

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

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IN RE: REVIEW OF THE PUERTO RICO
ELECTRIC POWER AUTHORITY
INTEGRATED RESOURCE PLAN

CASE NO.: NEPR-AP-2023-0004

SUBJECT: Supplemental Brief of Amicus
Curiae Robert A. Garcia Cooper in Response
to LUMA Energy's Responses to the Third
Set of 2025 IRP Post-Filing Requests for
Information, Filed April 16, 2026

SUPPLEMENTAL BRIEF OF AMICUS CURIAE ROBERT A. GARCIA COOPER

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW Robert A. Garcia Cooper, in his individual capacity as state-certified Engineer in Training (EIT, Certificate No. 28591), licensed Expert Electrician (Perito Electricista, License No. 10971), PhD student in electrical engineering at the University of Puerto Rico at Mayaguez, published researcher in energy systems and resilience economics, and Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), respectfully submits this Supplemental Brief in connection with the above-captioned proceeding.

On March 30, 2026, the petitioner filed a Petition to Appear as Amicus Curiae and Accompanying Brief, which was accepted by the Energy Bureau. That brief identified three structural limitations in the 2025 Integrated Resource Plan: (1) the Present Value Revenue Requirement (PVRR) metric excludes ratepayer outage costs by design; (2) the PLEXOS production cost and capacity expansion modeling framework is structurally incapable of capturing those costs; and (3) Puerto Rico-specific tools, namely the Customer Electric Service Impact Cost (CESIC) methodology and the ICE Calculator PR model, now exist to quantify the excluded costs, making their continued exclusion a regulatory choice rather than a methodological constraint. The original brief further identified that the 2025 IRP applies a capacity-weighted average forced outage rate of 29% across the legacy generation fleet and holds that rate constant as a static assumption throughout the entire 20-year planning horizon in the PLEXOS modeling, and argued that this chronic baseline unreliability is embedded in the PLEXOS model as a fixed external condition rather than treated as a cost variable attributable to the existing resource mix.

On April 16, 2026, LUMA Energy filed its responses to the Third Set of 2025 IRP Post-Filing Requests for Information pursuant to this Bureau's Resolution and Order of April 1, 2026. Those responses contain admissions that directly confirm the structural gaps identified in the petitioner's original brief. The petitioner submits this Supplemental Brief to place those admissions in context and to renew his request that the Commission direct future IRP filings to include a quantitative assessment of ratepayer outage cost burden under each resource plan alternative.

I. LUMA'S OWN RFI RESPONSES CONFIRM THAT ACTUAL RATEPAYER EXPERIENCE OF UNRELIABILITY IS NOT INCORPORATED INTO THE PLEXOS MODEL, AND THE DATA NECESSARY TO PERFORM THAT ANALYSIS EXISTED IN A PUBLIC JUDICIAL RECORD, AND WAS PRODUCED BY LUMA TWICE, BEFORE THE IRP WAS FILED

In response to RFI 5b, LUMA confirmed that the forced outage rate assumptions used in the 2025 IRP were based on a May 19, 2025 update reflecting historical unit performance through the first few months of 2025 only. More significantly, LUMA confirmed that it did not use actual unserved energy events or load shed events as an input to PLEXOS or in developing the forecasted forced outage rates. In response to RFI 5c, LUMA confirmed it did not consider actual unserved energy results from 2024 or 2025 when structuring the outage representation methods in the IRP modeling. In response to RFI 5d, LUMA stated that a direct comparison between modeled and actual unserved energy was not possible due to conflicting timelines.

The Commission should evaluate that timeline explanation against the following documented record.

On May 17, 2024, Dr. Fernando Tormos-Aponte, a researcher at the University of Pittsburgh, filed a public records access petition under Puerto Rico's Ley de Transparencia y Procedimiento Expedito para el Acceso a la Informacion Publica, Ley Num. 141-2019, in *Fernando Tormos-Aponte v. LUMA Energy, LLC; LUMA Energy ServCo, LLC*, Case No. SJ2024CV04490, Sala Superior de San Juan. The petition requested event-level outage data at the highest available granularity from June 2021 forward for the purpose of generating industry reliability metrics including SAIDI, SAIFI, CAIFI, and CAIDI.

In LUMA's Motion to Dismiss filed June 3, 2024 in that case, attached hereto as Exhibit A, LUMA described having produced a table designated RAW IDB 1-JUN-21 TO 19-AUG-23, which LUMA filed as Anejo 1 (parts A through G) to its Motion to Dismiss, attached hereto as Exhibits B through H, making it a publicly filed court exhibit in the record of SJ2024CV04490. LUMA's motion describes that table as containing 168,304 lines of event-level outage data covering June 1, 2021 through August 19, 2023, recording for each event the date and time of the outage, the date and time of restoration, the number of clients affected, and the sectors and municipalities where the fault was located. The case was subsequently closed by voluntary dismissal without

prejudice on August 1, 2024, as reflected in the Notice of Voluntary Dismissal attached hereto as Exhibit I.

That first production was in a public judicial record, filed by LUMA itself, as of June 3, 2024. But the record does not end there. As part of resolving Case No. SJ2024CV04490, LUMA produced a second, broader dataset covering January 1, 2021 through May 31, 2024, transmitted to the petitioner by Dr. Marcel Castro Sitiriche of the University of Puerto Rico at Mayaguez with the explicit written authorization of Dr. Tormos-Aponte to use it citing the case, as documented in the email chain attached hereto as Exhibit J. That dataset, attached hereto as Exhibit K, covers a total span of forty months, extending coverage back to January 2021 and forward through May 2024, and includes data not present in the court-filed table both before and after the period it covers. It was in LUMA's possession and organizationally producible as of the date of its production.

LUMA therefore produced event-level operational outage data on two separate occasions in connection with SJ2024CV04490: first through August 2023 as a public court exhibit in June 2024, and second through May 2024 as part of resolving the case in July 2024. The forced outage rate assumptions used in the 2025 IRP were finalized as of May 2025, ten months after the broader dataset covering through May 2024 had already been produced. The 2025 IRP was filed on October 17, 2025, sixteen months after the first production and fifteen months after the second.

LUMA's statement in RFI 5d that a direct comparison between modeled and actual unserved energy was not possible due to conflicting timelines cannot be reconciled with this record. The data was not unavailable. It was not unobtainable. It was produced by LUMA itself, in two separate productions, before the IRP modeling assumptions were finalized. That LUMA did not find it unduly burdensome to produce this data in the context of a public records case is further evidence that producing it for IRP purposes was not beyond LUMA's organizational capacity. The inability to perform the comparison that the Energy Bureau now requests through RFI 5d reflects a resource allocation choice, not a data constraint.

The petitioner's original brief argued that PLEXOS embeds chronic baseline unreliability as a fixed structural parameter and does not connect to what ratepayers actually experienced. LUMA's RFI 5b and 5c responses confirm this in LUMA's own words. The event-level data documented in Exhibits B through H and Exhibit K contains precisely the information that CESIC methodology requires to translate outage events into household economic costs, including outage timestamps, durations, and client counts by location. That translation has not been performed. The Commission is being asked to evaluate resource plans whose cost comparison excludes the economic burden those outage events imposed on ratepayers, despite the existence of the data necessary to quantify that burden.

The petitioner further notes that the 2025 IRP applies PR100 cost scaling factors to adjust NREL Advanced Technology Baseline cost estimates for Puerto Rico conditions, as confirmed in LUMA's responses to Question 1 of the First Set of Post-Filing Requests for Information, filed January 15, 2026. The petitioner conducted research as part of the University of Puerto Rico at

Mayaguez Electrical and Computer Engineering Department team, led by professors Marcel Castro Sitiriche, Agustin Irizarry Rivera, and Lionel Orama Excusa, which participated in and contributed to the PR100 Study. The outage cost methodology developed as part of that research was subsequently published in *The Electricity Journal* (2024) under Sandia National Laboratories Contract No. 1999908; however, as the publication followed the completion of the PR100 capacity expansion modeling, the outage cost estimates were not available for integration into the resource portfolio recommendations that the 2025 IRP now draws upon. To the extent that the 2025 IRP inherits cost scaling assumptions derived from PR100, it also inherits this structural gap. The Commission should have this context when evaluating the 2025 IRP's cost projections and their relationship to the full cost of service for Puerto Rico ratepayers.

II. THE DISCLOSED ACTUAL UNSERVED ENERGY DATA REVEALS A SIGNIFICANT DIVERGENCE FROM MODELED VALUES THAT UNDERSCORES THE NEED FOR RATEPAYER COST QUANTIFICATION

In response to RFI 5a, LUMA disclosed that actual annual unserved energy in Puerto Rico was 17,566 MWh in 2024 and 12,946 MWh in 2025. The PRP Solution Spreadsheet results presented at the Initial Technical Hearing showed modeled unserved energy of 225 GWh in 2024, more than twelve times the disclosed actual value.

The petitioner does not contend this divergence invalidates the IRP as a planning instrument. However, it carries a specific implication relevant to the petitioner's original argument. Even the confirmed actual unserved energy, 17,566 MWh in 2024 and 12,946 MWh in 2025, is expressed exclusively in megawatt-hours. Nowhere in this record is that quantity translated into an economic cost to the households and businesses who experienced those outages. The CESIC methodology performs precisely this translation using verified data from NEPR docket NEPR-MI-2019-0007. The ICE Calculator PR model, released February 19, 2026, provides an independent Puerto Rico-specific tool for the same purpose based on Phase 1 and Phase 2 surveying activities conducted in Puerto Rico. Two tools exist. The data exists. The translation has not been done.

The petitioner's original brief documented that the 2018-2019 IRP attempted Value of Lost Load quantification using survey data from New Zealand and Hawaii, jurisdictions with median incomes substantially higher than Puerto Rico's, producing estimates that bore no defensible relationship to the actual economic experience of Puerto Rico households. The 2025 IRP does not attempt this quantification at all, representing a regression from even that flawed prior effort. The Commission now has two independent Puerto Rico-specific tools available. The record now contains confirmed actual unserved energy figures. There is no longer any methodological basis for the absence of this analysis.

III. THE CONFIRMED BINARY AVAILABILITY MODEL STRUCTURE PRECLUDES TRANSLATION OF UNSERVED ENERGY INTO RATEPAYER ECONOMIC COST

In response to RFI 1c, LUMA confirmed that the Foundational outage methodology assumes complete binary availability: a unit is either at full rated capacity or fully out, with no partial outages and no unit derating. In response to RFI 1h, LUMA confirmed that all resources in the ST module run at full rated capacity with no derates.

This structure is appropriate for minimizing the cost of supplying electricity to the grid. It cannot, by construction, translate resulting unserved energy hours into economic cost to individual ratepayers, because that cost depends on when the outage occurs, how long it lasts, what time of day and season, what the household has stored in refrigeration, whether the household has access to alternative meal preparation, and numerous other factors that are household-specific and time-dependent. The petitioner's original brief further noted that each forced outage recovery event involves startup fuel expenditures that are distinct from normal operating fuel costs, and respectfully urged the Commission to direct LUMA to confirm whether unit startup costs associated with forced outage recovery events were fully captured in the PLEXOS production cost modeling. The binary availability confirmation from RFIs 1c and 1h strengthens this concern. CESIC methodology bridges the gap between unserved energy and ratepayer economic cost using verified federal cost basis sources and Puerto Rico consumption data from NEPR docket NEPR-MI-2019-0007.

The petitioner's original brief also noted that in a modeling framework that excludes outage costs, the economic disadvantage of generation resources with elevated forced outage rates, including the legacy thermal fleet with its confirmed capacity-weighted average FOR of 29%, is systematically understated relative to generation and storage resources with lower failure rates. The binary availability confirmation reinforces this point. The Commission should consider whether the PVRR advantage attributed to resource plan alternatives with continued reliance on legacy thermal generation would persist if the chronic unreliability cost of those alternatives were incorporated into the cost comparison.

IV. RENEWED REQUEST FOR RELIEF

The petitioner renews the request made in the original brief: that the Commission acknowledge the structural limitation identified herein explicitly in any final order on the 2025 IRP, and direct that future IRP submissions include a quantitative assessment of outage cost burden to ratepayers under each resource plan alternative evaluated.

The record now contains: LUMA's confirmed disclosure that actual unserved energy was 17,566 MWh in 2024 and 12,946 MWh in 2025; LUMA's confirmed disclosure that actual load shed events were not incorporated into the PLEXOS model inputs; LUMA's confirmed disclosure that a binary availability structure with no derating was applied throughout; 168,304 lines of event-level outage data publicly filed by LUMA itself in SJ2024CV04490 more than sixteen months before the IRP was filed; a second, broader production of event-level outage data by LUMA covering January 2021 through May 2024, produced fifteen months before the IRP was filed and ten months before the forced outage rate assumptions were finalized; the explicit written authorization of Dr. Fernando Tormos-Aponte to use that data citing the case; the peer-reviewed CESIC methodology and the ICE Calculator PR model as available tools for translating those quantities into household economic costs; and the documented structural gap inherited from the PR100 modeling lineage from which the 2025 IRP draws its cost scaling assumptions.

The exclusion of ratepayer outage costs from the IRP cost comparison is no longer a data problem or a methodological constraint. It is a documented gap, with confirmed inputs available for quantification and confirmed tools available for the analysis. The Commission has before it both the evidence and the means. The petitioner respectfully urges the Commission to act on that basis.

V. DECLARATION

In compliance with Section 7.01(B)(4) of Regulation No. 8543, the petitioner declares as follows:

- A) No party or lawyer in this proceeding assisted in drafting this supplemental brief.
- B) No party or lawyer in this proceeding contributed funds or any other type of resource for the preparation or submission of this supplemental brief.
- C) No person other than the petitioner contributed funds or any other type of resource for the preparation or submission of this supplemental brief.

Respectfully submitted,

In San Juan, Puerto Rico, on April 19, 2026.



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EXHIBITS

Exhibit A - LUMA Energy, LLC and LUMA Energy ServCo, LLC, Moción de Desestimación, Fernando Tormos-Aponte v. LUMA Energy, LLC, Case No. SJ2024CV04490, Tribunal de Primera Instancia, Sala Superior de San Juan, filed June 3, 2024 (Entrada SUMAC Num. 6, Páginas 1-15).

Exhibit B - Anejo 1-A a Moción de Desestimación, Fernando Tormos-Aponte v. LUMA Energy, LLC, Case No. SJ2024CV04490, filed June 3, 2024 (Entrada SUMAC Num. 6).

Exhibit C - Anejo 1-B, *ibid.*

Exhibit D - Anejo 1-C, *ibid.*

Exhibit E - Anejo 1-D, *ibid.*

Exhibit F - Anejo 1-E, *ibid.*

Exhibit G - Anejo 1-F, *ibid.*

Exhibit H - Anejo 1-G, *ibid.*

Exhibit I - Aviso de Desistimiento Sin Perjuicio, Fernando Tormos-Aponte v. LUMA Energy, LLC, Case No. SJ2024CV04490, Tribunal de Primera Instancia, Sala Superior de San Juan, filed August 1, 2024 (Entrada SUMAC Num. 20).

Exhibit J - Email chain: Marcel J. Castro Sitiriche to Robert A. Garcia Cooper, July 29, 2024, forwarding Fernando Tormos-Aponte to Marcel J. Castro Sitiriche, July 29, 2024, authorizing use of outage data citing Fernando Tormos-Aponte v. LUMA Energy, LLC, Case No. SJ2024CV04490.

Exhibit K - Raw outage event data produced by LUMA Energy in connection with Fernando Tormos-Aponte v. LUMA Energy, LLC, Case No. SJ2024CV04490, covering January 1, 2021 through May 31, 2024, transmitted to petitioner by Dr. Marcel J. Castro Sitiriche.

CERTIFICATE OF SERVICE

I hereby certify that on April 19, 2026, a copy of this Supplemental Brief was filed with the Office of the Clerk of the Puerto Rico Energy Bureau using its electronic filing system, and that electronic copies were served upon all parties of record in Case No. NEPR-AP-2023-0004 as reflected in the most recent Certificate of Service filed in this proceeding.

Robert A. Garcia Cooper