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

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| **IN RE:**<br><br>PROCESS FOR THE ADOPTION OF REGULATION FOR DISTRIBUTION RESOURCE PLANNING | **CASE NO.:** NEPR-MI-2019-0011<br><br>**SUBJECT:** Submittal of Updated Implementation Plan in Compliance with Resolution and Order of April 11, 2024 |

**MOTION TO SUBMIT UPDATED IMPLEMENTATION PLAN IN COMPLIANCE WITH RESOLUTION AND ORDER OF APRIL 11, 2024**

**TO THE PUERTO RICO ENERGY BUREAU:**

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

## I. Relevant Procedural History and Background

1. On December 31, 2020, this Honorable Energy Bureau of the Public Service Regulatory Board ("Energy Bureau") issued a Resolution and Order in the instant proceeding ("December 31st Order") ordering the Puerto Rico Electric Power Authority ("PREPA") and LUMA to initiate the work needed to complete the following three tasks: (1) the creation of voltage level maps, (2) the creation of preliminary maps of interconnection capacity, and (3) updating and completing a power grid inventory. *See* December 31 Order at pp. 8-10. The December 31st Order also directed PREPA and LUMA to submit a joint work schedule for each project. *See id*. at p. 10.

2. On January 29, 2021, PREPA and LUMA submitted a *Joint Motion by LUMA and PREPA Submitting Work Plan in Compliance with Resolution and Order of December 31, 2020*, in which they submitted a detailed work schedule on the three tasks identified in the December

31st Order (the "Work Plan"). On February 1, 2021, LUMA and PREPA filed a *Joint Motion by LUMA and PREPA Submitting Corrected Work Plan in Compliance with Resolution and Order of December 31, 2020* in which they submitted a corrected version of the Work Plan.

3. On February 16, 2021, LUMA submitted a revised Work Plan revising the work schedule for the power grid inventory to account for a procurement process needed for the power grid inventory. *See Motion in Compliance with Order Submitting Project Work Schedule Charts and Submitting a Revised Schedule on the Power Grid Inventory* of that date.

4. On July 21, 2021, PREPA informed the Energy Bureau that it had created the voltage level map, uploaded it onto the Electronic Filing Portal for Filing of Distributed Generation Projects, and these had gone live on May 28. 2021 (the "Voltage Level Map"). *See Informative Motion Regarding Voltage Level Maps* filed by PREPA on July 21, 2021.

5. On October 1, 2021, LUMA informed the Energy Bureau that as of September 30, 2021, an interconnection capacity map had been made available for use by any distributed generation ("DG") customers or developers on the lumapr.com website ("Interconnection Capacity Map"). *See* LUMA's *Informative Motion on Compliance with Order on Interconnection Capacity Maps* of October 1, 2021.

6. During 2021, the Energy Bureau held compliance hearings and LUMA submitted presentations for each of these hearings providing updates on the status of the three tasks established by the December 31st Order.[1] On December 8, 2021, LUMA submitted the presentation for the last of these compliance hearings, in which a close out date for all activities/milestones for

[1] *See Motion Submitting Presentation in Anticipation for Compliance Hearing Scheduled for February 10, 2021* filed on February 5, 2021, *Motion Submitting Presentation in Anticipation for Compliance Hearing Scheduled for July 14, 2021* filed on July 9, 2021, *Motion Submitting Presentation for Compliance Hearing* filed on October 7, 2021, and *Motion Submitting Presentation for Compliance Hearing* filed on December 8, 2021.

the power grid inventory was set for 2025. *See Motion Submitting Presentation for Compliance Hearing* filed on December 8, 2021.

7. On May 25, 2022, the Energy Bureau issued a Resolution and Order, notified on May 26, 2022 ("May 26th Order"), requesting additional information and actions in connection with the Interconnection Capacity Map . In the May 26th Order the Energy Bureau recognized that the information submitted by LUMA in the Interconnection Capacity Map was valuable; however, the Energy Bureau also raised the need to include additional information so that a DG proponent could have "sufficient information to interconnect its system in an expedited manner", including additional information on specific elements (e.g., the capacity of service transformer and caliber of secondary existing cables) related to the proposed interconnection location which could be a determining factor for the viability of the immediate installation of the DG. *See* May 26th Order at pp. 1-2.

8. In the May 26th Order, the Energy Bureau then ordered LUMA to: (1) provide more detailed information regarding the localized interconnection capacity, upon request of a proponent, in the interconnection filing platform within ten (10) working days from a proponent's request for this information, including the information specified in the May 26th Order (*see id*. at p. 1, Paragraph 1); (2) by September 30, 2022, expeditiously conduct any necessary processes (e.g., administrative, programing or the like) to update the Voltage Level and Interconnection Capacity Maps simultaneously with the completion of the interconnection of a DG system so that these reflect the most recent information of the state of the system (*see id*. at Paragraph 2); (3) in the meantime and until the process in the foregoing paragraph is completed, update the Voltage Level and Interconnection Capacity Maps at least monthly (*see id*. at Paragraph 3); (4) ensure the maps indicate the date of updating so that the user can use this information in its decision-making

regarding interconnection applications and similar matters (*see id*. at Paragraph 4); (5) submit to the Energy Bureau, on or before June 30, 2022, a detailed implementation plan to achieve compliance with the requirements in the May 26th Order, including a Gantt Chart reflecting the anticipated process to achieve compliance (the "Implementation Plan") (*see id*. at Paragraph 5); (6) submit monthly progress reports regarding the execution of the Implementation Plan on July 30, 2022, and August 31, 2022 (*see id*. at p. 3, Paragraph 6); and (7) submit a final implementation report regarding the matters ordered in the May 26th Order on or before September 30, 2022 (*see id*. at Paragraph 7).

9. On July 30, 2022, in compliance with the May 26th Order and in accordance with an extension requested by LUMA,[2] LUMA submitted an implementation plan detailing the steps to achieve compliance with the requirements in the May 26th Order and including a Gantt Chart reflecting the anticipated process to achieve compliance with such requirements ("Implementation Plan"). *See Motion to Submit Implementation Plan in Compliance with Energy Bureau's Resolution and Order Notified on May 26, 2022 and Request for Modification of Order to Align Timelines in Implementation Plan* filed on that date ("July 30th Motion"). In the July 30th Motion, LUMA also requested the Energy Bureau to modify the timelines for the required tasks under the May 26th Order, including the reporting requirements, to conform with the timelines in the Implementation Plan. *See id*. at p. 4.

10. On April 11, 2024, this Honorable Energy Bureau issued and Resolution and Order ("April 11th Order") taking notice of the Implementation Plan submitted by LUMA on July 30,

[2] *See Motion Requesting Extension to Submit Implementation Plan Required Under Energy Bureau's Resolution and Order Notified on May 26, 2022* filed on June 15, 2022.

2022 and ordering LUMA to submit by May 1, 2024 an updated version of the Implementation Plan, as well as scheduling a Technical Conference for May 20, 2024 at 10:00 a.m.

**II. Submittal of Updated Implementation Plan**

11. In compliance with the April 11th Order, LUMA herein submits its "IDP Implementation Updates". *See Exhibit 1*. In this document LUMA provides the status of the Voltage Level Map, Interconnection Capacity Map and Grid Inventory.

**WHEREFORE**, LUMA respectfully requests this Honorable Energy Bureau to **take notice** of the above and **approve** the Updated Implementation Plan in *Exhibit 1*.

**RESPECTFULLY SUBMITTED.**

I hereby certify that I filed this motion using the electronic filing system of this Energy Bureau and that I will send an electronic copy of this motion to PREPA at lionel.santa@prepa.com, arivera@gmlex.net, and mvalle@gmlex.net and the Independent Consumer Protection Office at hrivera@jrsp.pr.gov.

In San Juan, Puerto Rico, this 1st of May 2024.

**DLA Piper (Puerto Rico) LLC**
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*Exhibit 1*

Updated Implementation Plan

# IDP Implementation Updates

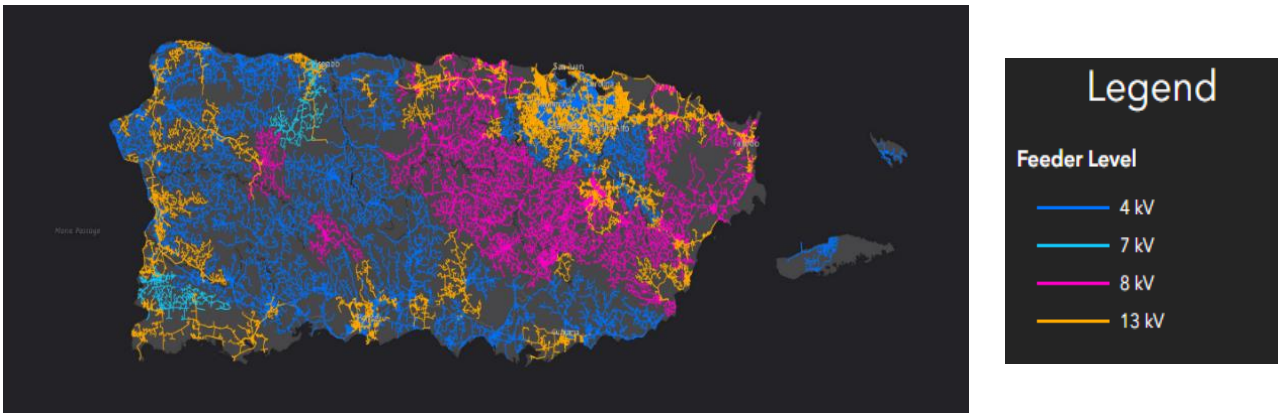
**NEPR-2019-0011**

May 1, 2024

# 1.0 Introduction

The creation of voltage level and interconnection capacity maps holds significant importance in the optimization of Puerto Rico's electric service infrastructure. Under Puerto Rico law, Distribution Generation (“DG”) systems can interconnect to the grid without a need to notify the utility or perform system impact studies. Interconnection capacity maps serve as valuable tools for developers and consumers to plan and execute efficient interconnections, ensuring reliable electricity delivery across Puerto Rico. Interconnection capacity maps serve as valuable tools for developers and consumers to plan and execute efficient interconnections, ensuring reliable electricity delivery across Puerto Rico. By providing a comprehensive visual representation of voltage levels and interconnection capacities, these maps enable stakeholders to identify potential bottlenecks, anticipate system constraints, and strategize for future expansion and upgrades. Additionally, customers and developers will be able to verify the capacity of the electrical distribution system to accommodate their connections before they are required to make capital investments.

The interconnection capacity map also provides guidance to developers and customers to understand the impacts of connecting distributed generation to the system. The information illustrated in the map below corresponds to those circuits whose information was validated by field electrical inspections.




In compliance with the Puerto Rico Energy Bureau’s (“Energy Bureau”) orders issued on the April 16, 2024, Resolution and Order and acknowledging the evolving energy landscape, the number of automatic interconnections that are taking place, and the importance of information being frequently updated and shared through the channels familiar to its customers, LUMA submits an updated version of its implementation plans.

## 1.1 Status

Table 1. Status of Resolution and Order Requirements provides an update on the progress of the hosting capacity maps, as requested by the Energy Bureau in its April 16, 2024 Resolution and Order.

**Table 1. Status of Resolution and Order Requirements**

| ORDER | DESCRIPTION | STATUS |
|---|---|---|
| **1** | **Voltage Level Map** | This map was last updated on April 16, 2024. Beginning in May 2024, updates will occur every second week of the month. |
| **2** | **Interconnection Capacity Map**<br>a) DG Penetration Map<br><br>b) Incremental Capacity (Power Flow based) | This map was last updated on April 16, 2024. Beginning in May 2024, updates will occur every second week of the month.<br><br>The upcoming May 2024 update will include the incremental hosting capacity analysis for 20 additional distribution feeders. |
| **3** | **Grid Inventory:**<br>Provide DG proponent or its representative additional data upon their request and, within 10 business days, additional data is:<br><br>a) Service transformer capacity and aggregated capacity of DG interconnected to the service transformer.<br>If available, size of secondary cable (service drop) capacity. | Available data of 47,500 service transformers out of 196,000 was compiled and updated in the Geographic Information System (GIS).<br><br>A web application to allow stakeholders to retrieve service transformer capacity and the aggregate DG connected to such service transformer was finalized and will be made available via the LUMA web access by May 31st, 2024.<br><br>Service drop data is not yet available. |

# 2.0 Progress to Date

Over the past three years, the demand for the interconnection of Distributed Generation (DG) to the distribution system has increased dramatically. An average of more than 3,000 applications are received, processed, and interconnected monthly by LUMA. As of March 1, 2024, more than 115,000 customers had registered Net Energy Metering (NEM) accounts, with 800 MW of installed capacity interconnected to LUMA's distribution system.

LUMA has been actively enhancing processes and systems to facilitate the integration of rooftop solar installations. Among these enhancements are the following:

- **New DG portal - Portal Connection LUMA**. As of January 2024, LUMA made available the new DG portal, called *"Portal Conexión LUMA,"* to DG proponents (i.e. customers or their representatives). This portal reduces the required documentation to apply for NEM and simplifies the validation and verification process enabling a more efficient process and providing a better interface for easy system navigation.

- **Feeder Model Improvement**. LUMA is in discussions with FEMA regarding the reimbursement of funding to finance and enhance the process of field verification and validation of distribution feeder models. Currently, despite limited funding, LUMA has assembled a technical team dedicated to (i) managing work orders, (ii) walking through the feeder route and assessing asset status, locations, and condition, and (iii) uploading to GIS and G-tech. This source of information will then be reliably converted into the Synergi model. The field verification process began with the worst performing feeders from a reliability perspective in the Mayaguez region. Twenty feeder models were field verified. Use of this field verification process will allow better representation of distribution system assets, hence improving the modeling of it. This will allow better visibility of the impact of DER integration and, at the same time, will provide updated information to customers about their immediate electrical infrastructure.

- **Enhanced load and DG data analysis – [1]NEMGIS**. An enhanced data analysis process was completed (NEMGIS) which extracts data from GIS, CC&B, legacy DG Portal, and *Portal Conexión LUMA*, matching customers with DG with service transformer number and service transformer with feeder number. The annual feeder peak demand is extracted from Pi Historian and fed into LUMA's web application, which will provide customers or its representative, service transformer and aggregated DG data. This effort will allow expedited updates for the Grid Inventory web application.

## 2.1 Updates on Voltage Level Maps

The voltage level map displays every feeder in a map highlighting at which voltage level (i.e., 4.16kV, 4.8kV, 7.2 kV, 8.32kV, or 13.2kV) each feeder is operated. Beginning in May 2024, the voltage level map will be updated every second week of each month. A change in feeder voltage class (e.g., from 4 kV to 13.23 kV) will be reflected in the following monthly update.

[1] NEMGIS: Process to compile DER GIS-related information. Portmanteau of abbreviations NEM (Net Energy Metering) and GIS (Geographical Information System).

## 2.2 Updates on Interconnection Capacity Maps

Potential system improvements at the primary voltage level[2] can be observed through the Interconnection Capacity Maps, which provide information to DG proponents or their representatives regarding areas where DGs could have a significant impact in the operation of the system and, thus, require investments in system upgrades. The Interconnection Capacity maps also aid distribution planners to opportunely recognize potential needs for system mitigations. However, these maps do not replace the obligation to perform distributed generation interconnection system impact studies. An interconnection system impact study identifies system violations and the required mitigations.

Within the Interconnection Capacity Mapping process, LUMA has enabled the following:

### 2.2.1 DG Penetration Map

The DG penetration results for a given circuit represent the percent of existing and queued-ahead DER, as a ratio to the peak load of the same circuit, as established in Regulation 8915, "*Reglamento para Interconectar Generadores con el Sistema de Distribución Eléctrica de la Autoridad de Energía Eléctrica y Participar en los Programas de Medición Neta*". The aggregate capacity of existing DG compared with the feeder peak demand is calculated as follows:

$$DG\% = \frac{DG_{existing}(MW)}{Feeder\ Peak\ Load(MW)}$$

A 15% threshold[3] is used to evaluate the feeder capacity to interconnect additional DGs. LUMA color coded feeders based on DG penetration percentages providing signals of potential areas or feeders suitable for solar PV installation without risk of triggering the need for supplemental studies or system upgrades, as shown in Table .

**Table 2. DG Penetration Map – Color Code Display**

| DG % CRITERIA | COLOR CODE |
|---|---|
| DG < 10% | Green |
| 10% ≤ DG < 15% | Yellow |
| 15% ≤ DG | Red |

The last quarterly update was published in March 2024 and revised on April 16th. Beginning on May 2024, the DG Penetration Map will be updated every second week of a month.

Feeders whose DG penetration factor has changed will be flagged and the corresponding map will be updated in accordance with the cadence described above. Appendix A illustrates the process for updating the DG Penetration Maps.

[2] Primary voltage level: This refers to the Utility (high) voltage side in a service transformer. If a customer is served by a 13.2 kV(primary) / 208/120V (secondary) service transformer, the primary side would be the 13.2 kV side.

[3] "Criteria for Supplementary Study," as established in Regulation 8915 "Reglamento para Interconectar Generadores con el Sistema de Distribución Eléctrica de la Autoridad de Energía Eléctrica y Participar en los Programas de Medición Neta"

### 2.2.2 Incremental Capacity, a power flow base Map.

Hosting capacity is an evolving concept that directly depends on updated, reliable, and accurate GIS and technical data. LUMA uses the Incremental Capacity Analysis (ICA), a deterministic approach. For each system bus (feeder segment or node), a current injection representing the DG is input into that bus, and iteratively increased in a preset step, performing a load flow calculation at each step. For each calculation, the chosen operating limits are checked. In the process of increasing the DG current injection, these operating constraints are monitored until a limit is exceeded, at which point the DG injection is the hosting capacity at that bus.

This method is used for those circuits with validated models suitable for simulation and analysis with power systems analysis software tools. In this case, Synergi Electric. This map layer is named *Incremental Hosting Capacity*.

LUMA has assembled a technical team dedicated to (i) managing work orders, (ii) walking through the feeder route and assessing asset status, locations, and condition, and (iii) uploading to GIS and G-tech. This information will then be reliably converted into the Synergi model. The field verification process began in the Mayagüez region with the feeders with the most interruptions or outages during a given period. Twenty feeder models have been field verified and will be processed for Incremental Hosting Capacity evaluation and mapping.

The Incremental Hosting Capacity analysis will be performed monthly and the incremental hosting capacity maps will be updated based on the following feeder change criteria:

- When a feeder model is field inventoried and GIS data is updated.
- Existing modeled and studied feeder modifies its topology characteristics. One or more of the below characteristic changes will be considered as topology modification:
    - A permanent load transfer takes place.
    - Completion of system upgrades, such as: three-phasing, reconductoring, voltage regulation equipment installation, substation power transformer change, feeder voltage level changes to higher level (i.e., from 4 KV to 13.2 kV).
    - A spot load (P>500 kW) is interconnected or disconnected. No feeder organic load growth will cause map updates.
- Aggregated DG increases to 500 kW capacity or above.

## 2.3 Update on Inventory of the Power Grid

As identified by the Energy Bureau, the data pertaining to the Energy Bureau's Resolution and Order dated May 25, 2022 in Case No. NEPR-MI-2019-0011 focused on the service transformer and aggregated DG capacity connected to it. To comply with this order, LUMA developed a system (NEMGIS) that retrieves data from several data sources such as GIS, Customer Care & Billing, legacy DG Portal, Portal Connection LUMA (enhanced DG Portal), Pi Historian, and distribution system operations (load transferring tracking).

The NEMGIS matches the service transformer ID to the feeder ID number, and DG matches to service transformer ID number, allowing processing DG penetration per service transformer ID and feeder ID.

LUMA created a web-based application that will identify and confirm the identity of the DG customer or their representative. Upon confirmation, the web application will display the service transformer capacity and aggregated DG connected to it. The requested data, if available, will be displayed automatically and

instantaneously. If no data is available, it will be instantaneously notified to the customer or their representative. NEMGIS data will be the source of data for the web application.

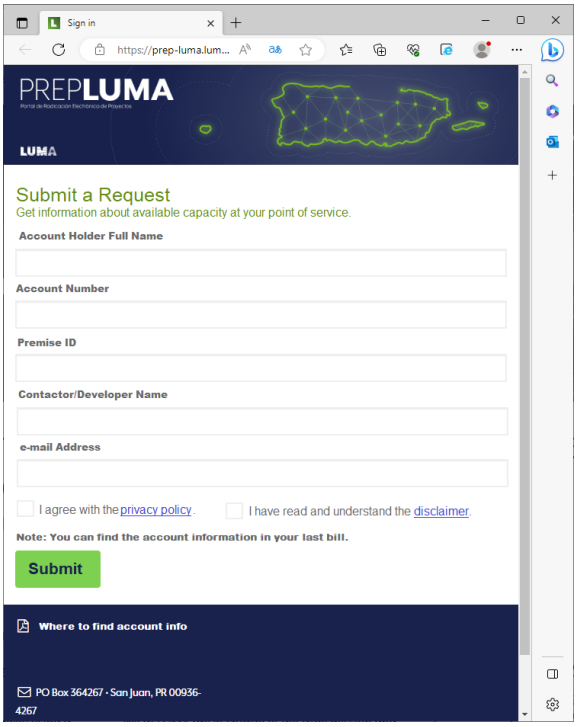



**Figure 1. Authentication Page**

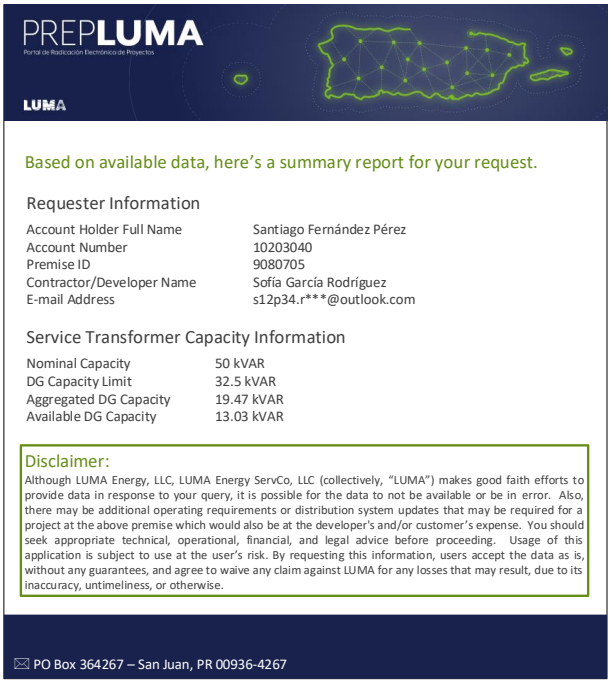



**Figure 2. Service Transformer Data Report**

The data processing architecture begins with NEMGIS retrieving data from the above-mentioned data lakes and feeding processed data to a database that will support a web-based application to interphase with the DG proponent or their representative. The flow diagram is depicted in Appendix B.

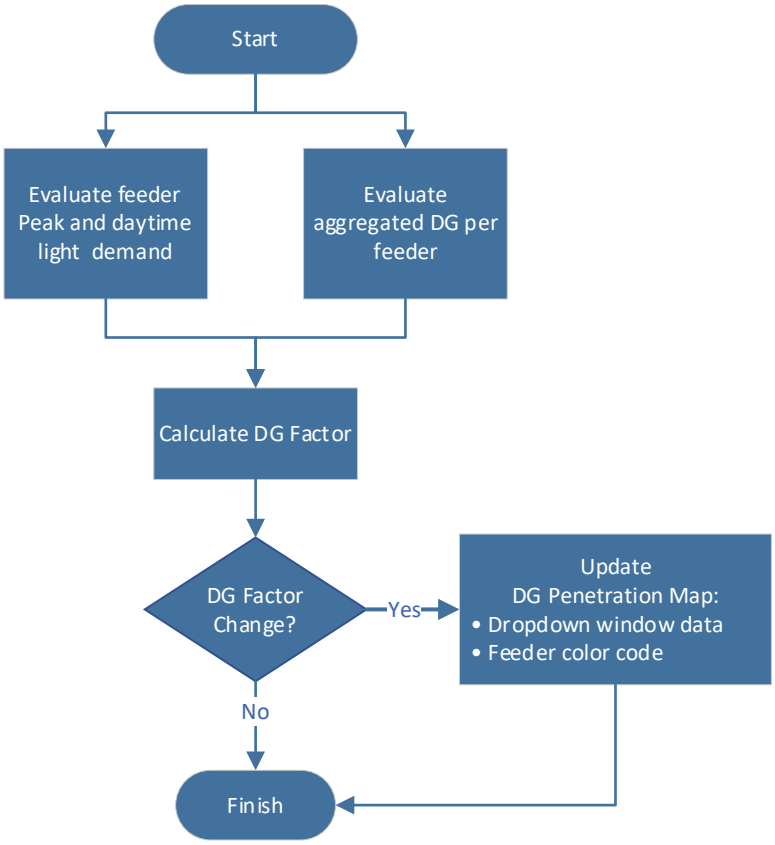
This web-based application is the gateway for DG proponents to access information for their interconnection projects. The web application will be hosted and presented in LUMA Web as shown in Figure 1 for the authentication page and Figure 2 for the reporting page.

The background process to validate and report the available capacity is depicted in Appendix C Processing requests from a DG customer- Request in the DG Info Page. Given the significant data retrieval and processing requirements, NEMGIS is designed to programmatically be updated every first week after the month in which data is being analyzed for, thus the processed data will be between one and thirty days old, with a median of fifteen days.

# 3.0 Plans and Updates Frequency

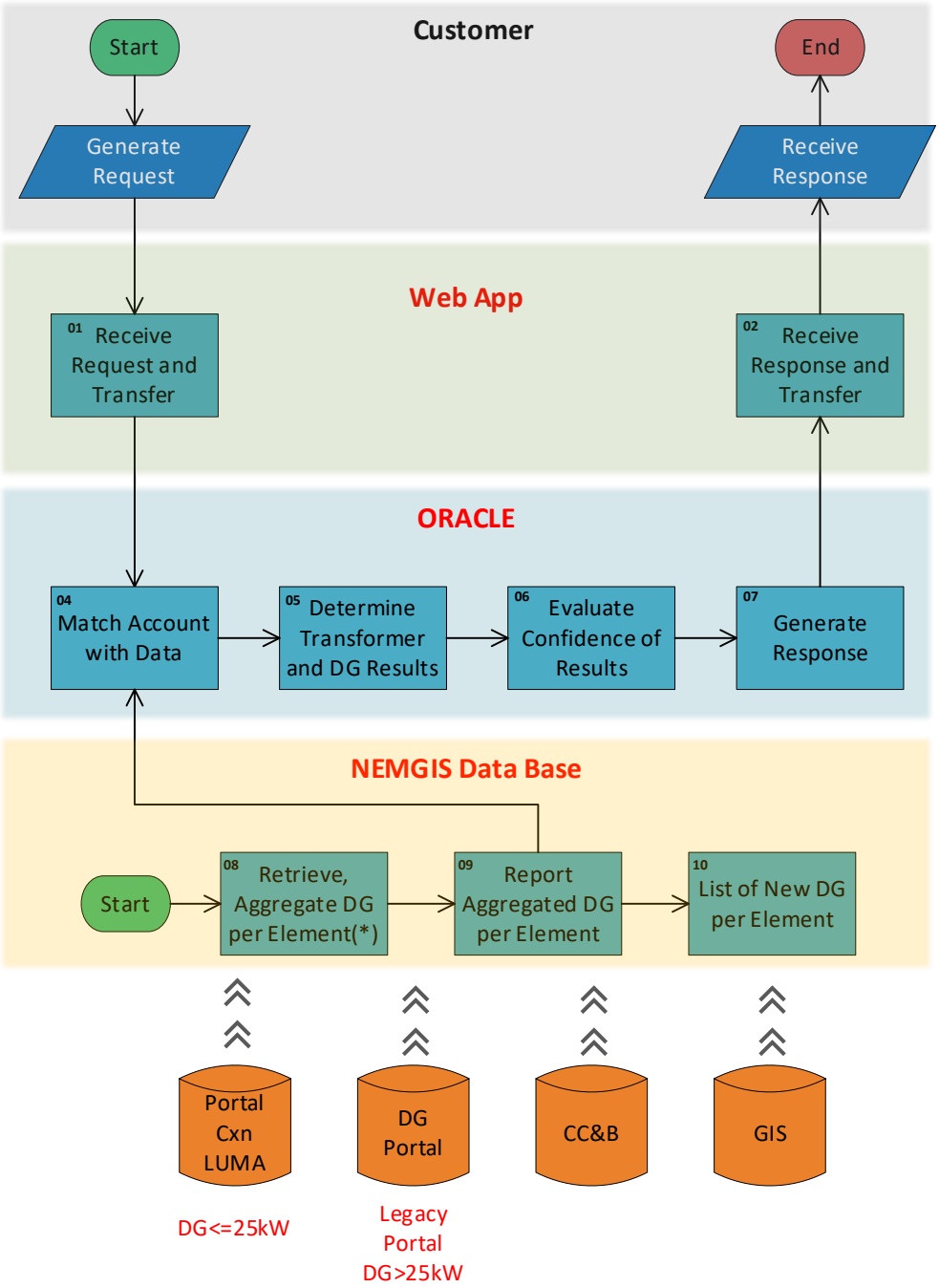
LUMA is actively pursuing enhancements to the update frequency of the Grid Inventory web application. Presently, a component of this application is contingent upon certain CC&B (Billing platform) routines that undergo monthly updates and are essential to the functionality of the web application. LUMA is continually exploring alternative solutions that would facilitate more frequent updates to the web application. As these improvement opportunities are identified, a detailed plan describing the scope, timeline, and budget will be formulated and implemented.

# Appendix A: DG Penetration Map Update Process




This flowchart shows the DG Penetration Map Update process. Every month, LUMA evaluates the feeder penetration based on demand and the additional DG capacity installed at the specific feeder, the DG Penetration as per the formula in Section 2.2.1 is calculated. The results then are updated in the customer-facing maps available on LUMA's website.

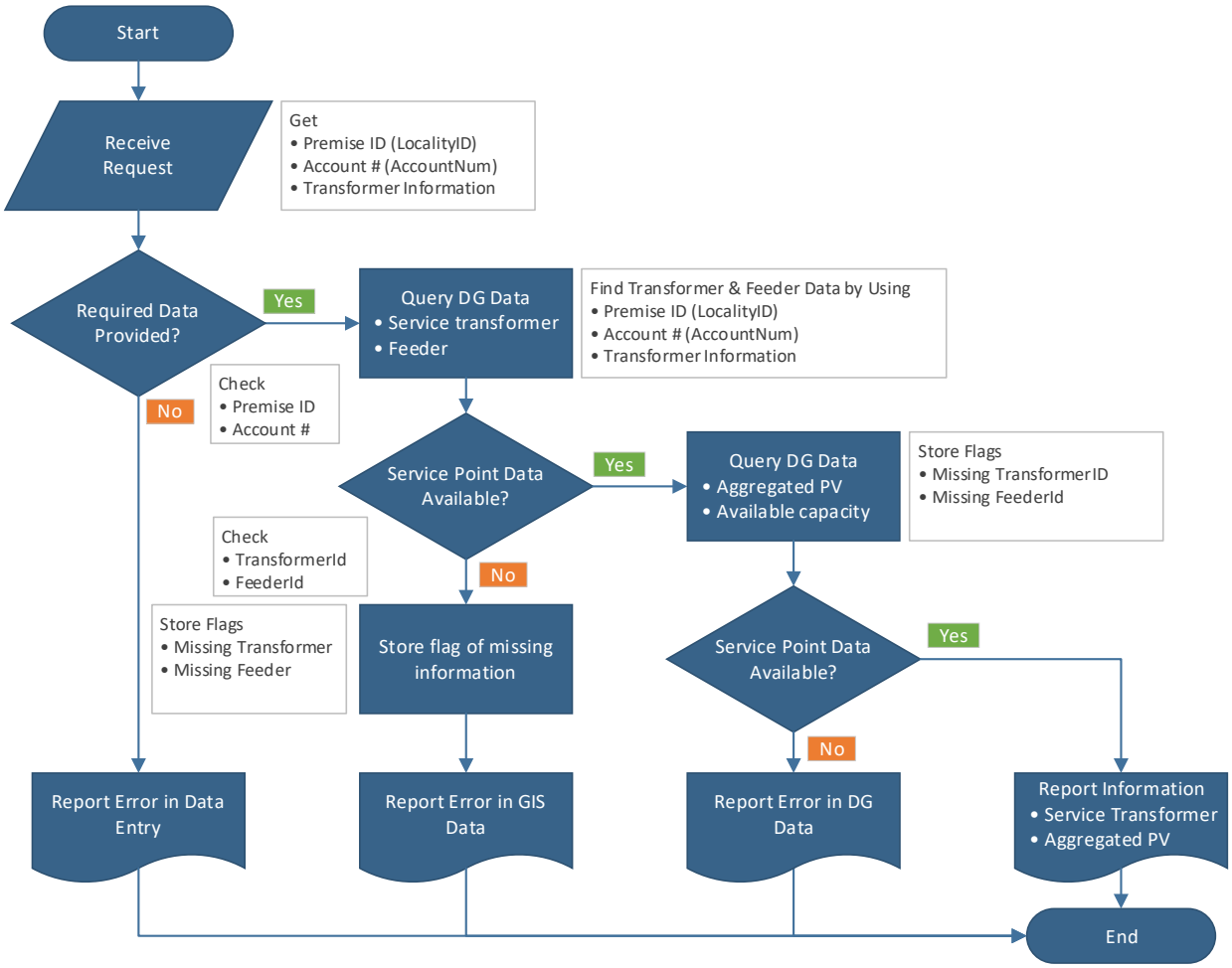
# Appendix B: Conceptual Data Processing Architecture - Service Transformer Data




The flowchart shows the functional process for the Grid Inventory web application. This application will provide customers with Service Transfomer data. This information, coupled with the feeder penetration data, will allow customers and developers to make informed decisions about potential DG installations in a particular service area.

The web app works with a combination of relational databases, which are the NEM application portal, CC&B platform (Billing), and the GIS system; each of these databases provides critical information for the final output of the web app. Both databases are combined in a compiled dataset called NEMGIS. This database is then used to answer queries made by customers through the web app. The NEMGIS database is updated monthly, with all the updates that the original database has incurred in the previous month.

# Appendix C: Processing requests from a DG customer- Request in the DG Info Page




The flowchart above illustrates an expanded view of the process that occurs in steps 4-6 of Appendix B: Conceptual Data Processing Architecture - Service Transformer Data. It shows the data verification process, starting with the user-required input, which is the Premise ID and Account Number, information available in the customer's monthly bill. The web app will then take this information and query the NEMGIS database for Service Transformer and Feeder data. If information is available, it will verify for aggregated DG capacity data at that location. If information is available, it will provide an output in a report format, as shown in Figure 2 in Section 2.3. If information is not available, it will then display an error or missing information data message.