

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

**NEPR**

**Received:**

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IN RE:  
LUMA'S RESPONSE TO HURRICANE  
FIONA

**CASE NO. NEPR-MI-2022-0003**

**SUBJECT: Report on Puerto Rico's Path to  
Stabilization**

**MOTION SUBMITTING REPORT TITLED  
"PUERTO RICO'S PATH TO POWER STABILIZATION"**

**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 the following:

**I. Background**

1. In a Resolution and Order of October 7, 2022 ("October 7<sup>th</sup> Order") with the subject "Baseload Generation Dispatch Status-Post Hurricane Fiona," this honorable Puerto Rico Energy Bureau ("Energy Bureau") convened a Technical Conference to discuss concerns raised by LUMA in a letter dated October 6, 2022, regarding Resource Adequacy and potential Generation resource deficiencies following Hurricane Fiona. Per the October 7<sup>th</sup> Order, the topics to be discussed at the Technical Conference were "(i) Dispatch Status of the available Baseload Generation post Hurricane Fiona and (ii) the identified temporary emergency mitigation measures thought to address the generation deficiencies arising from Hurricane Fiona."<sup>1</sup>

2. On October 12, 2022, the Energy Bureau entered a Resolution and Order whereby it ordered LUMA to develop a stabilization plan as a direct response to Hurricane Fiona, in

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<sup>1</sup> The Technical Conference was held as scheduled on October 11, 2022. During the Technical Conference, the Energy Bureau and consultants for the Energy Bureau posed questions to LUMA's representatives.

coordination with the Federal Emergency Management Agency (“FEMA”) and the Puerto Rico Electric Power Authority (“PREPA”) “to address any baseload generation inadequacy or shortfall that affects the dispatch availability and has the potential to cause load shedding or a blackout event of the electric system (“Stabilization Plan”)” (“October 12<sup>th</sup> Order”).

3. Per the October 12<sup>th</sup> Order, LUMA was directed to submit the 1<sup>st</sup> and the 15<sup>th</sup> day of each month from the notice of the Order, an updated report addressing the efforts conducted by LUMA to assure the completion of the Stabilization Plan.

4. On October 31<sup>st</sup>, 2022, LUMA submitted the First Update on the Stabilization Plan.

5. On November 1, 2022, this Energy Bureau held a technical conference for November 1, 2022 (“October 27<sup>th</sup> Order”) in connection with the first update on the Stabilization Plan. LUMA representatives appeared to discuss the Stabilization Plan and answered questions by this Energy Bureau.

6. On November 15, 2022, LUMA submitted a Second Update on the Stabilization Plan (“Second Update”). In addition, LUMA submitted supplemental information to the Second Update arising from a joint press conference of November 15<sup>th</sup>, 2022, where the Governor of Puerto Rico, the Hon. Pedro Pierluisi, and the Federal Coordinator for the Federal Emergency Management Agency (“FEMA”), Nancy Casper, announced that FEMA’s power stabilization initiative aims to install between 600 to 700 MW of temporary emergency generation capacity through the mobilization of power generation maritime barges and temporary land-based generators. *See Supplemental Submission to Second Update on Stabilization Plan to Inform of Announcement by the Puerto Rico Government and FEMA on Temporary Emergency Generation Capacity*, filed on November 15, 2022.

7. On December 1<sup>st</sup>, 2022, LUMA submitted the Third Update on the Stabilization Plan. LUMA thereafter submitted bi-weekly updates on the progress of the Generation Stabilization Plan. The most recent of these updates was submitted on November 1<sup>st</sup>, 2023 and constituted the final update in compliance with the Energy Bureau's October 12<sup>th</sup> Order.

8. Specifically, subsequent updates to the Stabilization Plan were filed on December 1<sup>st</sup>, 2022 (Third Update), December 15, 2022 (Fourth Update), January 17, 2023 (Fifth Update); January 31, 2023 (Sixth Update); February 14, 2023 (Seventh Update); March 1, 2023 (Eight Update); March 15<sup>th</sup> (Ninth Update); April 3<sup>rd</sup> (Tenth Update); April 17<sup>th</sup> (Eleventh Update); May 1, 2023 (Twelfth Update); May 15, 2023 (Thirteenth Update); June 1<sup>st</sup>, 2023 (Fourteenth Update); June 15, 2023 (Fifteenth Update); July 3<sup>rd</sup>, 2023 (Sixteenth Update); July 17<sup>th</sup>, 2023 (Seventeenth Update); August 1<sup>st</sup>, 2023 (Eighteenth Update); August 15<sup>th</sup>, 2023 (Nineteenth Update); September 1<sup>st</sup>, 2023 (Twentieth Update), September 15, 2023 (Twenty-First Update), October 2<sup>nd</sup>, 2023 (Twenty-Second Update), October 16, 2023 (Twenty-Third Update) and November 1, 2023.

9. As informed in its Seventh Update, FEMA reduced the target emergency generation capacity of the Stabilization Plan from 750MW to 350MW. According to LUMA's resource adequate analysis, the new target emergency generation capacity would still significantly reduce the Loss of Load Expectation ("LOLE"). *See*, Seventh Update dated February 15<sup>th</sup>, 2023.

10. As informed through the Twenty-Third Update on the Stabilization Plan ("Twenty-Third Update"), the emergency generation resources installed at the San Juan and Palo Seco sites reached the Commercial Operation Date with a total combined baseload capacity of 350 MW. Specifically, the seven gensets installed at the Palo Seco Site reached the Commercial Operation Date on June 7, 2023. The 20 gensets installed at the San Juan site reached the Commercial Operation Date on September 27, 2023.

11. In light of the completion of the construction activities and the achievement of the Commercial Operation Date at both sites, through the Twenty-Third Update, LUMA informed that it would continue to monitor the operation of the installed emergency generation equipment for an additional 15-day cycle, at the conclusion of which LUMA would respectfully request that the Energy Bureau deem that it has fully complied with the October 12<sup>th</sup> Order and to release it from the requirement to file further updates to the Stabilization Plan.

12. Consistent with the foregoing, on November 1, 2023, LUMA submitted its Twenty-Fourth and final update to the Generation Stabilization Plan. As informed in that submission, the emergency generation resources installed at the San Juan and Palo Seco sites maintained a regular operation and averaged a total combined baseload capacity of 355 MW during the period of 15 days following the Twenty-Third Update.

13. Consequently, LUMA requested that the Energy Bureau release it from the requirement to file bi-weekly updates on the Generation Stabilization Report.

14. As explained by LUMA, as per the October 12<sup>th</sup> Order, the Energy Bureau's interest upon requiring the development of a Stabilization Plan was for LUMA to "address any baseload generation inadequacy or shortfall that affects the dispatch availability and has the potential to cause load shedding or a blackout event of the electric system ("Stabilization Plan")," following the emergency created by Hurricane Fiona. October 12<sup>th</sup> Order at page 2.

15. On November 14<sup>th</sup>, 2023, the Energy Bureau entered a Resolution and Order that, in its pertinent part, releases LUMA from filing additional bi-weekly reports to the Stabilization Plan.

## **II. Submission of Presentation and Report Titled *Puerto Rico's Path to Stabilization***

16. Upon the conclusion of the installation of the emergency generators LUMA analyzed the elements that contributed to the success of this project and the accomplishments resulting therefrom.

17. Attached herein as *Exhibit 1*, LUMA includes a presentation titled *Puerto Rico's Path to Stabilization* which provides a summary of the implementation of the Generation Stabilization Plan, a timeline of relevant events and a description of the stages of this project.

18. LUMA also includes as *Exhibit 2*, a report titled *Puerto Rico's Path to Stabilization* which summarizes the accomplishments related to the Generation Stabilization Plan and its economic impact. The report also highlights the positive results derived from the installation of the emergency capacity generators as a result of the coordinated efforts between LUMA, FEMA, the U.S. Army Corps of Engineering, Genera and the Puerto Rico Electric Power Authority, among others. LUMA also includes a summary of the effects of the passage of Hurricane Fiona through Puerto Rico and a description of the efforts that led to the development of the Generation Stabilization Plan. *Exhibit 2* also describes the current state of Puerto Rico's Electric Power System. As expressed therein, the FEMA generators have been of significant benefit for Puerto Rico, avoiding 59 load shed events and "reducing the use of diesel oil and residual fuel oil which translates in environmental and cost benefits for the electric customers in Puerto Rico". See, Section 6.3 of *Exhibit 2* at page 39.

19. LUMA's filing of this report intends to put this Energy Bureau in position to assess the positive outcomes derived from the implementation of the Generation Stabilization Plan while also deriving the lessons learned from the process. The report also informs of LUMA's efforts to

assess the impact of the demobilization of the gensets on March, 2024 such as an increase in load shed events. *Id.*

20. LUMA respectfully requests that the Energy Bureau take notice of the attached report for all relevant purposes.

### **III. Request for Confidentiality of Portions of *Exhibit 2*.**

LUMA redacted portions of *Exhibit 2* and respectfully requests that those portions be kept confidential by this honorable Energy Bureau pursuant to the Energy Bureau's Policy on Management of Confidential Information, CEPR-MI-2016-0009, issued on August 31, 2016, and partially amended on September 16, 2016, and in accordance with the confidential nature of the December 20<sup>th</sup> closed Technical Conference. In compliance with this policy, LUMA hereby submits its Memorandum of Law in support of its request for confidentiality setting forth the legal basis for which LUMA is entitled to file portions of *Exhibit 2* under the seal of confidentiality. As explained below, the Energy Bureau should protect several pictures included in *Exhibit 2* from public disclosure as they contain CEII as defined in federal regulations and the Energy Bureau's Policy on Management of Confidential Information. *See* 18 C.F.R. § 388.113; 6 U.S.C. §§ 671-674; Energy Bureau's Policy on Management of Confidential Information.

#### **A. Applicable Laws and Regulations to Submit Information Confidentially Before the Energy Bureau.**

The bedrock provision on the management of confidential information filed before this Energy Bureau is Section 6.15 of Act 57-2014, known as the "Puerto Rico Energy Transformation and Relief Act." It provides, in pertinent part, that: "[i]f any person who is required to submit information to the Energy Commission believes that the information to be submitted has any confidentiality privilege, such person may request the Commission to treat such information as such . . . ." 22 LPRA § 1054n. If after appropriate evaluation the Energy Bureau determines that

the information should be protected, “it shall grant such protection in a manner that least affects the public interest, transparency, and the rights of the parties involved in the administrative procedure in which the allegedly confidential document is submitted.” *Id.* § 1054n(a).

The confidential information shall be provided “only to the lawyers and external consultants involved in the administrative process after the execution of a confidentiality agreement.” *Id.* § 1054n(b). Finally, Act 57-2014 provides that this Energy Bureau “shall keep the documents submitted for its consideration out of public reach only in exceptional cases. In these cases, the information shall be duly safeguarded and delivered exclusively to the personnel of the [Energy Bureau] who needs to know such information under nondisclosure agreements. However, the [Energy Bureau] shall direct that a non-confidential copy be furnished for public review.” *Id.* § 1054n(c).

Relatedly, in connection with the duties of electric power service companies, Section 1.10(i) of Act 17-2019 provides that electric power service companies shall provide the information requested by customers, except for confidential information under the Rules of Evidence of Puerto Rico.

Moreover, the Energy Bureau’s Policy on Confidential Information details the procedures a party should follow to request that a document or portion thereof be afforded confidential treatment. In essence, the referenced Policy requires identifying confidential information and filing a memorandum of law explaining the legal basis and support for a request to file information confidentially. *See* CEPR-MI-2016-0009, Section A, as amended by the Resolution of September 20, 2016, CEPR-MI-2016-0009. The memorandum should also include a table that identifies the confidential information, a summary of the legal basis for the confidential designation, and why each claim or designation conforms to the applicable legal basis of confidentiality. *Id.* at ¶ 3. The

party who seeks confidential treatment of information filed with the Energy Bureau must also file both “redacted” or “public version” and an “unredacted” or “confidential” version of the document that contains confidential information. *Id.* at ¶ 6.

The Energy Bureau policy on CEII is regulated by Section D of the Resolution issued on August 31, 2016, in Case No. CEPR-MI-2016-0009. Section D establishes that CEII is Validated Confidential Information and only authorized representatives may review such information:

2. Critical Energy Infrastructure Information (“CEII”)

The information designated by the [Energy Bureau] as Validated Confidential Information on the grounds of being CEII may be accessed by the parties’ authorized representatives only after they have executed and delivered the Nondisclosure Agreement.

Those authorized representatives who have signed the Non-Disclosure Agreement may only review the documents validated as CEII at the [Energy Bureau] or the Producing Party’s offices. During the review, the authorized representatives may not copy or disseminate the reviewed information and may bring no recording device to the viewing room.

*Id.* at § D (on Access to Validated Confidential Information).

Further on, Energy Bureau Regulation No. 8543, includes a provision for filing confidential information in proceedings before this Energy Bureau. To wit, Section 1.15 provides that:

[A] person has the duty to disclose information to the [Energy Bureau] considered to be privileged pursuant to the Rules of Evidence, said person shall identify the allegedly privileged information, request the [Energy Bureau] the protection of said information, and provide supportive arguments, in writing, for a claim of information of privileged nature. The [Energy Bureau] shall evaluate the petition and, if it understands [that] the material merits protection, proceed accordingly to . . . Article 6.15 of Act No. 57-2015, as amended.

Regulation No. 8543, *Regulation on Adjudicative, Notice of Noncompliance, Rate Review, and Investigation Proceedings* § 1.15; *see also* Energy Bureau Regulation No. 9137 on *Performance*



*Incentive Mechanisms* § 1.13 (addressing disclosure before the Energy Bureau of Confidential Information and directing compliance with Resolution CEPR-MI-2016-0009).

**B. Request for Confidentiality of the Pictures included in *Exhibit 2***

The Report attached herein as *Exhibit 2* contains pictures that identify or depict CEII that, under relevant federal law and regulations, is protected from public disclosure. LUMA stresses that the pictures which LUMA redacted from the public version of *Exhibit 2* warrant confidential treatment to protect the Puerto Rico Energy Transmission and Distribution System (“T&D System”) from threats that could undermine the system and negatively affect electric power services to the detriment of the interests of the public, customers, and citizens of Puerto Rico.

Generally, CEII or critical infrastructure information is exempted from public disclosure because it involves assets and information which pose public security, economic, health, and safety risks. Federal Regulations on CEII, particularly 18 C.F.R. § 388.113, states that:

Critical energy infrastructure information means specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure that:

- (i) Relates details about the production, generation, transportation, transmission, or distribution of energy;
- (ii) Could be useful to a person in planning an attack on critical infrastructure;
- (iii) Is exempt from mandatory disclosure under the Freedom of Information Act, 5 U.S.C. 552; and
- (iv) Does not simply give the general location of the critical infrastructure.

*Id.* at § 388.113(2).

Additionally, Section 388.113(3) defines critical electric infrastructure as a “system or asset of the bulk-power system, whether physical or virtual, the incapacity or destruction of which would negatively affect national security, economic security, public health or safety, or any combination of such matters.” *Id.* § 388.113(3). Finally, “[c]ritical infrastructure means existing

and proposed systems and assets, whether physical or virtual, the incapacity or destruction of which would negatively affect security, economic security, public health or safety, or any combination of those matters.” *Id.* § 388.113(4).

The Critical Infrastructure Information Act of 2002, 6 U.S.C. §§ 671-674, part of the Homeland Security Act of 2002, protects critical infrastructure information (“CII”).<sup>2</sup> CII is defined as “information not customarily in the public domain and related to the security of critical infrastructure or protected systems . . . .” 6 U.S.C. § 671(3).<sup>3</sup>

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<sup>2</sup> Regarding the protection of voluntary disclosures of critical infrastructure information, 6 U.S.C. § 673, provides in pertinent part that CII:

- (A) shall be exempt from disclosure under the Freedom of Information Act;
- (B) shall not be subject to any agency rules or judicial doctrine regarding ex parte communications with a decision making official;
- (C) shall not, without the written consent of the person or entity submitting such information, be used directly by such agency, any other Federal, State, or local authority, or any third party, in any civil action arising under Federal or State law if such information is submitted in good faith;
- (D) shall not, without the written consent of the person or entity submitting such information, be used or disclosed by any officer or employee of the United States for purposes other than the purposes of this part, except—
  - (i) in furtherance of an investigation or the prosecution of a criminal act; or
  - (ii) when disclosure of the information would be--
    - (I) to either House of Congress, or to the extent of matter within its jurisdiction, any committee or subcommittee thereof, any joint committee thereof or subcommittee of any such joint committee; or
    - (II) to the Comptroller General, or any authorized representative of the Comptroller General, in the course of the performance of the duties of the Government Accountability Office
- (E) shall not, be provided to a State or local government or government agency; of information or records;
  - (i) be made available pursuant to any State or local law requiring disclosure of information or records;
  - (ii) otherwise be disclosed or distributed to any party by said State or local government or government agency without the written consent of the person or entity submitting such information; or
  - (iii) be used other than for the purpose of protecting critical Infrastructure or protected systems, or in furtherance of an investigation or the prosecution of a criminal act.
- (F) does not constitute a waiver of any applicable privilege or protection provided under law, such as trade secret protection.

<sup>3</sup> CII includes the following types of information:

- (A) actual, potential, or threatened interference with, attack on, compromise of, or incapacitation of critical infrastructure or protected systems by either physical or computer-based attack or other similar conduct (including the misuse of or unauthorized access to all types of communications and data transmission systems) that violates Federal, State, or local law, harms interstate commerce of the United States, or threatens public health or safety;

As mentioned above, the Energy Bureau's Policy on Confidential Information provides for the management of CEII. In several proceedings, this Energy Bureau has considered and granted requests to submit CEII under seal of confidentiality.<sup>4</sup> For example, in at least two proceedings on Data Security,<sup>5</sup> and Physical Security,<sup>6</sup> this Energy Bureau, *sua sponte*, conducted proceedings confidentially, recognizing the need to protect CEII from public disclosure.

Additionally, this Energy Bureau has granted requests by LUMA to protect CEII in connection with LUMA's System Operation Principles. *See* Resolution and Order of May 3, 2021, table 2 on page 4, Case No. NEPR-MI-2021-0001 (granting protection to CEII included in LUMA's Responses to Requests for Information). Similarly, this Energy Bureau granted confidential designation to several portions of LUMA's Initial Budgets and Responses to Requests for Information in the proceedings on LUMA's proposed Initial Budgets and System Remediation Plan.<sup>7</sup>

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- (B) the ability of any critical infrastructure or protected system to resist such interference, compromise, or incapacitation, including any planned or past assessment, projection, or estimate of the vulnerability of critical infrastructure or a protected system, including security testing, risk evaluation thereto, risk management planning, or risk audit; or
  - (C) any planned or past operational problem or solution regarding critical infrastructure or protected systems, including repair, recovery, construction, insurance, or continuity, to the extent it is related to such interference, compromise, or incapacitation.

<sup>4</sup> *See e.g., In re Review of LUMA's System Operation Principles*, NEPR-MI-2021-0001 (Resolution and Order of May 3, 2021); *In re Review of the Puerto Rico Power Authority's System Remediation Plan*, NEPR-MI-2020-0019 (order of April 23, 2021); *In re Review of LUMA's Initial Budgets*, NEPR-MI-2021-0004 (order of April 21, 2021); *In re Implementation of Puerto Rico Electric Power Authority Integrated Resource Plan and Modified Action Plan*, NEPR MI 2020-0012 (Resolution of January 7, 2021, granting partial confidential designation of information submitted by PREPA as CEII); *In re Optimization Proceeding of Minigrid Transmission and Distribution Investments*, NEPR-MI 2020-0016 (where PREPA filed documents under the seal of confidentiality invoking, among others, that a filing included confidential information and CEII); *In re Review of the Puerto Rico Electric Power Authority Integrated Resource Plan*, CEPR-AP-2018-0001 (Resolution and Order of July 3, 2019, granting confidential designation and PREPA's request that included trade secrets and CEII); *but see* Resolution and Order of February 12, 2021 (reversing in part, grant of confidential designation).

<sup>5</sup> *In re Review of the Puerto Rico Electric Power Authority Data Security Plan*, NEPR-MI-2020-0017.

<sup>6</sup> *In re Review of the Puerto Rico Electric Power Authority Physical Security Plan*, NEPR-MI-2020-0018.

<sup>7</sup> *See* Resolution and Order of April 22, 2021, on Initial Budgets, table 2 on pages 3-4 and Resolution and Order of April 22, 2021, on Responses to Requests for Information, table 2 at pages 8-10, Case No. NEPR-MI-2021-0004;

On June 30, 2023, this Energy Bureau issued a Resolution and Order granting LUMA's previous requests for confidential treatment of confidential portions of LUMA's Updates to the Stabilization Plan. Also, on July 12, 2023, this Energy Bureau issued a Resolution and Order granting LUMA's requests for confidential treatment of confidential portions of LUMA's Sixteenth Update on Stabilization Plan filed on July 3, 2023. On November 14, 2023, the Energy Bureau further granted confidential treatment to the confidential portions of LUMA's Twenty-Third and Twenty-Fourth Updates. The Energy Bureau should apply those rulings to this filing and protect the pictures in *Exhibit 2*. The pictures depict the exact location, specifications and characteristics of the gensets and other large capacity equipment assembled and installed at Palo Seco, as well as pictures of the San Juan site. Thus, the pictures could be useful to a person planning an attack on the transmission and distribution facilities, as they enable a person to identify their location and provide clear depictions of the equipment which could compromise the electric power services in Puerto Rico.

LUMA respectfully submits that the pictures in *Exhibit 2* should be designated CEII. This designation is a reasonable and necessary measure to protect critical infrastructure and enable LUMA to leverage the information and assessment of critical infrastructures without external threats. Given the importance of ensuring the safe and efficient operation of the generation assets and the T&D System, LUMA respectfully submits that the pictures be maintained confidential to safeguard the facility's integrity and protect it from external threats.

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Resolution and Order of April 23, 2021, on Confidential Designation of Portions of LUMA's System Remediation Plan, table 2 on page 5, and Resolution and Order of May 6, 2021, on Confidential Designation of Portions of LUMA's Responses to Requests for Information on System Remediation Plan, table 2 at pages 7-9, Case No. NEPR-MI-2020-0019.

### C. Identification of Confidential Information.

In compliance with the Energy Bureau's Policy on Management of Confidential Information, CEPR-MI-2016-0009, below is a table summarizing the hallmarks of this request for confidential treatment.

	Document or file	Pages in which Confidential Information is Found, if applicable	Summary of Legal Basis for Confidentiality Protection, if applicable	Date Filed
1	Report titled Puerto Rico's Path to Stabilization	Pictures on pages 18-20, 26 31-32 and 34-35 of Exhibit 2.	Critical Energy Infrastructure Information 18 C.F.R. § 388.113; 6 U.S.C. §§ 671-674.	December 15, 2023

**WHEREFORE**, LUMA respectfully requests that this Energy Bureau **take notice** of the aforementioned, **accept** the *Exhibits 1* and *2* to this Motion and **grant** the request for confidential treatment that is included in this Motion.

### **RESPECTFULLY SUBMITTED.**

In San Juan, Puerto Rico, this 15<sup>h</sup> day of December, 2023

I hereby certify that this motion was filed using the electronic filing system of this Energy Bureau. I also certify that copy of this motion will be notified to the Puerto Rico Electric Power Authority, through its attorney of record: jmarrero@diazvaz.law and through attorney Lionel Santa, [Lionel.santa@prepa.pr.gov](mailto:Lionel.santa@prepa.pr.gov).

*[signature in the page that follows]*



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*Exhibit 1*  
*Path to Stabilization Report*



# Puerto Rico's Path to Power Stabilization

December 15, 2023



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## Executive Summary

Since June 1, 2021, the nearly 4,500 men and women of LUMA have been hard at work building a more reliable, more resilient, more customer-focused and cleaner electric system for our 1.5 million customers. While LUMA does not generate electricity, it is the System Operator for Puerto Rico and carefully monitors and dispatches available generation resources – operated by GeneraPR, EcoEléctrica, AES and others – to meet customer demand and ensure the reliability of the overall electric system. It is important to note that GeneraPR began operating the thermal generation assets owned by Puerto Rico Electric Power Authority in July 2023. As a result, the generation adequacy findings of this report based on operations that predate July 1, 2023, when PREPA operated its generation fleet.

While LUMA does not own or operate any generation facilities, it is committed to doing everything it can to address Puerto Rico's long-standing generation capacity issues. LUMA has been actively working with federal agencies, the Government of Puerto Rico and generation operators through the Generation Stabilization Program (GSP) established in the wake of Hurricane Fiona to increase available energy resources to allow generation operators to conduct priority repairs and maintenance to stabilize generation availability while minimizing supply deficits. This effort led to the installation of 350 megawatts of emergency generation.

LUMA's efforts to support increased generation capacity on behalf of its customers include but are not limited to:

- **Completing Annual Resource Adequacy Reports for Puerto Rico:** These critical studies highlighted the very high risk of inadequate generation supply to meet demand and proposed solutions.
- **Advocating for Emergency Generation:** Working with key stakeholders, LUMA advocated for an emergency generation solution to reduce the impacts to customers in the short-term while continuing to work toward a more robust system in the long term.
- **Expanding Clean Energy:** LUMA is connecting 4,100 customers to solar a month, a rate that has never been seen before in Puerto Rico. To date, LUMA has helped connect over 71,000 customers with solar panels, representing more than 450 megawatts of clean energy added to the electric grid.
- **Collaborating on Renewable Energy Projects:** LUMA is actively working with the U.S. Department of Energy and Puerto Rican partners to implement renewable energy projects to build a world-class energy system that will reliably serve Puerto Rico for generations to come.
- **Supporting the Addition of FEMA Generation:** In less than a year, this effort led to the first FEMA-funded, land-based electricity generators coming to Puerto Rico in Spring and Summer 2023, bringing approximately 350 megawatts of generation to support the system.

In short, sufficient generation is critical to achieving the better energy future that the people of Puerto Rico expect and deserve, and LUMA will continue to advocate for its customers to ensure that demand is and continues to be met.

The GSP effort has been a significant achievement for Puerto Rico:

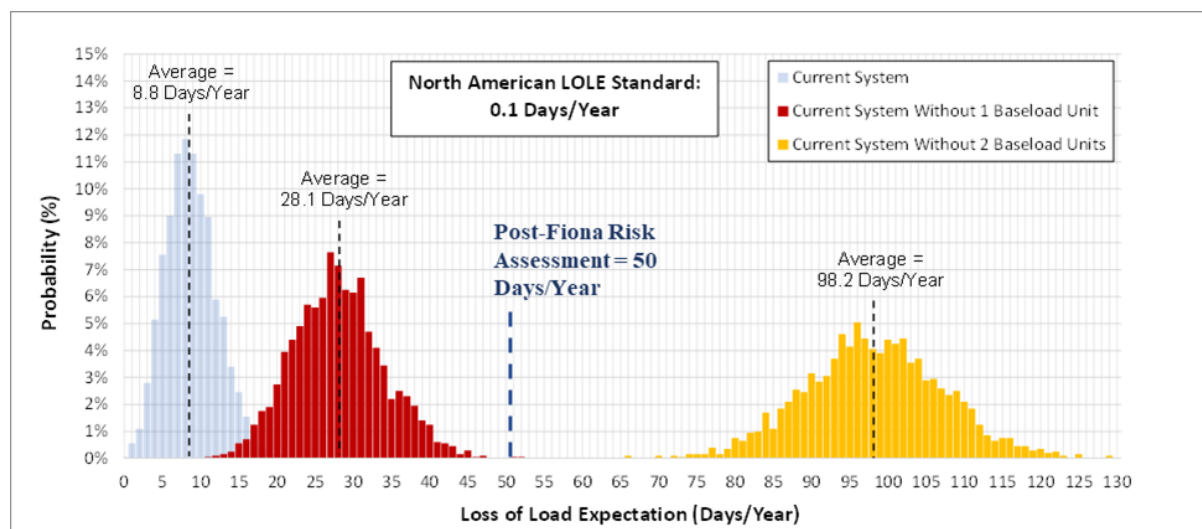
- Worker safety was a top priority throughout the entire deployment. Construction crews logged over 100,000 workhours during the 215-day GSP construction project without a reportable safety injury.
- The temporary generation will allow some of the more heavily damaged plants to implement much-needed maintenance and repair which will improve their future reliability.
- Puerto Rico has avoided an estimated 41 load sheds (power outages) since the first generators were synchronized on June 15, 2023, and will avoid another estimated 18 through March 15, 2024, for a total of 59 load shed events avoided as a direct result of these temporary FEMA generators.
- The Puerto Rico economy benefits from safer and more reliable delivery of electric service, which increases gross domestic product and improves the overall quality of life on the island.
- LUMA estimates that the FEMA generators are helping save approximately \$50 million dollars per month from reducing the dependence on older, less efficient, higher polluting diesel generators.

## 1.0 Introduction

When Hurricane Fiona made landfall in September 2022, it resulted in a complete blackout of the island's entire electric grid. The damage assessment and restoration following a hurricane event is typically focused on transmission and distribution poles and lines that receive the brunt of the damage from high winds and flying debris. While this Hurricane Fiona damage assessment was still underway, initial reports from the generation plants indicated they had also suffered severe damage, particularly as a result of heavy rain and flooding. Within the first week following a system blackout, growing concerns centered around the extent of damage to the generation units. The immediate concern was that the precarious and unreliable generation fleet in Puerto Rico would face even greater challenges in restoring service to help the island recover from this hurricane.

As these concerns related to the generation fleet became evident, various organizations and agencies sprang into action. LUMA sent a letter to the Puerto Rico Energy Bureau ("Energy Bureau") on October 6, 2022, notifying them of the increased risks to Puerto Rico and explaining the damaged generation fleet might not be able to serve the population. Without a chance to visit the sites and to physically assess the generation damages, it was impossible to be precise, but it was conceivable that up to 98 load shed events could be expected in the coming year. LUMA estimated a reasonable expectation would be for 50 load shed events over the course of the next 12 months as shown in Figure 1-1 below, which was included in the letter sent to the Energy Bureau.

**Figure 1-1: Probability Distribution of LOLE Days: Post-Fiona Expectation**



Source: LUMA Resource Adequacy report (filed on August 30, 2022, in docket NEPR-MI-2022-0002)

LUMA outlined potential solutions, which were limited to either barge mounted generation or temporary mobile generators. The Energy Bureau took action and communicated the situation to a broader circle of Puerto Rican Government entities, while Governor Pierluisi communicated to the Federal Government, requesting the declaration of a disaster area and other related assistance from FEMA.

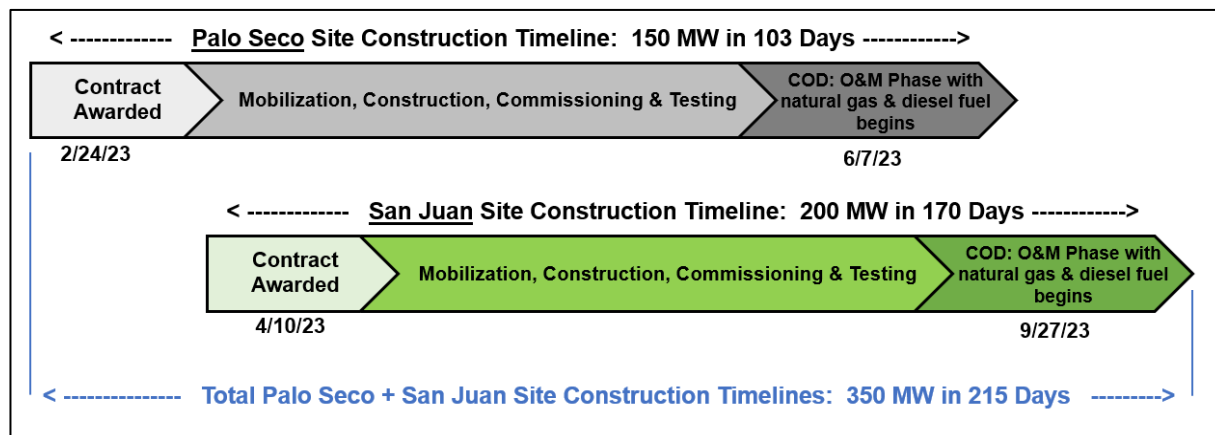
FEMA quickly responded to the generation-specific issues while also mobilizing its response to assist individual citizens and numerous industry sectors in Puerto Rico. Within days, FEMA had mobilized the Puerto Rico Power System Stabilization Task Force (“the Task Force”) and brought in several dozen FEMA and support team members to assess the specific generation damages and identify the appropriate response. Much of the generation damage assessment was conducted by the US Army Corps of Engineers (USACE) as part of the Task Force. Within the first few weeks, USACE had visited the various generation sites, assessed damages, and began to issue preliminary observations and discussion of alternatives. This effort resulted in the “Puerto Rico Power System Stabilization Task Force (PR PSSTF) Plan: Key Findings and Recommendations” report dated November 22, 2022.

At the same time, the Energy Bureau was heavily involved in assessing these electric generation restoration issues. The Bureau was an active member of early Task Force meetings and discussions. As damages became more apparent, the Bureau issued a Resolution and Order for LUMA to appear and present a summary of the Generation Stabilization Program (GSP) and issue bi-weekly reports thereafter, for as long as required. This bi-weekly report described the status of the Task Force progress, a discussion of any emerging issues or key decision factors being considered, and an updated Resource Adequacy risk assessment of how the emerging GSP was affecting the potential risk for interruptions in generation supply. This information has continued to be reported to the Bureau since that time.

It is important to recognize that while all the Generation Stabilization efforts were underway, FEMA and LUMA were also coordinating on a massive damage repair and remediation effort related to the transmission and distribution system. FEMA was also supporting multiple different industry sectors such as roads, water treatment, health care and other sectors with their own damage repair and restoration efforts. This report is primarily focused on the initiation and execution of the Generation Stabilization Program (GSP) and does not address these restoration activities supported by FEMA.

The Generation Stabilization Program was established with the goal of providing temporary generation to augment system capacity and supporting priority emergency repairs to stabilize the system without significant interruption in service. This GSP effort eventually resulted in the installation of 350 MW of temporary, dual-fuel, emergency generation capacity, including auxiliary and fuel handling systems, in only nine (9) months from contract award to commercial operation as shown in the diagram below. Two separate sites with overlapping schedules resulted in a total construction period of only 215 days.

Figure 1-2: Construction Timeline



Source: FEMA PR SSTF – Joint In-Progress

From beginning to end, three main themes endure throughout the GSP story:

### COMMITTED DECISION MAKERS

Many different federal and commonwealth policy makers and federal employees immediately sprang into action to reduce suffering of the Puerto Rican people from Fiona-related damages. Together, they overcame many bureaucratic challenges to maintain momentum and accomplish their tasks.

### EFFECTIVE TEAMWORK & COLLABORATION IN THE FIELD

Hundreds of employees across multiple organizations worked together to overcome engineering, procurement, and operations challenges. These teams identified creative workaround solutions to respond to field issues and completed the construction and installation without a single reportable injury.

### STRONG PROJECT MANAGEMENT FOCUS

Leaders from FEMA, USACE, Genera, PREPA, Westin, LUMA and many other groups coordinated together to deliver the project. Each organization had its own unique project management group, and these were all effectively coordinated in a single well-coordinated project management team, led by FEMA.

*What began as emergency response to hurricanes that caused devastating damage to an already unstable Puerto Rico energy grid led to identifying a generation solution that provides much-needed capacity, improves overall reliability of the grid, and delivers considerable cost savings to LUMA customers.*

### 1.1 Outcomes of the Task Force's Final Assessment Report

On November 22, 2022, the Task Force issued the Puerto Rico System Stabilization Task Force (PR PSSTF) Plan: Key Findings and Recommendations in which it concurred with LUMA's Resource Adequacy analysis that 700 MW of temporary generation capacity was required to stabilize the electric grid in Puerto Rico.

With that Task Force report, the effort of more than one hundred engineers shifted to generation capacity additions. This involved all aspects of planning and adding new generation capacity, including site prioritization and selection, review of available generators around the globe, consideration of site-specific equipment limitations and global supply chain constraints, as well as permitting, legal and contracting considerations.

## 2.0 The Puerto Rican Generation Sector

### 2.1 Brief Introduction to Resource Adequacy

The following basic overview of Resource Adequacy helps explain how this assessment can aid in understanding the current state of an electric system and inform subsequent decisions.

#### OVERVIEW OF RESOURCE ADEQUACY

- **The simple definition of Resource Adequacy:** A technical assessment of whether the current, or projected, electrical generation system portfolio is adequate to meet hourly customers' electricity requirements.
- **The results and implications of Resource Adequacy:** The Resource Adequacy quantifies how well the existing power plants in an electrical system are able to reliably serve electrical needs of its customers and the probability of shedding customers due to generation issues.

#### RESOURCE ADEQUACY METRICS

- **Loss of Load Expectation (LOLE), one of the most important risk metrics**, quantifies the probability over a defined period of time (usually one year) that the available generation capacity is insufficient to serve the customers' needs, i.e., leading to power outages.
- **Value of Load Loss (VOLL)** is the generally recognized metric to assign the economic cost of consumers from power outage events.

#### THE COST OF RESOURCE ADEQUACY RISK

In addition to being disruptive, power outages also have financial implications:

- The 2017 IRP used an industry consensus approach to estimate the VOLL (i.e., cost to the consumer from power outage events) in Puerto Rico as \$57,488 per MWh.
- In addition to the direct economic cost of load shed, the related fragility in the power portfolio increases the reliance on old, inefficient diesel peaking generation units, which will increase fuel costs and CO2 emissions by approximately 7 to 9%.

Resource Adequacy analysis and metrics, such as LOLE and VOLL, provide important insights that planners use to quantify risks and develop mitigation strategies to better serve customers' electricity needs. The Resource Adequacy analysis captures the state of Puerto Rico's electric system before and after Hurricane Fiona, as further described in the following sections.

### 2.2 Before Fiona

Over the last few years, Puerto Rico has endured several hurricanes. The danger of a large-scale power outage is a concern with every storm season. The people and businesses in Puerto Rico have endured the effects of inadequate power capacity leading to frequent power outages. Puerto Rico has inadequate power generation resources to deliver reasonable system reliability when compared to electric utility industry standards.



As written in the Generation Resource Adequacy Report dated August 30, 2022, the loss of load expectation (LOLE) for Puerto Rico for FY2023 was calculated to be 8.81 days per year, meaning that on average, it is estimated that there will be 8.81 days per year where load will not be fully served by PREPA and other generators in FY2023. This measure is 88 times higher than the utility industry benchmark of 1 day in 10 years LOLE standard (0.10 days per year). The following table summarizes the LOLE and loss of load hours (LOLH) results of the analysis.

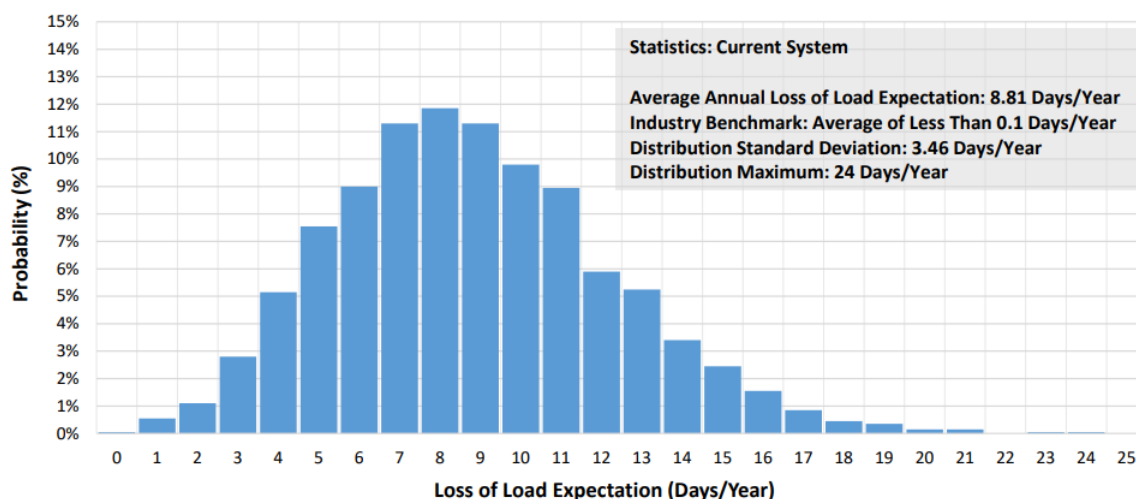
**Table 2-1: Calculated Resource Adequacy Risk Measures, Current System (FY2023)**

Measure	Generation Loss of Load Expectation (LOLE)	Generation Loss of Load Hours (LOLH)
Average	8.81 Days / Year	40.77 Hours / Year
Industry Benchmark Target	0.1 Days / Year	—

Source: Generation Resource Adequacy Analysis, August 30, 2022

The figure below illustrates the calculated probability of how many days load will exceed PREPA's generation capacity in FY2023. Based on the distribution, 8 days of loss of load is the most likely outcome. There is approximately a 50% probability that the number of days of loss of load will be equal to or greater than 9 days. Compared to utility industry standards, the results for Puerto Rico have a "wide" distribution. In other words, there is a high probability of much greater than zero days per year LOLE. For reference, the most likely outcome for a system that can meet the utility industry target standard of a 0.1 days per year LOLE (when load is greater than generation capacity) would be zero days, as contrasted with 8 days for Puerto Rico.

**Figure 2-1: Figure 2 2: Loss of Load Expectation Probability Chart, FY2023**



Source: Generation Resource Adequacy Analysis, August 30, 2022

## 2.3 Repairs and Maintenance

While hurricanes and other severe natural events have a significant impact on Puerto Rico's electric system, the lack of adequate generation capacity is the result of complex, long-standing issues related to the age and maintenance history of generation plants. The overall power generation portfolio is characterized by:

- **High forced outage rates:** The unplanned shutdown of a generating unit for emergency reasons, or a condition in which the equipment is unavailable because of an unanticipated breakdown. Forced outage rates in Puerto Rico are approximately 4-6 times the average for comparable aged generators in the rest of the mainland United States.
- **Delays in planned maintenance periods:** PREPA's power plants often require long durations for execution of planned outages, and these planned durations are generally magnified by delays in completing planned outages.
- **Partial plant deratings:** In addition to outages, many plants also operate with daily or weekly partial plant deratings that the generator imposes on how much that plant can be called upon for generation services by System Operations.
- **Overdue maintenance work:** Failure to properly maintain the systems increases forced outage rates. The units operated by PREPA, which have now been taken over by Genera, all face a considerable maintenance backlog.

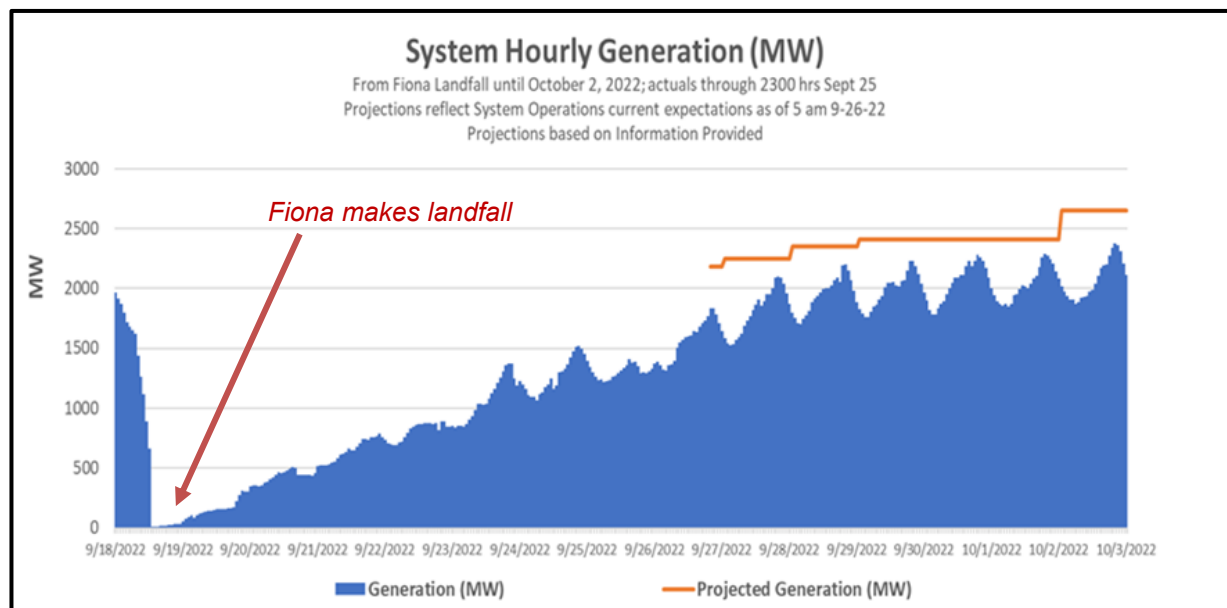
## 3.0 The Puerto Rican Generation Sector Following Fiona

### 3.1 The Impact of Hurricane Fiona

Hurricane Fiona made landfall on Puerto Rico as a Category 1 hurricane. Most of the damage from Fiona was more a result of torrential rain and flooding rather than high winds. This led to record rainfall, unleashing mudslides, sweeping away bridges, flooding neighborhoods, blocking roadways, and causing a complete power blackout across the island. Some generating sites reported 40 inches of rain within a few days of the hurricane's landfall. It took approximately 14 days to restore the power to 90% of the customers after Fiona.

Figure 3-1 below exhibits the available electric generation production as the system was restored after generation fell to zero MW when Fiona hit.

Figure 3-1: System Generation MW Drop when Hurricane Fiona Arrived

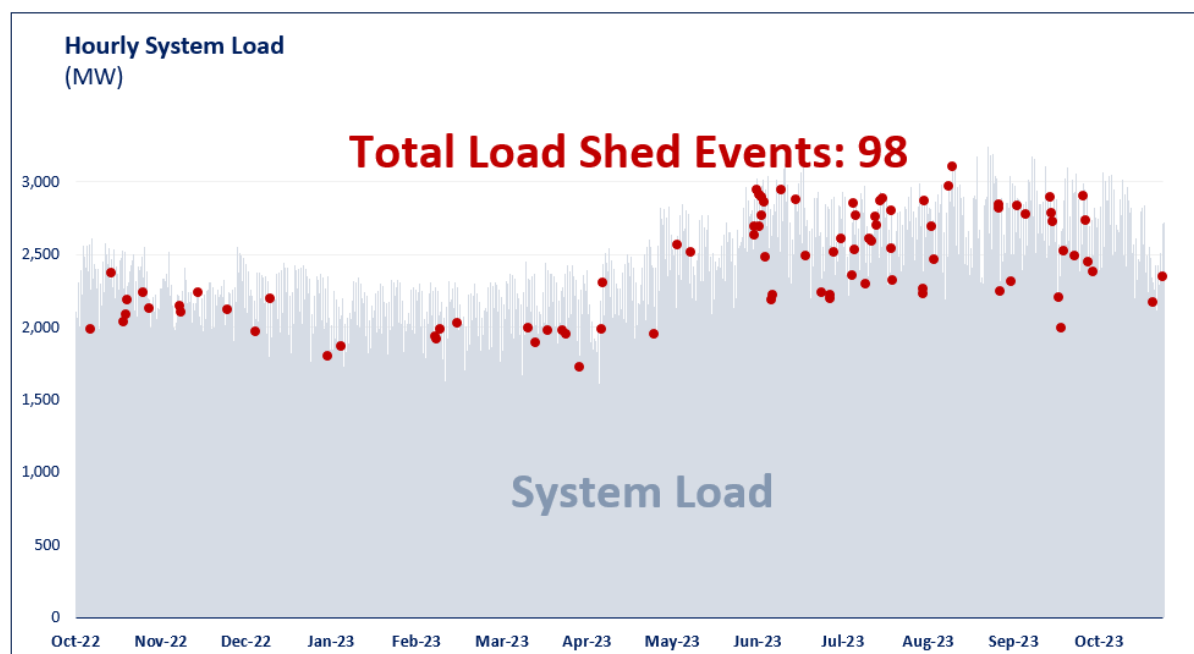


Source: LUMA Analysis of Fiona Restoration During LEOC Operations

Figure 3-2 below identifies the hourly demand for power (gray area) and all of the power system load sheds (red dots) that has occurred from October 1, 2022, through October 31, 2023, the period since the time Fiona arrived on September 18, 2022.

- From October 1, 2022, through October 31, 2023 (approximately one year since Fiona caused the island blackout), the Puerto Rico power system has experienced **98** actual load shed events. This compares with a general industry planning standard of having enough generation capacity with only one load shed event every 10 years.
- Puerto Rican electric consumers have experienced approximately eight load shed events per month since Fiona.

Figure 3-2: Hourly Power System Load with Load Shed Events Since Fiona (updated 10/31/23)



Source: LUMA Analysis of Fiona Restoration, as presented in the 11/1/23 PREB GSP report

Fiona left the island facing a likely prospect of increased load shed events from an unstable, inadequate power system. In addition to damage to actual power generation facilities, the fuel handling facilities at some plants were also damaged. The EcoElectrica plant remained in operation, but their LNG fuel handling facilities were damaged during Fiona. This eliminated the ability to unload LNG for several days until repairs could be made and LNG delivered, and the plant was at risk of running out of fuel. The EcoElectrica facility plays a critical role in maintaining system frequency and reliability. As a result of fuel deliverability issues, the energy production of the plant had to be limited in order to preserve the plant's availability to support the overall system, which also hindered system restoration.

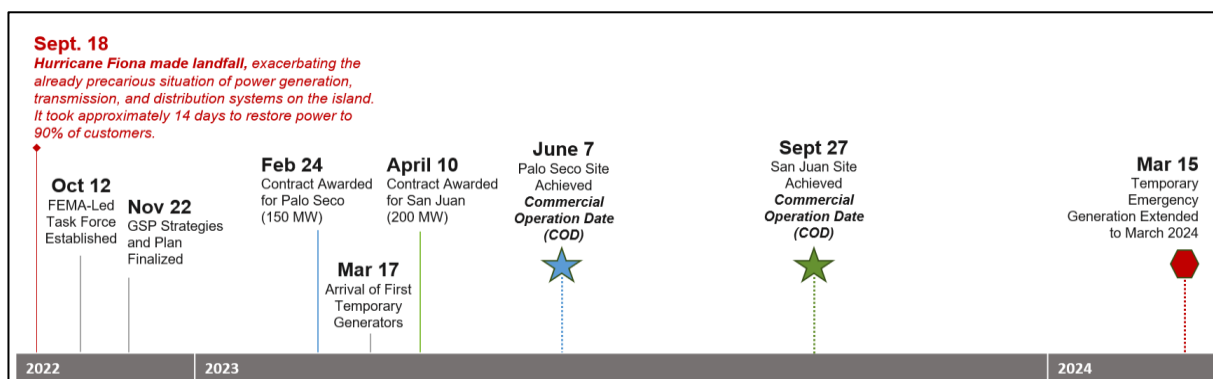
Overall, issues with insufficient energy generation raise the risk of outages for the customers and communities that LUMA serves daily. The damage from Hurricane Fiona put the electric grid in Puerto Rico at a significantly increased risk of incurring multiple load-shed events in the weeks, months and years to follow if no action was taken. As residents and businesses started re-building after Hurricane Fiona, these outages would have consequences beyond the electric grid with lasting effects on the economy, healthcare system, and other critical infrastructure facilities and services. Puerto Rico policy makers, regulators and LUMA all acted swiftly to begin paving a path to power stabilization.

## 4.0 Path to Power Stabilization: The Generation Stabilization Program (GSP)

LUMA's Resource Adequacy risk assessment report identified several deficiencies and potential mitigation strategies for existing level generation inadequacy. During system restoration following Fiona, these risks were updated each week and reported to the Energy Bureau and other relevant government agencies, as the consequences of Fiona became clear. The Energy Bureau took appropriate action and communicated the situation to a broader circle of Puerto Rico government entities.

The effects of Hurricane Fiona in September 2022 increased the sense of urgency to restore and stabilize the electric grid. The following timeline recounts the major GSP-related activities that occurred following Hurricane Fiona.

**Figure 4-1: Timeline of Key Events in the Generation Stabilization Program**



Sources: LUMA's Resource Adequacy reports and presentations, Energy Bureau's Resolution and Order documents

### Excerpts from the Energy Bureau's Resolution and Order to LUMA on October 12, 2022:

- “... to develop a Stabilization Plan as a direct response to the effects of Hurricane Fiona, in coordination with the Federal Emergency Management Agency (“FEMA”) and the Puerto Rico Electric Power Authority (“PREPA”) to address any baseload generation inadequacy ...”
- “... to provide the 1<sup>st</sup> and 15<sup>th</sup> day of each month, from the notice of the Resolution and Order, an updated report addressing the efforts conducted by LUMA to assure the completion of the Stabilization Plan.”

On October 12, 2022, Puerto Rico Governor, Pedro R. Pierluisi sent a letter to Federal Emergency Management Agency (FEMA) requesting Direct Federal Assistance to help stabilize the Puerto Rico electrical grid. The request was approved the same day, and the Puerto Rico Power System Stabilization Task Force was established.

## 4.1 The PR Power System Stabilization Task Force Established

The Puerto Rico Power System Stabilization Task Force was established by FEMA on October 12, 2022, and five days later the Task Force kicked off its first meeting with stakeholders.

### TASK FORCE OBJECTIVES

The main objectives of the Task Force:

- Prioritize the emergency repair of generation facilities in order to stabilize the PR power system,
- Consider the interconnectedness and interdependencies of the whole system including generation, transmission, distribution, as well as the supply chain (e.g., fuel deliveries) to avoid further interruption and outages, and
- Execute recommendations expeditiously to stabilize the power system prior to the 2023 Hurricane Season.

### PARTICIPANTS

The FEMA-led Task Force included scores of staff comprised of external and inter-agency staff from the mainland and Puerto Rico. The team included seasoned FEMA staff as well as subject matter experts and experienced professionals with deep knowledge of the utility industry from various agencies, entities, and other groups. For a list of the agencies and organizations involved and their respective roles, see Appendix A:Appendix A:. Hundreds of individuals and many smaller formal and ad hoc teams were formed all of which have, and continue to, contribute to the GSP project.

### PROJECT LEADERSHIP

Figure 4-2, below was created in the first few weeks of the GSP formation and begins to define the project organizational and leadership structure.

Figure 4-2: Snapshot from the Task Force's Organizational Structure Information

Organizational Group	Role
FEMA	<ul style="list-style-type: none"> <li>Overall direction of the Task Force reporting internally within Department of Homeland Security organization and coordinating the technical and support groups with LUMA and PREPA</li> </ul>
Task Force Leadership Team	<ul style="list-style-type: none"> <li>Government or operational groups represented that have a role in task force (Energy Bureau, P3A, Governor's office)</li> <li>FEMA-led as part of Task Force, periodic updates and written reports as appropriate</li> </ul>
Operational Coordination Team	<ul style="list-style-type: none"> <li>Representative from technical, operational, financial or government that are either leading, doing, or supporting ongoing activities</li> </ul>
Functional Teams and Subject Matter Experts	<ul style="list-style-type: none"> <li>Larger teams matrixed in from existing LUMA or PREPA organizations to address specific issue or analysis related to generation or T&amp;D functional areas</li> </ul>
Operations Support	<ul style="list-style-type: none"> <li>Specific project organizations for LUMA and PREPA with designated lead responsible project manager, senior oversight roles, steering committees and other Project Management Organization (PMO) functions created to support the Task Force</li> </ul>

Source: PREB GSP Report 01.15.23

## STATUS REPORTING AND COLLABORATION

The GSP effort involved many sub-teams and ad hoc groups working on various aspects of the initiative. This coupled with the aggressive timeline and project goals increased the importance of open communication channels and frequent status reporting to track progress, identify and resolve issues, and identify potential operational efficiencies. While several meetings were held daily, the following meetings were at the center of the overall project management and coordination efforts.

- Daily “Huddle” with the broader Task Force Team to discuss open action items and review status of assigned tasks.
- Site-specific daily meetings (sometimes twice a day) for the Integrated Project Delivery Teams to discuss each site's generation capacity delivery, installation, and commissioning.
- Weekly meeting among all Federal Task Force members and stakeholders to review status.
- Weekly LUMA Steering Committee Meeting for senior executive LUMA staff to be briefed on the project status and provide guidance to the team.





### LUMA COORDINATION

LUMA coordinated internally with its Capital Programs (Project Management Office) department to jointly support the GSP project. The Capital Programs (PMO) department was soon providing and coordinating overall project management and reporting progress at regular intervals. LUMA identified and organized staff for roles in:

- Project Management,
- Work Stream Leadership, and
- Project Workforce / Field Assignments.

Additional departments within LUMA also played crucial roles:

- Engineering
- Regulatory
- System Operations

## 4.2 The Desired End State (Critical Decisions)

With the teams assembled, the next step in the journey was to collect information and make critical decisions to shape the project. The initial focus of the Task Force was to address decisions related to site selection and potential sources of emergency generation. The planning and completion of priority maintenance, testing, and repairs at potential sites and their electrical switchyards were also considered in these decisions:

1. Identifying and prioritizing potential sites to host emergency generation.
2. Quantifying the amount of emergency generation capacity required.
3. Identifying commercially available generation equipment that could be brought to Puerto Rico.
4. Identifying critical switchyard equipment in inventory and assessing the lead-time to procure materials/equipment in global market.
5. Integrating other programmatic repairs that were being performed to these site locations' electric infrastructure.

### 4.2.1 Site Selection

The Task Force considered a range of engineering and operational constraints when evaluating potential sites for the new generation (e.g., adequate space, grid interconnection, fuel delivery and constructability). Findings were used to prioritize the most suitable locations for the temporary generation. This required technical expertise, experience, and historical knowledge of the sites to accurately assess their viability.



Some of the issues encountered during the site evaluations were:

- Limited space of the power plant boundaries that could host the generation,
- Existing interconnection equipment inadequate in capacity or in poor state of disrepair for new generation interconnection,
- Damaged underground cables, surrounding areas, and equipment,
- Problematic constructability areas due to obstructive existing structures,
- Fuel delivery constraints to each potential site, and
- Permit status and ability to operate for each potential site.



**March 2023, Old pipe-cable insulating oil system tank at San Juan in need of repairs**



**Site with water intrusion, captured during site evaluations**

Repeated site visits were completed by joint teams from FEMA, USACE, LUMA, and PREPA to assess physical and logistical characteristics of all feasible sites:

- Adequate space,
- Constructability,
- Compatibility for interconnection to grid, and
- Existing or previous generation onsite.



(Above) March 2023, Preliminary site evaluation of Palo Seco for generation unit placement

The evaluation considered all sites simultaneously since the decision to augment capacity at one site could influence the capacity of the other sites or power flows between sites. Several sites were thoroughly evaluated by the Task Force, but ultimately Palo Seco and San Juan power plant locations were selected. Other sites considered were Cambalache, Yabucoa, Aguirre, and Jobos.

#### **4.2.2 Emergency Generation Targeted Capacity**

The Resource Adequacy analyses indicated 700 MW were needed to have a reasonable reserve margin of generation capacity consistent with prudent utility practices. In the spring of 2023, as the global search for temporary generation was still underway, PREPA announced that 450 MW Aguirre Unit 1, which had been out of service since February 2022, would soon be restored to full operation. PREPA also stated that their generation fleet would soon be operating at the 65% availability level they had been targeting for the previous two years. As a result of this promised new availability, FEMA made the determination that the full 700 MW was no longer required and the 350 MW that had been identified and was under contract would be sufficient to accomplish their mission to stabilize the Puerto Rican Power Sector. This 350 MW target would be achieved with the installation of 150 MW of new generators at Palo Seco, and 200 MW new generators at San Juan. At the time of this report, seven months later, Aguirre 1 has still not returned to service and the fleet availability is hovering at slightly less than 50%.

#### **4.2.3 Suitable Generation Equipment for the Job**

Evaluations focused on two options:

- Generation barges – Generators mounted and operated on moored barges.

- Land-based mobile generation – Generators placed on the ground in a temporary configuration, which can be moved later if needed.

**Power Barge****Land-Based Mobile Generation**

The most significant factor in the selection of new generators was what was actually available that could be brought to Puerto Rico. The market for temporary emergency generation is a global market. There are less than 100 barges in operation world-wide, and most of these are locked up in long-term multi-year contracts. There are many more land-based mobile generators in operation but global unrest in several areas, particularly Ukraine, was increasing the competition to find these units. In addition, geopolitical factors had caused the oil and gas price to sharply spike upward. This led to oil producers trying to restart their wells, which further increased the competition for mobile generators. After searching global markets for availability, the decision was made to use land-based mobile generators. The picture below is one of the new land-based units installed at the Palo Seco site.

**New Land-Based Unit Installed at Palo Seco site**

#### 4.2.4 Identify Critical Equipment in Inventory and Leadtime to Procure

The interconnection of the generators to the transmission system is a complicated task that required engineering review to ensure the existing equipment was suitable and safe for the added electricity production and the grid could handle the new injection points. Equipment such as electric cables, insulators, transformers, breakers, switches, communication, and protection systems, including software and hardware, were reviewed, and approved. LUMA, as the System Operator, reviewed and approved all required equipment submittals to ensure the equipment and design met LUMA specifications.

Some interconnection components were readily available in the utility equipment market, and some were used from LUMA's inventory, but other large equipment, such as two existing transformers at the San Juan site were deemed to be inadequate for the additional 200 MW of emergency generation. A large transformer like the one needed at San Juan would cost millions of dollars and could have taken over a year to be manufactured and delivered. PREB discovered a large, unused transformer in inventory that was evaluated and approved for utilization. This decision avoided a large expenditure and prevented a notable delay in the construction schedule. At the same time, the entire power grid was being analyzed for repairs and upgrades.

#### 4.2.5 Other Programmatic Repairs and Upgrades to the Electric Infrastructure

Not only was the interconnection equipment at the generation site critical, but the entire grid system must also be capable of receiving and transmitting the additional electricity across the power grid. This required transmission system electricity load flow analyses to ensure the transmission infrastructure was not overloaded or other circuits in the grid were not negatively impacted by the additional power that would soon be produced by the emergency generation. System components or circuits that were impacted required upgrades or repairs before the generation was operational. It was also determined the existing underground power cable at the San Juan station could not handle the new capacity. Because of the amount of new generation capacity and inadequate power cables at the site, a new 115 kV transmission line had to be designed and built from the new transformer location to the existing San Juan 115 kV switch yard to ensure the amount of electricity from the new generators could safely be connected to the grid. The team would have to work around existing structures, minimizing disruptions to the operating power plants, procure specialized materials and enlist OEM technicians for this effort when the construction began.

### 4.3 Contracts Awarded

By December 2022, the FEMA-led Task Force issued Request for Proposals (RFPs) to construction companies capable of the GSP generation construction work. The USACE received and vetted proposals, awarded the contract, conducted the kick-off meeting, and managed the agreement throughout the construction project. All commercial matters were negotiated and managed by USACE as a member of the FEMA Task Force.

## PALO SECO

The first construction contract awarded for emergency generation at the Palo Seco site (150 MW) was awarded to Weston Solutions, Inc. on February 24, 2023. Weston Solutions, Inc. is a US-based, environmental, and infrastructure services firm servicing government and industrial clients. Weston has been in business since 1957. The Weston Work Plan had a turnkey scope for the Palo Seco site with these major requirements among many other contract obligations:

- Provide seven (7) Land-based mobile Generation units (Gensets) capable of providing a net continuous output of 150 MW at the Palo Seco Power Plant to mitigate power instability on the grid.
- Provide six (6) months of Operations and Maintenance (O&M) after the Commercial Operations Date (COD).
- Provide a Liquefied Natural Gas (LNG) storage and re-gasification system as well as all Balance of Plant (BOP) equipment, including black start generators, fuel delivery systems, transformers, and cable.



**Snapshot of Palo Seco  
Work Plan**

## SAN JUAN

Approximately six weeks later, on April 10, 2023, the second construction contract for the emergency generation at the San Juan site (200 MW) was also awarded to Weston Solutions, Inc. Weston's work plan scope for the San Juan site was very similar to the Palo Seco site project but with three major differences:

- Provide net continuous output of 200 MW at the San Juan site.
- Provide ten (10) land-based mobile generation (Gensets) capable of providing a net continuous output of 200 MW at the Palo Seco site to mitigate power instability on the grid.
- The San Juan site would not need the additional LNG system as it could connect to the existing natural gas pipeline at the San Juan site.

## 4.4 Construction at Palo Seco and San Juan

From contract award to achieving the Commercial Operation Date, both sites proceeded quickly through the process, completing most construction activities concurrently. The approximately 6-week difference between San Juan and Palo Seco was due to some administrative and contract issues and the general equipment arrangement plan. The San Juan site faced site-specific challenges of limited space and a congested power plant site. The array of ten generators ultimately had to be installed on property adjacent to San Juan for suitable operating and maintenance space and connected with a newly constructed overhead line to the San Juan Point of Interconnection. The table below shows the timeline from Contract to Commercial Operation for each site.

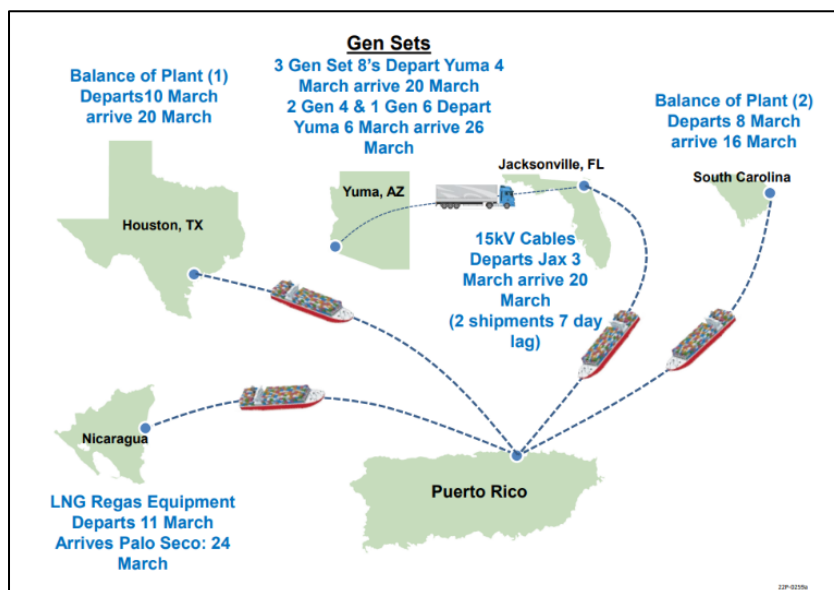
Figure 4-3: Construction to Commercial Operation Date (COD)

Milestone	Completion Date	
	Palo Seco Site	San Juan Site
Issued RFP	12/23/2022	2/10/2023
Proposal Received	1/30/2023	3/13/2023
Contract Awarded	2/24/2023	4/10/2023
Mobilization Starts	3/7/2023	4/23/2023
Mobilization Complete	4/23/2023	6/5/2023
Commissioning Begins	4/24/2023	5/25/2023
Commissioning Finished	5/29/2023	9/26/2023
Comercial Operation Date	6/7/2023	9/27/2023
Contract Award to COD (Days)	103	170
Palo Seco Contract Award to San Juans COD (Days)	215	

Source: FEMA PR SSTF – Joint In-Progress Review, 12 October 2023

## ACTIVITIES BY MONTH

The following section presents the month-by-month story, noting the highlights of each site side-by-side, for the nine months of major construction activity.



Procurement map of generation and LNG equipment for Palo Seco



**PALO SECO**

- Feb/Mar**
- **Contract awarded on February 24, 2023**
  - Mobilization of Weston crews and equipment.
  - Prepared site (demolition of old, unneeded buildings and tanks; disposal of rubble piles).
  - Fabrication of cable tray structures on-site and large steel pipe sections off-site.
  - 6 of 7 gensets arrived for Palo Seco.

**SAN JUAN**

- Addressed site risks from old, damaged equipment existing on the site (e.g., a leaking transformer planned for the new generator connections, and a damaged 115 kV underground pipe cable posed significant risk to installation).
- These issues needed a solution to make San Juan a viable site.

**March 2023, first genset arrives and unloaded at Puerto Rico**



**PALO SECO****Apr**

- Began installation of prefabricated diesel piping.
- Installed 100+ 60-foot-long pilings for LNG system foundation.
- Concrete forms were set for the LNG pile caps, footings and pedestals.
- 6 of 7 gensets were 90% assembled by April 10, 2023.
- Continued mechanical set-up and electrical testing/check-out of gensets.
- Crews pulled-in multiple Medium Voltage (MV) conductors to substation and gensets.

**SAN JUAN**

- **Contract awarded on April 10, 2023.**
- Early scheduling targeted nine (9) gensets (200 MW) for arrival in mid-May.
- Confirmed the viability of the existing equipment to make-ready the site for emergency gensets and associated equipment.
- **Cost and Delays Avoided:** The need for a large viable power transformer was resolved by PREPA when a new, unused 300 MVA transformer was found in inventory, avoiding a multi-million-dollar expense and year-long delay to purchase a new transformer.



April 2023, Gensets being assembled onsite at Palo Seco



(Right) Palo Seco  
construction site on  
April 23, 2023

REDACTED

(Below) March 2023, view of pile  
driving at Palo Seco, stacks of  
concrete pile staged onsite

REDACTED



(Above) An unused  
300 MVA  
transformer being  
evaluated for use at  
the San Juan



(Left) Ship arriving at  
wharf with five  
gensets from Egypt  
for the San Juan site  
on May 5, 2022

## PALO SECO

### May

- Construction continued...
- As many as 200+ workers on-site during day shift with 100+ on night shift.
- 91% of the concrete placed as of April 26 (eventually over 1,000 cubic yards were placed at Palo Seco).
- 50,000 feet of electric cable pulled and in place.
- 1,000 lineal feet of diesel pipe installed.
- Gensets advance toward final commissioning activities.
- The site had successful "first fire" (full speed, no load test) for 6 gensets; the 7th genset (spare) to be tested at later time.

## SAN JUAN

- Construction formally began at San Juan after required administrative documents (e.g., satisfactory general arrangement plan for equipment, pipe routings, electric cable paths) were completed and approved.
- Once the results from the geotechnical (soil boring) analyses were available for foundation design, foundation construction, including pilings and placement of concrete, would soon begin at the San Juan site.



LNG ancillary pad preparation for concrete placement at Palo Seco

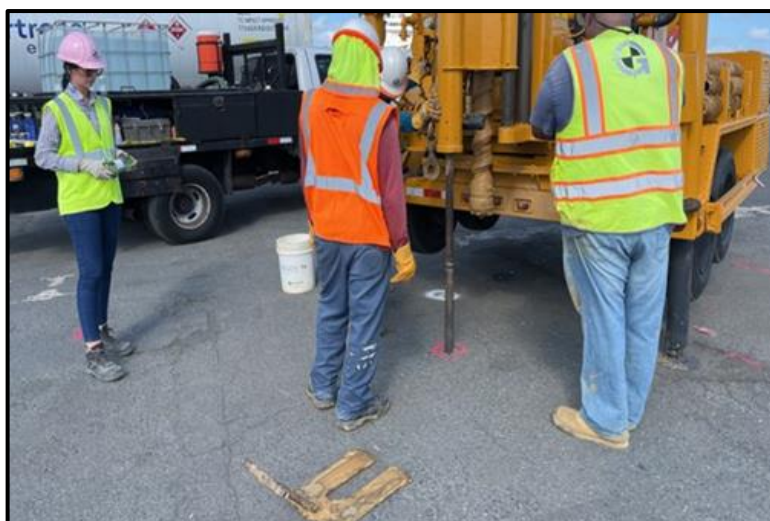


Forms and rebar being placed for LNG tank pedestals concrete pour at Palo Seco



**(Left) April 2023, Ground Penetrating Radar Investigation in proposed Transformer Area at San Juan site**

**(Right) May 2023, Soil boring samples in the proposed genset location on property adjacent to San Juan site**



**(Below) Generator being loaded into a ship in Alexandria, Egypt on 4/22/23 and headed to San Juan site**





**PALO SECO**

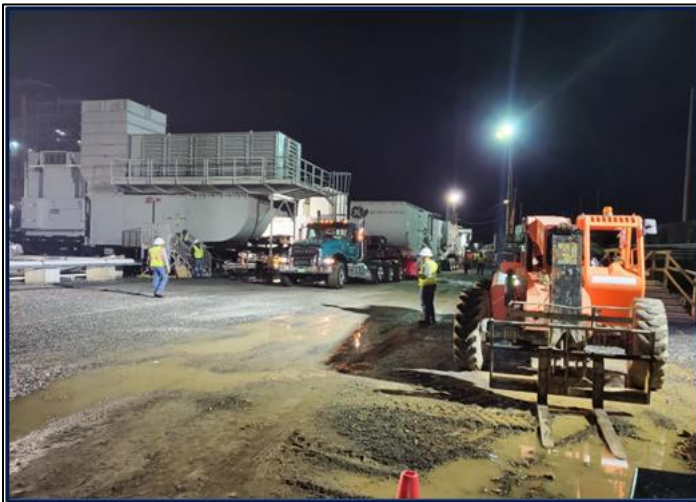
- June**
- Commissioning of new generators (gensets) completed on May 30 and completion of the demineralized water system required to meet EPA permit requirements set the stage for FEMA and EPA approval.
  - Weston announced on June 5, 2023, the Palo Seco site stood ready to begin generation operations within 48 hours if authorized by FEMA and EPA.
  - ***On June 7, 2023, the site achieved Commercial Operation Date (COD) and began the O&M phase.***

**SAN JUAN**

- Construction was progressing.
- 9 of 10 gensets had arrived and were being assembled while civil work began at the site.
- Foundation piles in place so foundation forms and rebar work began with concrete placement to follow.
- Diesel fuel piping and cable trays (being fabricated off-site) were arriving on-site for installation with gensets, diesel pump skids, and electric cabinets.
- Weston and LUMA collaborated to support the new 115kV transmission line design and LUMA provided some cable and hardware from inventory to help expedite the construction.

**JUNE 2023: PALO SECO “BEAT THE HEAT”**

A June heatwave stressed the Puerto Rico power system, already short of necessary power capacity. The lack of adequate generation resources and an increased demand for power due to record high temperatures put the power grid in a critical state that caused multiple power outages for thousands of people. Palo Seco gensets were authorized by the US Army Corps of Engineers (USACE) to operate and provide support for the power grid on June 7, 2023. The gensets were operating within 12 hours and continued through June 13, 2023.



(Left) May 2023, construction night crew working to unload genset

(Right) June 2023, 36 piles completed and ready to be trimmed before setting forms for the piles concrete cap.



(Left) June 2023, San Juan site



June 2023, Palo Seco site drone picture

### ***PALO SECO***

#### ***July***

- Activities were impacted due to a shift in focus to hurricane preparedness. Despite this, the LNG fuel was made available to gensets to sustain operations.
- Operations proceeded with occasional maintenance as typically required with operating generation equipment.

### ***SAN JUAN***

- Construction continued at the site with the focus on completing pre-commissioning of the emergency gensets and constructing the new infrastructure on-site.
- On July 9, 2023, the large 300 MVA transformer was prepared for transport by LUMA staff and moved to its newly completed foundation.
- The required new 115 kV transmission line from the 300 MVA transformer to 115 kV switchyard had significant challenges with design and constructability but ultimately resolved to an acceptable design and approach after evaluating multiple options.

**PALO SECO**

**Aug**

With the construction winding down, the focus at Palo Seco shifted to operations and maintenance.

**SAN JUAN**

- The San Juan site crews were sprinting down the GSP construction path to make the schedule deadline.
- Major effort was placed on the construction of the new 115 kV transmission line and switch yard modifications.
- Natural gas and diesel pipeline pre-fabrication was completed.
- Installation of cable tray supports for ground cables.
- Natural gas metering skid installation completed.
- Pressure testing with Nitrogen completed and all test passed. Meter Rep onsite for calibration validation.
- The site successfully completed 9 out of 10 new "first-fire" tests on natural gas and continued with diesel later in the month.



Equipment tie-downs used to stabilize equipment during storms

July 2023, 300 MVA transformer safely set on the new foundation





July 2023, Construction of natural gas pipeline



August 2023, 115 kV cabling being installed between poles 1 and 2.



**PALO SECO**

**SAN JUAN**

- |             |   |   |
|-------------|---|---|
| <b>Sept</b> | <ul style="list-style-type: none"> <li>Power generation continued at Palo Seco site ensuring regular communications with LUMA's transmission and generation system control center and providing power to the Puerto Rico power grid.</li> </ul>   | <ul style="list-style-type: none"> <li>Contractors and LUMA staff pushed to work long hours and weekends to complete commissioning before the target deadline of September 30, 2022.</li> <li><b><i>On September 27, 2022, the site achieved Commercial Operations Date (COD) and began the O&amp;M phase.</i></b></li> </ul> |
| <b>Oct</b>  | <ul style="list-style-type: none"> <li>By the end of September both sites had successfully completed this construction leg of the GSP initiative. On October 16, 2023, a report was filed with the Energy Bureau stating: "Emergency Generation at Palo Seco (150 MW) and San Juan (200 MW) sites have both reached the O&amp;M phase, i.e., Commercial Operation Date, with a combined baseload capacity addition of 350 MW."</li> </ul> |   |



September 2023, New 300 MVA transformer area complete with safety fence, spill containment dike, and painting

# REDACTED

(Above) September 2023, Labeling of pipes and cable trays indicates approaching project completion



(Left): September 2023, Cable tray covers being installed for safety and cable protection

### 4.5 O&M Phase

FEMA also announced both sites would remain in emergency generation O&M phase until March 15, 2024, which is six months after the synchronization of San Juan units even though this was three months after Palo Seco synchronization. This was a benefit for Puerto Rico as it provides more emergency generation to support the power grid.

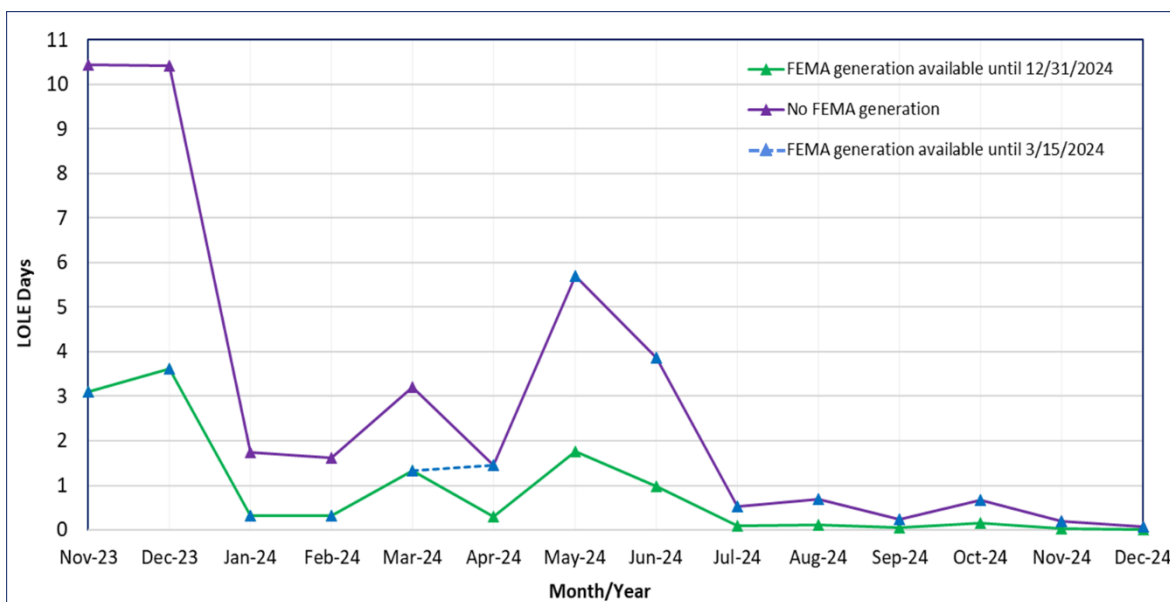
## 5.0 The Current State of Puerto Rico's Electric Power System

The addition of the FEMA emergency generation is significant and has greatly helped the electric grid, but it is also a temporary contribution to the power system needs as the generators are scheduled to cease operations on March 15, 2024. LUMA has calculated that the FEMA generation has provided, or will provide the following benefits:

- 41 load shed events were avoided in the approximately four months since the Palo Seco units were first installed from the combined 350 MW of FEMA emergency generation.
- The existing 350 MW of emergency generation will avoid an additional 18 load shed events in the approximately four remaining months until March 15, 2024.
- An additional 11 load shed events could be avoided if the generators were to remain until the end of December 2024.

It is important to point out that estimates of load shed events are highly dependent on projected outage schedules and resultant plant availabilities. Outages schedules in the second half of 2024 are still under discussion and are highly dependent on several uncertainties. Aguirre 1 and now Palo Seco 4 have both undergone significant damage and have no official return to service date. It has been LUMA's experience that generation availability has been routinely overestimated. While availability is expected to improve under Genera, the estimates for avoidance of potential future load shed events are considered to be conservatively low.

With the risk of losing the FEMA generation in March 2024, PREB has ordered LUMA and Genera to cooperate to pursue opportunities to extend this generation beyond March 15. This effort is underway and will have a significant impact, as depicted by Figure 5-1 below.

**Figure 5-1: Predicted LOLE Days Comparing Two FEMA Generation Scenarios (11/23/23 – 12/24/24)**

Source : LUMA : PREB GSP report 11/1/23

The GSP project, including the FEMA temporary generation, provides improved stabilization of the Puerto Rico system and a notable financial benefit to LUMA customers as described below in the next section.

## 6.0 Economic Impact of GSP to Customers

### 6.1 Treatment of the FEMA GSP Mission's Cost

The GSP mission falls under Direct Federal Assistance (DFA) by FEMA and represents over \$1.5 Billion obligated to the project. Under FEMA federal rules, the host government is required to fund 10% of the total costs while FEMA funds the remaining 90%.

The Government of Puerto Rico will fund approximately \$150 million of these costs (the final amount is to be determined) and will not be directly recovered from Puerto Rico electric customers.

### 6.2 Estimating Fuel Cost Impacts

A reasonable estimate of impacts associated with FEMA's temporary generation can be calculated by comparing the differential cost between the existing highest cost diesel-fueled peaking units and the FEMA generation. The FEMA generation units are fueled by natural gas, which is less expensive than diesel. LUMA estimates that the FEMA generators are helping save approximately \$50 million dollars per month to the electric customers of Puerto Rico, with the exact amount varying each month depending on prevailing fuel prices.

### 6.3 Next Steps for the Path to Power Stabilization

The GSP and FEMA temporary generation has been a significant benefit for Puerto Rico. The estimated 59 load shed events that have been avoided have helped consumers, critical loads such as hospitals, police, and residential customers at home on life-sustaining equipment, and the economy of Puerto Rico.

The FEMA generators were always intended to provide the generation reserves to allow existing generators to implement necessary repairs to return to an adequate level of service. This has happened to some extent, although the introduction of Genera to the grid has resulted in additional planned maintenance and repairs to the generation plants which is affecting outage schedules. LUMA has repeatedly said the existing plants needed additional maintenance so in that sense, supports Genera's planned maintenance focus and expects generation availability will eventually improve.

LUMA and Genera will be cooperating in the next several weeks and months to quantify the portfolio impact of alternate scenarios, particularly the departure of these 350 MW in March. Unless some other solutions can be identified to keep these generators in Puerto Rico, their departure would mean citizens of Puerto Rico would experience multiple load shed events each week.

The FEMA generators have also allowed a reduction in the use of diesel oil and residual fuel oil which has had significant environmental and cost benefits for the electric customers in Puerto Rico. LUMA has calculated in its quarterly Fuel Cost Adjustment Clause – Power Purchase Adjustment Clause (FCA-PPCA) that the impact to customers is a reduction of approximately 4 to 5 cents per kilowatt-hour.

The Power Stabilization Task Force and the Generation Stabilization Program succeeded in bringing new generation to Puerto Rico in a remarkably short period of time. FEMA implemented extraordinary leadership and commitment to make this happen. The government of Puerto Rico and the Energy Bureau all cooperated as needed to achieve the objective. The success in finding a way to have the generators remain in Puerto Rico will make the difference between a temporary 8-9 month reprieve that then sets Puerto Rico back exactly where they were before, or if it can be the first step in a necessary path to obtaining the generation capacity needed to have the citizens of Puerto Rico enjoy the same electric service as enjoyed by the rest of the US mainland.

## Appendix A: Task Force Participants and Roles

The Task Force's successful execution of this initiative was made possible through the participation and dedication of these organizations, agencies, and entities.

### TASK FORCE CORE MEMBERS AND THEIR ROLES:

- **Federal Emergency Management Agency (FEMA)** – With the established relationship, FEMA will continue to support the Government of Puerto Rico through the execution of the project to stabilize the power system by maximizing the flexibility of funding, including the ability to pursue renewable energy sources, developing plans that address long-term risks, and promote resilience. FEMA ensures all stabilization activities are feasible, cost reasonable, and aligned with local law and regulation. FEMA also identifies and leverages resources across Federal recovery partner agencies, including the existing Intragovernmental Reimbursable Work Agreement (IRWA) between FEMA and DOE to provide technical assistance on energy matters. FEMA is the lead Federal coordinator for the PR Power System Stabilization Task Force ("PR PSSTF").
- **Department of Energy (DOE)** – Conducts assessments of the power system facilities and provides technical guidance/recommendations to stabilize the power grid. DOE is a Primary Federal Agency on the Task Force
- **U.S. Army Corps of Engineers (USACE)** – Conducts assessments of the power system facilities and provides technical guidance/recommendations to stabilize the power grid, including cost estimates for the reparation of the system to stabilize it. USACE is a Primary Federal Agency on the Task Force.
- **Environmental Protection Agency (EPA)** – Conducts assessments of the power system facilities and provides environmental guidance and recommendations for the power grid and ensures compliance with the laws and regulations. EPA is a Primary Federal Agency on the Task Force.

### CORE COLLABORATIVE TEAM AND KEY STAKEHOLDERS:

- **Cybersecurity and Infrastructure Security Agency (CISA)** – Identifies critical infrastructure threats, risks, and supply chain challenges to adapt to changing conditions and to withstand and recover rapidly from power disruptions.
- **U.S. Coast Guard (USCG)** – Responsible for providing access to federal resources and technical assistance. USCG is a supporting agency to the PR Power System Stabilization Task Force.
- **Federal Energy Regulatory Commission (FERC)** – Oversees environmental matters related to natural gas and hydroelectricity projects and other matters.
- **Federal Oversight and Management Board** – Works with the people and Government of Puerto Rico to create the necessary foundation for economic growth and to restore opportunity to the people of Puerto Rico.

- **The Governor's Office (Fortaleza)** – Provides priorities and oversight on all matters related to energy in Puerto Rico.
- **Central Office for Recovery, Reconstruction and Resilience (COR3)** – Identifies, procures, and manages all state, federal and/or private resources available to the Government of Puerto Rico or any government entity to invest in recovery. Also, coordinates and channels all government efforts and activities related to recovery efforts, including the process, finance and work execution and infrastructure projects. Moreover, serves as advisor to the Governor and provides technical assistance and advice to other government entities regarding any matter related to the Recovery.
- **Department of Economic Development and Commerce Energy Policy Program (DEDC EPP)** – The Governor's primary advisor on all matters related to energy, including emergencies. DEDC EPP is the lead agency for the Government of Puerto Rico Emergency Support Function and is responsible for developing and maintaining the Puerto Rico Energy Assurance Plan annually prior to Hurricane Season.
- **Puerto Rico Electric Power Authority (PREPA, now GeneraPR)** – Developed and maintains the Puerto Rico Integrated Resource Plan (IRP) to evaluate existing and future generation resources. PREPA owns, operates, and maintains Puerto Rico's 24 primary generation facilities. PREPA also owns the Transmission and Distribution (T&D) System and coordinates with P3A to oversee the agreement with LUMA Energy to operate and maintain the T&D System. PREPA is a supporting ESF 12 (Energy) agency.
- **LUMA Energy (LUMA)** – Manages Operations and Maintenance of PR Transmission and Distribution System. LUMA is the System Operator, manages dispatch and coordinates all Bulk Energy System activities.
- **Business Emergency Operations Center (BEOC)** – Encourages and facilitates collaboration, information exchange and coordination between the private sector and the Government in the management of emergencies.
- **Puerto Rico Energy Bureau (PREB)** – Provides oversight to the Puerto Rico Energy Sector and consumer protection by adjudicating electricity rate increases.
- **Department of Natural and Environmental Resources (DNER)** – Ensures environmental compliance.
- **Puerto Rico Emergency Management Bureau (PREMB)** – Coordinates response, recovery, mitigation, protection, and preparedness efforts integrating other Government of Puerto Rico agencies. The PREMB Emergency Operations Center (EOC) may be activated to manage an incident including a catastrophic power outage.
- **Puerto Rico Public-Private Partnerships Authority (P3A)** – Spearheads the transfer of much needed investments for Puerto Rico's infrastructure to transform the Puerto Rican economy by securing private capital for public projects.





*Exhibit 2*

*Presentación Ruta hacia la Estabilización Energética de Puerto Rico*



# Ruta Hacia la Estabilización Energética de Puerto Rico

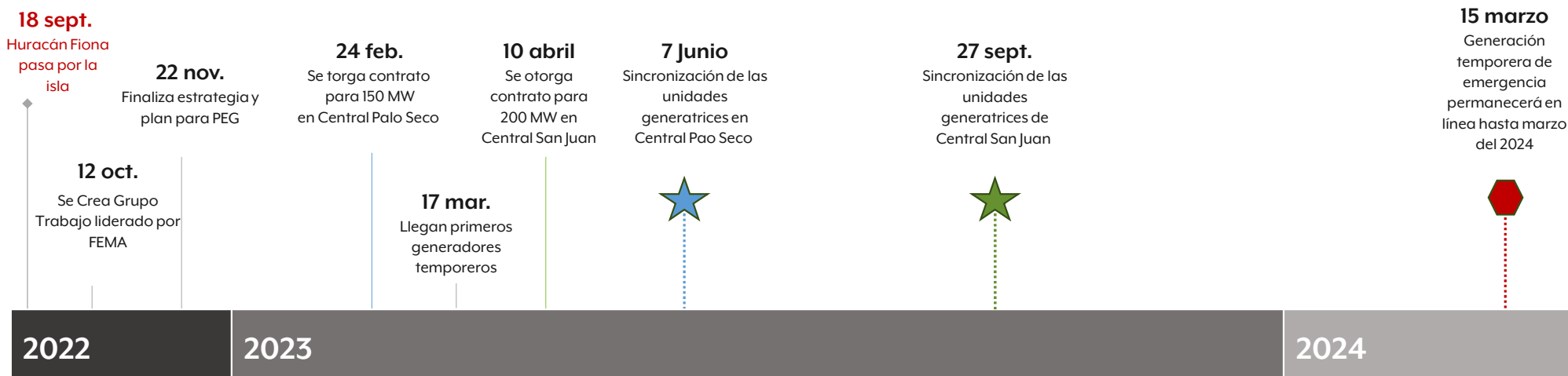
Noviembre 15, 2023

# El plan de estabilización de generación: un gran logro para Puerto Rico.

## BENEFICIOS

- ✓ **SEGURIDAD:** Las brigadas de construcción registraron sobre 100,000 horas de trabajo durante los 215 días de construcción del proyecto sin incidentes de seguridad.
- ✓ **MANTENIMIENTO & REPARACIONES:** La generación temporera permitirá realizar trabajos de mantenimiento y reparación que son necesarios llevar a cabo en las facilidades del sistema que reflejan mayor daño, proveyendo mejoras en su confiabilidad.
- ✓ **RELEVOS DE CARGA EVITADOS:** Puerto Rico ha evitado aproximadamente 41 relevos de carga (apagones) desde que los generadores fueron sincronizados el 15 de junio de 2023. Se estima evitar aproximadamente 18 posibles eventos similares, para el 15 de marzo de 2024. Un total de 59 relevos de carga que se evitarán como resultado directo de la generación de emergencia de FEMA.
- ✓ **BENEFICIOS ECONOMICOS:** LUMA estima que los generadores de FEMA ayuden a ahorrar aproximadamente \$50 millones de dólares al mes al reducir la dependencia de generadores que utilizan combustible diésel, los cuales son antiguos, ineficientes y generan mayor contaminación al ambiente.

# Agencias federales y estatales responden prontamente para aliviar el impacto del huracán Fiona

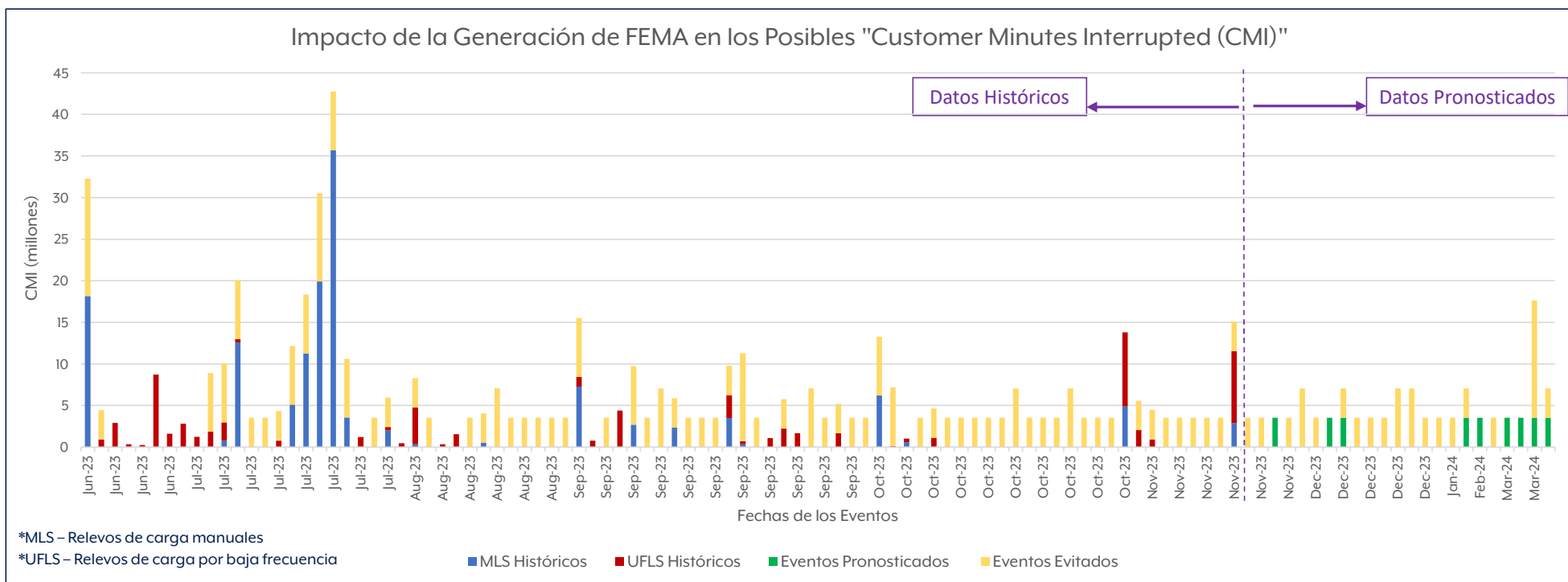


\*(PEG) Programa de Estabilización de Generación.

## El equipo desarrolló e implementó soluciones creativas para lograr los objetivos del proyecto y evitar demoras costosas.

<b>Se realizó una selección detallada de la localización</b>	<ul style="list-style-type: none"> <li>El grupo de trabajo consideró varios factores técnicos y operacionales al evaluar potenciales ubicaciones para la instalación de la nueva generación (espacio adecuado, interconexión a la red, suministro de combustible y construcción).</li> <li>Los hallazgos se utilizaron para priorizar las ubicaciones más adecuadas para la generación temporal: Palo Seco y San Juan.</li> </ul>
<b>Recursos inactivos aprovechados</b> (Transformador en inventario)	<ul style="list-style-type: none"> <li>Se consideró que los transformadores existentes en la planta de San Juan eran inadecuados para los 200 MW adicionales de generación de emergencia.</li> <li>El Negociado de Energía, descubrió un transformador grande sin usar en el inventario que fue evaluado y aprobado para su uso. Esta decisión evitó un gran gasto y evitó un retraso notable en el cronograma de construcción.</li> </ul>
<b>Retos de Construcción superados</b> (Nueva línea soterrada 115 kV)	<ul style="list-style-type: none"> <li>La línea soterrada existente en la localización no tenía la capacidad de transmitir la generación al sistema en el punto de interconexión.</li> <li>El equipo diseñó y construyó rápidamente una nueva línea de transmisión de 115 kV, entre el nuevo transformador y el patio de interruptores de 115 kV existente en la planta de San Juan. Se trabajó alrededor de las estructuras existentes, disminuyendo interrupciones de servicio a la planta generatriz.</li> </ul>
<b>Manejo de Compleja Logística Suplido Gas Natural</b>	<ul style="list-style-type: none"> <li>El plan para el proyecto de Palo Seco requirió la instalación de un tanque de Gas Natural de 93 k galones, además de un sistema de regaceo para proveer gas natural a la generación de emergencia.</li> <li>El equipo confrontó varios obstáculos para conseguir el tanque y los equipos asociados. El equipo fue fabricado en Nicaragua y luego transportado a Puerto Rico, donde fue transportado por medio de un plan de transporte complejo que requirió el uso de equipo pesado, cerrar carreteras al público y cálculos de carga de los puentes.</li> </ul>
<b>Necesidad de requisitos del sistema de agua desmineralizada</b>	<ul style="list-style-type: none"> <li>Una vez comienza la construcción, se identificó la necesidad de suplido de agua desmineralizada, mayor a la disponible en la planta de Palo Seco, necesaria para el control de contaminación.</li> <li>En un corto periodo de tiempo y con un requerimiento de proveer un sistema redundante en cada ubicación, el equipo de trabajo rápidamente diseñó, adquirió el equipo, y trabajó largas jornadas para cumplir con el programa de trabajo establecido.</li> </ul>

# Se evitaron posibles relevos de carga por déficit de generación



Análisis de eventos de Perdida de carga Junio 2023 – Marzo 2024	# de eventos	CMI promedio (millones)
MLS & UFLS Actuales (jun 23 – nov 23)	55	3.527
Eventos pronosticados (nov 23 – mar 24)	9	3.527
Eventos históricos evitados (jun 23 – nov 23)	91	3.527
Eventos pronosticados evitados (nov 23 – mar 24)	24	3.527

- El análisis muestra los relevos de carga y los déficits de generación por hora estimados para el período. Estos números **NO** son exactamente comparables, ya que podría haber varias horas en un solo día con un déficit que podría resultar en un solo relevo de carga.