded				
☐ Motor operator condition				

2.11. Instrument Transformers & Lightning Arresters

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Age, manufacturer, operating location				
☐ Overall condition				
☐ Test Results				
☐ Oil leaks				

6

2.12. Power Transformers

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Age, manufacturer, operating location				
☐ Oil leaks				
☐ Abnormal noise				
☐ Bushings (visible damage; oil level)				
☐ Arresters (visible; test results)				
☐ Temperature drag hands (winding/oil)				
☐ Tap-changer operations counter				
☐ Tank grounds, arrester grounding				
☐ Main winding power factor test results				
☐ Bushing power factor test results				
☐ Oil DGA / oil quality history				

2.13. Circuit Breakers

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Age, manufacturer, operating location				
☐ Oil leaks / Gas leaks				
☐ Breaker pole condition (M/O, SF6)				
☐ Bushings – B/O (visible damage; oil level)				
☐ Grading capacitors (visible; test results)				
☐ Timing test results				
☐ Cabinet condition; mechanism				

2.14. Substation DC System

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Battery charger age, manufacturer, operating location				
☐ Battery visual condition				
☐ Battery load test results				
☐ DC distribution				

2.15. AC Station Service System

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Station service transformer age, manufacturer, operating location				
☐ Transfer switch condition				
☐ Standby generator				
☐ AC distribution				

2.16. Protection Building

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐Permanent fixtures/structures that could be a potential impact point are properly guarded/warning signs in place.				
☐Must have adequate emergency lighting				
☐ Must have adequate number of fire extinguishers fully charged and yearly				

inspection, eyewash stations and locations properly identified				
☐ Communication devices (i.e. radio, telephone) are functional				
☐ Emergency access instructions are in place and visible				
☐ Phone books, radio maps, electrical drawings, switching maps are current and readily available				
☐ Electric heater/fans are suitably positioned and in proper working condition				
☐ Personal protective equipment (PPE) is available and in good condition (goggles, face shield, apron, gloves)				
☐ Battery room doors are fitted with panic doors				
☐ Battery room ventilation is functional and properly maintained				
☐ Recyclable items are segregated from waste times and hazardous from non-hazardous				
☐ Secured/Controlled Access				
☐ Door conditions				
☐ Window Conditions				
☐ Cable Tray				
☐ Cable Entry				
☐ Air Conditioning System				
☐ General Lightning				
☐ DC Charger/UPS				
☐ Housekeeping				
☐ Desk				
☐ Safety Procedures/Board				
☐ Eyewash station				
☐ First Aid Kit				

9

2.17. Protection/Telecommunication and SCADA Panels

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Housekeeping inside the panels (animals, wiring, terminal blocks, etc.)				
☐ Lightning				
☐ Labelling/Identification				
☐ AC plugs for power-up auxiliary test equipment				
☐ Door conditions				
☐ Cable Entry				
☐ Oxidation/corrosion				

2.18. Documentation (Drawings, Settings, etc.)

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ SLMPD Schematics				
☐ Logics, Electrical and SCADA As-Built Drawings				
☐ Setting Binders				
☐ Operational Procedures				
☐ DTT/Load Shedding or special Protection schemes				

10

2.19. Protection and Control

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Relay Manufacturers				
☐ FT Switches and FT Test Plugs				
☐ Metering Manufacturers				
☐ Relay Type (Electromechanical, Digital)				
☐ Local Annunciators				
☐ Control Type (mechanisms)				
☐ Calibration or Test reports				

2.20. SCADA

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ RTU/Gateway Manufacturer				
☐ Control Philosophy				
☐ Redundancy				
☐ RTU/Gateway conditions (diagnostic LEDs)				
☐ Configuration files (local/centralized)				
☐ Annunciator/HMI				
☐ Communication Protocols/Scheme/speed				
☐ Calibration or Test Reports				

11

2.21. Telecommunications

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ System ID				
☐ Technology (Microwave, OPGW, etc.)				
☐ Antenna conditions				
☐ Battery bank				
☐ Data Bandwidth				
☐ Calibration or Test Reports				

2.22. Stock and Material

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
☐ Must be properly store (i.e. pallets, shelving, pressurized bottles)				
☐ Hazardous material stored and labeled properly (WHMIS)				

12

3. General Substation Assessment (Summary)

Item	Health (Score)	Repair Priority	Strategic Priority	Comments
Site Access/Civil				
Fence				
Yard				
Telecommunications				
Structural and Foundations (Incl. Control Building)				
Transformers				
Breakers and Disconnects				
Control Building – Panels (inside)				
Protection and Control, SCADA				
Telecommunications				

Safety Concerns – Red Flags

13

Additional Comments/Notes

14

DISTRIBUTION LINE CHECKLIST

LUMA		Line Name:	Doc. #: Page : 1 of 7
Date (yy-mm-dd):	Voltage Level (KV):	Location:	Completed by:

DISTRIBUTION LINE INSPECTION CHECKLIST

1. Assessment Criteria

1.1. Available S&L Report: YES ☐ NO ☐ | Overall Assessment (good, fair, poor):

1.2. Health Condition (Health) and Frequency - Point Scoring System:

	4	3	2	1	0
Health	Very Good	Good	Fair	Poor	Very Poor
Frequency	Very Few or None	Somewhat frequent	Moderate	Very Frequent	All

1.3. Repair Priority Code

HIGH	MEDIUM	LOW
< 30 days	< 12 months	> 12 months

1.4. Strategic Priority code

Strategic Priority Code	Description
A	Compliance/Safety: Work scope required to achieve or maintain compliance with applicable codes and standards for safe operation of facilities and regulatory conformance.
B	Reliability: Work scope required to achieve or maintain minimum reliability metrics.
C	Efficiency: Work scope required to improve operating productivity. This includes asset life extension, maintenance cycle offsets, on-line monitoring/diagnostics and asset replacements.
D	Growth & Sustainability: Maximizing grid capacity and the integration of renewable energy sources.

1.5. Procedure to assess Problems – Use App Kaizala; create a chat for the feeder with all inspectors

- Note locations (create pin), add a picture of extremely improper vegetation. Insert comments such as 'heavy', 'moderate', etc.
- Create pins for suggestions where reclosers, fuses, fault indicators, etc. would improve performance. Include a picture.
- Include structures that are an imminent failure and high risk. Include pin and photo.
- Include structure that are an extreme safety risk to the public (pin and photo).

1.6. Root Cause Analysis

Vegetation	• Trees in right-of-way • Trees out of right-of-way	• Tree contacting line • Creeping plants
Poles	• Broken/rotten pole	• Leaning pole

Lines and conductors	• Clearance issues
	  ○ Lines close to buildings
	  ○ Low sag
	  ○ Long span
		• Conductor degradation (multiple splices)

Insulation	• Broken insulation • Contaminated insulation	• Arcing insulation
Hardware	• Loose guy wire	• Missing guy wire/anchor
Crossarms	• Broken/rotten crossarm • Leaning crossarm	• Missing/loose bracket

Equipment (reclosers, switches, fuses, voltage regulators, capacitor bank, etc.) and service transformers	• Leaking equipment
	• Missing arresters
	• Arcing insulation
		• Insulation
		  ○ Broken insulation
		  ○ Contaminated insulation

Wild life	• Crossarm nesting	• Pole pecking

2. Assessment

2.1. Clearances and Brushing

- Improper ROW clearance
- Poor vegetation Management

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.2. Structure and Foundation

- Animal damage
- Poor condition at ground level
- Conductors loose, broken or joints separated.
- Signs of burns or tracking due to lightning or insulator leakage
- Leaning structures
- Rust in steel poles
- Issues with weathering or splinters
- Problems with structures supporting switches, metering equipment, capacitor banks, regulators, etc.

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.3. Anchors

- Defective or missing guy
- Loose, corroded or damaged guy
- Improper anchor

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.4. Grounding

- Violation to standard
- General condition of ground wire

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.5. Insulators

- Contamination and signs of flashing
- Improper alignment

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.6. Hardware

- Excess hardware
- Inadequate spacing, improper grounding, bonding, etc.
- Missing bolts, nuts, washers or lock nuts

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.7. Conductor

- Insufficient clearance
- Corrosion
- Insufficient separation
- Damaged or loose ties
- Tree wire insulation damaged or missing
- Excessive sagging
- Excessive number of damaged splices

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.8. Crossarms

- Damaged, split, twisted, tilted, loose

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.9. Equipment (Transformers, Switches, Streetlights)

- Leaking or sweating
- Damaged or missing arrestors
- Broken or loose
- Abnormal noise
- Damaged or missing wildlife protectors
- Bushings
- Out of alignment

Assessment (good, fair, poor)	Health (1-5)	Frequency (1-5)	Repair Priority	Strategic Priority	Comments

2.10. General Line Assessment

Additional Comments

3. Recommendations

3.1. Stage 1a (Immediate Repair / Emergency Work / Imminent Failure):

Item	Scope of Work (Include how many or % of line)	Comments
☐ Insulators (broken)		
☐ Structural (poles and crossarms)		
☐ Conductor, Splicing and Spans		
☐ Other		

3.2. Stage 1b (Short-Term Reliability Improvement):

Item	Scope of Work (Include how many or % of line)	Comments
☐ Vegetation Management		
☐ Installation of fault indicators		
☐ Installation of lateral fuses		
☐ Perform Fusing check		
☐ Installation of reclosers		
☐ Other		

3.3. General Recommendation: what would you improve / what are the priorities?

Additional Comments
Clearance/Brushing:
Structure/Foundation:
Anchors/Guy:
Grounding:
Insulators:
Hardware:
Conductors:
Crossarms:
Equipment:
Other:

Appendix F: Asset Assessment

Like the Organizational Gap Assessment, LUMA SMEs charged with conducting an Asset Assessment attended several workshops, conducted targeted interviews with key PREPA personnel, reviewed data provided by PREPA, including reports by various consultants and made observations from select confirmatory site and facility visits. The objectives of the Asset Assessment were to determine the following:

- The effort required to restore the grid and improve the resilience of vulnerable electric T&D infrastructure
- Actions required to improve reliability, thus enhancing the customer experience
- Readiness for grid modernization improvements that support compliance with IRP goals

The following sections outline the approach and scope of this portion of the review and provide a discussion of the results.

F.1 Approach & Scope

LUMA's assessment was informed by the PREB-approved IRP as a strategic framework, and by our review of the following documents that detail the condition of PREPA's electric grid:

- Sargent and Lundy Transmission and Distribution Roadmap submitted by Sargent and Lundy on May 29, 2020
- Conceptual Transmission and Distribution 10-Year Capital Investment Plan for Reliability submitted by Sargent and Lundy on October 31, 2019
- Build Back Better: Reimagining and Strengthening the Power Grid of Puerto Rico facilitated by Navigant Consulting dated December 2017
- Grid Modernization Plan for Puerto Rio facilitated by Navigant Consulting dated December 2019
- US DOE: Resilience Solutions for the Puerto Rico Grid, June 2018
- FEMA 428 project settlement summary documents including estimating packages, Methods of Repair documents, Fixed Cost Estimates, Damage Description and Dimensions documents

During the assessment process, comprehensive or detailed information about infrastructure health across the system was not provided by PREPA. LUMA's investigations indicated that utility-wide inspection programs have not been executed within the last few decades; and consequently, LUMA's review of asset health is based on the limited information provided by PREPA, studies that have been performed by others such as S&L, workshops with PREPA teams and their consultants, and confirmatory site visits performed by LUMA.

LUMA created separate teams to conduct reviews of assets in five main categories below:

- Substations and Transmission Centers
- Electric Transmission System
- Electric Distribution System
- System Technologies and Facilities
- Telecommunications System and targeted areas

The last two areas were assessed using the gap assessment framework and results are provided were reported in the organizational gap assessment (Appendix C).

Checklists were developed for each major asset category and were used to guide the LUMA inspections and ensure consistency in the identification and scoring of the assets. Visual inspections employed checklists that outlined criteria for assessing health, repair priority and strategic priority. As an example, Tables F-1 through F-3 illustrate the above evaluation criteria for Electric Distribution Lines. Similar criteria were developed for transmission lines and substations and can be found in Appendix E.

Table F-1. Health Condition (Health) & Frequency-Point Scoring System

Rating	0	1	2	3	4
Health	Very Poor	Poor	Fair	Good	Very Good
Frequency	All	Very Frequent	Moderate	Somewhat Frequent	Very Few or None

Table F-2. Strategic Priority Code

Strategic Priority Code	Description
A	Compliance/Safety: Work scope required to achieve or maintain compliance with applicable codes and standards for safe operation of facilities and regulatory conformance.
B	Reliability: Work scope required to achieve or maintain minimum reliability metrics.
C	Efficiency: Work scope required to improve operating productivity. This includes asset life extension, maintenance cycle offsets, on-line monitoring/diagnostics and asset replacements.
D	Growth & Sustainability: Maximizing grid capacity and the integration of renewable energy sources.

Table F-3. Root-Cause Analysis

Component	Description
Vegetation	▪ Trees in right of way ▪ Trees out of right of way ▪ Tree contacting line ▪ Creeping plants
Poles	▪ Broken/rotten pole ▪ Leaning pole
Lines & Conductors	▪ Clearance issues ▪ Lines close to buildings ▪ Low sag ▪ Long span ▪ Conductor degradation (multiple splices)
Insulators	▪ Broken insulators ▪ Contaminated insulators ▪ Arcing insulators
Hardware	▪ Loose guy wire ▪ Missing guy wire/conductor
Crossarms	▪ Broken/rotten crossarm ▪ Leaning crossarm ▪ Missing/loose bracket

Component	Description
Equipment (reclosers, switches, fuses, voltage regulators, capacitor bank, etc.) & Service Transformers	▪ Leaking equipment ▪ Missing arresters ▪ Broken insulators ▪ Contaminated insulators ▪ Arcing insulators
Wildlife	▪ Crossarm nesting ▪ Pole pecking

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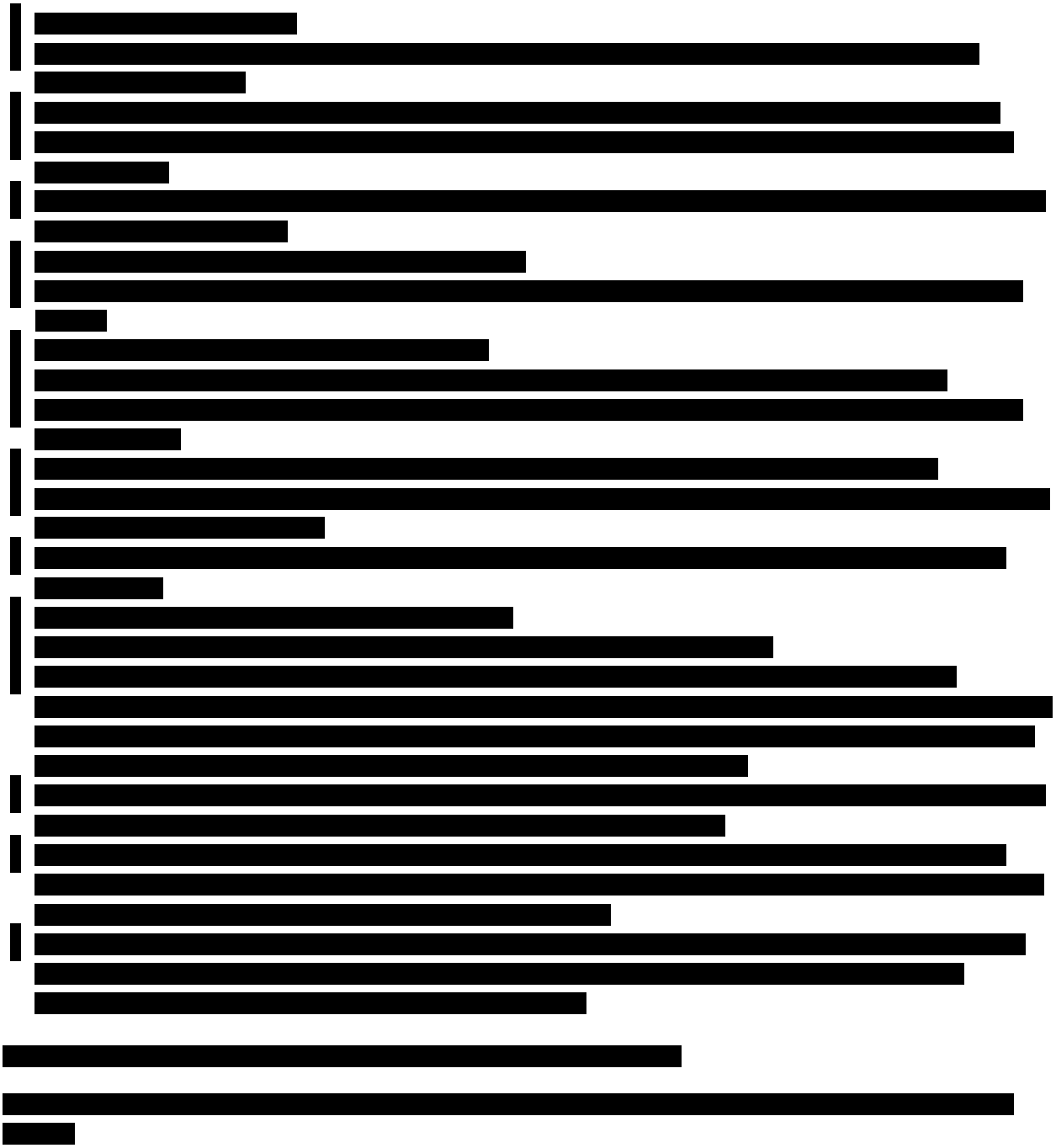
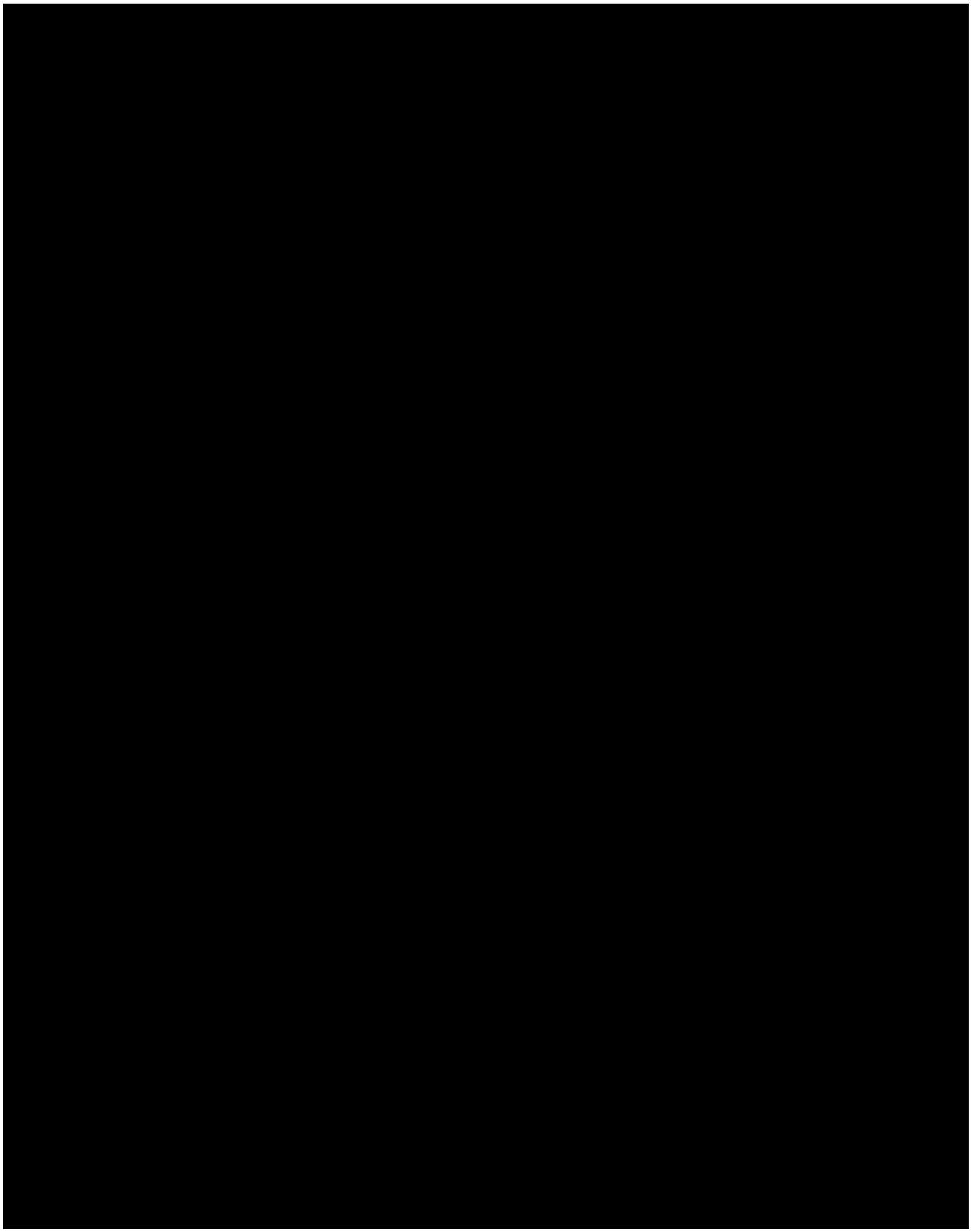
System Remediation Plan

System Remediation Plan

System Remediation Plan



System Remediation Plan



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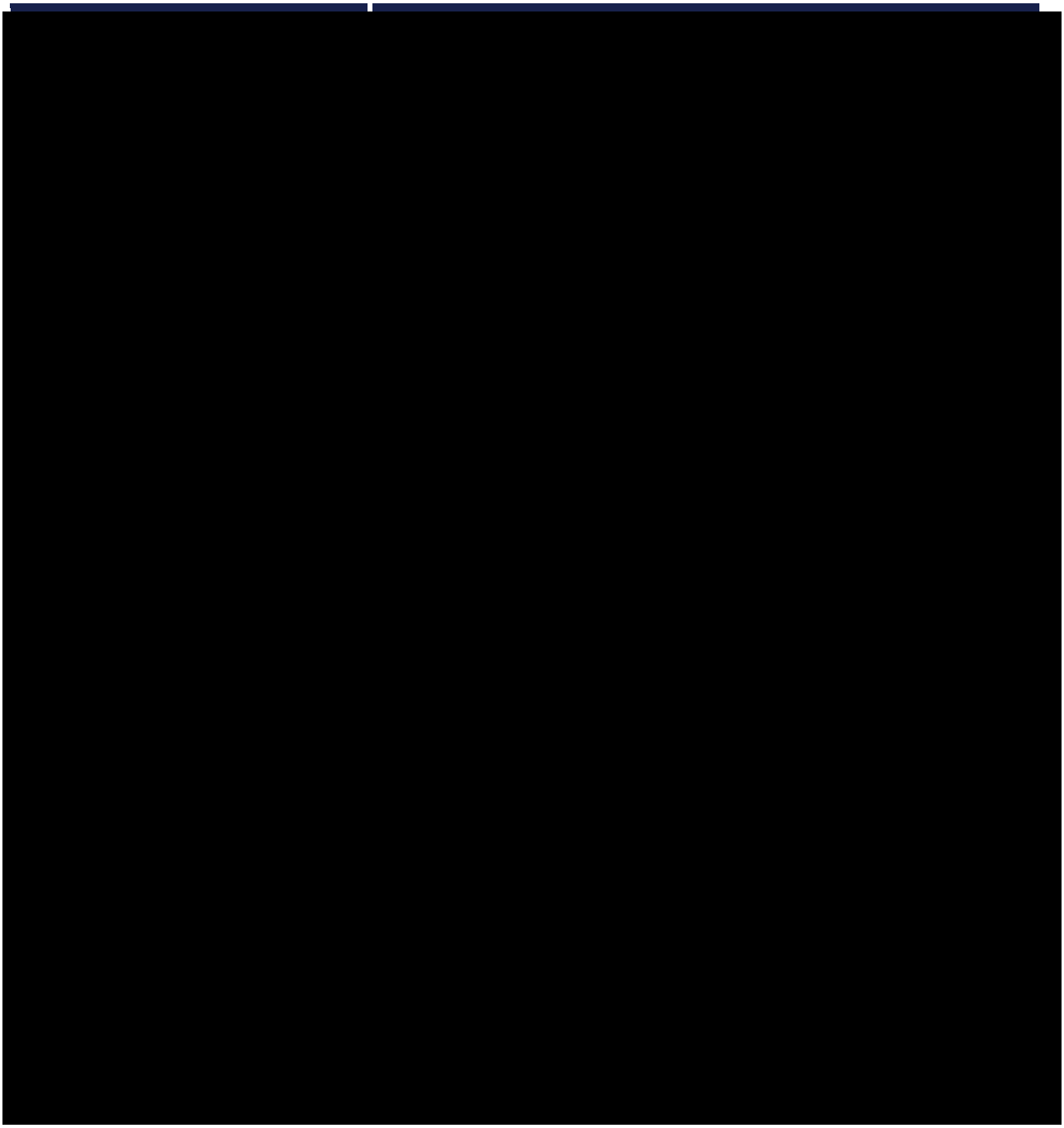


System Remediation Plan

Appendix G: Component Business Model

In parallel with the gap assessment, LUMA applied an industry accepted CBM for the purposes of:

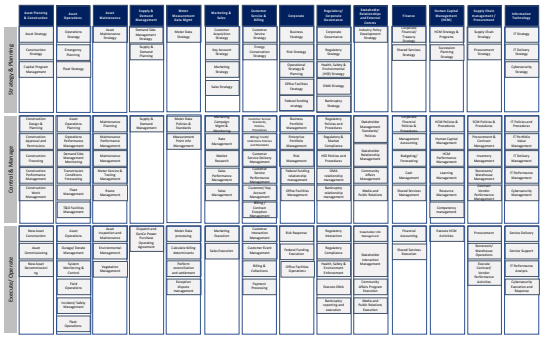
- Assessing completeness of the Utility Gap Assessment as it relates to those elements required under the OMA to provide safe and reliable electric service to the people of Puerto Rico,
- Identifying points of leverage and coordination across the organization with respect to improvement initiatives,
- Rating business components based on their potential impacts or consequences for the purpose of identifying SRP programs.

Component Business Model Description

The CBM presents a map of a business' "building blocks," consisting of three key elements:

Figure G-1. Key Elements of the Component Business Model

Columns are **Business Competencies** defined as large business areas with characteristic skills and capabilities (e.g., product development or supply chain) – components have "affinity of purpose"



A **Business Component** is a part of an enterprise that has the potential to operate independently – if sufficiently resourced, it could be a separate company or part of another company

An **Accountability Level** characterizes the *scope* and *intent* of activity and decision-making. The three levels used in CBM are typically:

- ***Directing***: strategy, overall direction and policy
- ***Controlling***: monitoring, managing exceptions and tactical decision making
- ***Executing***: doing the work

The CBM shifts the focus from an organizational view to one focused on critical skills / competencies and managing activities (thereby removing real or perceived barriers and redundancies between operating entities). The Business Competencies and Accountability Levels provide the structure, and the Business Components define the required capabilities to accomplish specific outcomes. This component view allowed LUMA to:

- **Focus** on components that are associated with high potential impacts and consequences as required in the SRP, and
- **Compare** current capabilities for each required skill / competency to levels deemed necessary to meet the standard of "remediated."

In doing so, LUMA has augmented the “process view” (gap assessment), with a “competency view” by answering the questions: “What are the impacts or consequences if a component / skill is not performed / present?”, “What capabilities are currently present within the organization?” and ultimately “What capabilities are required to effectively manage risk?” In tandem, the two views inform each other with insights regarding both the required outcome and the processes necessary to achieve the required outcome.

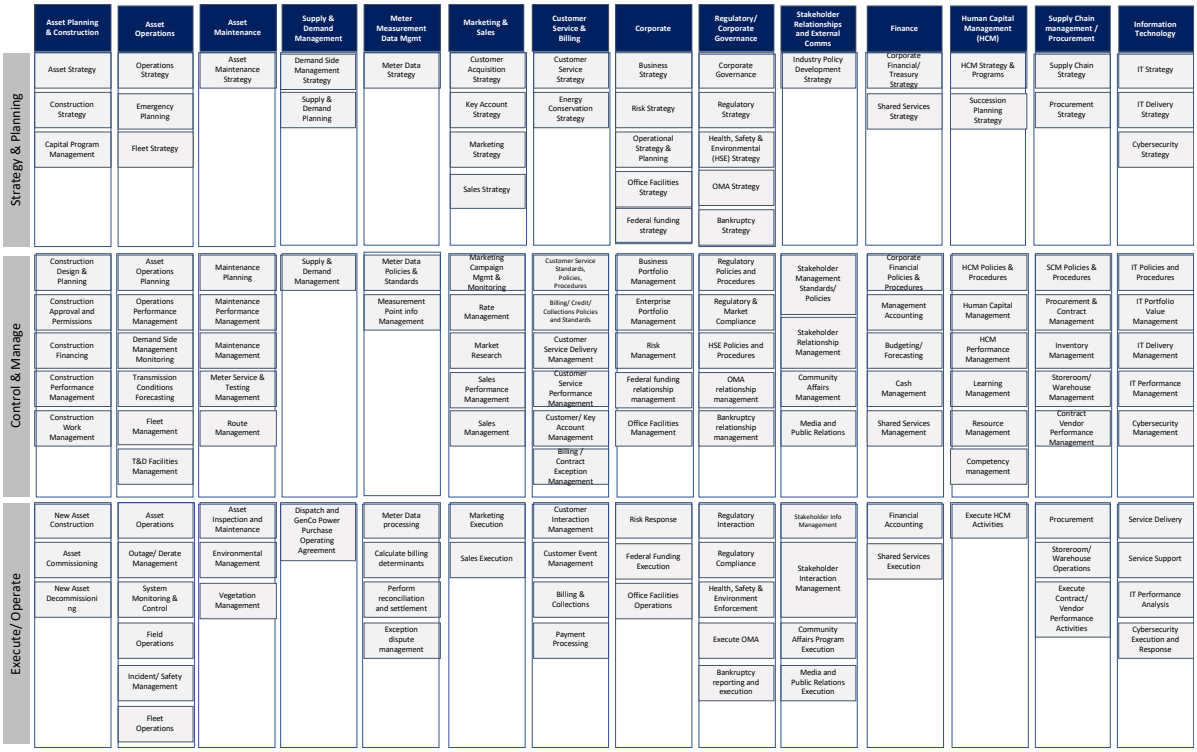
CBM Application to LUMA

LUMA adopted an established utility framework as a starting point for identifying the Business Competencies (columns) and Components (boxes), adjusted it as necessary to match LUMA’s specific operating, business, and regulatory environment; and ensured consistency by leveraging the scope of services defined in the OMA. The framework consists of 14 Business Competencies and three levels of accountability:

Table G-1. LUMA’s Component Business Model Accountability Levels and Competencies

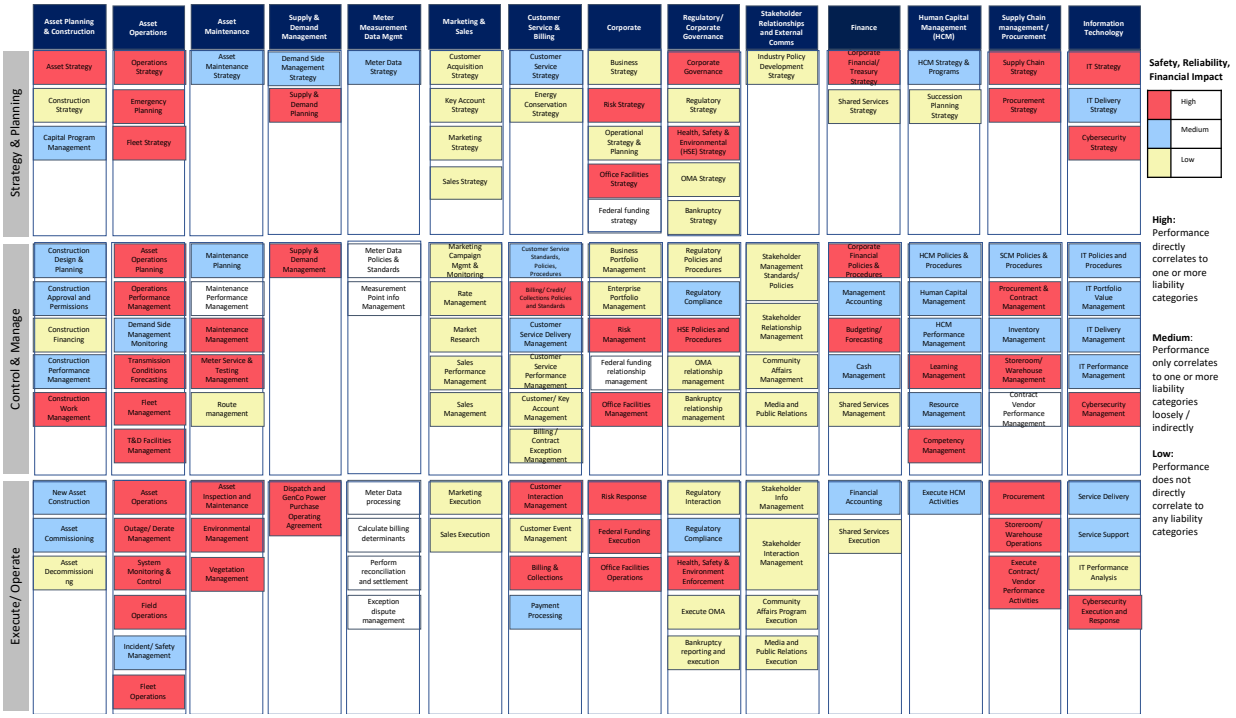
Accountability Levels	Competencies
▪ Strategy & Planning &Directing ▪ Control and Manage (Controlling) ▪ Execute and Operate (Executing)	▪ Asset Planning & Construction ▪ Asset Operations ▪ Asset Maintenance ▪ Supply & Demand Management ▪ Meter Measurement & Data Management ▪ Marketing & Sales ▪ Customer Service & Billing ▪ Corporate ▪ Regulatory & Corporate Governance ▪ Stakeholder Relationships & External Communications ▪ Finance ▪ Human Capital Management (HCM) ▪ Supply Chain Management (SCM) ▪ IT OT

Figure G-2. LUMA Component Business Model



Once the model represented a reasonable reflection of LUMA (Figure G-2), a risk view was developed to determine which components have an associated high consequence if the required skills / capabilities are not present / performed. An assessment combining experienced risk management personnel and relevant industry experience provided the input necessary to rate the components based on their potential liability. The resulting categorized CBM (Figure G-3) identifies the low / medium / high impact ratings.
Performance for the high impact liability components is directly correlated to one or more of the impacts or consequences categories (employee health and safety, public safety, delivery of electric service, physical and cyber security, requirements of applicable law, and financial loss to the utility).

Figure G-3. LUMA Component Business Model – Impact / Consequence View



Unsurprisingly, high impact and/or consequence components are focused on asset operations and maintenance, supply and demand management and supply chain which relate to the delivery of service, employee health and safety and public safety and requirements of applicable law. Customer billing and finance relate to financial loss to the utility and requirements of applicable law and IT/ cybersecurity, health, safety, and environment relate predominantly to safety and requirements of applicable law.

The capability maturities assigned during the gap assessment were adopted to baseline current capability and to establish targets. The capability maturity scores recorded during the gap assessment applied to the CBM model is a five-point scale, ranging from (1) Unfocused to (5) Excellent. Each level builds on the one beforehand, creating new functionality and increasing operational effectiveness, which increases capability and maturity. The LUMA maturity scale is illustrated in Table G-2.

Table G-2. LUMA Capability Maturity Scale

Score	Unfocused 1	Aware 2	Developing 3	Competent 4	Excellent 5
Scoring Criteria	The organization has not recognized the need for the basic elements and/or there is no evidence of commitment to put them in place. Work is performed informally or ad hoc Processes are undocumented and / or undefined Issues present major exposures Required expertise / training does not exist, capacity is insufficient or both	The organization has a basic understanding of the need to address these elements and is in the process of deciding how / starting to apply them. Preliminary documentation of processes being compiled Performance is unmeasured Little organizational effort to identify issues	The organization has identified the means address the major elements and some work is progressing on implementation. Basic performance can be measured Performance is minimally adequate Processes are documented and defined Issue identification is performed Competitively sub-par	All elements are in place and are implemented in the day-to-day operations of the business. Major improvements made Performance is adequate and continuously measured / verified Processes are managed (followed consistently) with appropriate controls Disciplined issues identification Competitively at par	The organization is using processes and approaches beyond the basic requirements, driving to achieve maximum value. Verifiable issues / defect reductions and or practices continuous improvement Deliberate effort to optimize / improve processes Competitively well positioned to competitively differentiated.

Figure G-4. LUMA Component Business Model – High Impact Liability Current Capability View

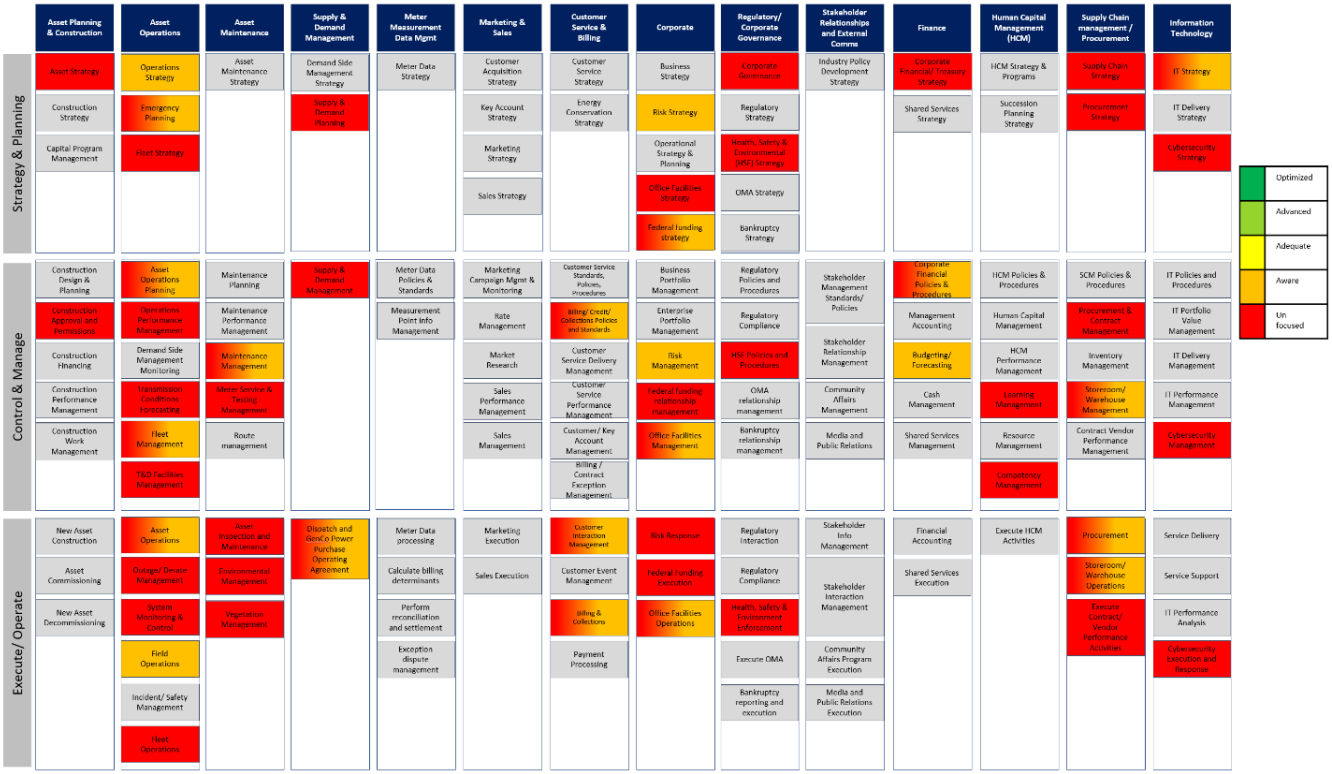
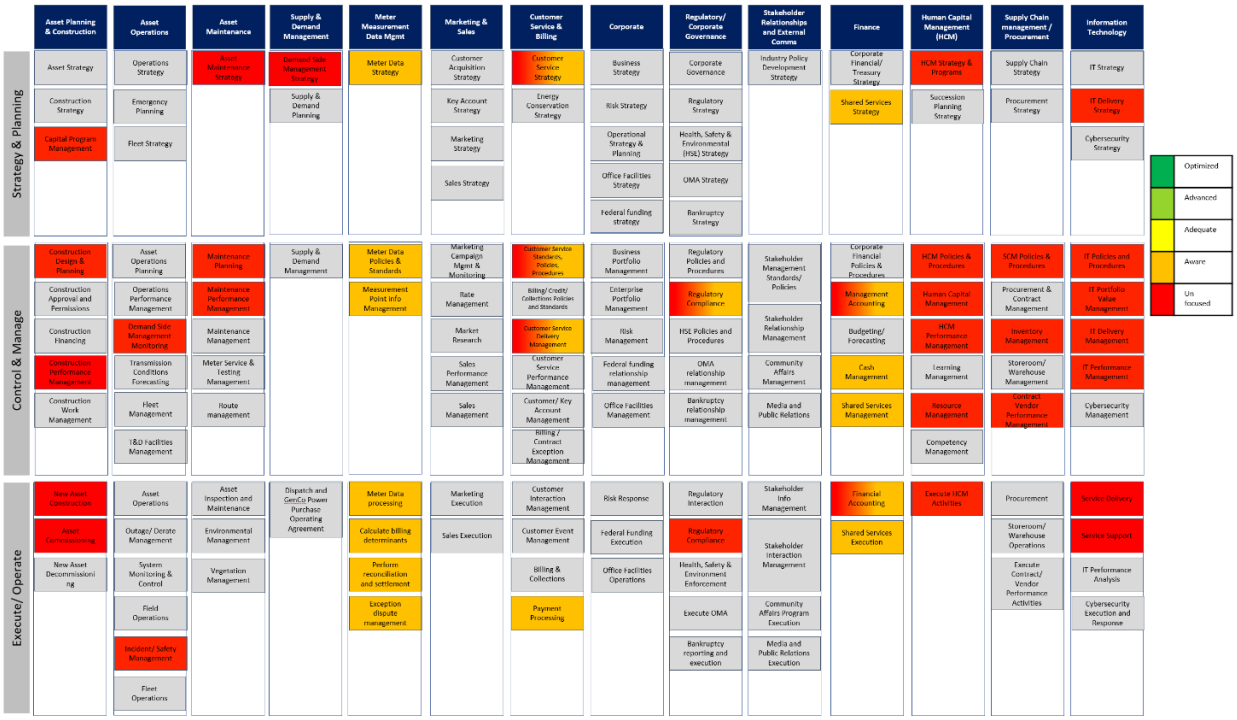


Figure G-5. LUMA Component Business Model – Medium Impact Liability Current Capability View



The multiple significant gaps in maturity for the high impact liability components create high risks for LUMA and will require remediation through the implementation of the SRP.

To confirm alignment, the SRP programs were then mapped across the high impact / consequence capabilities. A sample is shown below in Table G-3. It is important to recognize that one SRP program may increase the maturity of multiple high impact components in the CBM.

Table G-3. Program Mapping to Competencies (Sample)

Competency: Supply & Demand Management	
High Consequence Components	**Programs**
▪ High Consequence ▪ Supply and Demand Planning ▪ Supply & Demand Management ▪ Dispatch and GenCo Power Purchase Operating Agreement	▪ Critical EMS Upgrades ▪ Critical Energy Management & Load Generation Balancing ▪ Critical System Operation Strategy & Process ▪ Control Center Construction & Refurbishment ▪ Improvements to System Dispatch for Increased Reliability and Resiliency ▪ Resource Planning and Processes to Improve Resource Adequacy and Cost Tracking ▪ Supporting Shared Services for Generation