NEPR

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**Sent:** Saturday, July 30, 2022
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**GOVERNMENT OF PUERTO RICO**
**PUERTO RICO PUBLIC SERVICE REGULATORY BOARD**
**PUERTO RICO ENERGY BUREAU**

| | |
|---|---|
| **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 Implementation Plan In Compliance with Energy Bureau's Resolution and Order notified on May 26, 2022 and Request for Modification of Order to Align with Timelines in Implementation Plan |

# 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 WITH TIMELINES IN IMPLEMENTATION PLAN

**TO THE PUERTO RICO ENERGY BUREAU:**

**COME NOW, LUMA ENERGY, LLC** as Management Co., and **LUMA ENERGY SERVCO, LLC** (collectively, LUMA), through the undersigned legal counsel and respectfully state and submit the following:

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 ordering the Puerto Rico Electric Power Authority ("PREPA") to create voltage level and interconnection capacity maps ("December 31$^{st}$ Order"). *See* December 31 Order at p.1. The interconnection capacity maps were required to contain, at a minimum, the basic information to maintain potential project proponents informed of the current state of the feeders to which they intend to interconnect. *See id*.

2. On October 1, 2021, in compliance with the December 31$^{st}$ Order, LUMA informed this Energy Bureau that as of September 30, 2021, interconnection capacity maps had been made available for use by any customers or DG developers on the lumapr.com website. *See* LUMA's

*Informative Motion on Compliance with Order on Interconnection Capacity Maps* of October 1, 2021.

3. After other procedural events, 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 maps submitted by LUMA on September 30, 2021. In the May 26th Order the Energy Bureau recognized that the information submitted by LUMA in the interconnection capacity maps was valuable; however, the Energy Bureau also indicated that it would be useful as a determining factor for the viability of the immediate installation of a DG to have additional information on specific elements (e.g., the capacity of service transformer and caliber of secondary existing cables) related to the proposed interconnection location. *See* May 26th Order at pp. 1-2.

4. 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) ("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 ("Paragraph 2")); (3) in the meantime and until the process in Paragraph 2 is completed, update the voltage level and interconnection capacity maps at least monthly (*see id*. at Paragraph 3) ("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) ("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 ("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 ("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 ("Paragraph 7")).

5. On June 15, 2022, LUMA requested this honorable Energy Bureau an extension until July 29, 2022 to submit the Implementation Plan required under Paragraph 5 of the May 26th Order. *See Motion Requesting Extension to Submit Implementation Plan Required Under Energy Bureau's Resolution and Order Notified on May 26, 2022* of that date. As noted in the extension request, LUMA stated that after completing the development of the Implementation Plan, LUMA would be able to provide an update on the additional deadlines established in the May 26th Order.

6. In compliance with Paragraph 5 of the May 26th Order and in accordance with the June 15th Motion, LUMA herein submits the 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. *See* Exhibit 1.

7. As noted in Section 1.0 Project Cost of the Implementation Plan in Exhibit 1, the May 26th Order was issued after LUMA developed and submitted the Fiscal Year 2023 Budgets

in Case No. NEPR-MI-2021-0004, LUMA Initial Budgets and Related Terms of Service, and therefore, the tasks contemplated in the Implementation Plan currently do not have an allocated budget. As a result, compliance with Paragraphs 1, 2, 3 and 4 in the May 26th Order will require LUMA to spend money that has not been budgeted for in Fiscal Year 2023, and will result in other, higher priority, activities being delayed. LUMA includes in Section 5.0 of the Implementation Plan, several Gantt charts that outline the weekly tasks required to complete the work.

8. Based on the description provided in the Implementation Plan of the extensive work and multiple steps required to complete the required tasks under the May 26th Order and as shown in the Gantt charts, the estimated timeline to complete the tasks under Paragraphs 1, 2, 3 and 4 of the May 26th Order is months long. Therefore, the deadline of September 30, 2022 established in the May 26th Order for compliance with Paragraph 4 and for submittal of a final implementation report under Paragraph 7 (which appears to be based on the assumption that all the tasks in the May 26th Order will have been implemented by such date) cannot be possibly achieved. For the same reasons, the deadlines to submit the progress reports relating to the Implementation Plan established in Paragraph 6 of the May 26th Order are not aligned with these estimated timelines. Therefore, LUMA respectfully requests this honorable Energy Bureau to take notice of the above timelines and modify the May 26th Order to align with the timelines in the Implementation Plan. LUMA will inform this honorable Energy Bureau once it confirms a funding source to execute the Implementation Plan and provide a proposed start date for the activities based on the funding availability date.

**WHEREFORE,** LUMA respectfully requests that the Energy Bureau **take notice** of the aforementioned; **accept** the Implementation Plan in Exhibit 1 herein; **deem** LUMA in compliance with the requirement to submit this Implementation Plan under Paragraph 5 of the May 26th Order; and **modify** the May 26th Order to align with the timelines provided in LUMA's Implementation Plan.

**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 the attorneys for PREPA, Joannely Marrero-Cruz, jmarrero@diazvaz.law and Katiuska Bolaños-Lugo, kbolanos@diazvaz.law.

In San Juan, Puerto Rico, this 29th day of July 2022.

DLA PIPER

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Exhbit 1

Implementation Plan

# Voltage Level and Preliminary Interconnection Capacity Maps Additional Data

## Implementation Plan

NEPR-MI-2019-0011

July 29, 2022

# Contents

# Introduction

LUMA is dedicated to building a more reliable, more resilient, more customer-focused and cleaner energy system for all of Puerto Rico. Since assuming operations of the transmission and distribution system in June 2021, LUMA has been working closely with stakeholders to accelerate the adoption of home solar and empower the growth of renewable energy across Puerto Rico. Integrating renewable resources brings important opportunities and challenges. LUMA understands the goal of delivering system visibility and in this case, by providing useful grid information to Distributed Energy Resources (DER) developers and our customers. Hosting capacity information can assist DER developers and customers in targeting areas where distributed generation (DG) integration may be safer and more cost-effective.

In the past 14 months, LUMA has observed a high demand for DG and DER interconnection to the distribution system. In compliance with Law 17 which establishes the new energy policy for Puerto Rico, LUMA has been updating and enhancing legacy business and operating processes to establish a Transmission and Distribution (T&D) system that maximizes the integration of DG and DERs while improving its reliability and resiliency. Some of the activities include enhancing the DG interconnection process resulting in the integration of more than an average of 120 DG cases daily, developing the transition period plan Demand Response and Energy Efficiency, and developing a Phase I Electric Vehicle Infrastructure Deployment Program, actively providing comprehensive inputs to the New Interconnection Regulation including a Technical Interconnection Requirements (TIR) document which includes the adoption for smart inverters and advanced control settings to support voltage performance at the distribution level. These activities will potentially increase the distribution system hosting capacity and ability to integrate DG in a safe and timely manner.

Initiatives and improvements at the distribution system level are not enough to maintain the overall system capacity and capability to manage the integration of renewable resources while enhancing system reliability and implementing resiliency projects. The modernization of the transmission system, plays a significant role since it will control the system frequency and voltage stability through existing, legacy, rotating machines and future new technologies, including the utility scale Battery Energy Storage System integration. As a result, LUMA updated the transmission system steady state models and will update the time domain (dynamic) models for sound studies and mitigations analysis. Those updated models are the basis of feasibility and impact studies for the Tranche 1 utility scale renewable interconnection process. In addition, LUMA has been actively collaborating with the Department of Energy (DOE) Puerto Rico 100 (PR100) and with the National Renewable Energy Laboratory (NREL) onshore and offshore wind studies by providing an updated steady state model and inputs to the study process.

To facilitate the deployment of DG, LUMA publicly shares information with developers and customers with the goal of decreasing their upfront cost to make electricity more affordable. In compliance with the December 31, 2020, Resolution and Order issued by the Energy Bureau, LUMA published on September 30, 2021, three maps: (i) "Voltage-Level" (ii) "DG Penetration" and (iii) "Incremental Hosting Capacity." The Voltage-Level map color codes distribution feeders based on the primary voltage level, the DG Penetration map evaluates the aggregated DG compared with feeder peak demand, and the Incremental Hosting Capacity map is based on feeder power flow modeling (in the Synergi Program) and is planned for those distribution feeders whose models have been field certified or inventoried. The maps were made available in a single access location with different views for better assessment of potential DG applications. The maps are public for customers or DG developers on the lumapr.com website. LUMA has updated the maps every quarter since the first publication in September 2021.

Upon review of legacy data and systems, LUMA identified a significant gap caused by lack of data maintenance and emergency changes after Hurricane Maria and Irma (e.g. Customer ID matched to service transformer; service transformer matched to Feeder ID, among others that will be detailed in Section 3.0 below).To overcome and bridge the data gap, LUMA will initiate the Preliminary Engineering Data Collection (PEDC) project to inventory and assess the distribution system layout and equipment connectivity. The collected data will update the legacy Geographic Information System (GIS) data. The collected and inventoried data is crucial to match system elements (e.g., service transformer ID) to feeder section phasing and feeder ID, which is necessary data for managing the DG interconnection process, engineering studies and design, distribution planning, and system operations. The data collection includes distribution feeders, circuit breakers, primary system equipment (poles, switches, cap banks, etc.,) and service transformer data.

Any missing data related to the additional information requested in the Resolution and Order issued May 26, 2022, in NEPR-MI-2019-0011 ("May 26 R&O") will be gathered under the scope of large-scale data collection effort underway called the Preliminary Engineering Data Collection (PEDC) project. Until the PEDC project is complete, LUMA will not have all the information necessary to comply with the May 26 R&O.

This document provides the LUMA workplan to include additional information and increase the frequency of updating the DG Penetration Map to the existing DG Interconnection map (DG Penetration map). The plan will be undertaken across two orders, set out below, in accordance with the May 26 R&O.

[1] NEPR-MI-2019-0011 voltage level maps and preliminary interconnection capacity maps. Resolution and Order.

# 1.0 Project Cost

LUMA has prepared an estimate of the cost to implement the orders in the May 26 R&O included in Table 1-1 below. The May 26 R&O was issued after LUMA submitted the Fiscal Year 2023 budget in Case No. NEPR-MI-2021-0004, *LUMA Initial Budgets and Related Terms of Service,* and therefore, the tasks contemplated in this plan currently do not have allocated budget. As a result, the orders will require LUMA to either spend money that has not been budgeted for in Fiscal Year 2023 or, other approved projects could be reprioritized and delayed.

As a result of the above, the schedules included in this plan are considered contingent on funding. The GANTT charts included in Section 5.0 are designed with weekly durations to reflect the project kick-off plus “x” number of weeks required to complete the work. The start date for the work will be established once a funding source is determined.

**Table 1-1. Project Costs**

| Task Description | Budget |
|---|---|
| Order 1: Service transformer and DG data process enhancement | $ 223,978 |
| Order 2: Short-Term Improvement – DG Penetration Quarterly to Monthly Updates | $ 119,381 |
| Order 2: Mid-Term Improvement – DG Penetration Monthly to Weekly Updates | $ 86,117 |
| Order 2: Long-Term Improvement – IHCA Map Process Enhancement | $ 120,490 |
| **Total Implementation Cost** | **$ 549,965** |

# 2.0 Data Requirements

The May 26 R&O requires providing additional information to DG developers and customers and updating voltage level and Interconnection Capacity map in the terms specified in Table 2-1.

**Table 2-1. New Resolution and Order Requirements**

| Order | Description |
|---|---|
| **1** | Provide DG developers/owners additional data upon their request and, within 10 business days, additional data is:<br>a) Service transformer capacity where DG developer plans to interconnect.<br>b) The aggregated capacity of DG to interconnect or to be interconnected to the service transformer.<br>c) If available, size of secondary cable (service drop) capacity. |

| | |
|---|---|
| **2** | Update voltage level maps and interconnection capacity maps simultaneously once the DG system interconnection process is completed. |
| **3** | Update the maps mentioned above every month during the implementation of Orders 1 and 2. |
| **4** | Maps will include dates on which they were updated. |

# 3.0 Current Data and Process Limitations

## 3.1 Service Transformer and DG Data

Power utilities' customer data management and GIS systems must maintain the electrical digital connectivity (i.e. match) between each Customer and their service transformer, to the primary feeder, and the secondary side (BUS) of the high to medium voltage (HV/MV) substation feeding them. This is a basic system function that allows the utility to map where customers are located on the circuit, among other things. Ideally, a well-defined data management and data maintenance process contains:

- A Customer account ID matched to the premise ID
- A DG capacity matched to the Customer account ID
- A premise ID matched to the service transformer ID
- A service transformer matched to the feeder ID
- A feeder ID matched to the substation's secondary side (BUS)

The legacy data in Puerto Rico has data gaps and deficiencies that prevent matching/mapping each Customer to the primary BUS of the Substation where the Customer is connected. This means that with the current data, determining the aggregated DGs connected to a service transformer is not reliable, and determining the aggregated DGs per distribution feeder is not reliable.

The legacy GIS data contains around 40% of service transformer data but the data has been analyzed and deemed unreliable, and the remaining 60% of service transformer data is not recorded in the GIS system which prevents LUMA from completing the full electrical digital connectivity. Important data gaps associated with the implementation of the May 26 R&O are summarized in Table 3-1.

**Table 3-1. Existing Data Gap Assessment**

| Item | Required Data | CC&B | GIS | DG Portal | GAP |
|---|---|---|---|---|---|
| 1 | Customer ID | Yes | | | |
| 2 | DG capacity | | | Yes | |
| 2 | Premise ID | Yes | Yes | Yes | |
| 3 | Service transformer capacity | | Yes | | ~40% is existent but not reliable<br>~60% of data is missing |
| 4 | Secondary drop (cable/conductor data) | No | No | No | Not recorded |

*Note: No secondary drop (cable or conductor data connecting a customer meter from the service transformer) is recorded in the existing legacy systems.*

Although the Premise ID data is a common data element across the systems, around 20% of the matching data is non-existent, and the available 80% of the matching data is not reliable. Between the non-existent and non-reliable data above, matching data presents an even greater data gap as summarized in Table 3-2. The current plan targets to enhance the business processes and implement and adapt tools to expedite the data process, but this plan will not result in inventory data information as this data will be collected by the PEDC project.

**Table 3-1. Data Match Summary**

| Item | Data Match | CC&B | GIS | DG Portal | GAP |
|---|---|---|---|---|---|
| 1 | Customer ID matched to premise ID | Yes | Yes | No | Unreliable |
| 2 | DG capacity matched to premise ID | No | Yes | Yes | Also, in DG Portal |
| 2 | Premise ID matched to service transformer | No | Yes | No | ~80% of premise IDs are matched to service transformer but are not reliable<br>~20% of premise IDs are not matched to the service transformer |
| 3 | Secondary drop data matched to a Customer ID | No | No | No | Non-existent data |
| 4 | Secondary drop data matched to service transformer | No | No | No | Non-existent data |

The number of DG interconnection applications has increased, reaching approximately 2,500 per month. It represents more than 120 cases a day. It would be impractical and cost-prohibitive to plan and perform field inspections to improve the non-reliable data or collect the non-existent data (e.g., service transformer ID). The PEDC project will close those data gaps.

As indicated above, LUMA will initiate the PEDC project to collect and assess the distribution system from the low-voltage side of the substation transformer down to service transformer data. The collected data will identify:

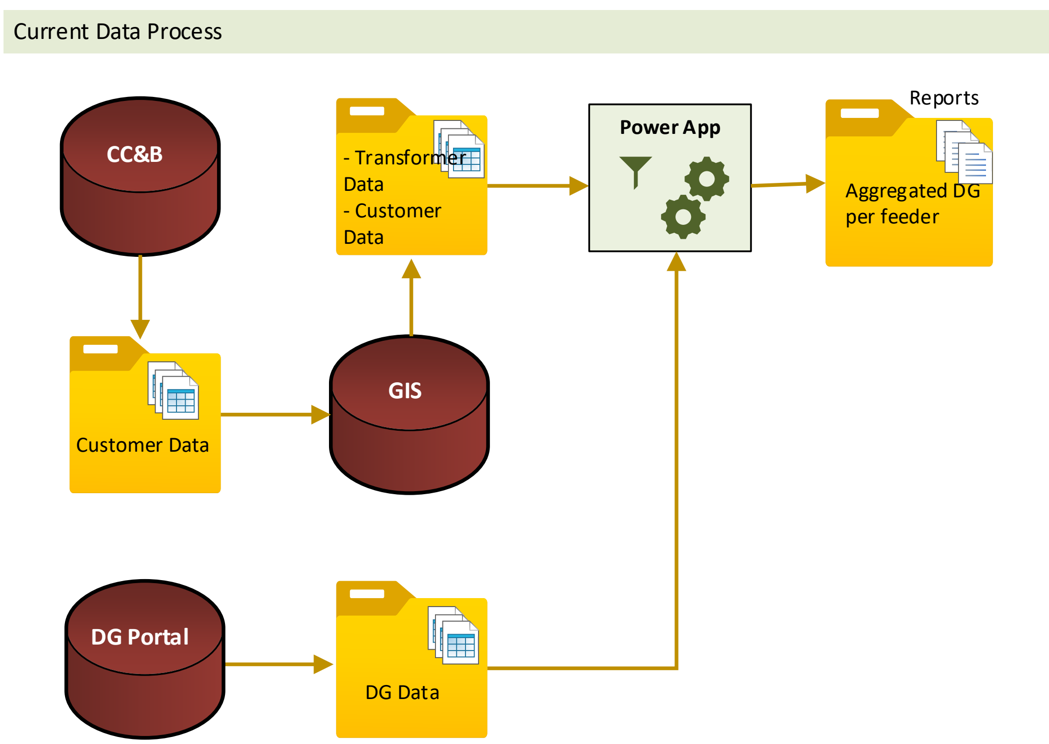
- The service transformer ID, location, and capacity

- The service transformer ID matched to a feeder-section ID
- The feeder-section ID matched to a phasing (A, B, or C) ID
- The feeder-section ID matched to a feeder ID
- The feeder ID matched to a substation BUS ID

As the PEDC project progresses, data will be updated in GIS. The updated data will therefore be available and reliable to process. Given that service drop data is unavailable, it cannot be included in the data-sharing process with DER developers and DG developers and customers.

In order to enable the expedited DG interconnection process, LUMA initially developed a Power App application to process legacy GIS and DG Portal data to match service transformer ID and capacity with aggregated DG data. The Power App application allows evaluation of whether a DG application will trigger a supplemental study or not. The evaluation requires manual data extraction and evaluation. Figure 1 shows the current process so that potential enhancements outlined later in this plan can be compared to the current state.

**Figure 1. Current Transformer and DG Data Process**



## 3.2 Interconnection Capacity Map

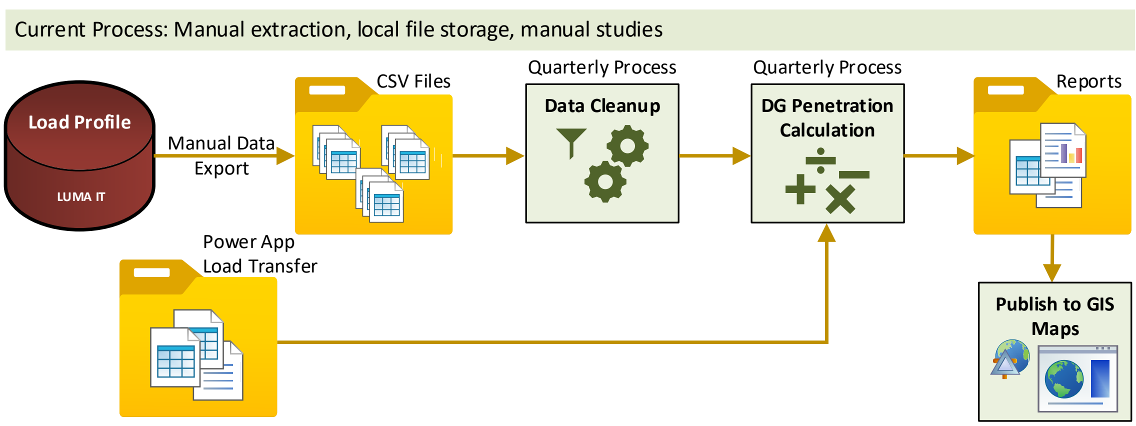
An overview of the current analysis and mapping process currently published by LUMA is as follows:

a) **Voltage Level Map:** A feeder voltage conversion project (example, from 4 kV system to 13 kV voltage class) will trigger the need to update this map. As any distribution system improvement works, the feeder voltage conversion work is updated to GIS. The new feeder voltage class is updated in GIS and triggers the voltage level map update.

b) **DG Penetration Map:** Each day, between 120 DG projects are interconnected and enabled by net metering service. The dynamic evolution of DG interconnection modifies the amount of aggregated DG per feeder daily. Analysis of the rudimentary load profile collected from legacy equipment and systems (i.e., single-phase feeder load readings) indicates feeder peak and minimum demand are mostly modified when load transferring occurs and aggregated DG increases.

   The current DG penetration analysis process, depicted in Figure 2 below, comprises seven manual steps. The study and mapping are executed every quarter and require around three weeks and seven engineers to process it and post it on the DG Interconnection Capacity Map.

**Figure 2. Current DG Penetration Calculation Process**




c) **Incremental Hosting Capacity Map:** Set to be evaluated and processed only when field certification/inventory of a distribution feeder is complete and updated in GIS with topology and equipment (currently 68 feeders). As the PEDC project progresses, the number of distribution feeders to be evaluated through the Incremental Hosting Capacity Mapping process will steadily increase every month.

# 4.0 Enhancement Plan

## 4.1 Service Transformer and DG Data

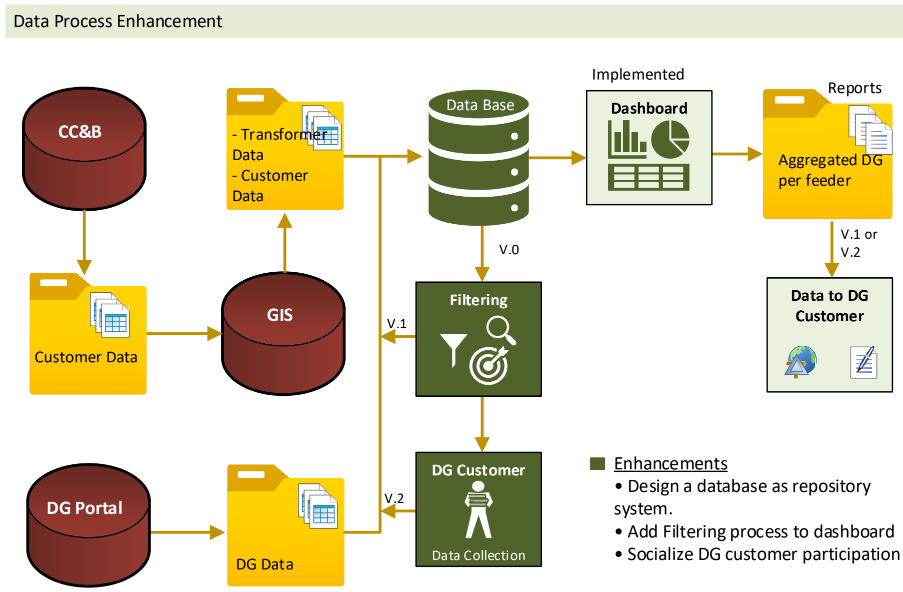
Using the legacy databases, LUMA is currently developing a dashboard with the ability to identify service transformers, their capacities, and the aggregated DG connected. The dashboard, among other uses, will allow for GIS data collecting and processing (i.e., service transformer ID, location and capacity, and premise ID) and DG Portal (i.e. premise with DG ID, DG capacity). A matching process will run to identify the service transformer servicing a customer with DG, thus providing an aggregated DG. The specifications of the dashboard will be revised to reflect and consider the May 26 R&O requests.

A data repository capable of tracking data status and sources will be designed and implemented. It will be complemented with a filtering process (see Appendix 1) capable of qualifying data as reliable or non-reliable. The reliable data will be available for DG Customers to view and use as appropriate. The non-reliable data will be shared with a disclaimer noting the data is for reference only, and future field inventory work (PEDC) will update the data. It is important to note (and as stated in Section 3.0) that most of the existing legacy data is non-reliable or non-existent. As a result, LUMA anticipates the majority of cases will be flagged as non-reliable.

While planning to initiate the PEDC project is in progress, an interim data collection process will be designed where LUMA will engage DG developers and customers to collect basic data from the field during site visits. At the same time, they perform feasibility, planning, engineering, and designing an evaluation of a DG project. The process will be called the "Customer Participation Process." The process will account for safety precautions during data gathering. The feasibility of service drop data collection will be discussed and evaluated with DG developers and customers. If safe, it will be included in the Customer Participation Process. Similar experiences in other jurisdictions indicate that LUMA can anticipate a positive response from DG developers and customers.

A web-based tool will be designed and developed. DG developers and customers seeking data will have access to the LUMA web portal, enter Customer-authorized information (i.e., Customer account ID and premise ID), and collect available data. If data is not reliable or available, a note will be displayed inviting them to collect it during their site visit by themselves. Figure 3 depicts the enhanced process.

**Figure 3. Enhanced Transformer and DG Data Process**




## 4.2 Interconnection Capacity Map

The existing process and tools will progressively be enhanced and automated to reduce processing and design time dedicated to collecting data, validating, conditioning, and analyzing before publication. The improvement plan consists of the DG Penetration Map and the Incremental Hosting Capacity Map, both explained below.

### 4.2.1 DG Penetration Map

During the first three months, a database system (working database) capable of collecting existing load and DG per feeder data will be developed. Raw and cleaned feeder load profile data will be stored in the working database for centralized storage and tracking. The load profiles from the SCADA system (Pi historian) and DG data from the Power App or DG dashboard, will be included within the working database classified by feeder ID key.

The tracking process encompasses the analysis of (i) feeder peak and minimum demand change, (ii) load transfer analysis, and (iii) aggregated DG capacity per feeder analysis. Feeders whose DG factors are revised (due to change in load or aggregated DG) will be updated in the DG Penetration map.

The improvements will reduce the analysis and map publication processing time from three weeks to one week of effort. The implementation will be tested and implemented for the first monthly map update. Figure 4 depicts the short-term enhancement block diagram.

A second (mid-term) enhancement stage will automate the feeders' DG penetration factor process. The automation will track feeders and factor changes from the previous publication. Feeders whose DG penetration factor changed will be flagged and their corresponding map will be updated. Appendix 3 shows the flow diagram to be followed. The mid-term enhancement will be implemented and tested for the second and third monthly updates. Testing and troubleshooting will be carried out before the third monthly update.

Figure 5 shows the mid-term enhancement diagram.

**Figure 4. Enhanced DG Penetration Calculation Process: Short-Term Enhancement**

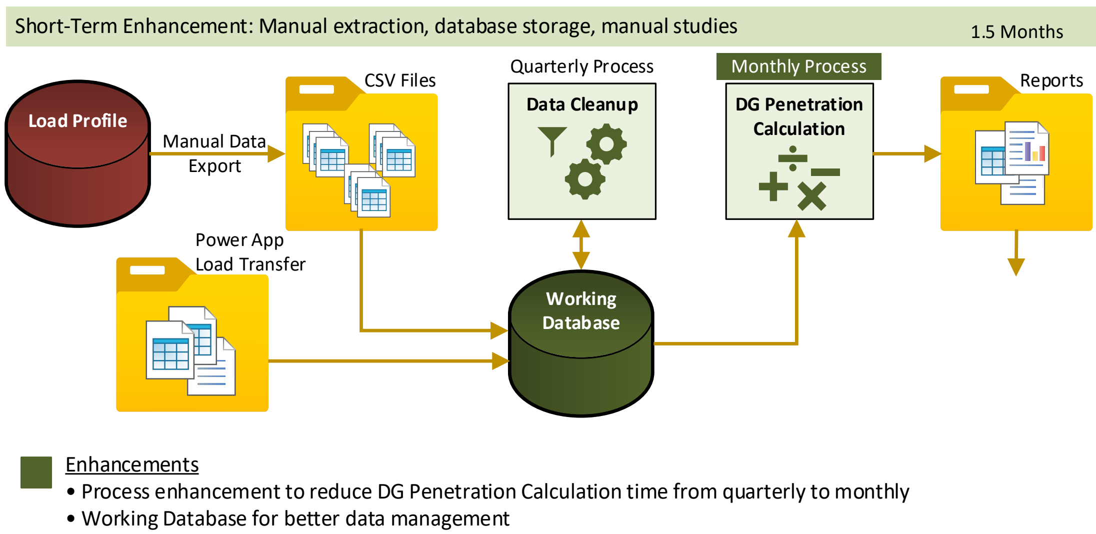
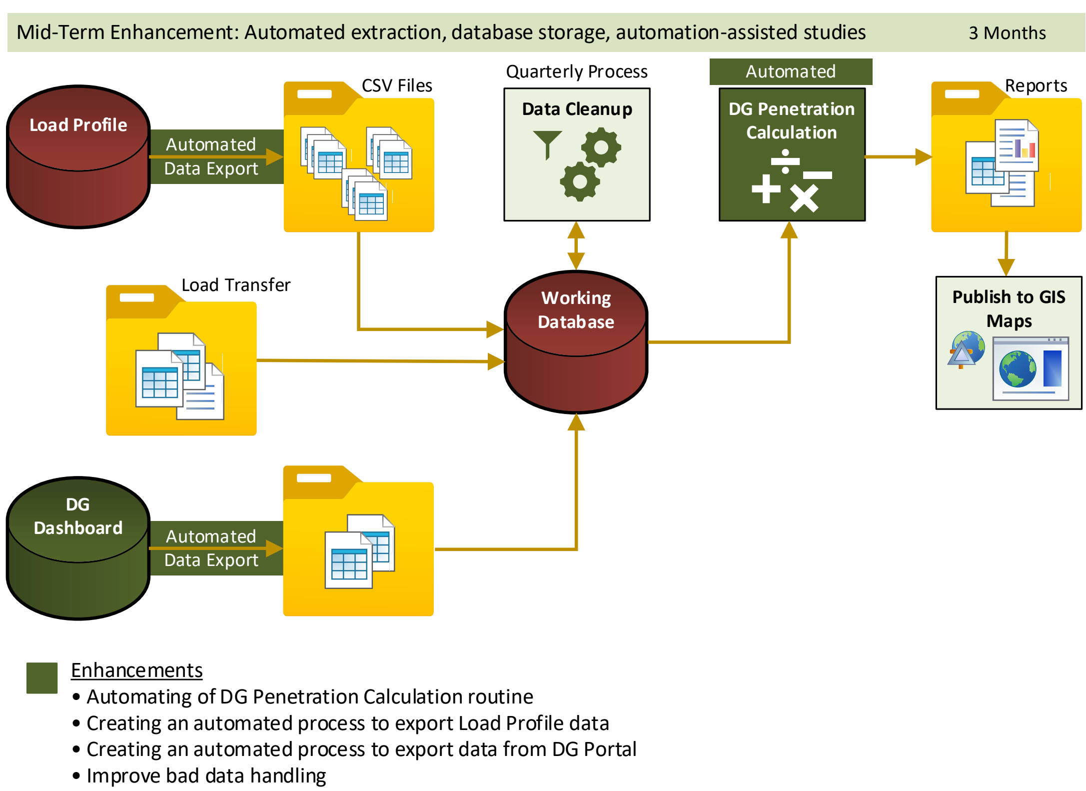



**Figure 5. Enhanced DG Penetration Calculation Process: Mid-Term Enhancement**



### 4.2.2 Incremental Hosting Capacity Map

The PEDC project will inventory and update more than 20 feeders monthly in GIS. Those feeders will be qualified as field certified/inventoried and marked for processing its Incremental Hosting Capacity Analysis (IHCA) via power flow simulations.

The Incremental Hosting Capacity Mapping process comprises feeder modeling (GIS to Synergi via forge process), Feeder model topology validation, load and DG modeling, model conditioning, running the IHCA process, post-processing the study result, and running the mapping process for its publication. Feeder model topology and equipment data will be exported from GIS/G-Tech, load from SCADA, DG capacities from DG Portal, and load modifications from load transferring data when long-standing load transfer is executed.

The analysis process is enhanced by adapting tools to efficiently process the increasing number of field inventoried distribution feeder models. The proposed initiative is a twofold enhancement of (i) Feeder model validating and conditioning and (ii) the IHCA process.

Enhancements of the IHCA process and mapping will be implemented and tested in 14 weeks once a funding source is determined.

The enhanced process will permit updating the Incremental Hosting Capacity Maps under the following scenarios:

a) When the PEDC project completes the feeders' field inventory and GIS data is updated monthly.

b) When the already modeled and studied feeders (item a) above) changes its topology. The topology change is triggered:

    - After a non-temporal load transfer takes place.
    - Following completion of system upgrades (three-phasing, reconductoring, voltage regulation equipment installation, substation power transformer change).
    - A spot load (P>500 kW) is interconnected. No feeder organic load growth will cause map updates.

c) When a change of aggregated DG increases above 500 kW capacity. Currently, the minimum Hosting Capacity segment is 500 kW.

All enhancements to expedite the map updates will enable expedited monthly updates for the first three months and every week after the third month of this plan's implementation.

# 5.0 Plan Development Timeline

The following charts show LUMA's plan to implement the initiatives mentioned above.

**Figure 6. Order 1: Short- and Mid-Term Enhancement Plan**

| Task | Program | Week | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| **Order 1: Service transformer and DG data process enhancement** | | | | | | | | | | | | | | | | | | | | | |
| 1.10 | Develop specifications : web tool; dashboard (mid and long term) | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 1.11 | **Develop Web Tool to get access to new data and collect data** | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | |
| 1.11.1 | Luma's Cybersecurity compliance | | | | | ■ | ■ | | | | | | | | | | | | | | |
| 1.12 | GIS Data Process (Quarterly to Monthly) | | | | | | ■ | | | | ■ | | | | | ■ | | | | | |
| 1.13 | Enhancing Dashboard | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 1.14 | Develop filtering data process (scripts) for dashboard | | | | | | | ■ | ■ | | | | | | | | | | | | |
| 1.15 | Define and develop repository database | | | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| 1.16 | Adapt dashboard from excel sheets to database format | | | | | | | | | ■ | ■ | | | | | | | | | | |
| 1.17 | Testing enhancements | | | | | | | | | | | ■ | ■ | | | | | | | | |
| 1.18 | Fix identified issues from testing | | | | | | | | | | | | ■ | ■ | ■ | | | | | | |
| 1.19 | Deploying new database/dashboard/web tool | | | | | | | | | | | | | | | ■ | | | | | |
| 1.20 | Socialization - DER Developers | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |

**Figure 7. Order 2, 3, and 4: Short- and Mid-term Enhancement Plan**

| Task | Program | Week | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| **Order 2: Short-Term Improvement - DG Penetration Map - Quarterly to Monthly** | | | | | | | | | | | | | | | | | | | | | |
| 2.10 | Develop specifications: Automatic DG Penetration process | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 2.10.1 | Includes tracking process (changes from last update) | | | | | | | | | | | | | | | | | | | | |
| 2.11 | Develop new business process (monthly/weekly update) | | | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 2.1 | Generate Load transfer report | | | ■ | ■ | | | ■ | ■ | | | ■ | ■ | | | | | | | | |
| 2.13 | Test and Implement New Monthly Process | | | | | | | | | | | | | | | | | | | | |
| 2.13.1 | Manual DG data export (monthly) | | | | | ■ | ■ | | | | | | | | | | | | | | |
| 2.13.2 | Manual Load data per feeder analysis (monthly) | | | | | ■ | ■ | | | | | | | | | | | | | | |
| 2.13.3 | HC map publication (monthly) | | | | | ■ | ■ | | ■ | | | | ■ | | | | ■ | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| **Order 2: Mid-Term Improvement - DG Penetration Map - Monthly to Weekly** | | | | | | | | | | | | | | | | | | | | | |
| 2.20 | Enhancement of load profile data export process | | | | | | ■ | ■ | ■ | | | | | | | | | | | | |
| 2.21 | Automate DG Penetration Calculation routine | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 2.22 | Generate Load transfer report | | | | | | | | ■ | | | | | | | | | ■ | ■ | | |
| 2.23 | Test enhancements (monthly) | | | | | | | | | | | | | | | | | | | | |
| 2.23.1 | Automate DG data export (monthly) | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | | | | | |
| 2.23.2 | Load data per feeder analysis (monthly) | | | | | | | | ■ | | | ■ | | | | ■ | | | | | |
| 2.23.3 | Enhanced HC map publication process (monthly) | | | | | | | | | | | | ■ | | | | ■ | | | | |
| 2.24 | Test enhancements (weekly) | | | | | | | | | | | | | | | | | | | | |
| 2.24.1 | Automated data export (weekly) | | | | | | | | | | | | | | | | | ■ | ■ | | |
| 2.24.2 | Load data per feeder analysis (weekly) | | | | | | | | | | | | | | | | | ■ | ■ | | |
| 2.24.3 | HC map publication (weekly) | | | | | | | | | | | | | | | | | ■ | ■ | | |

### Figure 8. Order 2, 3, and 4: Mid- to Long-term Enhancement Plan

| Task | Program | Week | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| **Order 2: Long-Term Improvement - ICA Map - Process Enhancement** | | | | | | | | | | | | | | | | | | | | | |
| 2.30 | Develop specification of streamlining ICA analysis process | | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| 2.31 | Define tracking process to identify feeder was updated (PEDC) | | | | | | | | ■ | ■ | | | | | | | | | | | |
| 2.31 | Streamline Validation/Conditioning Process | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 2.31 | Streamline ICA Analysis process | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 2.32 | Testing | | | | | | | | | | | | | | | ■ | ■ | ■ | | | |
| 2.33 | Deployment | | | | | | | | | | | | | | | | | ■ | ■ | | |

## A.1 Appendix 1. Filtering Process

The filtering process will assist the existing legacy data as follows:

1. Is the transformer size one of the past or present approved/standardized single and three-phase sizes (i.e., 25 kVA, 37.5 kVA, 50 kVA)? If not previously or currently standardized (e.g., 62 kVA transformer or a single-phase transformer with 500 kVA capacity), then flag it.
2. If the aggregate DER capacity is greater than the transformer size (e.g., including previous applications), then flag it.
3. If more than 10 DERs are connected to a transformer (e.g., previous applications), then flag it.
4. If more than 100 kW is connected to a single-phase transformer or more than 250 kW to a three-phase transformer (e.g., including previous applications), then flag it.
5. Is the transformer on a feeder that has been recently verified? Then check this against a list of recently field-verified feeders.
6. All flagged for review data will trigger a request for the Customer Participation Process.

## A.2 Appendix 2. DG Customer Participation Process

LUMA encourages (will request) developers to collect data following the steps below:

1. Find the service transformer the premise is fed by.
    a. Look for a size stenciled on the side of the unit, such as 25, 37.5, 50, etc.
    b. Note the size in kVA or kW. Note the identification tag and number.
    c. Label with a several-digit number and mark with "AEE," "PREPA," and/or "LUMA." LUMA will create a format including pictures of typical service transformer configurations to guide DG developers and customers during the data collection process.
2. Look at all other premises that appear to be served by the same service transformer.
    a. Estimate the number of DGs and capacity of the aggregated DG systems served by that transformer. If you cannot estimate the sizes of the DG systems, the average size is around 5.4 kW. Multiply it by the number of DG's fed by the same service transformer.
3. LUMA does not store information on the service conductor to the premise, but typical sizes are:
    - Overhead (OH) drops: Triplex #2 Aluminum (100 A) and #2 Cu (200 A)
    - Underground (UG) supplies: 1/0 AL (100 A) - most common, and #2 Cu (200 A)

    If the developer or electrician has access to the load center or meter connection, they may be able to see the size of the conductor or the main breaker. The larger the size, the larger the service conductor (i.e., 100 A may indicate a smaller conductor, while 200 A would indicate a larger conductor).
4. Take a picture of the service transformer and service drop (if visible).
5. To determine voltage rise, estimate the length of the conductor. This can be measured as a walk-off, with the distance from the transformer to the meter collected.
6. There is also some voltage rise across the service transformer if power flows reverse over the transformer.

The bigger the service transformer, the less voltage rise. A general rule of thumb is if the aggregate DER capacity is over 65% of the service transformer capacity, there may be elevated voltages due to voltage rise through the transformer, which is additive to the voltage rise through the service conductor.

## A.3 Appendix 3. DG Penetration Factor Analysis Flow