

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

**NEPR**

**Received:**

**Oct 24, 2023**

**9:07 PM**

**IN RE:**

Review of the Puerto Rico Electric Power  
Authority Integrated Resource Plan

**CASE NO. NEPR-AP-2023-0004**

**SUBJECT: Motion Submitting Responses to Requests  
for Information issued through Resolution and Order  
dated September 27, 2023**

**MOTION SUBMITTING RESPONSES TO REQUESTS FOR INFORMATION ISSUED  
THROUGH RESOLUTION AND ORDER DATED SEPTEMBER 27, 2023**

**TO THE PUERTO RICO ENERGY BUREAU:**

**COMES NOW LUMA Energy ServCo, LLC (“LUMA”)**, through the undersigned legal counsel, and respectfully states and requests the following:

**I. Submission of Responses to Requests for Information in Compliance with Resolution and Order dated September 27, 2023.**

1. On July 12, 2023, this Puerto Rico Energy Bureau of the Public Service Regulatory Board (“Energy Bureau”) issued a Resolution and Order in this docket, whereby it initiated the instant administrative proceeding for the review of the proposed 2024 Integrated Resource Plan (the “2024 IRP”) to be filed by LUMA as the agent for the Puerto Rico Electric Power Authority pursuant to the Puerto Rico Transmission and Distribution System Operation and Maintenance Agreement dated June 22, 2020 (the “July 12<sup>th</sup> Resolution and Order”).

2. Through the July 12<sup>th</sup> Resolution and Order, the Energy Bureau also took notice of Exhibit 1 to LUMA’s confidential *Motion Submitting Update on IRP Technical Consultant Contracting Process, Request for Modification of Procedural Timeline and Request for Confidential Treatment* filed on March 31, 2023 in Case No. NEPR-MI-2020-0012, *In re:*

*Implementation of the Puerto Rico Electric Power Authority Integrated Resource Plan and Modified Action Plan* (the “March 31<sup>st</sup> Motion”), through which, among other matters, the Energy Bureau scheduled the initial technical conference in this administrative proceeding for August 8, 2023, pursuant to the *Regulation on Integrated Resource Plan for the Puerto Rico Electric Power Authority*, Regulation No. 9021 dated April 20, 2018 (the “August 8<sup>th</sup> Technical Conference”).

3. The Energy Bureau issued, as Attachment A to the July 12<sup>th</sup> Order, an Agenda for the August 8<sup>th</sup> Technical Conference (Attachment A). The Energy Bureau also required LUMA to prepare a “presentation of its plan for the 2024 IRP, including addressing the agenda items in Attachment A and indicating how LUMA is or will follow the specific action items ordered by the Energy Bureau in the August 20, 2020 IRP Order.” *See*, July 12<sup>th</sup> Order at page 4 and Attachment A at paragraph 2.<sup>1</sup>

4. On August 8, 2023, LUMA appeared at the August 8<sup>th</sup> Technical Conference and, in compliance with the July 12<sup>th</sup> Order, offered a presentation to the Energy Bureau covering the items included in the technical conference’s Agenda. After covering the items on the Agenda, the Energy Bureau opened a confidential portion of the initial technical conference for purposes of discussing the contracting of the IRP Technical Consultant. During this discussion, LUMA agreed to submit a revised version of Exhibit I of the Final Contract with the IRP Technical Consultant addressing the issues discussed.

5. On August 8, 2023, LUMA filed a *Motion Submitting Presentation Offered During Initial Technical Conference* which included as *Exhibit 1*, a copy in PDF format of the presentation

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<sup>1</sup> After other procedural developments, on August 3, 2023, LUMA filed an *Informative Motion and Submission of Proposed Revised Agenda for Technical Conference Scheduled for August 8, 2023* whereby it proposed certain modifications to the Agenda issued by the Energy Bureau through the July 12<sup>th</sup> Order.

offered during the August 8<sup>th</sup> Technical Conference with slides 2-3, 5-6 and 8-9 provided in both Spanish and English.

6. On August 30, 2023, LUMA filed a *Motion Submitting Revised Version of Exhibit I of Final Contract for Technical Consultant and Related Documents, Request for Approval of Final Contract and Request for Confidential Treatment* whereby it submitted a revised version of Exhibit I of the Final Contract with the IRP Technical Consultant (the “August 30<sup>th</sup> Motion”). LUMA also submitted as Exhibit 2 of the August 30<sup>th</sup> Motion, a redline depicting the changes between the original version of Exhibit I submitted with LUMA’s July 27<sup>th</sup> Motion and the revised version. In addition, LUMA submitted as *Exhibit 3* therewith, a revised version of the Final Contract with a revision in Section 8.2 (Contractor Representations) of Exhibit A in redline form showing the changes made to the original version submitted with LUMA’s July 27<sup>th</sup> Motion and, as *Exhibit 4* a Contractor Certification.

7. On September 7, 2023, this Energy Bureau issued a Resolution and Order approving the Final Contract with the IRP Technical Consultant. The Energy Bureau also scheduled a technical conference for October 31, 2023.

8. On September 27, 2023, the Energy Bureau issued a subsequent Resolution and Order whereby it ordered LUMA’s personnel to attend the second pre-IRP filing period technical conference scheduled for October 31, 2023, together with its technical consultant (“September 27<sup>th</sup> Order”). The Energy Bureau also issued, as Attachment A to its September 27<sup>th</sup> Order, an Agenda for the October 31<sup>st</sup> technical conference and ordered LUMA to prepare a presentation in accordance with the agenda and to submit it by October 25, 2023. The Energy Bureau also ordered LUMA to respond to a series of requests for information (RFI’s) included as Attachment B of its September 27<sup>th</sup> Order.

9. In compliance with the September 27<sup>th</sup> Order, LUMA hereby submits as *Exhibit 1*, its responses to the Energy Bureau's RFIs. The responses include as attachments several documents in *Excel* format which LUMA is submitting separately on this same date to the Energy Bureau.

10. LUMA requests confidential treatment of the *Excel* files submitted in response to RFI number 1 and portions of RFI number 5 pursuant to the Energy Bureau's Policy on Confidential Information, CEPR-MI-2016-0009, Section A, as amended by the Resolution of September 20, 2016, CEPR-MI-2016-0009, and to the provisions of Article 6.15 of Act 57-2014 and Act 80-2011.

11. As per the Energy Bureau's Policy on Confidential Information, LUMA will submit expediently, within the next 10 days, a memorandum of law in support of its request for confidential treatment of those files.

**WHEREFORE**, LUMA respectfully requests that the Energy Bureau **accept** *Exhibit 1* in this Motion, **deem** LUMA in compliance with that portion of the September 27<sup>th</sup> Order which required LUMA to respond to certain requests for information and **take notice** that LUMA deems some of the documents submitted herein as confidential and, therefore, will be filing the corresponding memorandum in support of the request for confidentiality within the next 10 days.

**RESPECTFULLY SUBMITTED.**

In San Juan, Puerto Rico on October 24, 2023.

**I HEREBY CERTIFY** that we filed this notice and request using the electronic filing system of this Puerto Rico Energy Bureau and that courtesy copy of this notice and request was notified to counsel for PREPA [mvazquez@diazvaz.law](mailto:mvazquez@diazvaz.law) and [jmarrero@diazvaz.law](mailto:jmarrero@diazvaz.law), [Lionel.santa@prepa.pr.gov](mailto:Lionel.santa@prepa.pr.gov); and to Genera PR LLC through [brannen@genera-services.com](mailto:brannen@genera-services.com); [kbolanos@genera-pr.com](mailto:kbolanos@genera-pr.com); [regulatory@genera-pr.com](mailto:regulatory@genera-pr.com).



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*Exhibit 1*  
*Responses to RFIs*  
*(includes attachments in Excel format submitted separately)*

## INTEGRATED RESOURCE PLAN

# REVIEW OF THE PUERTO RICO ELECTRIC POWER AUTHORITY INTEGRATED RESOURCE PLAN

CASE NO.: NEPR-AP-2023-0004

**Response: ROI-LUMA-MI-2023-09-28-PREB#NEPR-AP-2023-0004**

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### SUBJECT

The Energy Bureau issued on September 27, 2023 a Resolution and Order (September 27 R&O) ordering LUMA to submit responses to the first set of Requests of Information (ROI) of the prefilling process of the 2024 Integrated Resource Plan (IRP). LUMA hereby complies and submits its response to Attachment B of the September 27 R&O addressing questions on: Load Forecast, Resource Adequacy, and New Resource Cost Parameters. Please note that LUMA is providing this data on a preliminary, informational basis. Data, estimates or other information provided at this time is subject to change and may be revised as LUMA develops the 2024 Integrated Resource Plan.

### 1. REQUEST

Provide the 2023 Resource Adequacy Analysis Report; and any associated analytical workpapers in Excel file format.

### RESPONSE

LUMA has attached a confidential draft version of the 2023 Resource Adequacy Analysis Report which was just recently completed but has not yet completed LUMA's final internal reviews. The results of the draft 2023 Resource Adequacy report forecast can be found in the attached confidential file: ROI1-Draft\_Resource Adequacy Report\_Confidential.pdf. LUMA will submit under separate cover to the Energy Bureau the requested associated analytical workpapers.

### 2. REQUEST

Provide Puerto Rico's historical total hourly load for all hours for 2020 to the present, including consistent estimates of the hourly consumption and the hourly system losses on the transmission and distribution system. As available, provide this information by Puerto Rico district and by major sector (residential, commercial, industrial) as categorized. Provide in Excel file format.

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## RESPONSE

LUMA provides historical load data, *ROI2-Customer Class Profiles Complete History Calibrated 2023-10-05.csv*. The file contains hourly load data for all hours from January 2020 to June 2022. The hourly class demand values in this file are estimates, not observational data. These values are based on historical class profile data, loss data, monthly sales, and system generation data. The class demand values reflect estimates of aggregate class demand at the meter. LUMA has provided the estimated losses in Table 1 (below) based on average total loss rates by customer class.

**Table 1. Customer Class Loss Rates**

Customer Class	Non-Technical Loss (A)	Technical Loss (net) (B)	Technical Loss (gross) (C)	Total Loss (A + C)
Residential	3.7%	10.3%	15.2%	18.9%
Commercial	2.5%	7.7%	11.6%	14.1%
Industrial	1.0%	3.3%	5.2%	6.2%
Agriculture	3.7%	10.3%	15.2%	18.9%
Public Lighting	3.7%	10.3%	15.2%	18.9%
Other Authorities	0.9%	3.0%	4.7%	5.6%

Total loss is the difference between electricity at the generation source and metered sales. All loss columns are defined as percent of electricity output at the generation source.

## 3. REQUEST

Provide LUMA's projected load forecast to be used in IRP modeling, with annual energy, annual peak load, and 8,760 hourly load projections for the 2024-2044 period. Provide in Excel file format.

## RESPONSE

LUMA has provided the requested load forecast data for a base forecast, a high forecast, and a low forecast in the attached nine files:

1. ROI3-Base Load Forecast 1 of 3).xlsx
2. ROI3-Base Load Forecast (2 of 3).xlsx
3. ROI3-Base Load Forecast (3 of 3).xlsx
4. ROI3-Low Demand Forecast (1 of 3).xlsx
5. ROI3-Low Demand Forecast (2 of 3).xlsx
6. ROI3-Low Demand Forecast (3 of 3).xlsx
7. ROI3-High Demand Forecast (1 of 3).xlsx
8. ROI3-High Demand Forecast (2 of 3).xlsx.
9. ROI3-High Demand Forecast (3 of 3).xlsx.

The attached files contain LUMAS's projected load forecast, prior to load modifier adjustment, to be used in the 2024 IRP, with annual energy, annual peak load, and hourly load projections for the 2024-2044 period. Each version of the forecast is split into three files due to the size of the files.



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### 4. REQUEST

Provide LUMA's breakdown of the load forecast (2024-2044) to be used in IRP modeling by Puerto Rico district and by major sector (residential, commercial, industrial) as categorized, in Excel file format.

### RESPONSE

LUMA has provided the requested load forecast data by customer class and geographic area in the same nine files provided in response to Request number 3.

### 5. REQUEST

Clearly describe how energy efficiency and distributed resources (solar PV and battery energy storage) affect the load forecast provided in the above questions. If energy efficiency and distributed resources are explicitly factored into the load forecast, provide the hourly component values for each of energy efficiency and distributed resources. Provide in Excel file format.

### RESPONSE

The United States Department of Energy (DOE) and the PR100 project team consider most of the detailed data referenced in the below subsections as confidential until the final PR100 study report is issued. The PR100 project team has provided LUMA the data identified below as confidential as well as its approval to share the data only with the Energy Bureau for this specific technical conference to assist in the development of the 2024 IRP.

LUMA's base load forecast will be adjusted (or modified) with the hourly impacts of each of the load modifiers listed below:

#### a. Energy Efficiency

LUMA plans to use the Energy Efficiency (EE) forecast, with measure-specific analysis, which was created by the PR100<sup>1</sup> study as the expected EE forecast in the 2024 IRP. LUMA believes this PR100 EE forecast, while relatively high level, is the most rigorous long-term forecast of EE available. LUMA does not believe that developing an alternative forecast could materially improve the PR100 EE forecast, until the pending results of the Energy Bureau's EE Baseline and Potential studies are available as an input.

The PR100 appears to start the rollout of residential and commercial programs in its forecast in FY22 and rapidly ramp up in subsequent years, adding industrial programs in FY24. Using a historical start date for the program launch does not appear accurate. LUMA plans to review the details of the PR100 forecast with the IRP technical consultant, Black & Veatch, to determine this forecast's reasonableness for use in the 2024 IRP and whether the

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<sup>1</sup> PR100 is abbreviation for the DOE sponsored study titled: Puerto Rico Grid Resilience and Transitions to 100% Renewable Energy.

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forecasted annual savings estimates should be delayed to a plausible future start date. The unmodified PR100 EE estimates are provided with this filing but may be adjusted prior to incorporation in the 2024 IRP.

The PR100 estimate is based on extending the duration and participation rates of modeled savings from end users proposed for the energy efficiency programs in LUMA's Transition Period Plan for Energy Efficiency and Demand Response (TPP). Without the benefit of Puerto Rico specific baseline and potential studies, the PR100 project developed this high-level estimate using typical data and results from other U.S. locations. The results of the PR100 EE forecast can be found in the attached confidential file: *ROI5-Energy Efficiency\_Annual and Hourly\_Savings\_Confidential.xlsx*.

The PR100 has chosen not to use this measure-specific EE forecast in the final version of the PR100 Study and has opted to create an annual EE forecast that achieves the Act 17 target of 30% energy savings by 2040, similar to what was included in the previous PREPA IRP.

The EE savings in the attached file will be allocated to the eight TPAs, discussed in the earlier description of the base load forecast, using historical sales by class within each TPA. Hourly EE savings with each TPA will be subtracted from the hourly base load forecast for the corresponding TPA.

### b. Flexible Demand

LUMA commissioned a flexible demand forecast for which it has included the draft results in this response. The flexible demand forecast is based on the combined results of a range of measures that can be used to reduce and time-shift customer demand. As with the EE forecast discussed above, without the benefit of Puerto Rico specific baseline and potential studies, the flexible demand forecast should be considered a high-level estimate based on typical data and results from other US locations. A draft forecast for the cumulative measures in the flexible demand program can be found in the attached confidential file: *ROI5-Flexible Demand Forecast\_Confidential.xlsx*. LUMA has not yet received operations and maintenance (O&M) costs associated with the forecasted measures. An estimate of the will be added to the programs for modeling in the 2024 IRP.

The flexible demand savings in the attached file will be allocated to the eight TPAs, discussed in the description of the base load forecast, using historical sales by class within each TPA. The hourly flexible demand savings within each TPA will be subtracted from the hourly base load forecast for the corresponding TPA.

### c. Distributed Solar and Storage

LUMA commissioned from Guidehouse two versions of a distributed solar photovoltaic and a distributed battery energy storage systems (DPV&DBESS) forecast which LUMA intends to use in the IRP. This forecast is not yet complete and there are no draft results available

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for sharing. The parameters that will be used for both forecasts are similar to those used by the PR100 study. The two forecasts will be based on a benefit cost analysis of the cost of a solar and storage system versus the benefits of customer energy bill savings and economic value of increased resiliency, using data from the Interruption Cost Estimate (ICE) Calculator.<sup>2</sup> One of the forecasts will be based on the net energy metering (NEM) credit value for customer excess energy remaining at the current full retail rate and the other will be based on the NEM credit value reducing to the time-of-use (TOU) value of the grid's avoided generation costs. LUMA has not determined what changes it could propose to the Energy Bureau for future revisions to the net energy metering (NEM) program. However, LUMA believes the TOU value of avoided costs for the NEM program provides a plausible lower bound of the credit value that is consistent with NEM changes and proposed changes in other jurisdictions.

LUMA expects the pending forecast using existing full retail NEM program values will be similar to the results of PR100, 1LMNET scenario forecast for DPV&DBESS. LUMA expects the alternative forecast with TOU avoided cost credit will result in lower DPV installations and may result in installation of increased DBESS capacity per customer to minimize the need to use grid as storage. LUMA is providing in response to this data request the PR100, 1LMNET forecast of for both the DPV and DBESS which will be used as proxies in preliminary 2024 IRP modeling until the pending forecast is available. The PR100 DPV capacity values were provided without annual energy consumption for the DPV. LUMA has used 18.5% as a preliminary estimate to show the approximate energy production of the DPV capacity provided by PR100. The PR100, 1LMNET forecasts for the DPV and DBESS can be found in the attached confidential file: *ROI5-Distributed PV and BESS\_Confidential.xlsx*.

d. Combined Heat and Power

LUMA has estimated the impact of existing and planned combined heat and power (CHP) projects in Puerto Rico. LUMA is also conducting a survey of customers to refine the understanding of existing uses and planned additions of CHP systems in Puerto Rico. In response to this ROI, LUMA is providing the most recent forecast of CHP used to develop LUMA's FY23 budget filing to the Financial Oversight and Management Board for Puerto Rico (FOMB), attached in file:

*ROI5-Combined\_Heat and Power\_Forecast\_FOMB\_FY2023.xlsx*.

The FY23 FOMB budget filing is the CHP forecast that LUMA plans to use for the 2024 IRP unless a revised forecast can be developed in the near future. LUMA is in the process of

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<sup>2</sup> The Interruption Cost Estimate (ICE) Calculator is an electric reliability planning tool developed by Lawrence Berkeley National Laboratory (LBNL) and Nexant, Inc.

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surveying CHP customers to collect further information which may yield information and data that warrants a future revision to the current CHP forecast. Should the survey results warrant a CHP forecast revision and a revised forecast can be completed in the near future, LUMA will endeavor to incorporate the revised CHP forecast in the 2024 IRP modeling.

The CHP forecast in the attached file will be added to the appropriate TPA based on the physical location of the CHP customer. LUMA is currently planning to use historical hourly billing data and results for the ongoing survey to allocate future CHP energy impacts to an hourly profile.

e. Electric Vehicle Charging

LUMA plans to utilize the light duty vehicle (LDV) and medium and heavy-duty vehicle (MHDV) electric vehicle (EV) charging impact forecasts developed by the PR100 project team. LUMA believes these PR100 EV forecasts are the most rigorous long-term forecasts of EV charging impacts available and plans to use those results in the 2024 IRP.

The PR100 project team prepared two versions of the LDV EV charging impact forecast, one with limited public charging and another with significant public charging. Both forecasts result in the same energy consumption in 2050 and each has a unique hourly profile. The forecast with significant public charging results in a lower charging load during system peak, which occurs in the evening hours. It is assumed that EV owners will perform more of their EV charging during their workday or other daytime travel. A single MHDV EV charging impact forecast was developed.

The results of PR100 EV forecasts are included in the attached confidential file: *ROI5-EV Charging Forecasts\_Confidential.xlsx*.

DOE and the PR100 project team view this detailed data as confidential until the final PR100 study report is issued. The PR100 project team has provided LUMA with the data and their approval to share the data only with the Energy Bureau for this specific technical conference to assist in the development of the 2024 IRP.

The LDV and MHDV EV charging forecast results will be in the attached file and will be added to the appropriate TPA based on the municipality detail included in the forecast.

### 6. REQUEST

Provide current planned capital costs and fixed O&M cost trajectories for all years across the planning horizon of 2025-2044 for supply resources to be used as options in the IRP modeling. These cost trajectories should capture any changes in capital and O&M costs across the planning horizon. Provide estimated cost trajectories for resources including (but not limited to) the following:

- a. Wind - onshore
- b. Wind - offshore
- c. Solar PV utility scale
- d. Solar PV distributed scale.

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- e. Battery energy storage utility scale - 4-hour duration
- f. Battery energy storage utility scale - 2 -hour duration
- g. Battery energy storage utility scale - 6-hour duration
- h. Battery energy storage - distributed scale
- i. Small combustion turbines or gas turbines
- j. Small reciprocating engines (RICE units)
- k. Other size CT, GT, or RICE units
- l. Combined cycle units

For all cost estimates including sources and the vintage of the estimate. Where feasible provide in Excel file format.

### RESPONSE

The IRP Technical Consultant will review the resource cost estimates developed by the PR100 project team, and, if the cost estimates are found to be consistent with the market trends, LUMA intends to adopt them for use in the 2024 IRP. LUMA considers the resource cost estimates confidential for the same reasons espoused in the previous response. The PR100 cost estimates were primarily drawn from the National Renewable Energy Laboratory (NREL) 2023 Annual Technology Baseline (ATB). The cost data found in the 2023 ATB were escalated to account for the PR100 estimated cost differential between resource projects constructed in the mainland U.S., on which the 2023 ATB cost are based, versus the higher costs expected for projects constructed in Puerto Rico. The PR100 team eliminated from their modeling simple cycle combustion turbines (CT) and combined cycle combustion turbines (CCCT). LUMA plans to include CT and CCCTs in the 2024 modeling and have not yet completed an estimate for these technologies.

The residential distributed solar photovoltaic (DPV) and distributed battery energy storage system (DBESS) were developed based on costs provided to PR100 by the Department de la Vivienda de Puerto Rico (PR Department of Housing). The PR Department of Housing costs were then adjusted for the forecasted technology cost trajectories in the 2023 ATB. The PR100 project team will provide LUMA the cost estimates used for the PR100 forecast of DPV and DBESS for residential and non-residential customers.

The technology cost data was only recently provided by the PR100 team to LUMA by the multiple DOE National labs, which develop the cost estimates. LUMA is in the process of consolidating the PR100 technology cost data and plans to have the IRP technical consultant review the data before LUMA shares the data with the Energy Bureau or the public.

### 7. REQUEST

Provide planned availability for first "new" resource in-service year, and planned allowed pace of installation (e.g., MW/year, for each year of the planning horizon) for each of the resource types considered as options in the IRP modeling.

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## RESPONSE

LUMA plans to use data provided by the 2024 IRP technical consultant for availability for first "new" resource in-service year. The technical consultant has provided the data in Table 2 below as estimates of the expected first year availability.

**Table 2. Estimate of Increase in Forced Outage Rate in First Year of Operation**

Technology	Estimate of Increase in Forced Outage Rate in First Year of Operation
Utility Scale Solar PV – Fixed tilt	2-4%
Utility Scale Solar PV – Single axis tracker	1.5-3%
Wind	1.5-3%
Combustion Turbine	3-5%
Combined Cycle Combustion Turbine	3-5%

The potential pace of installation of projects across Puerto Rico in future years will be based on numerous factors, including but not limited to the availability of a skilled construction workforce, the availability of construction equipment, the availability of equipment and materials. The availability of these key elements in Puerto Rico will vary with the world-wide market demand for these resources and with pace and certainty of current and future projects constructed in Puerto Rico. With a certain and steady pipeline of projects to keep both construction workers and equipment engaged, it is much more likely the needed resource will remain in Puerto Rico to service the steady stream of energy projects which would in turn potentially increase the pace and reduce the costs of construction.

For individual projects, for a utility scale installation, the IRP technical consultant estimated additional capacity of about 5-6 MW per month could be added, based on a schedule for a new solar facility of 12-15 months for a 50-70 MW facility. Numerous projects would be constructed simultaneously in Puerto Rico, however, estimating the potential pace of cumulative energy project construction across the island is not an exercise that LUMA has performed.