Corregido el Exhibit 1, conforme a la Orden del Negociado de 7 de septiembre de 2022.

NEPR

Received:

Sep 1, 2022

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

IN RE: DESPLIEGUE DE INFRAESTRUCTURA DE CARGADORES PARA VEHICULOS ELECTRICOS

CASE NO. NEPR-MI-2021-0013

SUBJECT: Submittal of Draft Phase I EV Plan and Request to Postpone Compliance Technical Hearing No. 3 and Concomitant Deadline to Submit Revised Phase I EV Plan

MOTION SUBMITTING DRAFT PHASE I EV PLAN AND REQUEST TO POSTPONE COMPLIANCE TECHNICAL HEARING NO. 3 AND CONCOMITANT DEADLINE TO SUBMIT REVISED PHASE I EV PLAN

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

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

I. Procedural and Factual Background

1. On November 18, 2021, this honorable Puerto Rico Energy Bureau ("Energy Bureau") issued a Resolution and Order (the "November 18th Order") setting forth directives for initiating electric vehicle ("EV") infrastructure deployment, including principles to guide the adoption of plans, regulations and procedures related to the electric vehicle energy sector in Puerto Rico (the "Principles").

2. Among others and in pertinent part, in the November 18th Order, the Energy Bureau ordered LUMA to: (a) file with the Energy Bureau, on or before September 1, 2022, a First Phase of an EV Charging Infrastructure Deployment Plan ("Phase I EV Plan") in accordance with the specified requirements set forth in the November 18th Order (*see* November 18th Order at p. 4); (b) file on or before May 31, 2022, a proposal for one or more rate designs targeting the customer

segments set forth in the Principles and envisioned in the Phase I EV Plan and addressing the requirements in the November 18th Order ("Rate Design Proposal") (*see id*. at pp. 5-9); and (c) attend Compliance Technical Hearings (referred to as Compliance Technical Hearings No. 1, No. 2, and No. 3) every three months in connection with the Phase I EV Plan preparation, scheduled for February 25, 2022,[1] May 31, 2022, and August 31, 2022, respectively (*see id*. at p. 5).

3. After other procedural events, on May 19, 2022, this Energy Bureau issued a Resolution and Order (the "May 19th Order") amending the dates and certain associated tasks established in the November 18th Order, providing for, in what is relevant to this Motion: (i) the filing of a draft of the Rate Design Proposal by May 31, 2022; (ii) the filing of a final Rate Design Proposal on June 30, 2022; (iii) the filing of a draft of the Phase I EV Plan for September 1, 2022; (iv) a Compliance Technical Hearing No. 3 scheduled for September 15, 2022, at 1:00 pm; and (v) the filing of the final Phase I EV Plan on September 30, 2022. *See* May 19th Order at p. 1.

4. On May 31, 2022, LUMA submitted to the Energy Bureau the draft of the EV Rate Design Proposal 1 (the "Draft EV Rate Design Proposal"). *See* LUMA's *Motion Submitting Draft of EV Rate Design Proposal* of that date.

5. On June 15, 2022, the Energy Bureau held the Compliance Technical Hearing No. 2 regarding the Draft EV Rate Design Proposal, during which the Energy Bureau issued a bench order directing LUMA to submit a revised rate design proposal by June 30, 2022 (the "June 15th Bench Order").

[1] Compliance Technical Hearing No. 1 was thereafter postponed to and held on March 4, 2022. *See* Energy Bureau's Resolution and Order entered on February 22, 2022.

6. On July 21, 2022, LUMA submitted to the Energy Bureau a revised EV Rate Design Proposal. *See Motion Submitting Revised EV Rate Design Proposal of that date*.[2]

II. Submittal of Draft Phase I EV Plan

7. In compliance with the November 18th Order, as amended by the May 19th Order, LUMA herein submits, as Exhibit 1, LUMA's draft Phase I EV Plan ("Draft Phase I EV Plan"). As presented in detail in Exhibit 1, the Draft Phase I EV Plan supports the deployment of infrastructure to enable equitable and accessible use of EVs while advancing the remediation of the electric system to improve reliability and resiliency for customers. The principal objectives are to enable greater EV adoption, produce fuel cost savings, and mitigate future generation supply constraints from increased EV load. This effort is part of LUMA's overall mission and objectives to modernize the grid to enable the sustainable energy transformation in accordance with Puerto Rico energy public policy.

8. As this Honorable Bureau is aware LUMA has made significant progress in advancing clean energy priorities and improvements to the electric system, including streamlining distributed energy interconnections (*see* NEPR-MI-2019-0016, *Progress Reports of Interconnection of the Puerto Rico Electric Power Authority*), conducting integrated distribution planning (*see* NEPR-MI-2019-0011, *In Re: Process for the Adoption of Regulation for Distribution Resource Planning*), designing proposed energy efficiency and demand response programs (*see* NEPR-MI-2021-0006, *In Re: Demand Response Plan Review, Implementation, and Monitoring*), integrating new renewable energy capacity for renewable portfolio compliance (*see* NEPR-MI-2020-0015, *In Re: Annual Compliance Report of Retail Energy Provider*), advancing

[2] LUMA had requested this honorable Energy Bureau to grant LUMA until July 1, 2022, to submit the Revised EV Rate Design Proposal. *See Motion Requesting Confirmation on Matters Addressed in Compliance Technical Hearing Held on June 15, 2022, and Stay of Order Establishing Deadline to Submit Revised EV Rate Design Proposal* filed on June 27, 2022.

the remediation of the transmission and distribution system to address system reliability and other critical needs and add modern technology (*see* NEPR-MI-2020-0019, *In Re: Review of Puerto Rico Electric Power Authority's System Remediation Plan*), and advancing priority system recovery and resilience programs (*see* NEPR-MI-2021-0004, *In Re: Review of LUMA's Initial Budgets*), among others.

III. Request for Postponement of Compliance Technical Hearing No. 3 and Concomitant Deadline to Submit Revised Phase I EV Plan.

9. LUMA respectfully submits that recent orders issued by this honorable Energy Bureau in several active proceedings establish concurrent deadlines and events that require participation by LUMA at complex and time-sensitive technical conferences, as well as technical filings that coincide in the last days of the months of August and during September 2022:

i. Case NEPR-MI-2021-004, *In re Review of LUMA's Initial Budgets*- Per a Resolution and Order of August 12, 2022, the Energy Bureau continued *motu proprio*, the technical conference to consider LUMA's Annual Budgets for Fiscal Year 2023 that had been set for August 17, 2022 ("August 12th Annual Budgets Order"). The Energy Bureau re-scheduled the technical conference for September 9, 2022. In turn, the conference was rescheduled for September 13, 2022, per a Resolution and Order of August 19, 2022. In the August 12th Annual Budgets Order, this Energy Bureau issued seven requests for information that LUMA shall answer on August 29, 2022; required LUMA to file by September 6, 2022, the presentation that it will offer in the technical conference; and set a third deadline for September 23, 2022, when LUMA shall submit revised or additional information that the Energy Bureau may request in the technical conference. Currently, per Resolutions and Orders issued on August 19, 2022, and August 25, 2022, LUMA has until September 8, 2022, to submit the presentation for the technical conference and until September 27, 2022, to file revised or additional information that the Energy Bureau may request in the technical conference. Finally, as per a Resolution and Order of August 26, 2022, LUMA has been required to submit the Quarterly Report for the Fourth Quarter of Fiscal Year 2022, by September 2, 2022 and a submission in response to an order to show cause, by September 6, 2022. Consequently, in connection with LUMA's Annual Budget for Fiscal Year 2023, this honorable Energy Bureau's schedule currently includes **one full-day technical conference to be held from 10:00 am through 5:00 pm on September 13, 2022**; and **five (5) deadlines** for LUMA to complete substantive filings in the last week of August and during the month of September.

On August 29, 2022, LUMA submitted its responses to the requests for information issued in the August 12th Annual Budgets Order. On August 30, 2022, LUMA submitted a "Motion for Partial Reconsideration of Resolution and Order of August 26, 2022, and Proposing Alternative Schedule for Submission and Consideration of Financial Actuals," whereby it requested that this Energy Bureau reconsider that portion of the August 26th Order that determined that consideration of the Q4 financial data is necessary to evaluate the FY 2023 Annual Budget that was certified by the Financial Oversight and Management Board for Puerto Rico ("FOMB") and alter the schedule for submission of the Q4 Report; and authorize LUMA to submit its year-end actual financial information on or before October 28, 2022.

ii. Case No. NEPR-MI-2019-0007, *In re the Performance of the Puerto Rico Electric Power Authority*- Per a Resolution and Order issued on August 18, 2022 ("August 18th Order"), LUMA shall submit by August 31, 2022, the name of a LUMA representative to meet with the Energy Bureau to discuss reporting on customer monthly peak data metrics. Furthermore, the Energy Bureau directed that LUMA submit by September 1, 2022, an explanation on several performance areas that the Energy Bureau identified in the August 18th Order as showing performance below the applicable baselines and information on corrective actions. Finally, by September 30, 2022, LUMA must file a timeline to report on non-technical losses as well as submit the first bi-monthly report on the status of LUMA's reporting on non-technical losses. Thus, per an order issued in the month of August, LUMA has been required to submit **three (3) filings** in the last days of August and in the upcoming month of September. In a motion filed on August 26, 2022, LUMA requested that the Energy Bureau extend to October 3, 2022, the deadline of September 1, 2022 to submit explanations on LUMA's performance with reference to corrective actions. On August 31, 2022, this Energy Bureau determined that LUMA's submission on under-performing metrics and corrective actions shall be filed on September 20, 2022.

iii. Case No. NEPR-AP-2020-0025, *In re Performance Targets for LUMA Energy ServCo, LLC*- LUMA has requested to file on September 21, 2022, a Revised Annex IX to the Transmission and Distribution System Operation and Maintenance Agreement ("T&D OMA") and supporting testimonies, in compliance with a Resolution and Order of August 1, 2022.

iv. Case No. NEPR-MI-2020-0001, *In re Tarifa Permanente de la Autoridad de Energía Eléctrica*- On or before 12:00 noon of September 15, 2022, LUMA shall file the quarterly reconciliations and calculated factors for the Fuel Charge Adjustment, Purchased Power Clause Adjustment and Fuel Oil Subsidy Riders. *See* Resolution and Order of July 31, 2022, Case No. NEPR-MI-2020-0001. As per the Energy Bureau's prior practice and precedents, a technical conference is held prior to the last day of the month to discuss the factors that will be in force beginning on October 1, 2022. Thus, LUMA has budgeted time in September and after September 15, 2022, to prepare this filing, appear at the technical conference and file any additional information that the Energy Bureau may require to consider the calculated factors and adopt the reconciliations.

v. Case No. NEPR-AP-2018-0004, *In re the Unbundling of the Assets of the Puerto Rico Electric Power Authority*- In compliance with a Resolution and Order of August 10, 2022 ("August 10th Order"), on August 24, 2022, LUMA submitted proposed changes to the draft wheeling customer rider as instructed by the Energy Bureau. Also, per the August 10th Order, LUMA shall file on or before August 30, 2022, comments to the wheeling services agreement. A technical conference is currently scheduled for September 23, 2022. On August 30, 2022, LUMA submitted its responses to the questions for comments included in Attachment B to the Final Resolution and Order. *See* "Motion Submitting LUMA's Responses to Questions for Comments By Stakeholders Included in Attachment B to the Resolution and Order of March 24, 2022," filed on August 30, 2022. To wit, the Energy Bureau currently has in its schedule **two (2)** events: a deadline for substantive submissions by stakeholders and a technical conference on the complex and policy-driven topic of wheeling services in Puerto Rico.

vi. Case No. NEPR-MI- *In re Review of the Puerto Rico Electric Power Authority's 10 Year Infrastructure Plan December 2020*- On or before September 15, 2022, LUMA is set to file the Supplemental 90-Day work plan regarding transmission and distribution programs submitted or to be submitted for approval by the Federal Emergency Management Agency.

vii. Case No. NEPR-IN-2022-0002, *In re Interrupción de Servicio Eléctrico del 6 de abril de 2022*- As the record of this proceeding shows, LUMA is set to file a circuit breaker failure report on August 26, 2022; a power plant analysis on September 9, 2022; and a root cause analysis on September 23, 2022. To wit, LUMA has been required submit **two (2)** technical and specialized filings within the next four (4) weeks. On August 26, 2022, LUMA submitted the circuit breaker report.

viii. Case No. NEPR-IN-2022-0003, *In re Interrupción de Servicio Eléctrico del 17 de agosto de 2022*- Per a Resolution and Order of August 17, 2022, LUMA is required to submit an incident report on or before August 31, 2022.

10. Per the aforementioned outline of the current filings and hearings calendar in several proceedings before this Energy Bureau, during the last week of August and the month of September 2022, there are **four technical conferences and at least seventeen (17) filings** to be submitted for consideration by this Energy Bureau, including the submission of the draft Phase I EV Plan and the Final Phase I EV Plan. This illustration of the regulatory calendar for the coming weeks provides important insights on the overall workload of this Energy Bureau, LUMA, PREPA and stakeholders. Incidents of overlapping and successive events have occurred in the past and this

Energy Bureau has mindfully postponed or re-scheduled events. *See* Resolution and Order of May 7, 2021, Case No. NEPR-MI-2019-0016, *In re Informes de Progreso de Interconexión de la Autoridad de Energía Eléctrica* (postponing compliance hearing that had been set for May 17, 2021 due to conflicts with other proceedings with this Energy Bureau); Resolution and Order of May 7, 2021, Case No. NEPR-MI-2021.006, *In re Demand Response Plan Review, Implementation and Monitoring* (rescheduling technical conference bases on conflicts with other proceedings); Resolution and Order of May 5, 2021, Case No. NEPR-MI-2020-0016, *In re Optimization Proceeding of MiniGrid Transmission and Distribution Investments* (postponing two technical workshops to allow the Energy Bureau to thoroughly analyze information submitted by stakeholders); Resolution and Order of May 14, 2021, Case No. NEPR-2020-0025, *In re Performance Targets for LUMA Energy ServCo LLLC* (amending procedural calendar *motu proprio* in attention to the pendency of parallel proceedings in Case No. NEPR-MI-2019-007).

11. It is respectfully submitted that when overlapping submissions and events are scheduled, the need for the procedural calendars and due dates to change on or close to a deadline increases, because the parties to proceedings, stakeholders, and this Energy Bureau, are not able to fully deploy their time and efforts to fulfill their duties, and processes become less efficient. LUMA, in good faith, proposes that a planning and scheduling approach that involves parties and stakeholders in setting short, medium term and long term agendas on the regulatory topics that will be addressed by this Energy Bureau each quarter, semester or year, will serve to streamline processes, enable the parties to comply timely with the orders of this Energy Bureau, ensure that the parties and stakeholders have sufficient time to work on topics and matters that have been prioritized, and further efficiencies. Moreover, a scheduling proceeding or scheduling meetings, will further the common goal of adopting reasonable timeframes to secure compliance with energy

public policy goals and related legal mandates. To that end, LUMA will submit forthwith to this Energy Bureau a proposal to open a scheduling docket where stakeholders and those entities that this Energy Bureau supervises and regulates, are able to engage in collaborative discussions with this Energy Bureau regarding schedules for active proceedings.

12. LUMA respectfully requests that this Energy Bureau consider the aforementioned summary of the current schedule and timeline of filings across several active dockets, to ascertain that even with several dedicated teams spanning regulatory, operations, and other components of LUMA's operations and workforce, it is not feasible to comply simultaneously with the overlapping deadlines and appear for the technical conferences that are scheduled in the aforementioned active and parallel proceedings. LUMA respectfully posits that there is a material benefit for all of those concerned to prioritize proceedings and deadlines for the Annual Budgets, the filing of the FCA, PPCA and FOS quarterly reconciliations and calculated factors, the revised Annex IX to the T&D OMA, and the filing of the investigation reports outlined above. To wit, LUMA will propose in each of the relevant dockets and in this Motion, that several other deadlines and technical conferences be re-scheduled for the last week of September and the first-two weeks of October 2022. This will allow all of the parties concerned to concentrate on a group of filings and appearances at technical conferences that require considerable time and resources during the month of September to then address other matters, without delay, in the first half of the month of October.

13. LUMA proposes collaborative solutions to minimize overlapping filings and conferences and allow for sufficient time between filings and appearances at technical conferences for personnel to prepare and comply with the orders of this Energy Bureau. In turn, this will reduce the need for piecemeal requests to extend times for submissions or re-schedule conferences.

14. In view of the above, LUMA respectfully requests that the Energy Bureau briefly postpone the Compliance Technical Hearing No. 3 scheduled for September 15, 2022 for two weeks- that is, until September 29, 2022. In addition, given that the revisions to the draft Phase I EV Plan will be done in attention to the input received during the Compliance Technical Hearing No. 3, LUMA also respectfully requests that the concomitant deadline to submit the revised Phase I EV Plan be postponed two weeks from the date of the rescheduled Compliance Technical Hearing No. 3, that is, until October 13, 2022.

15. LUMA looks forward to discussing and obtaining input from the Energy Bureau and its consultants on the Draft Phase I EV Plan during the upcoming Compliance Technical Hearing No. 3.

WHEREFORE, LUMA respectfully requests that the Energy Bureau **take notice** of the aforementioned; **accept** the Draft Phase I EV Plan attached as Exhibit 1, **deem** LUMA in compliance with the requirement to file this document set in the November 18th and May 19th Orders, and **grant** LUMA's request to postpone the Compliance Technical Hearing No. 3 to September 29, 2022, and the concomitant deadline to submit the revised version of the Phase I EV Plan to October 13, 2022.

RESPECTFULLY SUBMITTED

In San Juan, Puerto Rico, this 1st day of September 2022.

We hereby certify that we filed this motion using the electronic filing system of this Energy Bureau and that we will send an electronic courtesy copy of this motion to the attorneys for PREPA, Joannely Marrero-Cruz, jmarrero@diazvaz.law and Katiuska Bolaños-Lugo, kbolanos@diazvaz.law. LUMA understands that other participants or stakeholders in this proceeding will be notified as a result of the publicity of the filings in this process. Notwithstanding, LUMA will send a courtesy copy of the filing to the following stakeholders: agalloza@aggpr.com; alberto.cortes@warrenecm.com; aldo@skootel.com; angel.d.rodriguez@outlook.com; antonio@velocicharge.com; azayas@azeng.net; bigwheelcorp@gmail.com; blazquezmalu@gmail.com; carlosxcedeno@gmail.com; clrivera@caguasexpressway.com; flota@caguasexpressway.com; cnegrette@solrenew.com;

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Repaired Exhibit 1

Draft Phase I EV Plan

Draft Phase I Electric Vehicle Plan

September 1, 2022

NEPR-MI-2021-0013

Contents

1.0 Executive Summary

In its capacity as the grid operator for Puerto Rico, LUMA is hard at work accelerating the clean energy transformation in Puerto Rico – ushering in an energy future that includes more solar, more wind and more electric vehicles ("EVs"). While LUMA's number one goal is to improve reliability and resilience for customers, over the past year we have made significant progress in advancing clean energy priorities and improvements to the electric system. As part of the Puerto Rico Energy Bureau's Tranche 1 of renewable energy Requests for Proposal, we are working with renewable energy developers and investors to integrate the 844 MW of new utility-scale solar energy and 490 megawatts of battery energy storage into the grid. Additionally, LUMA is coordinating with three utility-scale wind and solar energy facilities approved for construction to connect an additional 270 megawatts of electricity to the grid. These multifaceted renewable energy projects are not only advancing Puerto Rico's clean energy goals, but they will also improve future reliability of the electric system for our customers. Since starting operations in June 2021, LUMA has interconnected more than 28,000 customers with rooftop solar, representing over 145 MW of additional renewables.

As part of its overall mission, LUMA is also modernizing the grid to enable the sustainable energy transformation in accordance with Puerto Rico energy public policy. The electrification of transportation is an exciting and dynamic trend which, if successfully harnessed, will allow for reductions in overall carbon emissions, and the enhancement of service to customers. LUMA has been working since 2021 on a plan to promote the adoption of EVs in Puerto Rico. Our focus has been on supporting the deployment of infrastructure to enable equitable and accessible use of EVs while advancing the remediation of the electric system to improve reliability and resiliency for customers.

This draft Phase I EV Infrastructure Deployment Plan (the "EV Plan") aims to:

- Enable greater EV adoption,
- Produce fuel cost savings, and
- Mitigate future generation supply constraints from increased EV load.

LUMA does not own or operate generation facilities, nor do we purchase or manage the fuel used in generation which has driven the increase in electricity costs to consumers over the past two years. Fuel costs currently account for over 60% of customers' total electricity bill. By implementing the EV Plan LUMA can help to reduce Puerto Rico's dependence on expensive imported fossil fuels and help lower overall electricity costs to customers. Lower use of these fossil fuels will also aid in the reduction of the emission of air pollutants including carbon monoxide, major contributors to climate change.

The EV Plan —filed in response to PREB Resolution and Order ("R&O") NEPR-MI-2021-0013 dated November 18, 2021: *Principles for Initiating EV Infrastructure Deployment* (the "Resolution"), as modified by R&O NEPR-MI-2021-0013 dated May 19, 2022— addresses EV infrastructure deployment, equity and access. The EV Plan is driven by a commitment to provide the reliability of the energy system that might enable our customers to someday in the future choose to purchase EVs with confidence. The EV Plan identifies near-term and mid-term EV support actions that LUMA and stakeholders may engage in. the EV Plan outlines a roadmap for future growth and increased EV adoption in Puerto Rico.

The EV Plan reflects insights gained from: 1) stakeholder consultations; 2) assessment of the local EV market, market actors and forecast of EV adoption; 3) residential customer surveys 4) review of relevant

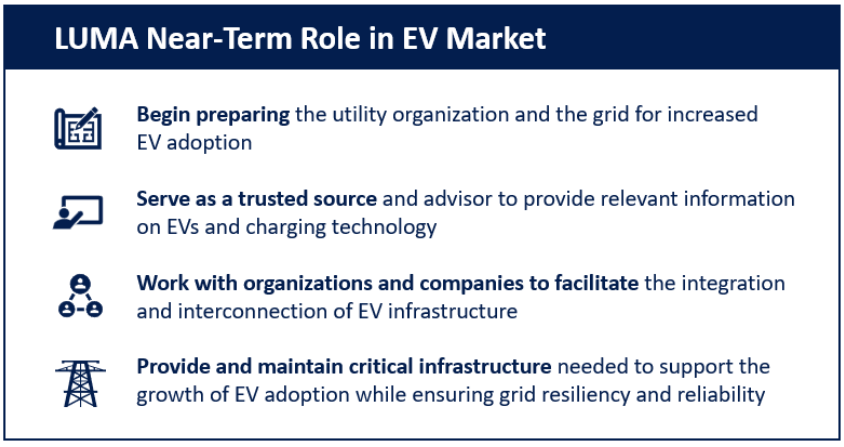
policies and funding opportunities; and 5) benchmarking of EV initiatives, programs, actions, and tactics implemented by other utilities to address barriers to EV adoption.

LUMA believes that its EV-related efforts in the EV Plan should 1) create value to all customers, 2) enable industry partners to provide their expertise and serve customers, 3) harmonize with LUMA's other initiatives and external programs and funding, 4) leverage LUMA's core capabilities, 5) take from those proven by other entities in other regions, and 6) be achievable in the near-term.

LUMA has identified current barriers to wider EV adoption in Puerto Rico and proposes specific initiatives in this EV Plan to address these constraints. Increased electrification of transportation involves a broad shift in the way that society utilizes resources to move goods and services. Many actors are involved in such a broad, dynamic change. Government must work hand-in-hand with a variety of private sector actors across multiple industries including technology providers, transportation and logistics companies, automobile manufacturers and retailers, energy suppliers, commercial and residential real estate developers, and others. LUMA as the Transmission and Distribution ("T&D") grid operator plays an important role in this process for Puerto Rico. LUMA is presenting this roadmap and will take important actions in support of greater EV adoption in Puerto Rico. However, the successful implementation of the EV Plan is critically dependent on other actors taking coordinated action under effective public policies implemented by the Government of Puerto Rico.

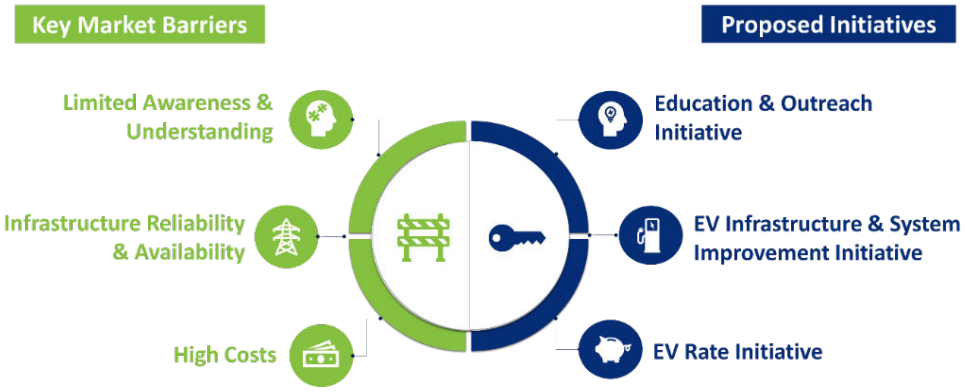
Figure 1-1 summarizes LUMA's proposed role in enabling transportation electrification in Puerto Rico in the near-term. LUMA will develop the resources within the utility and the grid for increased EV adoption, while working to improve grid resiliency and reliability. LUMA aims to work collaboratively with local stakeholders and entities to help facilitate the interconnection of EV infrastructure by streamlining processes and serving as a trusted advisor. LUMA also plans to offer affordable charging rates and work alongside market actors that will provide charging services to all communities, rate classes and potential EV owners.

Figure 1-1: LUMA's Role in Transportation Electrification



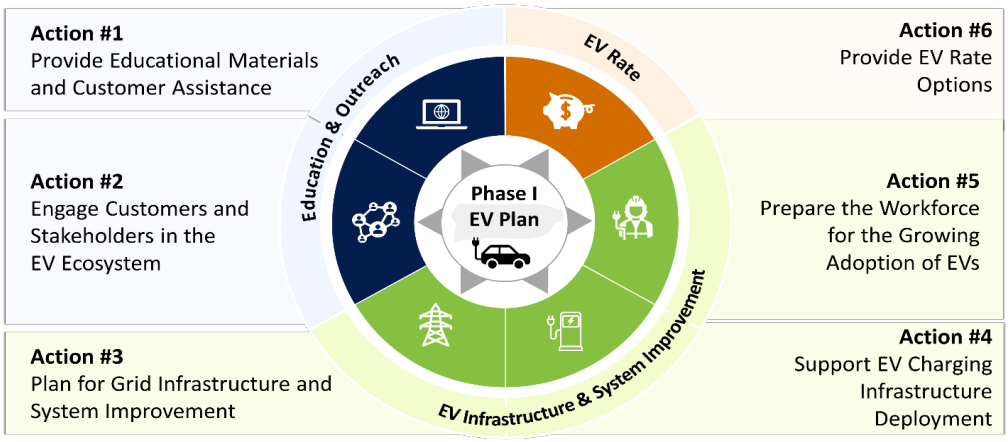
Based on these insights and in keeping with LUMA's proposed role in the EV ecosystem, LUMA identified three broad initiatives that LUMA will undertake to address the three key barriers to EV adoption as shown below:

Figure 1-2: Key Market Barriers and Proposed Initiatives



LUMA's Phase 1 EV Plan comprises six near-term actions to be pursued over the next three years across these three initiatives as shown below.

Figure 1-3: Portfolio of Near-Term Actions



LUMA recognizes that increased EV use will be a key contributor to achieving Puerto Rico's clean energy and climate goals as set forth in Act 17-2019[1] and Act 33-2019[2]. The proposed portfolio of near-term actions in the EV Plan will help promote the use of EVs and contribute to achievement of several objectives of Puerto Rico's Energy Public Policy Act and Climate Change Mitigation, Adaptation, and Resiliency Act. Specifically with respect to the purposes of these Acts, the EV Plan is expected to bring significant benefits in the following ways:

[1] Act 17-2019 - https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/17-2019.pdf

[2] Act 33-2019 - https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/0033-2019.pdf

- **Greater EV Adoption**: By directly addressing many of the key barriers to EV adoption, such as low awareness EVs and concerns about electrical system reliability, LUMA expects that the EV Plan will contribute to greater EV adoption in Puerto Rico. Each additional EV as a result of the EV Plan will contribute to lower fuel costs for Puerto Ricans and lower GHG emissions.
- **Fuel Cost Savings**: Residential customers can save over $1,000 annually on their fuel costs by switching from a gasoline vehicle to an EV. Under the proposed residential EV TOU rate, customers could save almost $1,300 annually in fuel costs and current EV owners charging on the current Residential electrical rate could save $135 annually by shifting their EV charging consumption to Off-peak hours (see Section 5.1.1).
- **Mitigate Resource Adequacy Constraints**: By shifting EV consumption from the evening period when the grid typically has the most supply challenges, the residential EV TOU rate can also help to mitigate future resource adequacy constraints arising from increasing EV load. The potential addition of an active managed charging rate option in the medium to long-term will further reduce resource adequacy constraints by allowing LUMA to directly control the charging of residential EVs during periods of high system energy load.

While there is much exciting work ahead, the clean energy transformation in Puerto Rico is well underway and will benefit LUMA's 1.5 million customers. LUMA is committed to continuing to work collaboratively with our regulator, government, and stakeholders to develop sound policies and strategies as we also strive to build a more reliable and more resilient energy system.

2.0 Introduction and Context

This Phase I EV Plan (the EV Plan) is being filed in response to the Puerto Rico Energy Bureau's ("PREB") Resolution and Order (R&O) NEPR-MI-2021-0013 dated November 18, 2021: *Principles for Initiating EV Infrastructure Deployment* (the "Resolution"). The Resolution ordered LUMA to file, on or before September 1, 2022, the First Phase of an EV Charging Infrastructure Deployment Plan (Phase I EV Plan).

This introductory section provides an overview of the value and benefits of EVs, followed by an overview of the regulatory and policy context for the EV Plan. The final two subsections in this Introduction set out 1) the Guiding Principles governing LUMA's strategy and plans for EV programs, and 2) the proposed role of LUMA in the EV market.

2.1 Value and Benefits of Transportation Electrification

Transportation electrification brings significant value and benefits to customers – EV owners and non-owner alike – as well as to the local economy, the electric system, and to the environment.

2.1.1 Benefits to Customers

Over the lifetime of the vehicle, higher upfront costs for EVs will be more than offset by lower maintenance and fuel costs than conventional vehicles, bringing economic benefits to their owners.[3] On average, Puerto Rico residents can save over $1,200 per year by going electric (Section 5.1.1.).[4] This value will only increase over time as EV costs are projected to continue to decline.

Furthermore, EVs can be an attractive alternative to conventional cars, creating new mobility choices for customers. Especially in municipalities where residents typically drive more than their urban counterparts, spend more on fuel and vehicle maintenance, and often have fewer choices to meet their transportation needs, EVs can help these residents reduce costs and minimize the environmental impact of transportation in their communities.

More EVs on the road could also mean higher total costs for generating, transmitting, and distributing power. However, several studies in other jurisdictions have shown that utility customers benefit overall from increased EV adoption since higher revenues generated from EV use can be reinvested in system improvements and customer programs to help improve service and reduce electricity prices.[5]

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[3] Atlaspolicy.com. 2022. Total Cost of Ownership Analysis. [online] Available at: <https://atlaspolicy.com/wp-content/uploads/2022/01/Total-Cost-of-Ownership-Analysis.pdf>.

[4] Potential savings to residential customers when converting from internal combustion engine car to EV and charging during off-peak hours on the proposed EV TOU rate. LUMA's Revised EV Rate Design Proposal, Case No. NEPR-MI-2021-0013.

[5] N. Ryan, "Engaging Utilities and Regulators on Transportation Electrification," E3, March 1, 2015. https://www.ethree.com/documents/E3-NRDC_EVs_ Paper_Final_20150129.pdf. And Hawaiian Electric Company, "Electrification of Transportation Roadmap", March 2018. https://www.hawaiianelectric.com/documents/clean_energy_hawaii/electrification_of_transportation/201803_eot_roadmap.pdf

2.1.2 Benefits to the Local Economy

EVs can provide economic benefits to the local economy by: (1) reducing fuel costs as it typically costs less to power a vehicle with electricity, resulting in customer money saved over lifetime of vehicle; and (2) shifting consumption away from imported fossil fuels to more locally produced electricity resources, resulting in more money saved on transportation energy locally. These fuel savings, therefore, become additional income that may be spent in the local economy, creating additional jobs in Puerto Rico. Moreover, new investments in transportation electrification will contribute to more jobs across occupations[6] and regions in Puerto Rico which ultimately contribute to the local economy and decrease pollution and greenhouse gas (GHG) emissions.

Using more energy efficient vehicles like EVs can support the Puerto Rico economy and help diversify the local transportation fleet. The multiple fuel sources used to generate electricity results in a more secure local energy source for the electrified portion of the transportation sector. All of this adds to Puerto Rico's energy security.

2.1.3 Benefits to the Environment

Puerto Rico's GHG Baseline Report shows that transportation emissions mainly come from on-road vehicle fuel combustion and that the transportation sector has historically been and is expected to remain one of the primary sectors contributing to GHG emissions in Puerto Rico.[7] The scale of emissions associated with EV use largely depends on the mix of resources used to generate electricity. In the near-term EV use will contribute to additional GHG emissions in Puerto Rico due to the reliance on diesel and fuel oil for generation. However, as the generation mix transitions to renewables over the next decade, EVs will run on increasingly low-carbon electricity, leading to significant emissions benefits over conventional vehicles as EVs also produce low to no tailpipe emissions.

Additionally, EVs will improve local air quality and associated health outcomes, while also reducing noise pollution. Reducing noise pollution and exposure to diesel particulates will benefit workers and residents near areas with significant commercial and industrial activities.

2.2 Regulatory and Policy Context for EV Plan

The EV Plan must address barriers to EV adoption and propose a portfolio of actions to be taken by LUMA including investments to support electric vehicles customers, rate design, and services. LUMA proposed actions include EV initiatives and rate design that contributes to the objectives of Act 17-2019[8]

[6] The number of workers from a variety of educational and employment backgrounds in the EV industry in Puerto Rico will likely increase, such as those in the automotive and charging equipment maintenance.

[7] Puerto Rico Greenhouse Gases Baseline Report 2014 (https://drna.pr.gov/wp-content/uploads/2017/05/Puerto-Rico-GHG-2014.pdf)

[8] Act 17-2019: Set the parameters for a resilient, reliable, and robust energy system with just and reasonable rates for all class of customers; make it feasible for energy system users to produce and participate in energy generation…unbundle and transform the electrical power system into an open system. [establishes a renewable energy target of 100% by 2050] https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/17-2019.pdf

and Act 33-2019[9]. EV initiatives include marketing, education, and outreach campaigns to increase EV adoption across all sectors and lower emissions. According to the Resolution, the EV Plan must address, but not be limited to the following:

1. **Barriers to EV Adoption**: Addressing barriers to the adoption of electric vehicles in the residential and low/moderate-income sectors (single-family residential, public transit fleet and multi-family structures).
2. **Proposed EV Initiatives**: A description of each proposed initiative, including targeted customers, coordination with the Revised EV Rate Design Proposal, description of outreach and education approaches and detailed budget by spending category.
3. **Key Performance Indicators (KPIs)**: Key metrics to measure program success and proposed reporting timeframe for program outcomes.
4. **Budget:** Provide a budget by plan year for each proposed initiative and benefit-cost analysis aligned with the Puerto Rico (PR) Test, along with a description of how proposed costs will be recovered.
5. **EV Forecasts**: EV adoption and EV infrastructure forecasts and resulting load impacts and how they may be mitigated.
6. **Load Management**: Identify EV charging rates and/or load management efforts to incentivize off-peak charging.

On November 18, 2021, the PREB issued a R&O under Case No. NEPR-MI-2021-0013 which commenced a regulatory proceeding regarding the deployment of EV charging infrastructure through a R&O dated August 21, 2021 (the August 21st R&O). As directed in the August 21st R&O, the PREB held a Stakeholder Workshop on September 23, 2021. The main purpose of the Stakeholder Workshop was to: "initiate a dialogue on electric vehicle adoption trends and to encourage the deployment of the necessary infrastructure."

Following the workshop, the PREB issued the November 18th R&O which, among other things, set out the "Principles". According to the November 18th R&O, the Principles reflect stakeholder feedback from the September 23, 2021, workshop as well as public regulatory documents and proceedings in other jurisdictions related to EV charging infrastructure deployment. The Principles cover key elements of EV charging infrastructure deployment, including:

[9] Act 33-2019: Set forth the public policy of the Government of Puerto Rico on climate change and on the mitigation, adaptation, and resilience processes per sector; establish a greenhouse gas emission inventory… to combat the effects of climate change. https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/0033-2019.pdf

Principle 1: Equipment Siting/Locating, indicating among other things, that the charging infrastructure deployment shall be sequenced by sector, starting with residential, followed by fleets, transit and, finally, multi-family structures

Principle 2: Grid Connectivity, indicating among other things, that rate designs shall encourage customer behavior beneficial to the (electricity) system and, to the extent possible, shall be synchronized with a concurrent implementation of time-of-use (TOU) rate for residential customers

Principle 3: Incentives, with consideration given to focusing rate design on the pairing of EV charging with distributed generation (DG) and storage

Principle 4: Charging Technology and Needs, with existing standards such as International Organization for Standardization (ISO) 15118 (concerning the interface between EVs and the grid) to direct deployment

Principle 5: Benefits and Costs, indicating rate designs to shift EV charging to times when energy, particularly low-carbon energy, is abundant

Principle 6: Utility Participation in the EV Charging Market, indicating the utility's participation in this component of the energy sector shall primarily target: a) make-ready infrastructure investments; b) services to hard-to-serve segments; and c) areas where the market does not adequately respond to demands or needs

Principle 7: Charging/Billing those Receiving Electric Service via EV Charging, indicating billing to end users of EV charging stations shall be on a unit ($/kWh) basis, not time-based ($/minute), and that certain third parties operate under an electric tariff that includes discounts/subsidies, which should not necessarily be passed on to EV charging

Principle 8: Government Supplying Land for EV Charging Infrastructure, especially along highways

The EV Plan should reflect these Principles and comply with additional requirements as set out in the November 18th R&O. These additional requirements (the "Requirements") are set out below[3]:

Requirement A: Identifying near-term transportation electrification actions LUMA can take to address barriers to EV adoption in the residential sector

Requirement B: Identifying a portfolio of actions, including investments and infrastructure to support EVs, rate design, programs, and services to contribute to the objectives of Act 17-2019[10] and Act 33-2019[11]

[10] Act 17-2019: Set the parameters for a resilient, reliable, and robust energy system with just and reasonable rates for all class of customers; make it feasible for energy system users to produce and participate in energy generation…unbundle and transform the electrical power system into an open system. https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/17-2019.pdf

[11] Act 33-2019: Set forth the public policy of the Government of Puerto Rico on climate change and on the mitigation, adaptation, and resilience processes per sector; establish a greenhouse gas emission inventory… to combat the effects of climate change. https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/0033-2019.pdf

Requirement C: Addressing barriers to the adoption of transportation electrification in the residential and low-income sectors first

Requirement D: Filing a draft proposal for rates related to EV charging and/or load management efforts to control the timing of charging in the residential sector

Requirement E: Addressing disadvantaged communities, such as through programs to enable vehicle charging access to multifamily buildings and renters, low-income customers, and public transit

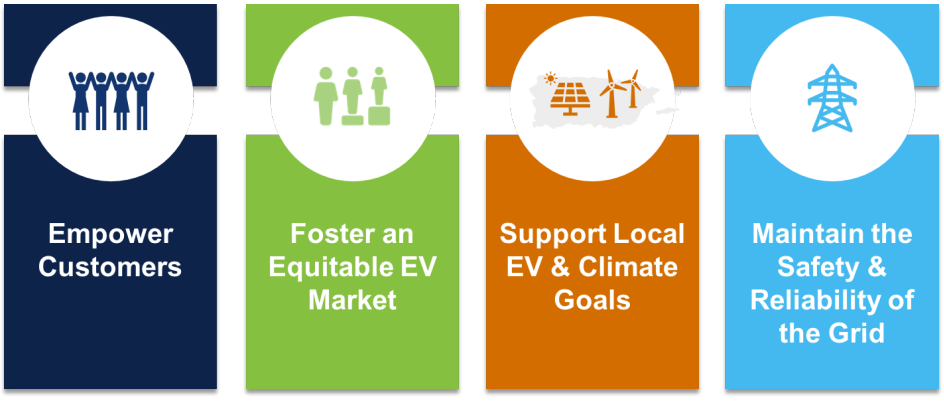
Requirement F: Minimizing electricity system impacts from increased electrification of the transportation sector

Requirement G: Discussion of potential impacts on competitive EV supply equipment market and identification of sustainable role for LUMA, supporting data and methodology used to develop the Phase I EV Plan, and information relating to the various programs and initiatives LUMA proposes within the EV Plan, such as target customers served, eligibility criteria, how adoption barriers are addressed, the current and anticipated impacts resulting from increased transportation electrification and how the programs and initiatives address these system impacts and relate to Puerto Rico's climate and energy goals and public policy, cost effectiveness analysis, marketing and education approaches, budgeting, reporting and recovery of costs, among others.

2.3 Guiding Principles

Drawing upon the Principles and Requirements outlined by the PREB, LUMA synthesized four Guiding Principles which: (1) serve as the foundation for decision making; (2) ensure that the Plan incorporates the needs of customers and inputs from stakeholders; and (3) ensure that LUMA's priority remains the customers and community value. Figure 2-1 shows the Guiding Principles governing LUMA's strategy and plans for EV programs.

Figure 2-1: EV Plan Guiding Principles



Empower Customers: LUMA will enable greater customer engagement and options for utilizing and providing EV services to enhance customers' awareness and understanding of EVs, ensure optimized utilization of resources and electricity grid assets to minimize total system costs for the

benefit of all customers. LUMA will empower customers to be part of the energy resources portfolio as stated in Act 17-2019.

Foster an Equitable EV Market: A key priority for LUMA in the EV Plan is to prioritize education, investments and access in EV technology and charging infrastructure in low/moderate-income communities[12] and those overburdened by air pollution and underserved by the transportation system. Additionally, LUMA will ensure that benefits and costs of the EV Plan are fairly distributed throughout the community.

Support Local EV & Climate Goals: Drawing upon Act 17-2019 and Act 33-2019, LUMA will support renewable and storage integration and collaborate with stakeholders to achieve EV and climate goals. In the rollout of local EV infrastructure, LUMA will work to maintain and improve the reliability and resiliency of the grid. Initiatives will be forward looking to support continuous EV adoption.

Maintain the Safety & Reliability of the Grid: LUMA will maintain the safety and reliability of the grid by enhancing utility activities to support a strong culture focused on employee safety and the safety of the people of Puerto Rico. LUMA will improve the resilience of vulnerable infrastructure, while modernizing the grid and enabling sustainable energy transformation.

2.4 LUMA's Role in Puerto Rico's EV Market

There are a range of possible strategies and roles that LUMA could play to address the many market barriers and increase EV adoption and engage many other market actors in Puerto Rico's EV market pursuing their own strategies and initiatives. Therefore, to help focus LUMA's efforts in development of the EV Plan, LUMA believes that it should focus its EV-related efforts on actions that:

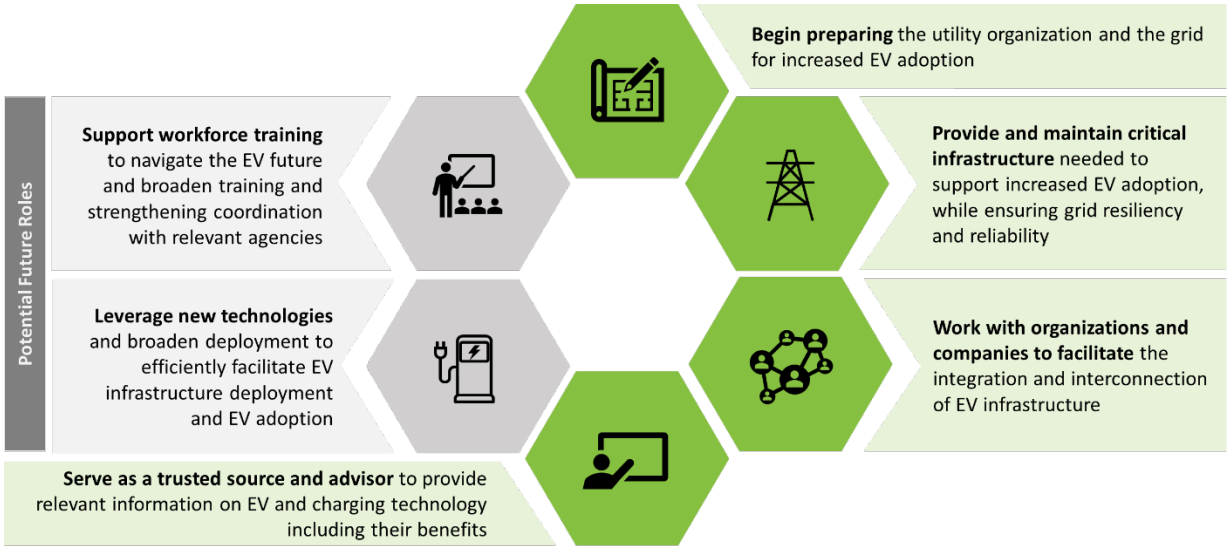
- create value to all customers;
- enable industry partners to provide their expertise and serve customers;
- harmonize with LUMA's other initiatives and external programs and funding; and
- leverage LUMA's core capabilities, while considering current constraints;
- are proven by other entities in other regions;
- are achievable in the near-term.

Reflective of these considerations, Figure 2-2 illustrates LUMA's proposed role in enabling transportation electrification in Puerto Rico. In the near-term, LUMA plans to begin preparing the organization, and repairing critical grid infrastructure needed to support the growth of EV adoption, while working to improve grid resiliency and reliability. Additionally, LUMA aims to work collaboratively with local stakeholders and entities to help facilitate the interconnection of EV infrastructure by streamlining processes and serving as

[12] *Regulation for Energy Efficiency – PREB.* Low Income customer means a residential customer living in a housing unit eligible for the Weatherization Assistance Program administered by PEPP or any successor equivalent low income efficiency program administered by PEPP or a Customer that is eligible for a low-income electric rate such as lifeline residential service (LRS), residential service for public housing projects (RH3), residential fixed rate for public housing under ownership of the public housing administration (RFR), or similar.

a trusted advisor. To accelerate capital investments in charging infrastructure, LUMA also plans to offer affordable charging rates, and over time working alongside market actors that will provide charging services to all communities, rate classes and potential EV owners.

Figure 2-2: LUMA's Role in Transportation Electrification



It is important to note that LUMA's role is not to purchase, own and/or operate charging infrastructure in the near term. This role is better suited to the service providers who specialize in EVSE installation and operation, and to the Puerto Rico government agencies who have access to funding for deploying it. LUMA's role is to support and facilitate these market actors in ongoing infrastructure deployment projects.

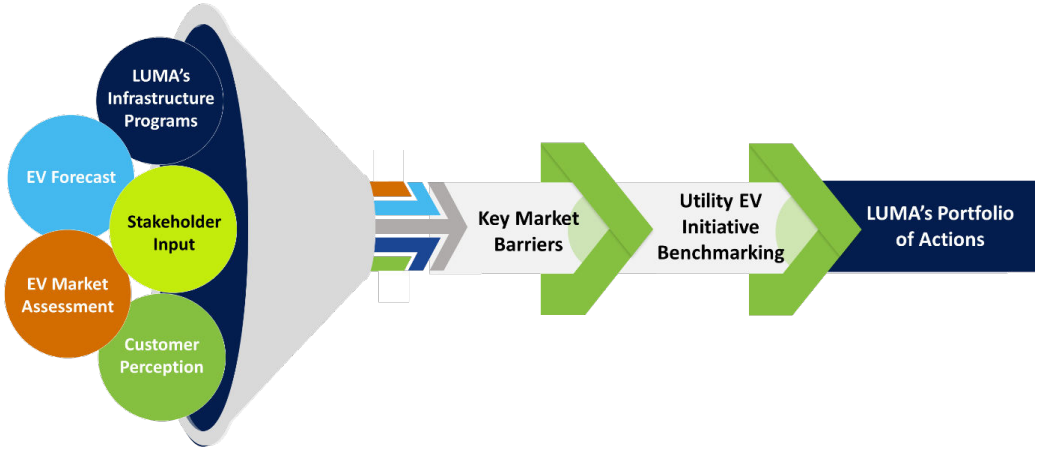
In the long-term, LUMA's role will likely evolve as EV adoption grows and the need for charging infrastructure increases. Accordingly, LUMA intends to evaluate and leverage new technologies to broaden infrastructure deployment opportunities and increase EV adoption in Puerto Rico. An example of such technologies is to leverage Level 2 smart meters and/or vehicle telematics to provide charging load data in lieu of AMI meters.

As the transportation industry transitions from Internal Combustion Engine Vehicles (ICEVs) to EVs, new jobs are being and will continue to be created. From construction workers who build out the infrastructure to the electricians who install charging stations and other equipment needed for EVs, there is great potential in this evolving industry. LUMA sees that job creation is an important aspect of economic development and in the EV industry in Puerto Rico and plans to work collaboratively with relevant stakeholders to create, engage and train the workforce of the clean transportation future.

3.0 Approach to EV Plan Development

Based upon the Guiding Principles described above and our understanding of the value and benefits of transportation electrification, LUMA took an integrated approach to developing the EV Plan aimed at promoting EV adoption and enabling proactive grid integration that considers the needs of all customers. Figure 3-1 illustrates the integrated approach and key steps LUMA took to assess the EV market, understand customers' needs and evaluate gaps that LUMA could fill to support the near-term growth in EV adoption in Puerto Rico.

Figure 3-1: Approach to EV Plan Development



To assess the EV market, LUMA first conducted a preliminary EV adoption forecast to better understand current and anticipated EV adoption and electric system impacts. Then, LUMA assessed the prevalence of EV and charging technologies, along with trends in adoption and infrastructure deployment. LUMA also reviewed existing and planned activities in the EV market by various other market actors as well as relevant policies and available funding. This step ensures that the EV Plan supports competition and encourages all market actors, including the private sector, to participate and support EV adoption in Puerto Rico.

LUMA then engaged with stakeholders in the EV ecosystem to gather input and feedback from stakeholders and various internal teams within LUMA, along with guidance from the PREB to refine LUMA's strategy and its action plan.

LUMA also considered the ongoing foundational infrastructure programs in the development of this EV Plan. These other efforts include LUMA's System Remediation and Improvement EV Plan, and the additional Improvement Programs documented in LUMA's Annual Budget filing[13]. The most foundational of these various initiatives are the many activities aimed at improving system reliability needed to support the growing EV market in Puerto Rico.

[13] NEPR-MI-2021-0004. "Fiscal Year 2023 Annual Budget," filed on July 13, 2022.

In the final step, LUMA evaluated its customer perception towards EVs. This step enabled LUMA to identify the key market barriers to EV adoption and challenges faced by the residential customer segment. Once key market barriers were identified, LUMA identified potential initiatives to address barriers to EV adoption and benchmarked the corresponding programs, actions and tactics that have been implemented by other utilities.

The following subsections discuss in detail each of the steps that LUMA took to develop the EV Plan and identify the most appropriate role and strategy for LUMA that would best serve its customers, while supporting policy goals and enhancing the safety and reliability of the grid.

3.1 EV Market Assessment

This section provides an introduction to EVs and charging technology, including trends in EV adoption and infrastructure deployment in the U.S. and Puerto Rico. It is important to understand the EV market and be aware of what other industry actors are doing to inform the near-term strategy for supporting EV adoption growth and fair competition in the market.

3.1.1 Vehicle Market and Adoption Trends

In the context of this report, EVs include PHEVs[14] and battery EVs (BEVs)[15]. EVs are available for use in various applications other than passenger vehicles. These applications include medium- and heavy-duty vehicles, transit buses, school buses, and micro-mobility such as bicycles and scooters.

Low Income Context in Puerto Rico – LUMA has a relatively high percentage of customers that are low-income households. The median annual household income in Puerto Rico is $21,058, which is less than the median annual household income of $64,994 across the entire US[16]. The poverty rate in Puerto Rico is 44.1%, significantly higher than Mississippi's poverty rate of 18.7%, the state with the highest poverty rate[17] in the US.

Vehicle ownership represents a significant cost burden for many low-income households. The International Council on Clean Transportation (ICCT) estimates that the cost of vehicle-related expenses (including insurance, fuel, maintenance, and car purchase) for low-income households could represent up to 50% of their household incomes. The vehicle ownership rate among low-income households is expected to be lower than for higher income households. Specifically with respect to EVs, new car buyers with annual household incomes less than $50k represented only 21% of BEV purchases whereas they represented 39% of sedan with internal combustion engines (ICE) purchases according to the Fuels

[14] PHEVs are powered by an internal combustion engine (ICE) and an electric motor that uses energy stored in a battery. The vehicle can be plugged in to an electric power source to charge the battery. PHEVs can travel on either electricity or gasoline. The all-electric range of a PHEV can range from 10 to over 50 miles with a fully charged battery, depending on the model.

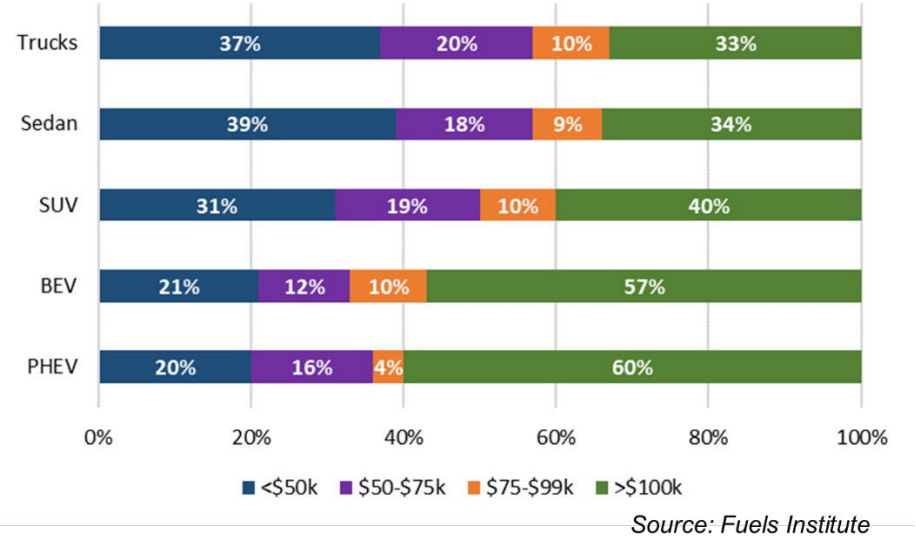
[15] BEVs use a battery to store the electric energy that powers the motor. A BEV does not have an ICE. Batteries in BEVs are charged by plugging the vehicle in to an electric power source. The range of a BEV on a full charge can be over 300 miles, depending on the model.

[16] U.S. Census Bureau Quickfacts: Puerto Rico and United States Median Household Income (2020). https://www.census.gov/quickfacts/fact/table/PR/PST045221

[17] The US Census Bureau measures poverty rate by using a set of money income thresholds (the minimum level of income deemed adequate) that vary by family size and composition to determine who is in poverty.

Institute, as shown in Figure 3-2. In comparison, new car buyers with an annual household income greater than $100,000 represented 57% of BEV purchases, but only 34% of ICE sedan purchases.

Figure 3-2: Distribution of New Car Buyers by Household Income (2019)



Source: Fuels Institute

Further, given the price premium for EVs, we anticipate that the EV ownership rate among low-income households, expressed as a percentage of the EV ownership rate among higher income households, would be even lower than for gasoline-powered vehicles. Additional details on Puerto Rico's low-income household are provided in LUMA's Revised EV Rate Design Proposal.[18]

Vehicle Costs – The upfront cost of an EV is still more expensive than a comparative conventional (ICEV) due to the high cost of batteries. The high purchase price of EV is typically regarded by consumers as the main barrier to choosing a new EV over an ICEV of similar size. The purchase price, however, does not provide the full picture as operating and maintenance (O&M) costs of EVs can be much lower over the life of an EV.

While higher upfront vehicle costs present a barrier to adoption, the upfront EV price premium can be offset by incentives and the lower annual operating expense of EVs can make their total cost of ownership (TCO)[19] more attractive. A study done by the U.S. Department of Energy's Argonne National Laboratory found that the maintenance costs of BEVs are 40% lower than ICEVs.[20] In terms of refueling or recharging costs, residential customers in Puerto Rico can save over $1,000 annually (approximately

[18] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

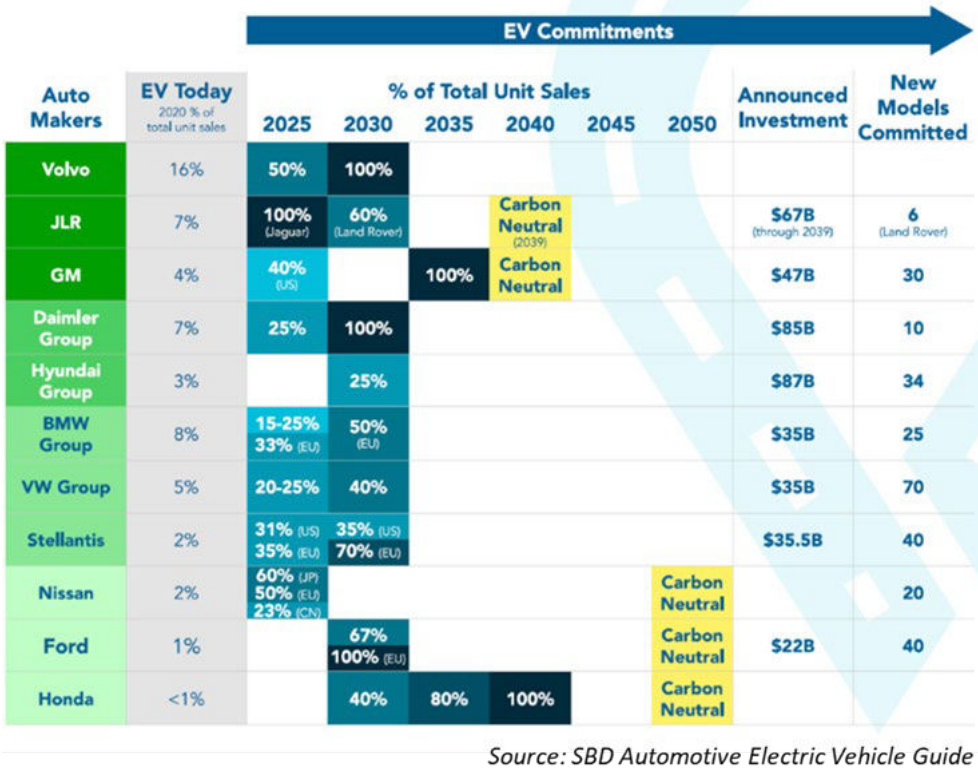
[19] The TCO calculation should consider vehicle cost and depreciation, financing, fuel costs, insurance costs, maintenance and repair costs, taxes and fees, and other operational costs to formulate a holistic TCO and operation of an EV.

[20] U.S. Department of Energy Office of Scientific and Technical Information, "Comprehensive Total Cost of Ownership Quantification of Vehicles with Different Size Classes and Powertrains," https://www.osti.gov/biblio/1780970. Accessed July 27, 2022.

$90 per month) when they switch from ICEV to EVs. The amount of savings can increase to over $100 per month when residential EV drivers charge their EVs solely during off-peak hours if they participate in the LUMA's proposed residential EV TOU rate.[21] This lifetime savings potential of EVs could be a significant value proposition for consumers and as battery prices and technology improve, prices come down and more attractive models arrive in the market.

Automaker Strategic Investment and Commitment – In recent years, one of the major trends of the EV market has been automakers' shift in strategy to invest in developing batteries as a core competency and attention to enabling and component technologies that align with their in-house architectures. Moreover, several major automakers have announced their electrification targets, committing to specific and ambitious dates for transition of their vehicle sales to EVs. Figure 3-3 provides details on the EV commitments by major automakers whose investment strategies totaled nearly $330 billion aiming towards investment in EV technologies.

Figure 3-3: Automaker EV Commitments



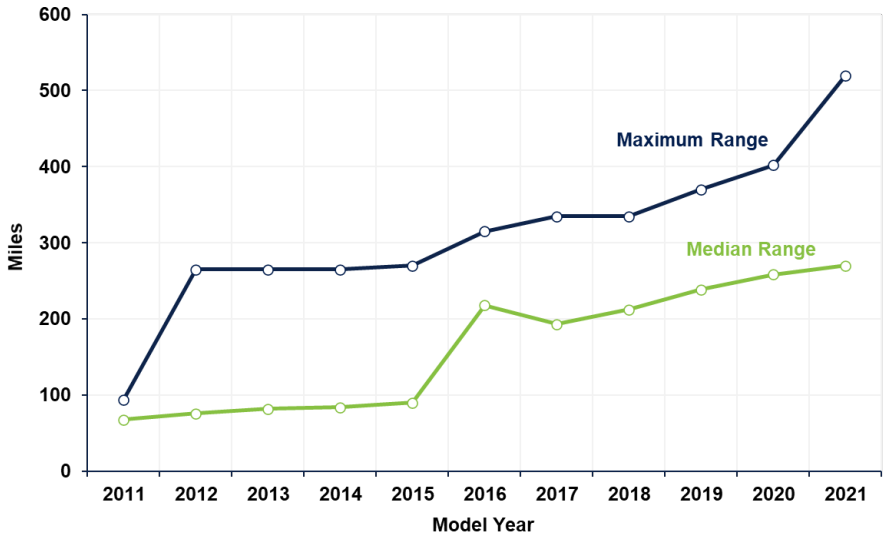
Source: SBD Automotive Electric Vehicle Guide

Model Availability and Driving Range – In 2021, more EV models were available for sale than ever before in the U.S. and as of April 2022, there were 28 EV models available (up from 19 models in 2021) from 18 different car manufacturers. Rising automaker announcements have made it clear that there will

[21] Puerto Rico Energy Bureau. Case No. NEPR-MI-2021-0013. "Motion Submitting Revised EV Rate Design Proposal," https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

be considerably more EV models commercially available over the next decade. Moreover, significant improvements in overall EV efficiency and battery technologies have led to increased EV driving ranges since 2011. The median range based on EPA rating for all EV models available on the market in 2020 surpassed 250 miles as seen in Figure 3-4, the average EV range of all models is about 250 miles, and more than half of the available vehicles (15 out of the 28) offer a range between 200 and 260 miles.

Figure 3-4: Range of BEVs Available for Sale in the U.S. – Model Years 2011-2021

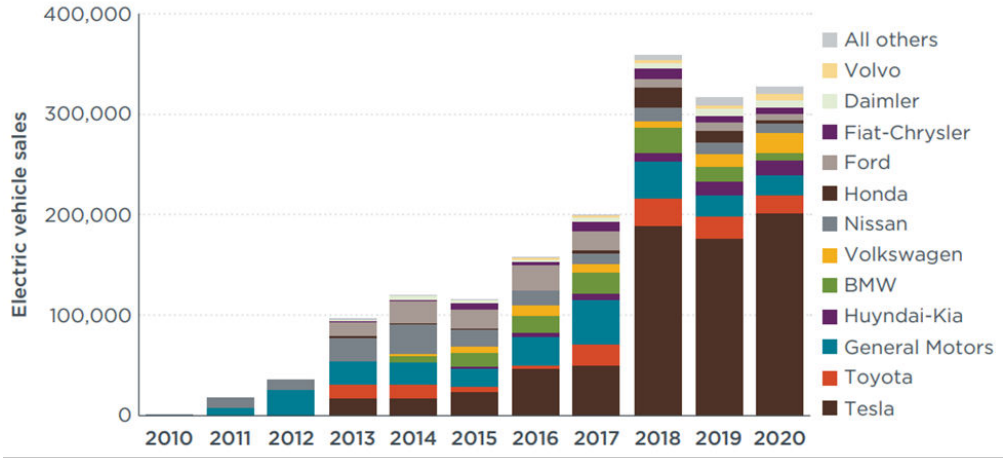


Source: U.S. Department of Energy and U.S. Environmental Protection Agency, Fuel Economy website. And Guidehouse Insights.

U.S. EV Adoption Trend – BEVs made up approximately 4% of new vehicle sales in the U.S. in 2021, compared to about 2% in 2020.[22] Figure 3-5 illustrates the annual EV sales in the U.S. from 2010 through 2020 by key automaker. The market has grown significantly from 2010 to over 300,000 vehicles sold annually starting in 2018.

[22] Argonne National Laboratory, "Light Duty Electric Drive Vehicles Monthly Sales Updates," https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates, accessed July 24, 2022.

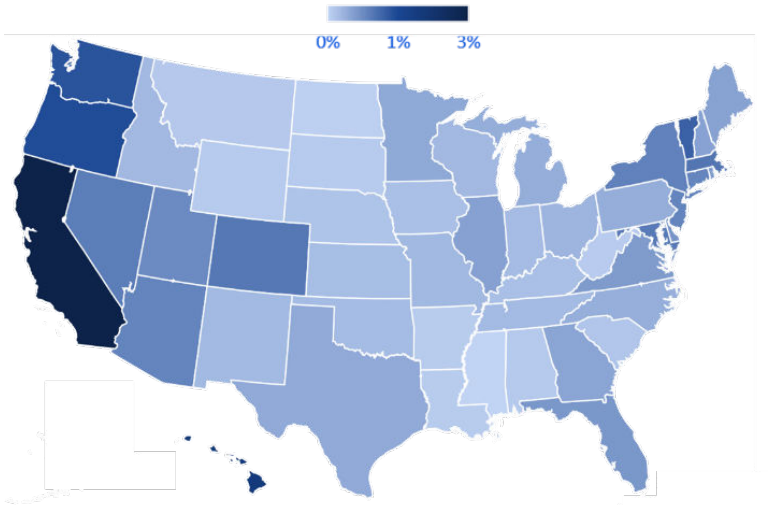
Figure 3-5: EV Sales in the U.S. by Major Automaker – 2010 to 2020



Source: International Council on Clean Transportation (icct)

When compared to metropolitan areas, Figure 3-6 shows that rural communities and regions in the U.S. have much lower EV adoption rates, with the vast majority of non-urbanized areas having a percent EV penetration[23] of between zero and half a percent.

Figure 3-6: Percent EV Penetration by Metropolitan Area



Source: IHS Markit

Due to high incentives rates on EV purchases and favorable regulatory policies, California is leading in the EV adoption front with approximately 39% of all EVs in the U.S. and more than 2% EV penetration

[23] % EV penetration is calculated by dividing the total number of EVs on the roads by the total number of vehicle registrations.

rate. Based on EV registration data provided by the National Renewable Energy Laboratory, Puerto Rico had approximately 3,210 EVs on the roads as of September 2021[24], representing 0.12% EV penetration.

Figure 3-7: Highest and Lowest Percent EV Penetration States and Puerto Rico

Highest % EV Penetration

State	% EV Penetration
California	2.61%
District of Columbia	2.02%
Hawaii	1.72%
Oregon	1.28%
Washington	1.21%

Lowest % EV Penetration

State	% EV Penetration
Arkansas	0.13%
West Virginia	0.13%
Puerto Rico	0.12%
North Dakota	0.10%
Mississippi	0.06%

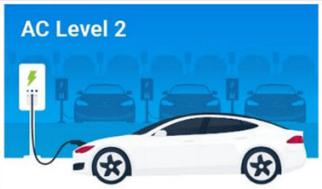
Compared to other regions in the U.S., Figure 3-7 shows that Puerto Rico has ranked among the lowest percent EV penetration in the U.S.

3.1.2 Charging Infrastructure

Charging equipment for EVs (also called Electric Vehicle Supply Equipment (EVSE)), is available in different levels based on the rate that the battery is charged. The time needed to fully charge an EV will vary based on the size of the EV battery, how depleted the battery is, and the supply characteristics (voltage and current) of the EVSE. Table 3-1 provides a brief explanation as well as benefits and drawbacks of the different types of EV charging.

[24] Registrations as of September 30, 2021, sourced from Experian Automotive and analyzed by the National Renewable Energy Laboratory.

Table 3-1: Types of EV Charging[25]

AC Level 1	AC Level 2	DC Fast Charge
		
Voltage 120V 1-Phase AC	**Voltage** 208V or 240V 1-Phase AC	**Voltage** 208V or 480V 3-Phase AC
Amps 12 – 16 Amps	**Amps** 12 – 80 Amps (Typically 32 Amps)	**Amps** < 125 Amps (Typically 60 Amps)
Charging Loads 1.4 to 1.9 kW	**Charging Loads** 2.5 to 19.2 kW (Typically 7 kW)	**Charging Loads** ≥ 50 kW (Typically 50 kW)
Charge Time for Vehicle 2 – 5 miles of range per hour	**Charge Time for Vehicle** 10 – 30 miles of range per hour	**Charge Time for Vehicle** 150 to 350+ miles of range per hour
Application • Residential Single-Family and Multi-Unit Dwellings	**Application** • Residential Single-Family and Multi-Unit Dwellings • Workplace, Fleet and Public	**Application** • Residential Multi-Unit Dwellings • Workplace, Fleet and Public
Benefits • Uses standard residential wall outlet • Little to no investment in infrastructure and installation • Low impact on electric utility peak demand charges	**Benefits** • Quicker charging than Level 1 • Smart version have Wi-Fi controls, allowing EV drivers/fleet operators to take advantage of TOU electric rates and/or property managers to manage charging consumption • More energy efficient than Level 1 for short duration charge events	**Benefits** • Fastest charging option available
Drawbacks • Slowest charging rate	**Drawbacks** • Requires higher voltage outlet or hardwired charger • May require electrician to install and higher infrastructure costs • Potentially higher impact on peak demand charges	**Drawbacks** • Expensive to purchase and install • Potential for increased peak demand charges • Competing standards can be confusing to EV buyers
Estimated Costs Low to no cost	**Estimated Costs** $500 to $5,000*	**Estimated Costs** Over $20,000*

Residential EV drivers tend to recharge daily or once every two days, typically overnight with about 70-80% of charging occurring at home, using Level 1 or Level 2 EVSE.[26] EVs arrive from auto manufacturers with portable chargers (Level 1) which can be plugged into standard 120-volt household outlets and are often adequate for residential use with a minimal cost. Specialized charging equipment for Level 2 charging is also available with additional cost, typically ranging in cost from $500 to $5,000 or more depending on the capabilities and amount of power provided. Level 2 EVSE may be more appropriate for

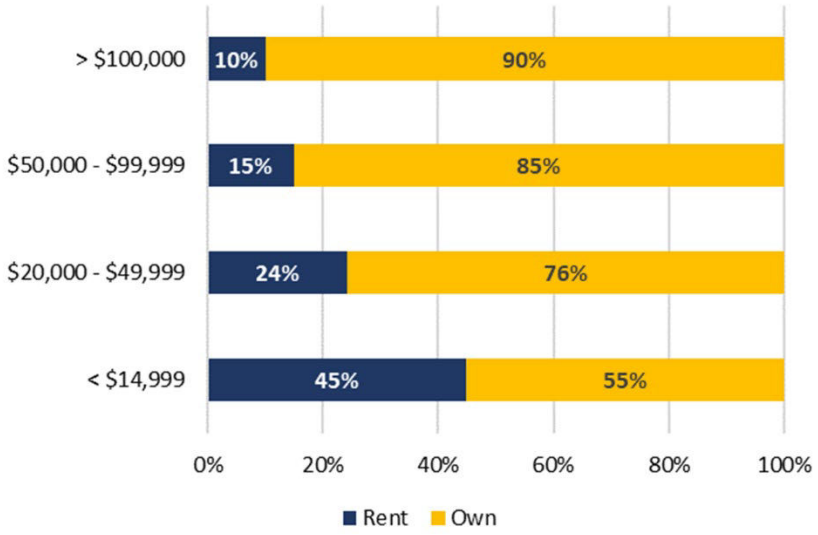
[25] Bates Electric and U.S. Department of Energy. (2015 November). "Costs Associated with Non-Residential Electric Vehicle Supply Equipment," https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf

[26] Fuels Institute and Electric Vehicle Council. (2021, June). "EV Consumer Behavior," https://www.fuelsinstitute.org/Research/Reports/EV-Consumer-Behavior/EV-Consumer-Behavior-Report.pdf

some residential customers as it provides higher power flows to reduce the amount of time it takes to charge an EV.

Even though most residential EV charging occurs at home with the use of Level 1 or Level 2 EVSE, access to the technology and charging infrastructure could make EVs less accessible to some residential drivers, especially those in multi-family rental housing, where both property owners and outdated building codes can create barriers to EVSE installation. In Puerto Rico, 45% of households with an income less than $14,999 were renters whereas only 10% of households with an income above $100,000 rented a home as depicted in Figure 3-8.

Figure 3-8: Puerto Rico housing status by 2020 household income

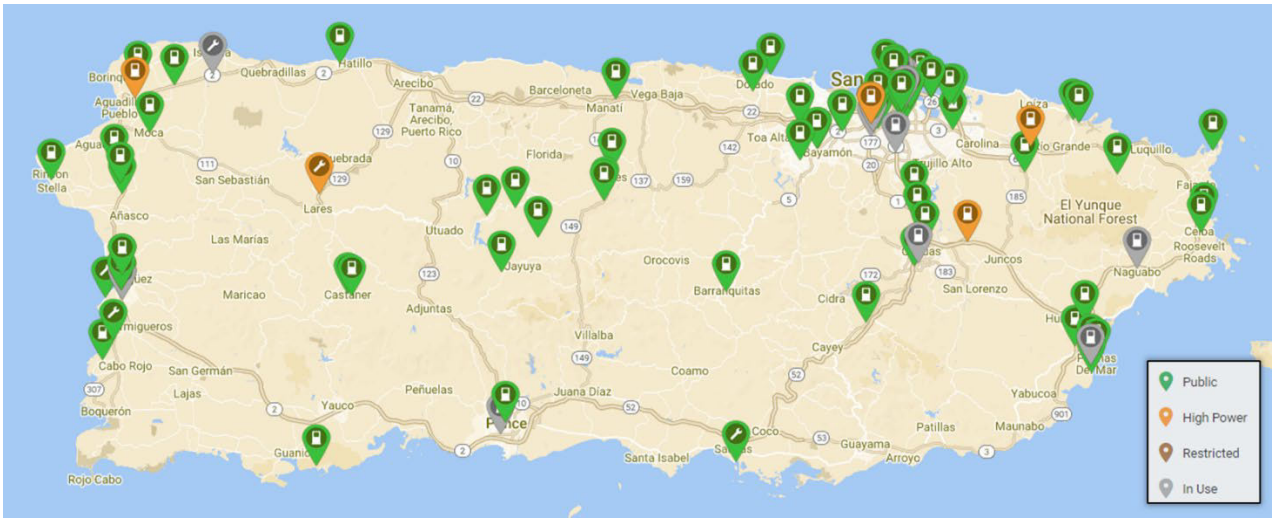


Source: US Census

Renters typically may have difficulty installing EV chargers and would rely on public chargers which could also limit EV adoption among low-income renters. Therefore, the transition to mass EV adoption among residential customers will eventually require a mix of EV charging solutions that can support all customer types with various charging needs and infrastructure constraints. Today, there are approximately 99 public charging stations (shown in Figure 3-9) located in Puerto Rico that can support residential customers with no easy access to home charging. Most these public charging stations, however, are Level 1 and Level 2 EVSE which take longer to charge, especially for those making trips longer than their vehicle range would permit – the estimated daily vehicle miles travelled (VMT) is approximately 15 miles[27].

[27] https://safety.fhwa.dot.gov/hsip/reports/pdf/2020/pr.pdf

Figure 3-9: Public Charging Stations in Puerto Rico[28]



3.1.3 Relevant Policies

The Transportation sector is a core component of Puerto Rico's climate change, renewable energy, and resiliency policies. In 2019, the Governor of Puerto Rico signed into law the *Puerto Rico Energy Public Policy Act of 2019 (Act 17-2019) and Puerto Rico Climate Change Mitigation, Adaptation, and Resiliency Act (Act 33-2019).* The Acts provide guiding principles for transforming the electric power system and promoting the electrification of motor vehicles. Below are the key principles within the Acts that relate to the development of the EV Plan:

Act 17-2019 establishes a renewable energy target of 100% by 2050 and requires the government-owned utility to aggressively reduce the use of fossil fuels, minimize greenhouse gas (GHG) emissions, and support initiatives in Puerto Rico that focus on mitigation, adaptation, and resilience. Act 17-2019 mandates include, but are not limited to the following:

7. The electric power system should be reliable and accessible, promote industrial, commercial, and community development, improve the quality of life at just and reasonable cost, and promote the economic development of the Island.
8. Educate citizens and electric power service customers on energy efficiency consumption reduction, distributed generation strategies, and other available tools to empower consumers to have more control over their energy consumption.
9. Require that every electric power service company design mitigation option adapted to their information technology networks and operations, which shall include the adoption of specific cyber security measures to effectively prevent and manage cyber-attacks.

[28] https://www.plugshare.com/

Act 33-2019 establishes climate change public policy and processes to mitigate, adapt, and increase resiliency by sector. Act 33-2019 establishes purposes, objectives and measures relating to EVs including, but not limited to the following:

- Achieve twenty percent (20%) energy generation from renewable sources by 2022; forty percent (40%) from 2023 to 2025; sixty percent (60%) from 2026 to 2040; and one hundred percent (100%) from 2041 to 2050.
- Promote education, research, development, and technology transfer, and disseminate climate change mitigation, adaptation, and resilience knowledge.
- Promote the participation of citizens and economic and social agents in the formulation and evaluation of climate policy
- Promote the use of energy efficient vehicles and energy diversification through financial and administrative incentives for consumers. For such purpose, the feasibility and convenience of establishing a refund for the excise tax paid when purchasing a vehicle propelled by alternative or combined energy, or any other method that incentivizes the acquisition of these types of vehicles shall be evaluated.
- Promote priority, free, or reduced-rate parking spaces for hybrid vehicles or for those that run on alternative energy sources, including reduced parking rates and the availability of priority parking spaces, among others.
- Guarantee the development of electricity infrastructure with sufficient capacity to respond to the additional electricity demand that shall result from the transition to electric vehicles and that may be adapted to electric mobility and transport electrification.

LUMA used the guidelines and objectives of the Acts as the foundation in the development of the EV initiatives within the EV Plan. The initiatives will focus on areas to minimize GHG emissions to achieve a renewable energy target of 100% by 2050, provide education and to customers, and build a more resilient energy system powered by renewables to support EV adoption.

3.1.4 Funding Opportunities in the EV Market

Federal and local funding opportunities can help shape the roadmap and types of actions that LUMA can take to promote EV adoption in Puerto Rico. It is, however, important to note that these broader funding opportunities may not be directly available to LUMA to support the Phase 1 EV Plan. Rather, these funding opportunities will be available for other market actors to access. Reviewing the funding opportunity landscape helps ensure that LUMA is aware of and prepared to support the EV charging infrastructure deployments and other market developments supported by these funding opportunities.

The Bipartisan Infrastructure Law (BIL) allocates about $13.6 million[29] over five years to support an expansion of EV charging network in Puerto Rico. In addition, Puerto Rico is eligible to apply for $2.5

[29] The Bipartisan Infrastructure Law Will Deliver for Puerto Rico – U.S. Department of Transportation https://www.transportation.gov/sites/dot.gov/files/2021-12/Puerto%20Rico.pdf

billion[30] of competitive grants to support communities, improve local air quality, and increase EV charging access in underserved and overburdened communities. Funding opportunities are primarily intended for state energy offices, Department of Transportation (DOT) and other entities. LUMA will support and advise eligible entities on the EV charging and infrastructure deployment. Table 3-2 provides a summary of the funding opportunities available to Puerto Rico and potential impact on residential customers.

Table 3-2: Summary of Available Funding and Potential Impact on Residential Customers

Funding Opportunity	Description	Funding Amount ($ Billions)	Potential Impact on Residential Customers
Federal Transit Administration (FTA) Low and No Emission Bus Grant	Provides capital funding to replace, rehabilitate, purchase, or lease buses and bus-related equipment and to rehabilitate, purchase, construct, or lease bus-related facilities. Provides capital funding for low or no emissions bus projects.	5.62	This grant can help residential customers (especially low/moderate income customers) who often ride transit and/or school buses realize the benefits of EVs.
National Electric Vehicle Infrastructure (NEVI) Formula Program	Strategically deploy electric vehicle (EV) charging infrastructure and establish an interconnected network to facilitate data collection, access, and reliability.	5.00	Creating a robust network of public charging stations can help reduce range anxiety[31] among residential customers. Additionally, greater availability to public charging stations can also broaden charging access to those who do not have access to home charging and those who live in rural and/or low/moderate income
Charging & Fueling Infrastructure Grants (Corridor Charging)	Deploy electric vehicle (EV) charging and hydrogen/propane/ natural gas fueling infrastructure along designated alternative fuel corridors and in communities.	1.25	

[30] Historic Infrastructure Investments in Charging – The White House https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/09/fact-sheet-biden-harris-administration-proposes-new-standards-for-national-electric-vehicle-charging-network/#:~:text=The%20Bipartisan%20Infrastructure%20Law%20also,this%20program%20later%20this%20year.

[31] Range anxiety is a term used to refer to the fear of driving an EV and running out of power, without being able to find a charging station on time to recharge.

Funding Opportunity	Description	Funding Amount ($ Billions)	Potential Impact on Residential Customers
Charging and Fueling Infrastructure Grants (Community Charging)	Program funds will be made available each fiscal year for Community Grants, to install EV charging and alternative fuel in locations on public roads, schools, parks, and in publicly accessible parking facilities. These grants will be prioritized for rural areas, low- and moderate-income neighborhoods, and communities with low ratios of private parking, or high ratios of multiunit dwellings.	1.25	communities
Smart Grid Investment Grant Matching Program (SGIG)	The purpose of this program is to provide grants up to 50% of qualifying Smart Grid Investments.	3.00	Investment in smart grid functions can support grid modernization and improvement efforts, ultimately benefiting all customers.
Volkswagen (VW) Settlement	Allows for EV incentives and infrastructure related expenses. Repower and replacement of eligible vehicles, engines, and equipment.	0.0087	Depending on the use of this VW Settlement, it can support EV adoption among residential customers and accelerate EV charging network in Puerto Rico.

Federal Transit Administration (FTA) Low and No Emission Bus Grant: The grant of $5.6 billion funds for purchases or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities. The funding will provide Puerto Rico a pathway to deliver a comprehensive fleet electrification solution to commercial vehicle customers and help achieve GHG savings goals. The potential increase in electric load from transit buses will affect LUMA's EV load forecast and public charging rate rollout timeframe. This grant will support the transition to cleaner public transportation such as transit and school buses that connects residential customers to their jobs, school, health care, and loved ones, while reducing air pollution that has long overburdened low/moderate-income communities.

National Electric Vehicle Infrastructure (NEVI) Formula Program: Puerto Rico was included in the U.S. Department of Transportation's Federal Highway Administration's (FHWA) NEVI Formula Program aimed at accelerating the deployment of an EV charging network located along designated FHWA Alternative Fuel Corridors. The program provides an estimate of $5 billion to eligible entities and help ensure a unified network of chargers with payment systems, and pricing information that are easily accessible and reliable. Each corridor, a stretch of highway with charging stations along the route, will have a station no more than 50 miles apart within one mile of the highway.

Charging & Fueling Infrastructure Grants (Corridor and Community Charging): In addition, Puerto Rico is eligible to apply for the $2.5 billion Charging and Fueling Infrastructure Corridor and Community Charging grants. Specifically, the Corridor Charging grant supports the deployment of EV charging infrastructure along designated alternative fuel corridors and in communities. The Community Charging grant funds the installation of EV charging in locations near public roads, schools, parks, and in publicly accessible parking facilities. This grant prioritizes rural areas, low-and moderate-income neighborhoods, and communities with low ratios of private parking, or high ratios of multiunit dwellings.

Smart Grid Investment Grant Matching Program (SGIG): LUMA is eligible for the Smart Grid Investment Grant Matching Program (SGIG), which covers up to 50% of eligible costs for qualifying electricity provider system upgrade projects selected on a competitive basis. An additional $3 billion was added to the program under BIL Section 40107, which allowed for the deployment of technologies, including data analytics and software to enhance grid resilience and flexibility.

Volkswagen Settlement: The Volkswagen Settlement of $8.7 million[32] that can be used for EV incentives and infrastructure related expenses is currently overseen by the Department of Natural and Environmental Resources. The funds have not been used and might be reassigned to the Energy Bureau.

3.1.5 Activities Among Other Market Actors

Collaboration among key market participants – local government, charging service providers, automaker and local car dealerships, and local community organizations and businesses – is critical to support the deployment of infrastructure and awareness-building for EVs. To better support EV stakeholders, LUMA consulted with and reviewed existing and planned activities among market actors to better understand the needs and trends in the market. LUMA plans to leverage its core capabilities to support EV stakeholders through their planning and electrification journey.

Government: A total of $13.6 million[33] of federal funding is available to Puerto Rico, which will accelerate EV adoption. LUMA has coordinated with the Department of Transportation and Public Works (DTOP) on the development of the National Electric Vehicle Infrastructure (NEVI) Program, under which States are required to submit an EV Infrastructure Deployment Plan that describes how it intends to use its apportioned formula funds. The federal funds will contribute to increase EV public transit and EV chargers along public highways. LUMA will continue its collaboration with DTOP to successfully deploy EV infrastructure.

Further, other agencies as Department of Economic Development and Commerce (DDEC) are engaged in the development of EV infrastructure, and LUMA maintains engagement with the agency. Moving forward, LUMA will develop strong relationships with government bodies to improve energy system reliability and access to EVs and charging infrastructure.

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[32](2021, November) Resolution and Order: Principles for Initiating EV Infrastructure Deployment https://energia.pr.gov/wp-content/uploads/sites/7/2021/11/20211118-MI20210013-Resolution-and-Order.pdf

[33] The Bipartisan Infrastructure Law Will Deliver for Puerto Rico – U.S. Department of Transportation https://www.transportation.gov/sites/dot.gov/files/2021-12/Puerto%20Rico.pdf

EV Charging Service Providers: LUMA will align with charging service providers to promote and distribute educational information on the installation of EV charging stations in all market segments. Additionally, LUMA will help facilitate charging infrastructure deployment by providing necessary information to streamline grid interconnection processes.

Automaker and Local Car Dealerships: Education and awareness are essential in promoting and increasing EVs on the island. LUMA will collaborate with local dealerships to provide educational materials and technical guidance for their sales representatives and necessary information that can be shared with prospective EV buyers.

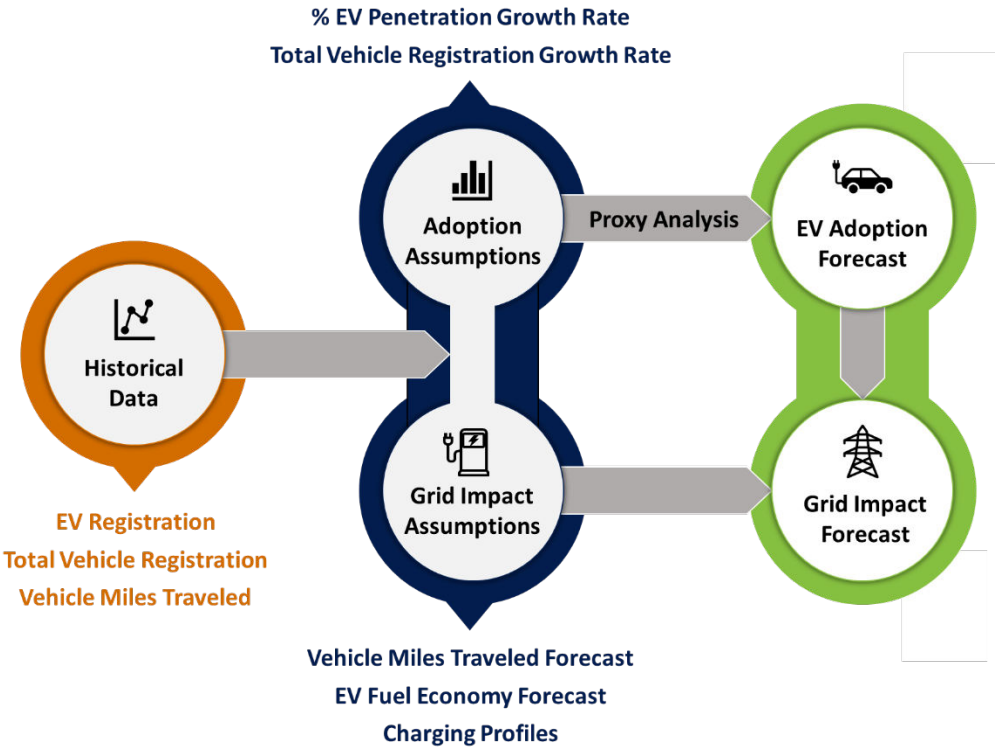
Local Energy Associations: LUMA will expand coordination with local energy associations such as Solar & Energy Storage Association (SESA) and Association of Energy Engineers (AEE) to further support the advancement of EV adoption and preparing the workforce to adopt to new EV technologies.

Local Businesses: Currently, most of the public charging stations are available at local business locations for guests and customers during business hours. LUMA will engage with hotels, taxi companies and local retailers to support the increase of EV charging infrastructure.

3.2 Preliminary EV Adoption Forecast

To support the development of the EV Plan, LUMA conducted a preliminary EV adoption and grid impact forecast. This adoption forecast represents one potential EV future based on a high-level, top-down analysis shown in Figure 3-10. This preliminary forecast was developed to quickly provide a rough baseline estimate of EV adoption (given limitations in data availability and timing) for the sake of informing the Phase 1 Plan development. This forecast was not meant to be used for system planning purposes and will be superseded by more detailed and rigorous analyses to be conducted at a later date.

Figure 3-10: Approach to Develop Preliminary EV Forecast



The approach used to develop preliminary EV adoption forecast was based on an analysis that utilizes projected growth rates of EV adoption in other regions of the U.S. that closely match characteristics of EV market and demographic attributes in Puerto Rico. The forecast methodology was selected largely due to data limitations preventing a more robust analysis. More details on data and assumptions used are discussed below.

3.2.1 Data and Assumptions

Historical Data – LUMA compared several sources of EV adoption data for Puerto Rico, though most were incomplete and/or unreliable. For instance, LUMA was provided a database of electric vehicle registrations that was mostly comprised of electric golf carts. The final data used to develop the preliminary EV adoption forecast was provided by the National Renewable Energy Laboratory (NREL) using data from Experian Automotive, which showed a cumulative total of 3,210 plug-in electric vehicles (PEVs) registered in Puerto Rico during 2021. For total vehicle registration data, the latest data source available was based on the 2010 Highway Statistics conducted by Federal Highway Administration (FHWA), reporting a total vehicle registration in Puerto Rico of 2,531,199 in 2007[34].

[34] Federal Highway Administration. (2011, December). "Highway Statistics 2010 – State Motor-Vehicle Registrations," https://www.fhwa.dot.gov/policyinformation/statistics/2010/mv1.cfm

The total vehicle miles traveled (VMT) assumption was derived from fatality rate and number of facilities reported in FHWA's Puerto Rico Highway Safety Improvement Program 2020 Annual Report.[35] As the fatality rate is the ratio of number of fatalities to the number of annual VMT, the resulting total VMT in 2019 is 146,850 million miles. Deriving the total VMT by total vehicle registrations in 2019 (2,700,537) results in a 2019 annual VMT per vehicle of 5,438 miles.

Adoption Assumptions – The development of the preliminary EV adoption forecast was based on combining several high-level assumptions and proxy analyses, starting from estimating Puerto Rico's total vehicle registration from 2008 to 2021. LUMA applied historical growth rate of vehicle registration in Hawaii to the Puerto Rico's 2007 total vehicle registration number, resulting in the 2021 vehicle registration of 2,709,206. Dividing the EV registrations data by total vehicle registration, the 2021 percent EV penetration in Puerto Rico is equal to 0.12%.

Next, LUMA leveraged several reputable EV forecasts, such as those done by the U.S. Energy Information Administration (EIA), Hawaiian Electric Company (HECO), and Guidehouse Insights, as benchmarks to estimate the forecasted growth rate of EV penetration (as percent of total registrations). To identify the most suitable forecasted EV adoption growth rate for Puerto Rico, LUMA performed a proxy analysis, comparing several criteria such as demographics and EV market characteristics of Puerto Rico against other regions in the U.S. Key criteria used in the proxy analysis include population, renter rate, median income, land area, vehicle ownerships[36], and 2021 percent EV penetration[37]. Each criterion was weighed equally, except 2021 percent EV penetration where U.S. states that have closest percent EV penetration to Puerto Rico were weighed higher. The analysis showed that the top three states that are most comparable to Puerto Rico based on the aforementioned criteria are Arkansas, Louisiana, and Mississippi. LUMA then used the forecasted growth rate of EV adoption in these states as proxy for EV adoption growth in Puerto Rico.

To derive the number of EV adoption from percent EV penetration, LUMA leveraged total vehicle registration forecast done by HECO[38] which provide a breakdown forecast by island. Considering the size of the island and other characteristics such as average VMT, number of vehicles per person and median income, LUMA used forecasted vehicle registration of the Hawaii Island (Big Island) as a proxy for vehicle registration growth in Puerto Rico.

Grid Impact Assumptions – LUMA incorporated the VMT forecast, forecasted fuel economy of EVs and representative charging profiles to estimate the impact of increased EV adoption on the electric grid.

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[35] Federal Highway Administration. (2020). "Highway Safety Improvement Program 2020 Annual Report," https://safety.fhwa.dot.gov/hsip/reports/pdf/2020/pr.pdf

[36] https://www.census.gov/programs-surveys/sis/resources/data-tools/quickfacts.html

[37] U.S. Energy Information Administration Vehicle Stock Forecast (Reference Case) - https://www.eia.gov/todayinenergy/detail.php?id=50096, and Hawaiian Electric Company's EV forecast - https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/stakeholder-and-community-engagement/working-groups/forecast-assumptions-documents, and proprietary Guidehouse Insight's EV Adoption North America.

[38] https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/stakeholder-and-community-engagement/working-groups/forecast-assumptions-documents

LUMA leveraged projected compound annual growth rates in VMT from FHWA[39] to forecast future VMT in Puerto Rico. The FHWA VMT forecast shows a growth of 0.7% in VMT under the 30-year Baseline Economic Growth Outlook. This VMT growth rate was applied to the 2019 VMT discussed in Section 3.2.1 to created forecasted VMT for Puerto Rico.

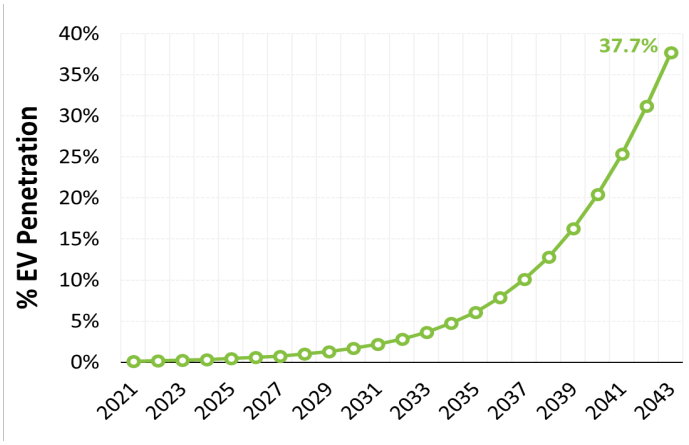
To forecast the fuel economy of EVs, LUMA first estimated the weighted average fuel economy of the top five EV models sold in the U.S. in 2019,[40] which was used as a starting point for the EV fuel economy forecast. Then, LUMA projected EV fuel economy by leveraging the growth rate of forecasted EV fuel economy conducted by the U.S. EIA.[41]

Lastly, LUMA used NREL's EV charging profiles[42] as representative charging behavior of EV drivers in Puerto Rico. For the preliminary EV adoption forecast, LUMA included two charging profiles – home Level 1 and home Level 2 – and assumed that the majority (60%) of EV charging occurs at home using Level 1 charging stations. Accordingly, one representative charging profile was derived and used to estimate peak impacts of EV charging on the electric grid.

3.3 Preliminary Forecast Results

The resulting preliminary forecast of EV penetration in Puerto Rico from 2022 to 2043 is illustrated in Figure 3-11. According to this forecast, approximately 38% of vehicle registered in Puerto Rico (or approximately 1.2 million EVs) are projected to be EVs in 2043.

Figure 3-11: Preliminary EV Forecast



[39] https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_forecast_sum.cfm#:~:text=FHWA's%20Spring%202021%20long%2Dterm,over%20the%20next%2030%20years.

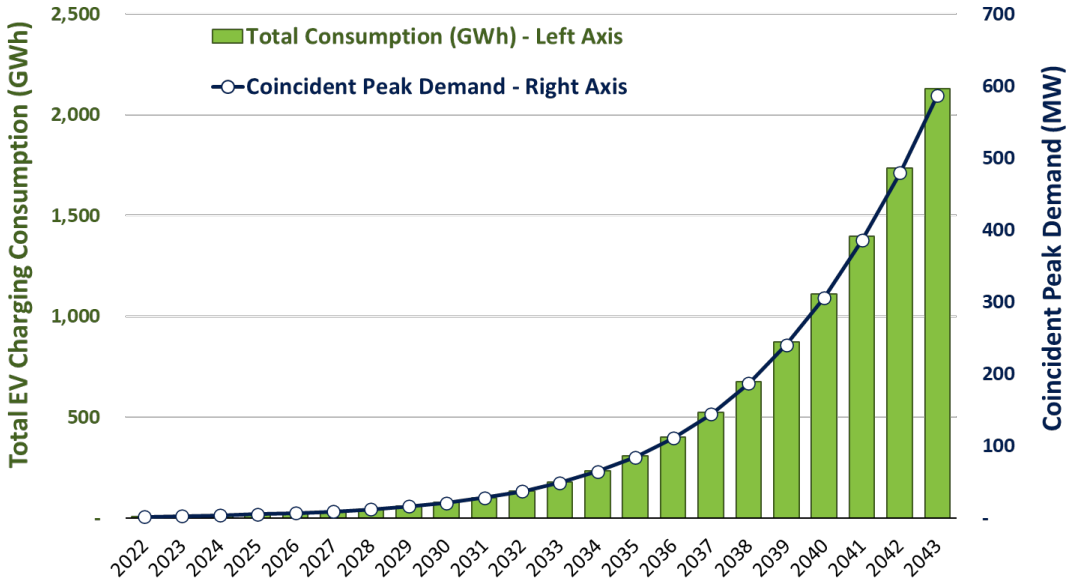
[40] 2019 is the latest year with available data. Number of EV sales for the top five EV models came from Transportation Research Center at Argonne National Laboratory (https://afdc.energy.gov/data/10567). Fuel economy (miles per gallon equivalent) of the top five EV models sold in the U.S. came from Fueleconomy.gov.

[41] https://www.eia.gov/totalenergy/data/browser/?tbl=T01.08

[42] https://www.nrel.gov/news/program/2020/how-might-electric-vehicles-affect-electric-loads.html

LUMA further developed a system-level EV charging impact forecast associated with the preliminary EV adoption forecast. The results from grid impact forecast are shown in Figure 3-12.

Figure 3-12: Preliminary Grid Impact Forecast[43]



The impacts of increased EV adoption on the electric grid are forecasted to remain relatively small in the near term – roughly 10 to 19 GWh per year and 2 to 5 MW of peak demand during coincident peak hours from 2023 to 2025. However, grid impacts are expected to grow rapidly to become a significant additional load on the Puerto Rico's electric grid in the longer-term.

It is important to note that the charging profiles used to estimate grid impacts assume that the majority of EV drivers charge their vehicles on the standard residential rate and start charging their vehicles at the time that is most convenient for them (typically from 6PM – 8PM). This implies that EV charging is forecast to be highly coincident with 1) the 7PM-11PM period that has the greatest forecast generation resource deficiency as discussed in Section 3.6) LUMA's 6PM-7PM distribution system peak load. Thus, EVs represent a growing opportunity for LUMA to encourage smart charging through time-of-use rates and/or manage charging behavior in a way that will be most beneficial to the grid.

3.4 Stakeholder Engagement

LUMA engaged with external stakeholders from the start of the EV Plan development. Multiple stakeholders provided their input and contributed to the development of this EV Plan. LUMA incorporated their feedback on market barriers, areas of support and available funding. These collaborative efforts will ensure a smooth transition to electrified transportation in Puerto Rico. The following section summarizes feedback received in this process.

[43] Coincident peak demand is assumed to occur between 6PM to 7PM.

Support and promote the adoption of EVs – Stakeholders including local non-profits, organizations and government agencies expressed support and promotion of the adoption of EVs. Specifically, they support the integration, deployment of EV charging stations to the grid, and EV programs. They believed that carbon emissions per mile will be reduced as customers switch from diesel cars to EVs. The Oficina Independiente de Proteccion al Consumidor (OIPC) also recommends exemptions on property tax and tax incentives for stations powered by renewables.

Collaboration with organizations – Collaboration with local organizations and government agencies is a key component to increase EV adoption and accelerate the deployment of renewables on the grid. Stakeholders recommended that LUMA work with the Energy Office, Puerto Rico Department of Treasury, and other agencies. Support and collaboration efforts with other agencies can help determine the types of funds and activities or programs that can be leveraged for initiatives. In addition, collaboration with the Puerto Rico Department of Treasury can help LUMA access plug-in electric vehicle (PEV) and plug-in hybrid electric vehicle (PHEV) registration tracking data which supports the development of the EV forecast.

Competitive Market – EV automakers and charging infrastructure manufacturers indicated that utilities participating in the EV market should complement the actions of other actors rather than compete with them. The role of utilities in owning charging infrastructure should be considered an “areas of last resort.” Overall, Puerto Rico’s master plan should include measures which will ensure that multiple stakeholders and technology companies can participate and compete in supporting the growth of EVs and EV charging infrastructure.

Education and Outreach – Stakeholders are aware of the benefits education and outreach programs can have on improving EV adoption rates on the island. They indicated that education is important and the most critical part of the planning process. Communication among customers, charging station developers and utilities will improve coordination and identification of opportunities to reduce development times and prevent unnecessary costs.

Utility’s Role in Infrastructure Buildout – Stakeholders indicated that studies should be conducted to identify the types of upgrades that will be needed to allow for the integration of EVs and outline several responsibilities to support EV infrastructure buildout. Some stakeholders suggested utilities should be responsible for providing wiring and the backbone infrastructure to support the growth of charger ready locations. Stakeholders also suggested utilities should provide transformer installation, ownership, maintenance, monitoring and associated infrastructure investments such as meters. Beyond the technical components, utilities should provide logistical support such as streamlining connection processes, helping new customers navigate new service requests, testing interconnection, collecting load data and tracking utility program implementation. Lastly, it was recommended that LUMA provide gas stations with higher-power transformers.

EV Rate Options – Several stakeholders were in favor of developing a TOU rate structure to promote the adoption of EVs and EV charging stations. The finalized EV rate will have an impact on the price of EV charging services, which incorporates some level of recovery on the fixed costs and variable electricity rates.

The insights provided by the stakeholders summarized above show a need to provide education and raise awareness around EVs, maintain grid reliability, support charging infrastructure deployment in coordination with private sector investment, and enhance collaboration with regulatory bodies to secure funding and alignment for future initiatives.

3.5 Customer Perceptions

LUMA has partnered with J.D. Power and Associates (J.D. Power) to conduct EV customer survey quarterly to better understand EV adoption barriers and market characteristics in Puerto Rico. The key objectives of the survey include the following:

- Measure customers EV ownership and assess where EV owners charge
- Evaluate customers familiarity with EVs to determine educational needs
- Capture customers thoughts and concerns on buying and leasing EVs
- Understand the key factors influencing the likelihood of EV purchases
- Utilize survey findings to support the development of the EV Plan initiatives

3.5.1 Survey Methodology

The J.D. Power survey utilizes an online methodology via multiple online panels. LUMA has a customer database of 543,682[44] customer email addresses (Residential: 415,349, Commercial: 128,333) as of the end of 2021. J.D. Power operates the customer database provided by LUMA through a query system that selects approximately 100,000 unique residential emails and 10,000 to 11,000 unique business emails. The email selection process occurred each time a survey was conducted to ensure accurate representation of customers. Current survey results were collected in two timeframes as shown in Table 3-3.

Table 3-3: Customer Survey Timeline and Number of Respondents

	Q1 Survey	Q2 Survey
Timeframe	02/01/2022 to 03/15/2022	03/16/2022 to 05/16/2022
Number of Respondents	593	1,310

J.D. Power included data integrity controls for the collections of customers survey which ensures that each response is unique and prevents customers from submitting multiple responses. Therefore, the results are reliable and statistically significant.

3.5.2 Survey Results

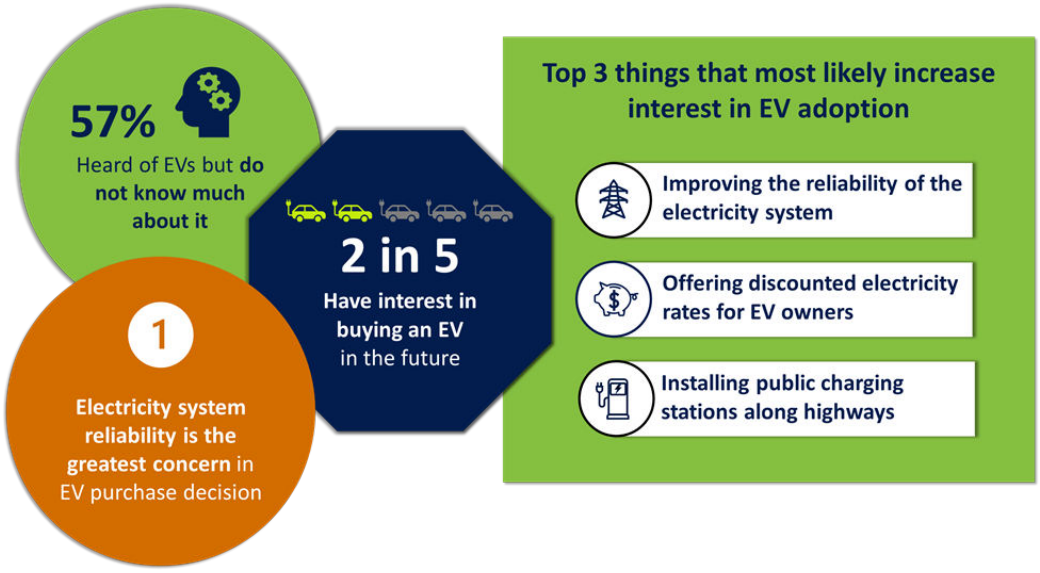
The J.D. Power survey provides valuable insights into Puerto Rico customers' perspectives towards EVs and current barriers to adoption. Survey results were consistent across the two waves (Q1 and Q2) and broadly align with other national EV consumer surveys conducted by Pew Research Center (2021)[45], and

[44] (2022, March 24) *Motion in Compliance with Resolution and Order of March 11, 2022. NEPR-MI-2021-0013*

[45] Spencer, A., & Funk, C. (2021, June 3). *Electric vehicles get mixed reception from American consumers*. Pew Research Center. Retrieved August 3, 2022, from https://www.pewresearch.org/fact-tank/2021/06/03/electric-vehicles-get-mixed-reception-from-american-consumers/

Plug In America (2022)[46], with a few notable exceptions that are described below. Further details of survey results can be found in Exhibit 10.3

Figure 3-13: EV Customer Survey Key Takeaways



As seen in Figure 3-13, there is a relatively strong interest in EV adoption as 40% of survey respondents expressed some interest in buying an EV in the future. Additionally, more than half of the respondents have heard of EVs but do not know much about it, implying that awareness and understanding of EVs can be greatly enhanced through education and outreach.

Electric System Reliability

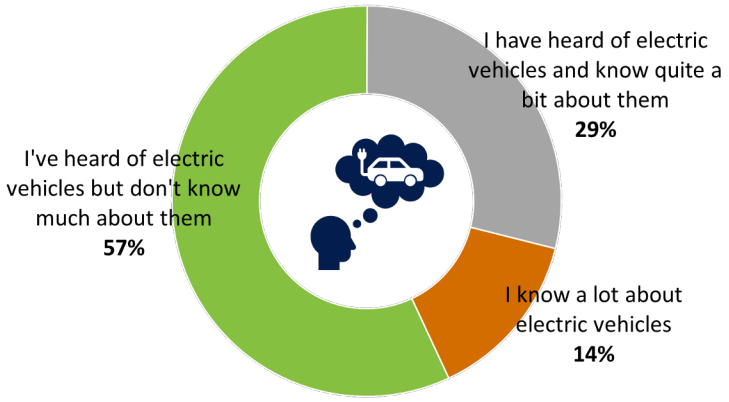
Electric system reliability is viewed as the top concern in EV buying decision among survey respondents and one of the top three things that would likely increase respondents' interest in adopting an EV. Respondents' concerns regarding system reliability connects with the broader reality of Puerto Rico's electric power system.

Customer Familiarity with EVs

There is an education gap and lack of interest among respondents to purchase or lease EVs. Respondents were asked to describe their familiarity with EVs, and more than half of the survey respondents have heard of EVs but did not know much about them, as depicted in Figure 3-14. The results highlight an opportunity for LUMA to provide educational materials about the benefits and resources available to EV owners.

[46] (2022, February). *The Expanding EV Market - Observations in a year of growth*. Plug In America. Retrieved from https://pluginamerica.org/wp-content/uploads/2022/03/2022-PIA-Survey-Report.pdf

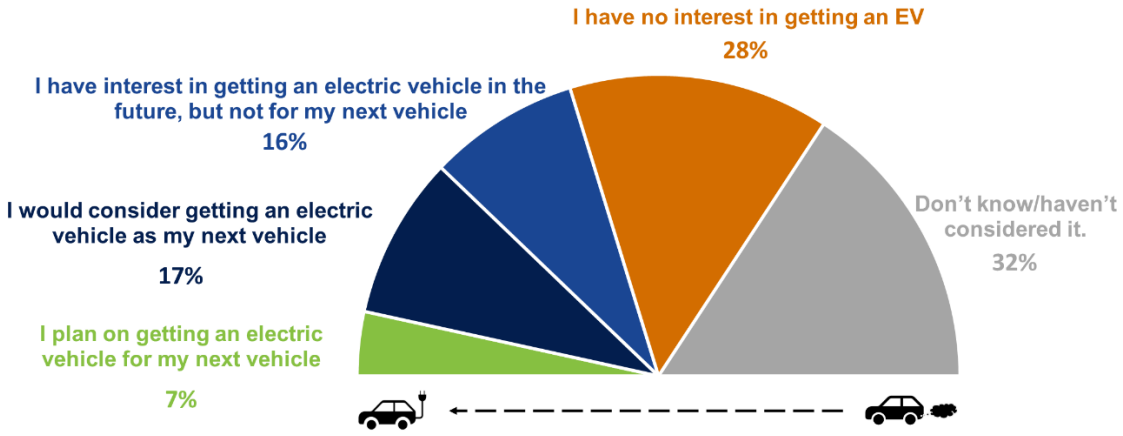
Figure 3-14: Customer Familiarity with EVs



Interest in Purchasing an EV

Following the question about knowledge of EVs, respondents were asked about their interest in purchasing EVs. About 40% of respondents expressed interest in EVs in the future, whereas 60% of respondents had no interest and were not considering purchasing or leasing an EV as shown in Figure 3-14. It will be valuable to track changes in this metric over time after providing educational materials.

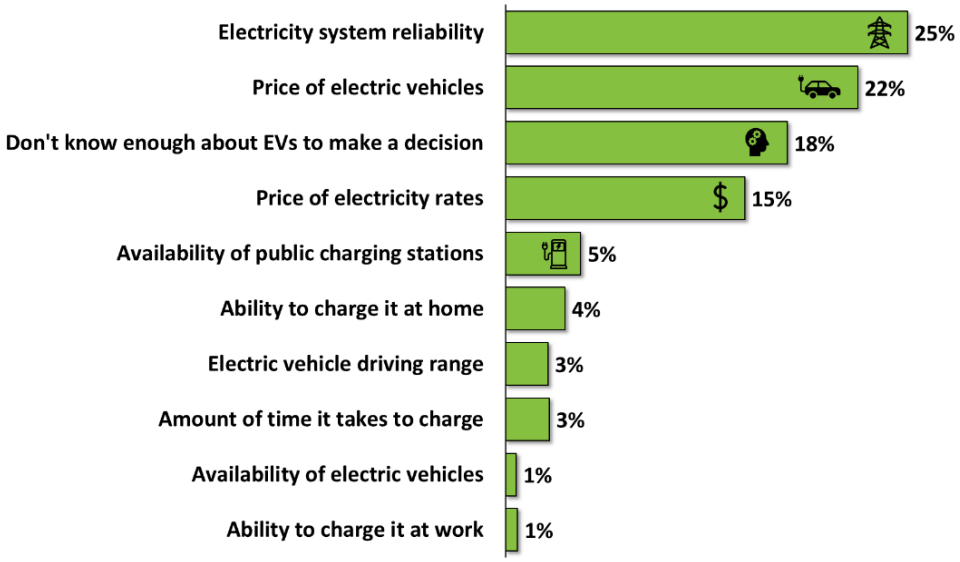
Figure 3-14: Customers' Interest in EVs



Greatest Concern in Purchasing an EV

The top four greatest concerns respondents were: (1) Electric system reliability, (2) Price of EVs, (3) Don't know enough about EVs to decide and (4) Price of Electricity, as shown in Figure 3-15. The results align with the current overall system reliability concerns, associated costs with EVs in Puerto Rico and the lack of EV educational programs.

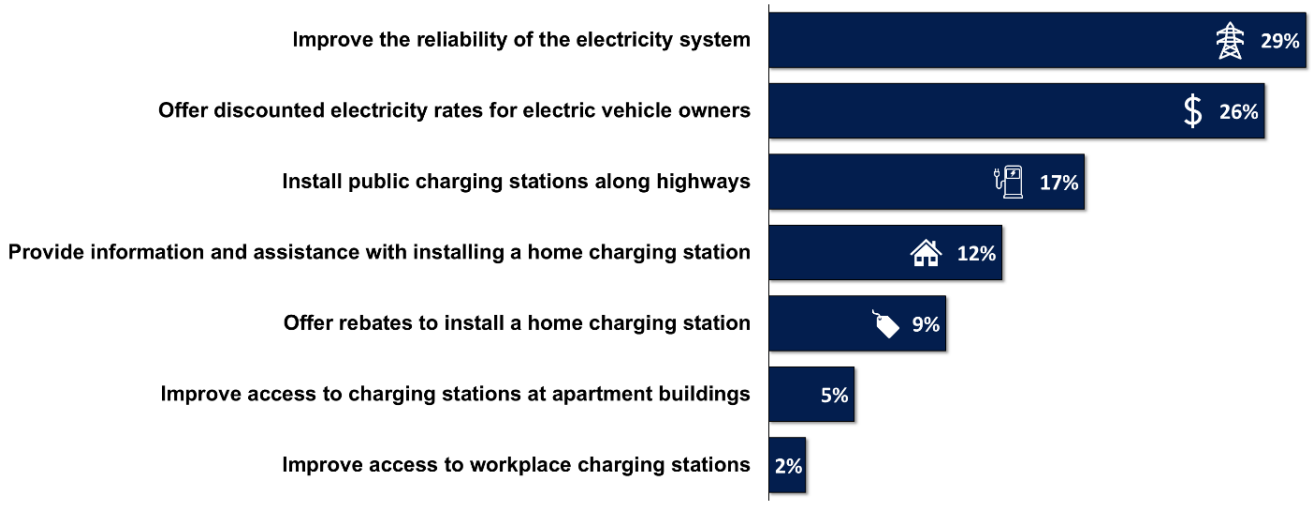
Figure 3-15: Customer Survey - Greatest Concern in Purchasing an EV



Key Factors Influencing Likelihood of EV Purchases

To better address customers' concerns in purchasing an EV, respondents were then asked about the key factors that influence their likelihood of EV purchases. As shown in Figure 3-16, the top four factors included (1) Improve the reliability of the electric system, (2) Offer discounted electricity rates for EV owners, (3) Install public charging stations along highways, and (4) Provide information and assistance with installing a home charging station.

Figure 3-16: Factors Influencing Likelihood of Purchasing an EV



The survey results and key takeaways are summarized into the following:

1. Customers' familiarity with EVs show a limited awareness and understanding of EVs and charging technology

2. Greatest concern in purchasing an EV is electric system reliability
3. The key factors influencing the likelihood of EV purchases is to improve the reliability of the electricity system

These key findings are discussed further in the next section, along with the proposed EV Plan initiatives to overcome the barriers.

3.6 Summary of Resource Adequacy Study

According to LUMA's recent Resource Adequacy Study,[47] Puerto Rico has inadequate supply resources to deliver reasonable system reliability. Simply put, there is not enough reliable generation capacity by PREPA and other generators to meet expected demand and the probability of load shedding outages is much higher in Puerto Rico than industry standards.

The loss of load expectation (LOLE) – an industry standard metric for the probability of load shedding outages – for Puerto Rico for FY2023 was calculated to be 8.81 days per year. Meaning that on average it is estimated that there will be 8.81 days per year when customer demand will not be fully served by PREPA and other generators in FY2023. This measure is 88 times higher than the utility industry benchmark of 1 day in 10 years LOLE standard (0.10 days per year).

The risk of load shedding outages is not due to insufficient generation nameplate capacity. The primary issue is that most of PREPA's generation is not reliable or available and too frequently incapable of operating when electricity is needed to meet the energy needs of Puerto Rico due to its age and maintenance history. The principal causes of this issue include prolonged planned maintenance; high forced outage rates; and partial plant deratings.

Figure 3-17 below presents the average number of loss of load hours (LOLH), broken out by hour of the day they are most likely to occur. The LOLH reflects the expected average number of hours in FY2023 when there will be insufficient generation capacity available to serve demand. The resource adequacy analysis indicates that the timing of the largest resource deficiency is during the evening hours – with the hours between 7 p.m. and 11 p.m. representing approximately 55% of the potential load shedding outages. The evening hours are when system load is highest and when solar production is diminished or unavailable. In terms of seasonality of potential load shedding outages, the summer months are the most challenging.

[47] LUMA Energy, LLC and LUMA Energy ServCo, LLC (LUMA) 2022, *Resource Adequacy Study*

Figure 3-17: Calculated Loss of Load Hours by Hour of the Day

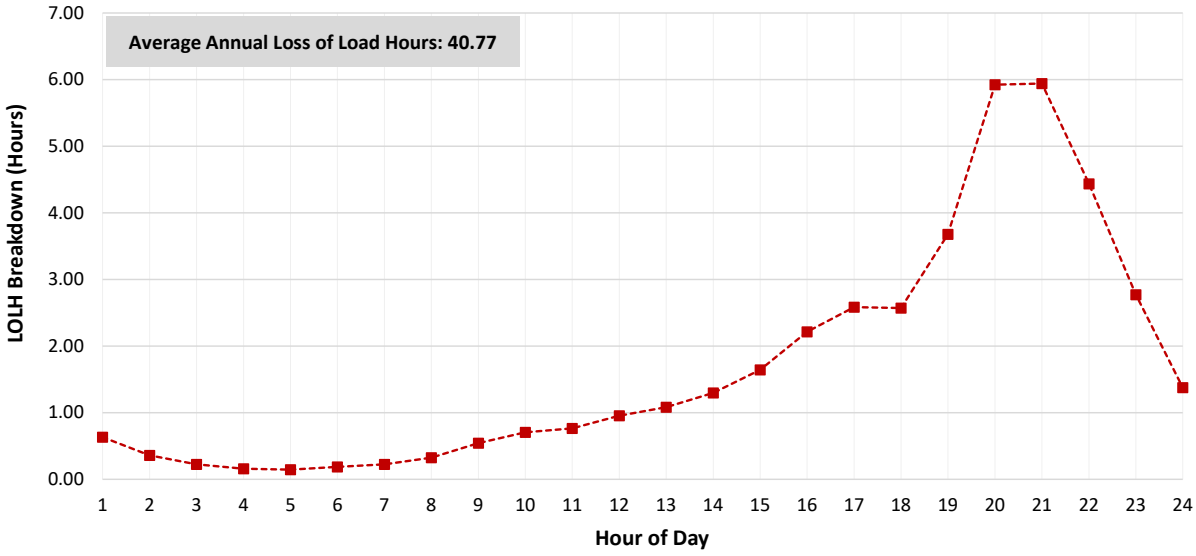
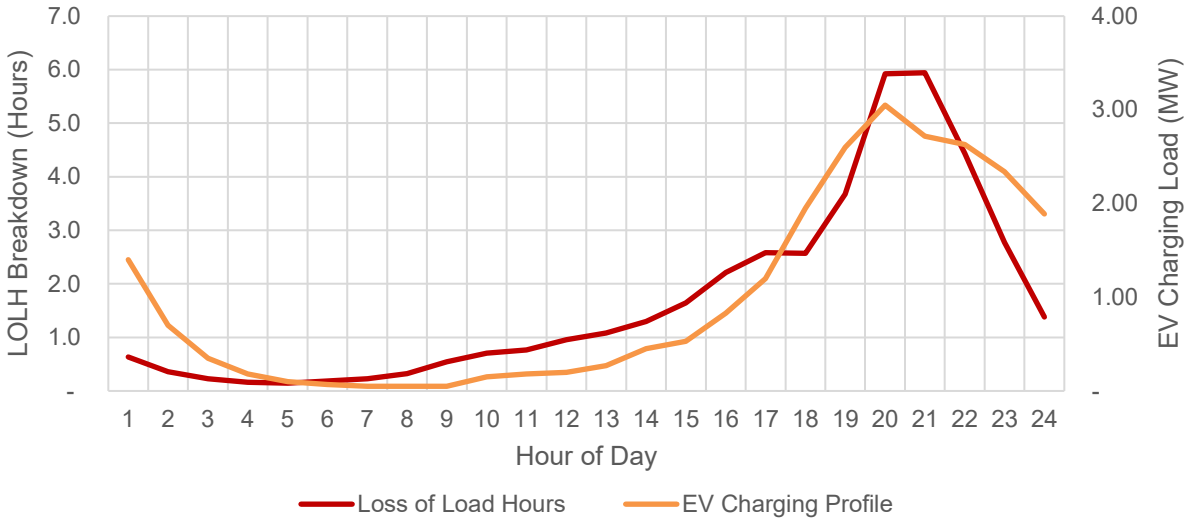


Figure 3-18 below presents an overlay of the hourly LOLH chart above against a typical Level 2 EV charging profile from NREL.[48] The graphic illustrates that the hours of the day most likely to experience a loss of load event align with typical peak charging hours. Therefore, accelerating adoption of EVs without addressing resource adequacy constraints could increase the resource deficiency during the peak period, potentially contributing to increased load shedding outages. This highlights the importance of managed charging programs that can help shift EV charging to off-peak periods of the day.

Figure 3-18: Annual Loss of Load Hours vs EV Charging Profile



[48] https://www.nrel.gov/news/program/2020/how-might-electric-vehicles-affect-electric-loads.html

As the T&D operator, LUMA cannot deliver the energy to meet customer demand unless enough energy is generated. Improving resource adequacy to reduce the risk of "load shedding" outages from inadequate generation requires further discussion and review involving the Energy Bureau, generators, policymakers, LUMA and key stakeholders.

While EV penetration and EV charging load is currently relatively low, it is expected to grow rapidly. Given this rapid growth, it is vital for LUMA explore the demand management opportunities available from EV charging in the near-term to mitigate further impacts on Resource Adequacy from growing EV charging demand in the long-term.

3.7 LUMA's Foundational Infrastructure Programs

LUMA is currently implementing a robust and comprehensive portfolio of initiatives and programs to improve reliability, enhance customer experience, invest in worker safety and training and advance renewable energy generation and integration.[49] The EV Plan will comprise a broad range of actions that represent an important addition to this ongoing portfolio. As such, it is important that the EV Plan is coordinated and aligned with other LUMA initiatives and programs.

LUMA's System Remediation Plan and Improvement Programs encompass a comprehensive range of projects and activities, many of which are focused on improving system reliability. The EV Plan must build upon the foundations of, and the reliability improvements flowing from LUMA's System Remediation and Improvement Plan by addressing other barriers to greater EV adoption in Puerto Rico.

There are several other LUMA programs, projects and activities within the System Remediation Plan and Improvement Programs that will directly support the EV Plan. For example:

- **AMI Program** - In this program, LUMA will establish two-way remote meter reading reporting and control capabilities which will enable a broad range of capabilities, resulting in cost savings to the utility and customer satisfaction improvements. LUMA's AMI Program and associated billing system enhancements will enable more sophisticated metering and billing to allow LUMA to offer EV-specific rates.
- **Customer Service Modernization Program** - Under this program, LUMA will develop and implement a cloud-based contact center platform that allows for the management of a high volume of inbound and outbound customer communications across a range of channels. This will enable faster and more fulsome responses to LUMA customer queries regarding EVs and EV charging infrastructure.
- **Substation Compliance and Studies Program** - LUMA will provide better and more localized information regarding local grid capacity constraints which will allow more accurate responses to EV charging infrastructure requests and inform EV capacity heat map development.
- **Critical Energy Management and Load Generation Balancing Program –** This program will enable control of EV charging, such as through managed charging, to mitigate the impact of EVs on operating costs and system reliability.

Several other initiatives are complementary to the EV Plan. For example, as part of LUMA's efforts to integrate new distributed energy resources and renewable energy capacity, LUMA has developed publicly available Interconnection Capacity Maps. The processes, data and technology used to generate these maps are very similar to those necessary to create EV infrastructure capacity maps. Similarly, LUMA proposes to implement a comprehensive market outreach and communications effort as part of the Transition Period Program Plan (TPP) for Energy Efficiency and Demand Response. To minimize duplication of efforts, the EV Plan must complement and leverage the infrastructure and capabilities that LUMA is building as part of these other initiatives.

The EV Plan is also contingent or dependent upon other LUMA efforts and filings, as well as other PREB filings. For example, the EV Plan's projected spending in FY 2023 needs to be covered within the approved program funds outlined in the 2023 Annual Budget plan or, alternatively, the 2023 Annual Budget must be increased to address the incremental costs for the EV Plan's projected FY 2023 spending. Similarly, the EV Plan's projected FY 2024 spending must be covered within the approved program funds outlined in the 2024 Annual Budget plan. The EV Plan is also dependent upon finalization of the Avoided Cost Study related to the Puerto Rico – Cost Test[50] ("PR Test") developed in Case No. (NEPR-MI-2021-0009). By Resolution and Order approved on August 12, 2022, in Case No. NEPR-MI-2021-0009 (August 12 R&O), PREB adopted the PR Test framework and a prioritization of PR Test impacts and stated that the PR Test applies to all distributed energy resources, including EV to grid. In the August 12 R&O, PREB also indicated that the Avoided Cost Study for Energy Efficiency ("Avoided Cost Study") "is underway to provide values for many of the Utility System Generation Impacts of the PR Test and the Energy Bureau will continue this process and hold additional technical conferences to facilitate the development of the values"[51]. Without the Avoided Cost Study Values that are expected to form the key input to the PR Test, LUMA cannot yet assess the cost-effectiveness of the EV Plan. LUMA proposes to conduct this cost-effectiveness analysis once the Avoided Cost Study is completed and approved by PREB.

Among LUMA's many other initiatives, the Revised EV Rate Design Proposal (NEPR-MI-2021-0013) should be considered as an integral component of the EV Plan. The Revised EV Rate Design Proposal provides details for a revenue neutral, three-part Residential EV Time of Use (TOU) rate to be introduced on an interim basis that would address on of the top three barriers to greater EV adoption in Puerto Rico and outlines additional EV-specific rate offerings that LUMA will evaluate for possible introduction in the medium term. The key coordination and alignment need of the EV Plan with LUMA's other initiatives and regulatory filings are summarized in Table 3-4. These other initiatives and regulatory filings include: (1) Annual Compliance Report with Renewable Energy Portfolio, (2) System Remediation Plan (SRP), (3) Fiscal Year 2023 Annual Budget, (4) Energy Efficiency and Demand Response Transition Period Plan (TPP), (5) Puerto Rico Test for Demand Response and Energy Efficiency, and (6) Revised EV Rate Design Proposal.

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[50] This is a test adopted in accordance with the Regulation for Demand Response dated December 21, 2022 ("Regulation 9246") and the Regulation for Energy Efficiency dated March 25, 2022 ("Regulation 9367"). It is a cost-effectiveness screening test, reflecting Puerto Rico public policy, used to evaluate whether proposed or actual EE and DR programs or initiatives provide benefits greater than their costs. *See* Regulation 9246, Section 1.09(B)(20) and Regulation 9367, Section 1.09(B)(45) and Section 5.02(B).

[51] August 12th R&O at page 8

Table 3-4: Key Coordination and Alignment Needs of the EV Plan

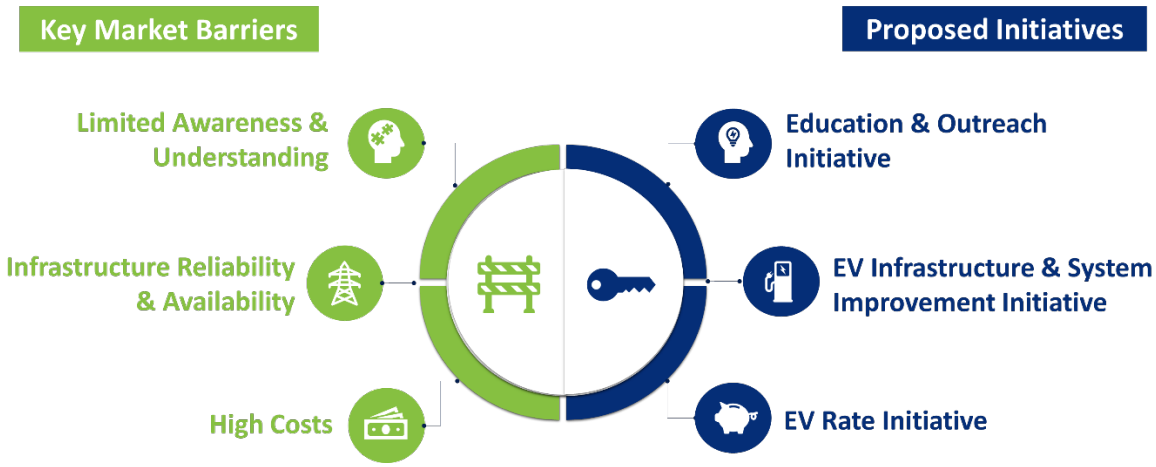
Filing & Description	Case No:	Alignment Needs with EV Plan
Annual Compliance Report with Renewable Energy Portfolio Summary of LUMA's efforts to integrate new renewable energy capacity including three utility scale wind and solar energy facilities, totaling over 175 MW.	NEPR-MI-2020-0015	Additional renewable capacity will directly support additional EV load. LUMA has announced its publicly available Interconnection Capacity Maps. LUMA plans to include a function to show to load capacity to help guide EV charging developers to areas where direct current fast charging (DCFC) electric vehicle supply equipment (EVSE) can likely interconnect with minimal needs for system reinforcement.
System Remediation Plan (SRP) Broad and comprehensive programs to address system reliability and other critical needs and add modern technology, such as AMI, to enable the integration of renewables	NEPR-MI-2020-0019	System reliability is one of the top three barriers to EV adoption in Puerto Rico. Multiple technologies within the SRP will enable and support greater EV adoption AMI will provide new data to help LUMA offer a set of services including an EV time of use (TOU) rate that will play a vital role balancing the costs of networks and enabling drivers to charge their EVs as cheaply as possible.
Fiscal Year 2023 Annual Budget The Annual Budgets for Fiscal Year 2023 includes LUMA's allocation of total spending related to priority system recovery and resilience programs.	NEPR-MI-2021-0004	EV Plan's budget will need to be aligned with approved program funds outlined in the 2023 Annual Budget plan and subsequent annual budgets. The key budget priorities which coincide with the EV Plan includes improving customer experience, enabling, and integrating renewable energy, investing in worker safety, and training, and utilizing new technologies.
Energy Efficiency (EE) and Demand Response (DR) Transition Period Plan (TPP) The two-year TPP summarizes LUMA's proposed portfolio of programs related to Energy Efficiency and Demand Response.	NEPR-MI-2021-0006	EE/DR marketing and educational resources will serve as the foundation for LUMA's EV Plan's marketing and outreach initiative. LUMA will leverage the EE/DR TPP educational materials. AMI deployment for the TPP's Battery Demand Response Program will enable managed charging within the EV Plan. Information Technology (IT), Operating Technology (OP) and billing systems used for EE/DR will also be utilized to manage billing and customer usage under the EV Residential TOU rate.

Filing & Description	Case No:	Alignment Needs with EV Plan
Puerto Rico Test (PR Test) for Demand Response and Energy Efficiency The PR Test is a cost-effectiveness screening test, reflecting Puerto Rico's public policy, and used to evaluate whether proposed or actual DR initiatives provide greater benefits than their costs.	NEPR-MI-2021-0009	The PR Test adopted on August 12, 2022, noted that the Proposed PR Test Framework should be included in future benefit-cost assessments of DERs, even those that are difficult to quantify and monetize. EV Plan benefit and cost analysis will be dependent on the outcomes from the Avoided Cost study from which values will be developed as inputs to the PR Test.
EV Rate Design Proposal A detailed proposal of a three-period Residential EV TOU rate.	NEPR-MI-2021-0013	The Revised EV Rate Design is an integrated component of the EV Plan and provides a constructive framework for charting the rate options to support EV adoption in Puerto Rico.

3.8 Key Market Barriers and Proposed Initiatives

LUMA synthesized the findings from the market assessment, stakeholder feedback and customer surveys to identify the current market barriers facing EV adoption among residential customers in Puerto Rico. These key market barriers currently fall into three main categories outlined in Figure 3-19. The following section delves into the details for each market barrier and the initiatives LUMA is proposing to address these barriers.

Figure 3-19: Key Market Barriers and Proposed Initiatives



Limited Awareness & Understanding: As EVs are still a relatively new technology and many mainstream consumers are unaware or just learning about how the technology works, and the advantages of EVs. As a result, awareness of and enthusiasm for EVs remain low outside of early

adopters as highlighted in Section 3.5.2. The range anxiety issue also falls under this category as many consumers may think that an EV battery cannot store enough energy for their driving needs, or that charging infrastructure availability is not yet sufficient.

> **Education and Outreach Initiative:** LUMA proposes to develop educational and outreach resources to help residential and low-income customers and underserved communities make informed decisions, encourage EV adoption, and reduce range anxiety. LUMA will maintain documentation of its outreach to community organizations of disadvantaged and low-income communities. The familiarity with EVs is also important to overcome some of the misconception around EVs. A well-executed educational and outreach initiative has been proven to empower customers to make choices that are better for them, the local economy, and society.

Infrastructure Reliability & Availability: The infrastructure issues highlight consumers' concerns regarding the reliability and resiliency of the electric grid system in Puerto Rico as shown in the survey results discussed in Section 3.5.2. These electricity grid reliability concerns can be constraining EV adoption and charging infrastructure deployment in Puerto Rico.

> **EV Infrastructure & System Improvement Initiative:** LUMA continues to implement foundational improvement programs to build a more reliable, more resilient, safer, and cleaner energy system. Additionally, LUMA plans to work collaboratively with customers and EV industry stakeholders to support and facilitate EV charging infrastructure deployment needs. LUMA proposes to develop a suite of deliberate and inclusive actions under this initiative to help minimize overall strain on the grid, improve grid reliability, facilitate, and streamline infrastructure deployment, reduce the need for costly grid upgrades and avoid stranded asset risk. LUMA can also further help overcome high costs barrier by sharing information about technologies like automatic load management systems that can help reduce infrastructure costs for installing EVSE, especially in multifamily residential buildings.

High Costs: Costs to adopt an EV remain one of the biggest barriers to adoption. The upfront costs of an EV today remains materially higher than their gasoline counterparts even with rebates and/or incentives accounted for in some cases. Such high initial capital costs are typically difficult to overcome for many consumers in Puerto Rico since approximately 44% of households in Puerto Rico are living at or below the poverty line, with little to no disposable income to purchase an EV[52]. However, there are many cost-saving factors related to TCO which can be lower for EVs relative to their gasoline counterparts as discussed in Section 3.1.1.

[52] The US Census Bureau measures poverty rate by using a set of money income thresholds (the minimum level of income deemed adequate) that vary by family size and composition to determine who is in poverty.

EV Rate Initiative: LUMA proposes to evaluate, develop, and offer alternative rate options for residential customers to help lower the cost of charging an EV and give customers greater buying power. As discussed in Section 3.1.2., as much as 80% of EV charging typically occurs at home and charging at home is likely the most cost-effective way to reduce the operating costs of owning an EV among residential EV drivers. Providing alternative rate options for residential customers to incentivize them to charge their EVs during off-peak hours can further reduce the TCO, making EVs more attractive while minimizing the impacts that EV charging may have on the electric grid.

3.9 Utility EV Initiative Benchmarking

LUMA undertook a market research and benchmarking exercise to better understand best practices, business models and lessons learned from the various EV programs and initiatives offered by utilities across the U.S. The key programs of focus were based on the proposed initiatives laid out in Section 3.8. which include: (1) Education and Outreach Initiative, (2) EV Rate Initiative, and (3) EV Infrastructure & System Improvement Initiative. Several program attributes were evaluated, including but not limited to, the level of participation (customers enrolled, chargers installed), incentive levels (rebates or price signals), target customers (single-family residential, multi-family residential, public, etc.), eligibility requirements, education and outreach approach, customer intake approach and program costs. LUMA evaluated lessons learned and best practices and these programs have proven to be successful in other regions and have informed the range of actions that LUMA may take to support the EV market in Puerto Rico in the near-term (0-3 years).

LUMA focused on EV initiatives offered and/or proposed to support EV adoption among residential customers. Through the benchmarking exercise, LUMA also looked for potential future opportunities beyond the 3-year timeframe. This enables LUMA to begin preparing for the EV market in Puerto Rico beyond the next three years.

In addition to the three initiatives described above, LUMA recognizes that unequal distribution of benefits from the transportation and energy systems can prevent both low/moderate-income communities from realizing equitable benefits from these systems. As a result, LUMA will emphasize equity considerations in the EV Plan and when planning infrastructure support and improvement in EV charging stations and seek to improve existing disparities in the EV market.

3.9.1 Education and Outreach Initiatives in the U.S

LUMA evaluated ten Education and Outreach initiatives targeting the residential customer segment from seven different utilities across the U.S. to assess resource needs and best practices. The key initiatives across utilities are shown on Table 3-5. LUMA plans to focus its efforts in the near-term on key foundations of education and outreach initiatives, including education and advisory services and online education tools to address the knowledge gap around EVs, while prioritizing low-income communities.

Table 3-5

Initiative	Initiative Count	Utility Count	
Education & Advisory Services	3	3	Near-Term Focus
Online Educational Tools	4	3	
Dealership Training & Incentives	3	2	

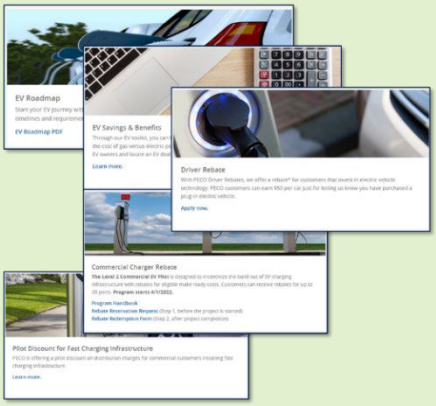
Education and Advisory Services – All utilities reviewed in the benchmarking exercise provide general EV educational resources through their EV program website. Only a few highlighted in Table 3-6 offer a standalone market education program as the majority of the utilities reviewed provide program-specific education and outreach along with other programs, such as EV rates. A utility is typically an ideal entity to help educate customers and raise awareness on the benefits of EVs, the appropriate charging infrastructure needed and EV charging rate options, to the benefits of all customers. Electric utilities are also often a trusted source in the community to provide reliable and correct information on energy-related topics and use. Such information can be further extended to EVs and charging technologies. Examples of education resources provided by other utilities across the U.S. include EV 101 (types of EVs and charging, how to charge an EV and how much it costs to charge an EV compared to gasoline counterparts), EV model availability, benefits of EVs, available incentives, and charging rate and program options.

Case Study: Puget Sound Energy (PSE)

In 2019, PSE rolled out an EV program for its customers – PSE Up & Go Electric[53] – primarily focusing on market education and increasing access to charging infrastructure. The program aims to raise awareness and assists customers with EV and charging decision-making. Resources provided through the program include cost calculators, charger comparisons and facts about owning and maintaining an EV. PSE's customers can also sign up for a monthly newsletter to stay updated on the latest EV news and learn about local EV-related events. Additionally, PSE utilizes the program platform to provide its customers with programmatic education and marketing, including its charging and rebates programs.

Case Study: Philadelphia Electric Company (PECO)

As part of its transportation electrification efforts, PECO offers its customers an EV education and outreach program (EVsmart Program[54]), providing education content based on its pilot and program structure, along with website updates, email campaigns, newsletter, and EV-related events. The program also features an interactive, online EV toolkit[55] that allows customers to research the benefits and advantages of owning an EV. PECO continues to promote the use of EVs with its customers through rebates and other programs designed to support the build-out of the EV infrastructure in Pennsylvania and its EVsmart Program has been a great way for customers to learn about EV options in region and how PECO can help make customers' EV goals a reality.



Online Educational Tools – Several utilities reviewed provide online tools to customers. Examples of such tools include EV savings calculator, TCO calculator, EVSE selector tool, and EV charging location

[53] https://www.pse.com/pages/electric-cars/charging-with-pse

[54] https://www.peco.com/SmartEnergy/InnovationTechnology/Pages/ElectricVehiclesL3.aspx

[55] https://www.peco.com/SmartEnergy/InnovationTechnology/Pages/EVSavingsBenefits.aspx

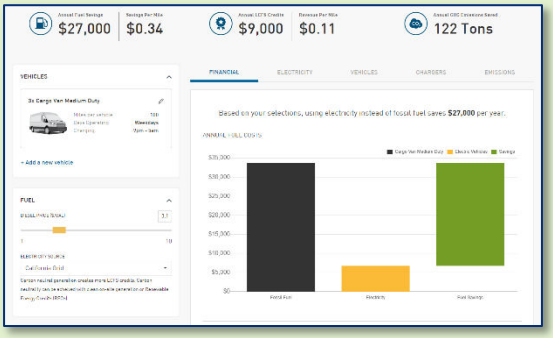
map. These online, self-service tools offer consumers a quick and easy way to gather personalized insights about how to maximize benefits and minimize costs that further guide their adoption decisions.

Case Study: Madison Gas and Electric (MGE)

MGE provides an "Explore My EV" tool[56] on their website for customers in their service area who are interested in taking the first step toward understanding the savings potential that EV could bring and all the associated benefits. The tool uses WattPlan[57] white label service to provide: (1) savings potential based on a customer's driving habits, home electricity use, and available tax credits and incentives; (2) vehicle options side-by-side to understand how different scenarios may impact a customer's costs including electric bills in the near- and long-term; and (3) details on next steps if buying an EV is deemed a good investment for a customer

Case Study: Pacific Gas & Electric (PG&E)

In 2020, PG&E launched an online calculator for its customers to utilize when considering transitioning their vehicle or fleets to EVs. The EV Savings Calculator[58] allows customers to assess EV savings estimates based on their inputs, such as typical driving range, budget after incentives, and vehicle characteristics. The tool also factors in rate options available and offers recommendations for charging infrastructure, charging time, and fuel costs. The tool helps customers better understand key TCO factors and provides insights into estimated reductions in greenhouse-gas emissions.



3.10 EV Infrastructure & System Improvement Initiatives in the U.S

LUMA analyzed more than 40 EV

Infrastructure & System Improvement initiatives from 24 different utilities to determine the essential actions to support key stakeholders on charging infrastructure deployment. In the near-term, LUMA will focus its efforts on providing foundational information and analysis that can help streamline and reduce soft cost components of the charging infrastructure installation.

Table 3-6 : List of EV Infrastructure

Initiative	Program Count	Utility Count	
EV Hosting Capacity Map	13	13	Near-Term Focus
EV Readiness Checklist	3	3	
EVSE Installation Guidebook	4	4	
EVSE Rebate	19	17	
EVSE Installation Rebate	5	4	
Make-Ready	6	6	
EVSE Ownership & On-Bill Financing	6	6	
Workplace Charging	2	2	

[56] https://mge.wattplan.com/ev/

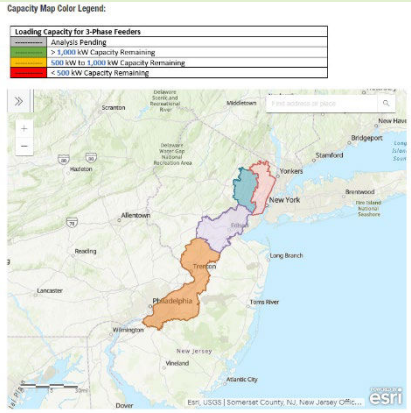
[57] WattPlan is a cloud-based software for automating customer education in EV, renewable and rate programs targeted the utility industry. https://www.wattplan.com/EV/

[58] https://ev.pge.com/

EV Hosting Capacity Map - Among utility EV infrastructure initiatives reviewed, 13 of those provide an EV Hosting Capacity Map to customers, illustrating the distribution grid's available hosting capacity for EV infrastructure to help guide customers and developers on installation placement. The EV Hosting Capacity Map enables customers to save time and money when planning for infrastructure deployment. By indicating the amount of resources that can potentially be connected to the grid, an EV Hosting Capacity Map also helps ensure safety and reliability as LUMA focuses on limiting voltage and thermal issues. Typically, data used to create the EV Hosting Capacity Map is for informational purposes only and does not generally constitute an offer of service or guarantee that service will be available to any specific project at any specific location and the map along with associated data is not intended to be a substitute for the established service application process.

Case Study: Public Service Enterprise Group (PSE&G)

PSE&G provides its customers with an EV Hosting Capacity Map[59], representing an estimate of the remaining circuit load capacity to help guide EV customers and/or EV charging developers to areas where high-powered EVSE can likely interconnect with minimal needs for system reinforcement. PSE&G's EV Hosting Capacity Map displays the approximate amount of private energy resources that can be accommodated without adversely affecting power quality or reliability under existing control configurations, and without requiring major infrastructure upgrades. The geospatial map includes calculated, feeder-level values and is frequently refreshed to reflect the most up-to-date information.



EV Readiness Checklist – An EV Readiness Checklist is typically designed to guide consumers through the development of EV infrastructure. Several utilities and local government entities in many states provide the EV Readiness Checklist to support their customers and local residents. These EVSE installation guides commonly provide a detailed description of the process for the purchase/procurement and installation of EVSE. The guide typically contains helpful information for residential customers, ranging from identifying how many EVSEs will be needed and outlining the process of getting the EVSE installed, to ensuring customers have a positive experience when transitioning to electrified vehicles. Based on the review of several EV Readiness Checklists and EVSE installation guides, the process that customers must take to install EV charging stations can vary across the U.S. depending on existing laws, regional requirements, and customer needs.

[59] https://nj.myaccount.pseg.com/myservicepublic/hosting_capacity_map

Case Study: Potomac Electric Power Company (PEPCO)

PEPCO provides a 7-step EV Readiness Checklist[60] to its customers. The simple checklist helps get customers' home EV-ready starting with the following steps:

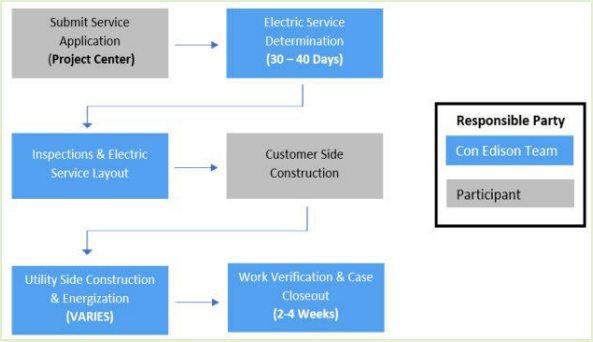
- ***Assess charging needs:*** This step can be done by evaluating: (1) how far an EV can travel on a full charge; (2) whether there is workplace or public charging that could support a customer daily driving need; and (3) what time of day does a customer plan to charge their EV and for how long.
- ***Determine charging level:*** Depending on a customer's charging needs, the type of charging and estimated cost of EVSE can be identified.
- ***Consult and electrical contractor:*** Once the first two steps are identified, customers will need to have a qualified electric contractor obtain all required permits, file an application with PEPCO and complete any upgrades needed. PEPCO also provides a list of local licensed electrical contractors on its website.
- ***Obtain permits:*** Customers must obtain all necessary permits before starting any electrical work to install the EVSE. This can typically be done by an electrical contractor.
- ***Install charging station:*** Customers need to have an electrical contractor install the charging station.
- ***Have the inspection performed:*** Customers have to ensure that an inspection is performed, if required by the local permitting authority.
- ***Charge an EV:*** Before customers start charging an EV, they should work with their charging equipment provider to learn how to correctly use their EVSE to charge their vehicles.

EVSE Installation Guide – A few utilities provide an EV charging infrastructure installation guidebook to residential and commercial customers. These guidebooks typically provide important information on how utilities can help with charger selection, site planning and design, including high-level details of the electric installation process, typical steps, challenges, and technical solutions associated with adding EV charging station projects to established electrical services.

[60] https://www.pepco.com/SmartEnergy/InnovationTechnology/Pages/ElectricVehicles/EVReadinessChecklist.aspx

Case Study: Consolidated Edison Company (ConEd)'s Guide to Electric Vehicles[61]

ConEd provides a step-by-step guide to installing EV chargers intended for installation of Level 2 and DC fast chargers in its service territory. Within the guide, ConEd provides the high-level information about its electric system, along with steps for requesting electrical service for customers' EV charging station installation, processing for EV charging installation, and required paperwork to request a new service. ConEd plans to revise and/or amend the guide as needed in keeping with developments and progress in the electric and EV industries.



3.10.1 EV Rate Initiatives in the U.S

LUMA reviewed a total of 36 EV rates from 29 different utilities based on two criteria that a rate must: (1) serve residential EV customers; and/or (2) aim to drive EV adoption among residential market segments. Three key rate structures were identified as depicted in Table 3-8 which include: (1) TOU rates; (2) fixed monthly subscription charge; and (3) off-peak charging discount. This review helped shape the Residential TOU Rate and build the foundation for a commercial charging EV rate. Table 3-7 depicts a summary of the most common types of EV benefits and incentives across the U.S.

Table 3-7: List of EV Rate Initiatives

Initiative	Initiative Count	Utility Count	
Residential EV Rate Pilot(s)	19	15	Near-Term Focus
Public Charging EV Rate Pilot	28	20	
Demand Response/Managed Charging	8	5	

Among EV rate structures reviewed, TOU pricing is the most common EV rate option for residential EV charging. TOU rate structure is further categorized based on metering requirement since the impact of price signals on customers' EV charging behavior can vary significantly between a whole-house and separately metered TOU rates. For public charging TOU rates were grouped based on the variation in demand charges. Further details on EV rate structures can be found in the Revised Draft Electric Vehicle Rate Design Proposal.[62]

Table 3-8: Distribution of EV Rate Structures

Rate Structure		Program Count		Utility Count
		Residential Rate	Public Charging Rate	
TOU	Whole-House Meter	12	-	12
	Separate Meter	8	-	8
	Reduced Demand Charge	-	9	9
	Fixed Demand Charge	-	2	1
Fixed Monthly Subscription Charge		1	-	1
Off-Peak Charging Discount		5	1	5

[61] https://www.coned.com/es/our-energy-future/technology-innovation/electric-vehicles/-/media/ac64e3f8e2fa44e9b7d24400123e846f.ashx'

3.10.2 Equity-Focused EV Initiatives in the U.S

Climate change and greenhouse gas emissions typically hit low/moderate income communities first and hardest since these communities disproportionately live near busy roads, freeways, or industrial areas. They are exposed to high levels of emissions and increased illness and health costs, amongst other impacts. Increasing EV access in communities most impacted by poverty and pollution is a necessity not only to meet Puerto Rico's clean energy goals, but also to reverse a history of environmental injustice and disinvestment in these communities. It was LUMA's intention to develop the EV Plan with a focus on effective solutions to increase EV adoption and access and consider the unique mobility challenges of low/moderate income households, ensuring that the benefits of clean transportation are broadly shared.

Investment in underserved communities among electric utility in the U.S. has surged in the past few years. And typically, these utilities outline equity goals and implement specific definitions for underserved communities in different ways.

Education and Outreach Initiative – As discussed in Section 3.5.2., a general lack of awareness about EVs can create barriers to adoption which can be exacerbated among low/moderate income households and rural populations. Education and outreach strategies targeted to meeting the needs of these customers signal a strong commitment to ensuring these communities are prioritized in efforts to expand access to EVs.

Case Study: Southern California Edison (SCE)'s Charge Ready and Market Education Program

During Phase 2 of its Charge Ready program, SCE is investing $14.5 million in three separate marketing, education, and outreach programs, all of which include strategies for engaging customers living in disadvantaged communities within SCE's service area. The programs feature outreach to local community and community-based organizations to collaboratively develop mass media marketing materials tailormade for disadvantaged communities. Moreover, the programs include the development of web- and mobile-based self-service tools and resources for helping consumers to better understand the TCO savings for driving electric.[63]

EV Infrastructure & System Improvement Initiative – Lack of access to charging infrastructure can also be a limiting factor to EV adoption in low-income and underserved communities. Charging an EV can be difficult, especially for low-income consumers who likely reside in multi-unit dwellings (MUDs) or are renters with no access to a private garage. Greater access to public EV charging stations across Puerto Rico can help support renters and residents in MUDs. It can further support access to charging for taxi drivers and ride-sharing service providers. Low-income consumers may also face barriers to accessing existing charging stations because they may not have smartphones or may not be able to afford charging network subscriptions.

[62] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

[63] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M344/K059/344059748.PDF

Case Study: DTE Energy (DTE) & Lyft Partnership[64]

In early 2022, DTE has partnered with Lyft (a ride-sharing company) to incentivize drivers in DTE's service area who purchase or lease an EV for use on the Lyft network. The partnership aims to provide equitable access of EVs to all customers by providing $2,000 upfront rebate for the purchase or lease of an EV when drivers apply and accepted into the program, with an additional rebate of up to $5,000 if the driver completes 200 rides per quarter. The key objective of the partnership is to close the gap of equitable access to EVs as shown in the 2022 Economic Impact Report for Detroit that 60% of Lyft riders start or end in low-income areas.

Case Study: Pacific Gas & Electric (PG&E)'s Electric Vehicle Charger Incentive and Education Program: The program aims to provide financial incentives for up to 2,000 low-income households to install residential Level 2 chargers (up to $500 toward the purchase of a Level 2 charger and up to $2,000 if electrical infrastructure upgrades are required at the residence). Within its service area, PG&E partnered with local community-based organizations to focus its education and outreach efforts on meeting the specific needs of local communities, including non-English speaking households.[65]

EV Rate Initiative – Access to EVs has largely been limited to certain sectors of the population due to financial and logistical constraints. Making EVs a real choice for low-income and underserved communities requires more than providing subsidies to bring down the cost of charging infrastructure, but rather EVs need to be practical and accessible. Upfront EV purchase costs remain a significant barrier to EV ownership among low-income households. Incentives and EV charging rate programs, especially those with equity-focused components, can help overcome financial barriers and expand EV access for low-income consumers and underserved communities.

Case Study: Dominion's Residential Charging Tariff[66]

In July 2021, Dominion filed an application for five new tariffs to support transportation electrification in Virginia, one of which provide aims to support its residential customers who wish to have Level 2 charging installed in their homes. The Residential Charging Tariff includes incentives for the deployment of charging infrastructure to low-income customers and in low-income communities and communities of color. Additionally, for 100 eligible low-income customers, no costs will be charged for the installation of Level 2 charging station and associated infrastructure, wiring from the panel to the charging station, and outlet for the charging station. The Tariff has a target to reach 1,000 participants with a 10% carveout reserved for low-income customers.

[64] https://ir.dteenergy.com/news/press-release-details/2022/DTE-Lyft-partner-to-make-electric-vehicles-more-accessible/default.aspx

[65] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M314/K145/314145047.PDF

[66] https://scc.virginia.gov/docketsearch/DOCS/7jtj01!.PDF

4.0 Portfolio of Actions

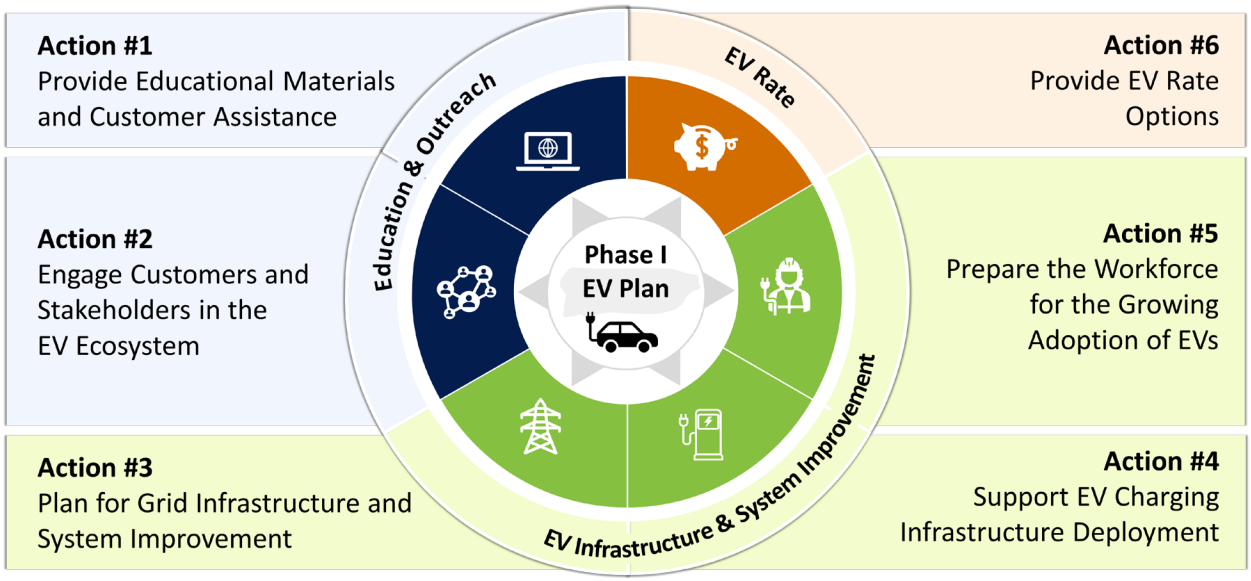
This section discusses the portfolio of actions corresponding to proposed EV initiatives outlined in section 3.8. To select and prioritize near-term actions, LUMA considered a broad range of potential actions and activities that take advantage of the unique strengths of LUMA and local stakeholders, then tailored them to the needs of customers and local grid infrastructure, while accounting for resource limitations and system constraints.

4.1 Summary of Actions

LUMA proposes a total of six near-term (0-3 years) actions, aiming to lay the groundwork for broad electrification in residential market segments. A summary of proposed actions curated based on the three initiatives discussed in Section 3.8 are depicted in Figure 4-1.

For the first proposed initiative (Education and Outreach Initiative), LUMA will focus on raising awareness and education through the lumapr.com website and through direct customer and stakeholder engagement. To provide alternative rate options for EV charging among residential customers, LUMA developed a Draft EV Rate Proposal with a revision submitted on July 21, 2022. The EV Rate Proposal is an integral part of the EV Plan, and its development was undertaken concurrently with the development of the EV Plan.

Figure 4-1: Portfolio of Near-Term Actions



To maintain safety and reliability of the electric grid, LUMA proposes three actions under the EV Infrastructure & System Improvement Initiative to plan for grid infrastructure and system improvement and support EV charging infrastructure deployment, while preparing LUMA's internal workforce to help facilitate Puerto Rico's transition to electrified transportation. These actions are being proposed to support existing and future activities in the EV market and foster opportunities for third-party EVSE service providers to deploy charging infrastructure needed to support the growing EV market.

LUMA has also considered equity opportunities and concerns in each of the proposed actions as equity is an integral part of the EV Plan development.

4.2 Education and Outreach Initiative

Education and awareness remain major barriers to EV adoption in many places including Puerto Rico. Survey results discussed in Section 3.5.2 show there is a general lack of awareness and understanding around EVs in Puerto Rico. In the near-term, supporting the transition to electrified transportation is to some extent an educational journey to understand customer behavior and preferences and to learn what processes or programs best serve these new customers' needs.

Given customer unfamiliarity with EV and charging technology, customers can be hesitant to switch to EVs. As shown in the survey results, roughly 12% of survey respondents would benefit from additional information about EVs to help them make informed decisions. To meet this need LUMA's Education and Outreach Initiative will provide information to help overcome customer barriers to widespread adoption. Education and Outreach efforts are an essential step to providing stakeholders and community members with a basic introduction to EVs, raising community awareness about the purpose and importance of establishing a comprehensive EV program, and illustrating how transportation electrification initiatives are related to other community issues, such as air quality, carbon reduction, and other public energy policy goals[67].

The Education and Outreach initiative is also essential for program-specific education as it can greatly improve program participation rate and performance. Additionally, education can also help enhance customer satisfaction with more sophisticated programs, such as EV TOU rate and/or targeted advisory assistance.

Overarching Goals – The overarching goal of this initiative is to educate and drive customer awareness around EVs and LUMA's EV programs that best fit the various stages of EV ownership and ultimately encourage actions toward further adoption of EVs.

Barriers Addressed – The Education and Outreach initiative will address the limited awareness and understanding around EVs and charging technology for all types of customers. It will also help customers navigate through complex information that may create misperceptions around EVs.

Potential Partners – In the U.S., EV education and outreach efforts are typically delivered through collaboration among various stakeholders, including but not limited to, utilities, local and national NGOs, state and local governments, automakers and auto dealerships and EV charging service providers and developers. LUMA plans to work collaboratively with various stakeholders to achieve the overarching goals of this initiative, consistent with those of utilities in other states in the U.S.

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[67] Act 17-2019: Set the parameters for a resilient, reliable, and robust energy system with just and reasonable rates for all class of customers; make it feasible for energy system users to produce and participate in energy generation…unbundle and transform the electrical power system into an open system. https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/17-2019.pdf

Act 33-2019: Set forth the public policy of the Government of Puerto Rico on climate change and on the mitigation, adaptation, and resilience processes per sector; establish a greenhouse gas emission inventory… to combat the effects of climate change. https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/0033-2019.pdf

LUMA's Role – LUMA will serve as a trusted resource and advisor to provide reliable information on EVs. LUMA aims to implement this initiative with support from potential partners who are willing to contribute their knowledge and expertise surrounding transportation electrification in Puerto Rico. LUMA is uniquely positioned to develop and provide EV marketing, education, and outreach efforts in many ways, including:

- LUMA's websites and app are a resource for many customers seeking information about electricity matters, including EVs
- LUMA's customer mailings are some of the best communication channels to reach prospective EV adopters
- LUMA can leverage the existing relationships with its customers and customer service representatives to raise awareness around EV resources and website
- LUMA is best qualified to raise awareness and educate customers, dealerships, and fleet operators about rate options and other relevant initiatives that could provide additional savings
- LUMA can share lessons learned and best practices of EV charging infrastructure deployment along with the transition to EVs with its customers based on their own experiences.

Value Proposition for Customers – The Education and Outreach initiative will help improve awareness and understanding of EVs, charging technology and benefits among customers, ultimately helping them to make informed decisions in EV adoption. Additionally, this effort can add to customer benefits by increasing participation and enrollment in EV rates and future initiatives, leading to further increased EV adoption in Puerto Rico.

4.2.1 Action 1: Provide Educational Materials and Customer Assistance

Action Summary - Action 1 is intended to build and provide accessible data-driven information on EVs, charging technology and EV program-specific information to customers. This information will be designed to improve public awareness and understanding of the options, feasibility, and benefits of EVs, along with information about program opportunities within LUMA and in the community. Educational resources will be developed and maintained on a publicly accessible EV program webpage on LUMA's website, allowing all customers to easily access EV-specific information along with access to trained customer contact center.

LUMA will develop a suite of general and program-specific educational resources, tools, and marketing collateral to provide information on EVs and charging technology as well as the benefits of EVs and EV program offerings, such as the EV TOU rate currently being proposed. These educational resources will be hosted on a branded, community-facing EV landing page on LUMA's website and will be used to train internal staff in the Customer Contact Center along with customers. Educational resources and materials being developed in this action may include:

- Electric Vehicle 101: Types of EVs and charging, EV charging information (how, where, how long, and how much to charge an EV)
- Information about processes and considerations for installing EV charging equipment
- Available EV models, including those in used car market
- Benefits of EVs (both monetary and non-monetary benefits)
- Available EV-related funding and incentive opportunities (including other community and federal programs)
- EV rate options and programs

- Public charging station map

Target Customer Segment – This action targets all customer segments, but the near-term effort and resources will be used to focus on information that most benefits the low-income and residential customer segments.

Implementation Strategy – LUMA will develop an engaging and compelling suite of educational and outreach collateral with messaging tailored to all customer segments, focusing on gaps or needs of residential customers and low-income communities in the near term. The collateral will be design for use across a variety of communications channels – website, social, email, and face-to-face meetings – to address multiple uses and audience needs. Additionally, LUMA will capture the system wide benefits of EVs across all customer segments and ensure that program-specific information such as EV rates is reaching eligible customers through a trusted source.

LUMA will leverage internal and potential external resources to create a landing page or resource site to host EV general and program-specific information. Once the landing page is launched, LUMA will ensure that a hyperlink and contact information are included in relevant collateral and outbound messages to its customers.

Equity Considerations – Educational materials and messaging will use the lens of equitable outcomes and consider language and cultural differences to ensure that they are inclusive and support people from varying backgrounds. This will include materials and communications in Spanish and English.

LUMA acknowledges that low/moderate income customers may find it more difficult to buy brand new EVs. As a result, it is essential that any collateral developed focuses on affordability, increasing awareness of EV benefits and pointing to the potential for cost savings over the lifetime of EVs ownership. In addition, information relating to used EVs will be considered and LUMA will pay attention to addressing misperceptions around the range of EVs and concerns about weakened batteries and potential costs to make upgrades to used EVs when developing educational materials.

Expected Outcomes

- A set of general and program-specific resources developed to ensure that customers are supported throughout their electrification journey. These may include benefits of EVs, available funding, types of EVs, charging technology options, EV TOU rate information and online tools
- EV landing page on LUMA's website
- Contact information for key points of contact for EV-related customer inquiries

4.2.2 Action 2: Engage Customers and Stakeholders in the EV Ecosystem

Action Summary – Action 2 aims to directly engage with customers and stakeholders to raise awareness and enable LUMA to have a better understanding of customers' needs and help support the growth in EV adoption in Puerto Rico. Additionally, targeted customer engagement will help educate key decision makers within organizations, corporations, and communities on the benefits and opportunities for transportation electrification. Examples of customers groups and stakeholders LUMA will engage include vehicle automakers, EVSE service providers, low-income community groups and government agencies.

Under this action, LUMA plans to engage with key stakeholders, market actors, and customers to provide information, raise awareness, communicate interconnection processes, provide advisory support,

participate in EV-related events, and gather feedback. Furthermore, LUMA will explore collaboration and engage with local stakeholders to support ongoing and/or future EV infrastructure projects supported by funding opportunities outlined in Section 3.1.4.

Target Customer Segment – Local government and non-governmental organizations, fleet operators (government, rental car companies, bus operators, etc.), building owners, facility managers (including MUDs), auto dealerships, automakers, and EV charging service providers.

Implementation Strategy – LUMA will establish a dedicated point of contact(s) for engagement with external stakeholders. LUMA will leverage internal resources to develop an engagement plan with key customers, entities, and events along with timeline and key topics of discussions. LUMA will prioritize engagement efforts based on the needs and interests of customers and stakeholders in EV adoption and charging infrastructure deployment. LUMA will utilize educational resources and marketing collateral developed in Action 1 when engaging with customers and stakeholders and participating in EV-related events.

Equity Considerations – LUMA will seek ongoing input from stakeholders and low/moderate income community members about how LUMA can better serve their mobility needs and reduce barriers to EV adoption. Furthermore, LUMA will directly engage with alternative transportation service providers commonly serving low/moderate income individuals, such as transit bus operators, ride-sharing companies, and drivers to gauge their interests in EV adoption and how LUMA can best address barriers to adoption. LUMA will also work to ensure that its efforts under this action bring EV exposure to underserved communities.

Expected Outcomes

- Engaging information and events for customers (with a focus on underserved communities) to promote awareness and understanding of EVs and charging technologies
- Active participation in stakeholder meetings, workshops, and events to coordinate with and support other agencies and companies working to accelerate EV adoption in Puerto Rico.

4.2.3 Coordination and Alignment with LUMA's Other Initiatives

LUMA proposes to implement a market outreach and communications effort as part of the EE/DR TPP, which may provide synergies with EV outreach efforts to deliver stronger results and optimize resource use. To minimize duplication of effort, the EV Plan must complement and leverage the activities that LUMA plans as part of these other initiatives. LUMA will utilize the Mi LUMA app[68] and lumapr.com website to provide assistance and communicate EV-related messaging. LUMA will also cross-promote EV initiatives with net energy metering (NEM), EE and DR programs to customers and stakeholders.

[68] Mi LUMA app currently allows customers to view and pay LUMA bills, view 12 months of bills and payments, add other electric service accounts, view and report outages, request support services, book appointment to visit customer service center https://lumapr.com/mi-luma-web-and-app/?lang=en

4.2.4 Potential Future Opportunities

While developing the EV Plan, LUMA also considered potential future opportunities that LUMA may take in the longer term. Within the Education and Outreach Initiative, LUMA envisions that the proposed actions set forth above are critical to create strong foundation for future opportunities which may include:

- Continue customer and stakeholder engagement efforts
- Engage with local stakeholders (government, EV driver associations, etc.) and form partnerships to drive awareness and policies
- Evaluate and plan to offer high-level fleet assessment services to local fleet operators

4.3 EV Infrastructure and System Improvement Initiative

Puerto Rico's electricity system has deteriorated from decades of neglect and mismanagement compounded by the onslaught of hurricanes Irma and Maria in 2017, and earthquakes in late 2019 and 2020. Electricity system reliability is currently viewed as the greatest concern in customer decisions about whether to purchase an EV. Over the long-term, mass adoption of EVs will require restoring Puerto Rico's infrastructure to a well-functioning state to support the buildout of charging infrastructure, improve system reliability, and address customer perceptions of electricity reliability as a barrier to adoption.

In the near-term, EV market development will require a joint approach between LUMA and external market actors to address current barriers to adoption. LUMA will continue its mission to restore and modernize the grid to enable a flexible, reliable grid that is better suited to the integration of renewables and EVs. In parallel, LUMA will work to support other market actors' efforts to address other market barriers, such as installation of charging infrastructure. LUMA will leverage its capabilities and take the facilitator role in supporting other market actors in EV infrastructure deployment.

Early collaboration between charging service providers, site developers and LUMA will be required to ensure all parties set expectations appropriately, and proactively resolve potential project barriers. LUMA aims to be proactive in customer and stakeholder engagement as proposed in Action 2 to address future grid impacts from EV charging infrastructure rollouts. LUMA acknowledges that opportunities to get out in front of infrastructure challenges exist and plans to address market barriers by being proactive in foundational infrastructure improvement and investment that will likely be needed as EV adoption grows, as discussed in Section 3.7.

Deploying EV charging infrastructure in a way that maintains reliability, safety, and minimizes cost also requires robust planning, careful execution, and close coordination within LUMA and between local stakeholders. Internally, the ongoing and planned foundational improvement efforts will incorporate the projected impacts of EV adoption on the electric grid and consider EV as one of the distributed energy resources that LUMA needs to prepare the grid for.

In addition, the shift to EVs will also require an investment in Puerto Rico's local workforce as skilled workers will be needed to support the growing EV market. As a result, LUMA proposes three actions within this initiative with equity considerations for low/moderate income and underserved communities to ensure that the benefits of EVs are shared fairly among all customers.

Overarching Goals – The overarching goals of this initiative are to:

- Support and facilitate the deployment of EV charging infrastructure
- Provide guidance on favorable locations to site and on how to interconnect EV charging infrastructure on the distribution system
- Provide and strengthen internal workforce to support the growing EV adoption in Puerto Rico

Barriers Addressed – The EV Infrastructure and System Improvement Initiative will address the electric system reliability concern that Puerto Rico's residents may have when considering buying an EV. This initiative also addresses the limited awareness and understanding of EV infrastructure and hosting capacity.

Potential Partners – Maintaining a safe and reliable electric grid is no small effort and in the case of transitioning transportation and electric grid infrastructure to EVs, every part of the ecosystem is vital for the transformation to work. Partners that LUMA plans to work collaboratively with may include:

- Department of Transportation and Public Works
- Department of Economic Development and Commerce (Energy Public Policy Program)
- Independent Office for Customer Protection
- Department of Housing
- Renewable Energy Consultants and Contractors Associations
- Charging service and equipment providers

LUMA recognizes that these potential partners will play a key role in deploying EV charging infrastructure and that collaboration with these partners are crucial to ensure that electricity grid system has enough capacity to integrate the growing charging infrastructure deployment.

LUMA's Role – In the near term, LUMA will be a facilitator and connector of the electric grid in the EV infrastructure ecosystem. LUMA will improve and maintain reliability and minimize grid impacts by coordinating with existing investment and planning processes. In addition, LUMA aims to improve communications and information sharing with customers and others in the ecosystem as laid out in the Education and Outreach Initiative in Section 4.2. Most importantly, LUMA will support more equitable access to charging infrastructure for all customers and communities through partnerships with relevant stakeholders and ensuring that infrastructure is developed in a way that is accessible to low/moderate income and underserved communities.

Value Proposition for Customers – LUMA's support for infrastructure development projects can have numerous benefits to customers and the entire EV ecosystem. The addition of the EV Hosting Capacity map will expand the depth and accessibility of information to developers and customers interested in EV charging station development. Another value proposition of this initiative for customers and developers is lowering infrastructure cost as better coordination and communication among stakeholders and LUMA will help streamline the integration and interconnection processes, thereby reducing time spent on project development and improving developer and customer experience.

4.3.1 Action 3: Plan for Grid Infrastructure & System Improvement

Action Summary – This action focuses on planning for grid infrastructure and system improvement efforts that can be done internally within LUMA. In this action, LUMA plans to develop and regularly update detailed EV load projections for the 2024 Integrated Resource Plan (2024 IRP) and other system planning purposes to ensure that foundational infrastructure programs incorporate the impact of increased EV adoption. Furthermore, LUMA will evaluate the distribution system and local grid infrastructure using locational EV impact forecasts developed under the Department of Energy's PR100 initiative and utilize advanced planning studies to optimize existing resources as more EV infrastructure is being deployed.

Accordingly, LUMA will develop and publish an EV Hosting Capacity Map on the community-facing website (as laid out in Section 4.2. under Education and Outreach Initiative). The EV Hosting Capacity Map will help facilitate EV charging equipment deployment throughout Puerto Rico by providing information to identify sites that will minimize the cost of grid upgrades required to provide safe and reliable service. LUMA plans to build the EV Hosting Capacity Map such that developers and customers can log into a single platform to see all available information, such as the amount of EV charging infrastructure that can be interconnected at a particular location without resulting in adverse system conditions. This will also provide guidance to customers and developers on potentially favorable locations that can accommodate more charging stations.

Target Customer Segment – The action will target all customer segments.

Implementation Strategy – LUMA will track EV adoption and charging infrastructure deployment through coordination with local transportation partners and/or third-party data providers. In the near-term, LUMA will leverage the high-level projections of EV penetration rate and associated load impacts developed to support the EV Plan (Section 3.2.). Additionally, LUMA will continue to provide input on EV related matters to assist with the PR100 study activities relating to locational EV impact forecasts. Upon the completion of the PR100 EV forecast, LUMA will apply the locational EV impact forecasts to evaluate the distribution system and assess impacts that could lead to grid upgrades which will be incorporated in its 2024 Integrated Resource Plan.

LUMA has been implementing an integrated portfolio of foundational infrastructure programs to improve reliability and enhance customer experience. As part of the Compliance & Studies, Technology & Performance Program, LUMA will incorporate projected grid impacts from EV adoption into distribution studies that focuses on eliminating major cascading outages and implementing new procedures and standards to ensure the distribution system complies with regulations and Prudent Utility Practice.

LUMA's planning and engineering teams will benefit the most if a bottom-up forecasting approach is developed, to allow applying necessary feeder upgrades during the major reconstruction projects. Based on this need, LUMA initiated a feeder-level EV forecasting activity, categorizing each feeder as strong, medium, or minimum adopters. Each feeder is then assigned growth projection based on their categorization and using the systemwide adoption forecast as a basis for truing up the aggregate feeder-based approach.

In the technology portion of this program, LUMA will expand its ongoing efforts to develop PV Hosting Capacity Maps to integrate EV hosting capacity data. Key activities in the development and implementation of the EV Hosting Capacity Map include:

- *Data Collection and Analysis:* LUMA will collect relevant data and conduct load capacity analysis for EV charging locations.
- *Map Development:* LUMA will develop the EV Hosting Capacity Map based on the analysis conducted.
- *Ongoing Updates to Map data:* LUMA will be responsible for ongoing updates to the underlying data. Additional validation analyses may be conducted to ensure all data has been reviewed and updated based on the current system conditions. The EV Hosting Capacity Map will be updated on an annual basis.

The EV Hosting Capacity Map will be developed in phases as data becomes more available and distribution capacity is being analyzed. The implementation of the EV Hosting Capacity Map will be communicated with customers and developers via LUMA's efforts laid out under the Education and Outreach Initiative.

Equity Considerations –The EV Hosting Capacity Map will be available to help customers understand how charging stations are currently distributed and where new infrastructure would be most beneficial, including from the perspective of equity. Additionally, in the initial phase of EV Hosting Capacity Map development, LUMA will prioritize data collection and analysis of distribution load capacity in the low/moderate income areas to the extent possible.

Expected Outcomes

- Forecasted EV adoption and charging load impacts on the electric grid to inform and better target LUMA's broader system planning and reliability improvement efforts
- EV Hosting Capacity Map on EV Program website

4.3.2 Action 4: Support EV Charging Infrastructure Deployment

Action Summary – Under this action, LUMA plans to collaborate with key stakeholders and leverage existing studies and lessons learned from other jurisdictions to develop guidebooks and checklists for the installation of EV charging infrastructure. These resources will help facilitate EV adoption and charging infrastructure investments in Puerto Rico. To ease and streamline the integration and interconnection processes for charging infrastructure development, LUMA will develop an Interconnection Guidelines and/or Project Connection Manual for high-powered EV charging stations, while ensuring equitable and fair treatment of new charging infrastructure deployment. Guidelines will be consistent with the EV Application Process outlined in Exhibit 1.28.

LUMA will also continue to work and with the Puerto Rico Highway and Transportation Authority (PRHTA), the Department of Transportation and Public Works, and other government agencies to support participation in the National Electric Vehicle Infrastructure (NEVI) formula grant program. PRHTA has been working to designate official "Alternative Fuel Corridors" that are eligible for NEVI grant funding for EV charging stations. LUMA provided input during the development of the *Puerto Rico Plan for Electric*

Vehicle Infrastructure Deployment and will continue working with PRHTA during the ongoing implementation phases.

LUMA also recognizes that there are several federal funding opportunities coming to support EV charging infrastructure rollout in Puerto Rico as discussed in Section 3.1.4. Accordingly, LUMA plans to remain proactive in the collaboration with local stakeholders and project developers to facilitate future federally funded infrastructure deployment. Additionally, depending on feasibility of implementation and internal resource availability, additional activities under this action may include supporting and collaborating with relevant stakeholders to encourage new and evaluate existing local policies that further promote the benefits of EVs, such as HOV lane access, EV parking benefits, EV tax and fee exemption or reduction, and availability of EV charging at MUDs. LUMA's can also further help overcome high costs barrier by sharing information about technologies like automatic load management systems that can help reduce infrastructure costs for installing EVSE, especially in multifamily residential buildings.

Target Customer Segment – This action will target all customer segments.

Implementation Strategy – LUMA will use publicly available EVSE installation guidebooks and EV Readiness Checklists as starting points in completing this action. LUMA will then revise and/or add necessary information and steps tailored to fit the needs of customers and the infrastructure in Puerto Rico's electric grid.

For the Interconnection Guidelines and/or Project Connection Manual, LUMA plans to leverage lessons learned from its existing interconnection process and from EV infrastructure buildout and interconnection best practices to help customers and developers prepare the site and expedite the processes.

Equity Considerations – LUMA will leverage its efforts in the Education and Outreach Initiative to initiate community engagement early in the development of EV guidebooks and checklist to identify problems, receive feedback and build trust within the low/moderate income and underserved community members. LUMA will further focus on equity, safety, cost, efficiency, and transparency throughout various stages of the interconnection process. Moreover, requests to develop EV charging infrastructure in low/moderate income areas will be prioritized in the integration and interconnection processes to ensure equitable distribution in geographic coverage of EV charging infrastructure.

Expected Outcomes

- EV infrastructure deployment guidelines and checklist
- Revised Technical Interconnection Requirement and/or Project Connection Manual

4.3.3 Action 5: Prepare Workforce for the Growing Adoption of EVs

Action Summary – To support local economy as Puerto Rico transitions to clean energy and transportation future, LUMA plans to build and train its workforce to support the growing and evolving EV market. LUMA recognizes that holistic workforce development strategies are an essential building block of EV market development and will lay the groundwork for thriving EV market in Puerto Rico. In the near-term, LUMA will ensure that our internal workforce has the skills, training, and experience needed to support customers through their EV purchase decision making and the deployment of EV infrastructure.

Target Customer Segment – This action will target all customer segments.

Implementation Strategy – LUMA will plan to train its staff in various departments, including but not limited to, Customer Experience, Planning, Engineering, Business Transformation, Billing and Grid Modernization. To support staff training, LUMA will leverage its efforts under the Education and Outreach and EV Infrastructure and Improvement Initiatives to create EV-specific content that staff can use to communicate and support customers. Specialized skills and training on charger features, vehicle capabilities, interconnection processes, and site host needs, and expectations are some of the necessary knowledge that customer contact center must have to effectively support the needs of customers, developers and/or site hosts. Furthermore, the customer contact center will have the knowledge of available programs and services for EVs and charging infrastructure. LUMA will also create a list of resources that are outside of LUMA's expertise. For example, the customer contact center can direct customers to appropriate entities who can walk them through the permitting processes.

Equity Considerations – LUMA will offer training and/or reskilling opportunities to a diverse group of staff who are interested in advancing their careers in the EV industry.

Expected Outcomes

- Trained or additional staff
- EV-specific content for customer contact center
- EV FAQs list

4.3.4 Coordination and Alignment with LUMA's Other Initiatives

LUMA will leverage its ongoing efforts initiated in foundational infrastructure programs discussed in Section 3.7. to support its actions under this initiative. For example, LUMA can utilize the resources used to develop distribution hosting capacity study and public hosting capacity map to conduct distribution impact analysis and create EV Hosting Capacity Map.

4.3.5 Potential Future Opportunities

LUMA recognizes that the EV charging infrastructure deployment will continue to grow as a result of emerging regulations and favorable policies as discussed in Section 3.1.3 and 3.1.4. Therefore, it is essential that LUMA considers any long-term needs while developing the EV Plan. As such, potential future opportunities may include:

- Incorporating a more granular EV adoption and grid impact forecasts to system planning studies
- Continuing to update and making dynamic of the EV Hosting Capacity Map
- Expanding the development of internal skilled workforce
- Supporting local stakeholders to facilitate infrastructure deployment through streamlining permitting and interconnection processes and evaluating local policies, such as EV-ready building codes and zoning ordinance

4.4 EV Rates and Load Management Initiative

The price of electricity and lack of an EV-specific rate is one of the top four barriers to EV adoption in Puerto Rico. As discussed in Section 3.5.2., approximately 15% of survey respondents said the price of

electricity was their greatest concern to purchase an EV. In addition, 26% of respondents indicated that discounted electricity rates for EV owners would increase their interest in purchasing or leasing an EV.

As discussed in Section 3.6., LUMA's resource adequacy analysis indicates that potential load shedding outages due to insufficient generation resources are most likely to occur during the period from 7 pm to 11 pm. This is also the same period when residential EV charging demand is highest (i.e., when most EV owners return home in the late afternoon / early evening and plug their EVs in to recharge). While EV penetration and EV charging load is currently relatively low, it is growing rapidly. Given this rapid growth, it is vital for LUMA to explore the load management opportunities available from EV charging in the near-term to fully realize the capacity that EV charging could provide to Puerto Rico's resource adequacy in the long-term.

The EV Rate is designed to address these customer concerns, to boost EV adoption in Puerto Rico and to help mitigate Puerto Rico's future resource adequacy challenges related to EV load growth. Specifically, as per PREB guidance and the requirement to focus on the residential sector in the near term, LUMA is proposing a three-period Residential EV TOU rate on an interim basis as described in the LUMA's Revised EV Rate Design Proposal.[69] This rate – essentially a form of "passive" managed charging – will encourage EV owners to shift their residential EV charging from the evening to other periods of the day when resource adequacy challenges and load shedding outages are less likely. Shifting consumption away from the evening period will also mitigate the impact of EVs on grid loading and grid reliability. The proposed rate helps achieve fuel cost savings for drivers and lowers the overall TCO for EVs, while ensuring fair, equitable and appropriate cost recovery.

Beyond the near-term, LUMA will leverage findings and lessons from the proposed EV rate to support the development of other possible EV rates for residential customers and EV rate offerings for other sectors. For example, LUMA will explore opportunities to use "active" managed charging to provide more precise control of EV charging, akin to using EV charging as a DR resource.

Overarching Goals – The overarching goal of this initiative is to provide residential customers with a revenue-neutral EV-specific rate option that incentivizes off-peak charging and mitigates the impact of EVs on grid loading and grid reliability.

Barriers Addressed – The EV Rate Initiative is designed to address residential customer concerns about the price of electricity for EV charging.

Potential Partners – Large-scale implementation of the proposed EV rate will require enabling technologies such as interval metering and AMI infrastructure to gather data, and to calculate and generate bills under a TOU rate structure. LUMA, like some other utilities, currently lacks interval metering and AMI infrastructure, but plans to implement this capability over time. Similarly situated utilities lacking robust AMI infrastructure have piloted the use of measurement capability of EV chargers and vehicle telematics as a submeter, to provide EV charging consumption information to implement EV rates without AMI. LUMA plans to explore the services and capabilities available from EV charging infrastructure

[69] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

providers, EV manufacturers and EV charging software solutions companies to facilitate the deployment of the proposed EV rate on an interim basis prior to LUMA's full AMI deployment.

LUMA's Role – As noted above and as detailed in the Revised EV Rate Design Proposal[70], LUMA's proposed role will be to introduce the proposed EV rate on an interim basis, communicate the availability of this rate to residential customers (in parallel with the various education and outreach efforts described in Section 4.2 above), and to evaluate customers' and stakeholders' response to this rate. LUMA may propose a permanent EV rate for residential customers through a future rate case that will leverage AMI infrastructure to provide better management of energy demand, enable additional dynamic pricing options, reduce the cost of electricity delivery, and improve customer service.

LUMA will also leverage findings and lessons from the proposed rate to evaluate and support the development of other possible EV rates for residential customers and EV rate offerings for other sectors for potential introduction in the medium-term.

Value Proposition for Customers – Customers will benefit from more affordable EV electricity rates that reduce the TCO of EVs. Specifically, residential EV drivers could save over $1,000 annually ($90/month) on their "fuel" costs when switching from gasoline-powered vehicle to EVs and upward of $1,280 annually ($107 a month) when charging their EVs solely during Off-peak hours. Additionally, current EV drivers could potentially save $135 annually by shifting all their residential EV charging consumption to Off-peak hours.

4.4.1 Action 6: Provide EV Rate Options

Action Summary – Pending PREB's review of the LUMA's Revised EV Rate Design Proposal, LUMA's primary focus in this initiative is to implement the proposed three-period Residential EV TOU rate on an interim basis as described in LUMA's Revised EV Rate Design Proposal. Table 4-1 provides a summary of the proposed Residential EV TOU Rate time periods and rates (Note that the proposed EV TOU rate only covers the FCA rider of residential customer bills and that the standard rate and other riders would still apply unchanged on participating customers' bills).

Table 4-1: Proposed Residential EV TOU Rate

Residential EV TOU Period	Time Period	Proposed Rate ($/kWh)
On-peak	5PM – 11PM	0.259841
Shoulder-peak	11PM – 9AM	0.221919
Off-peak	9AM – 5PM	0.129920

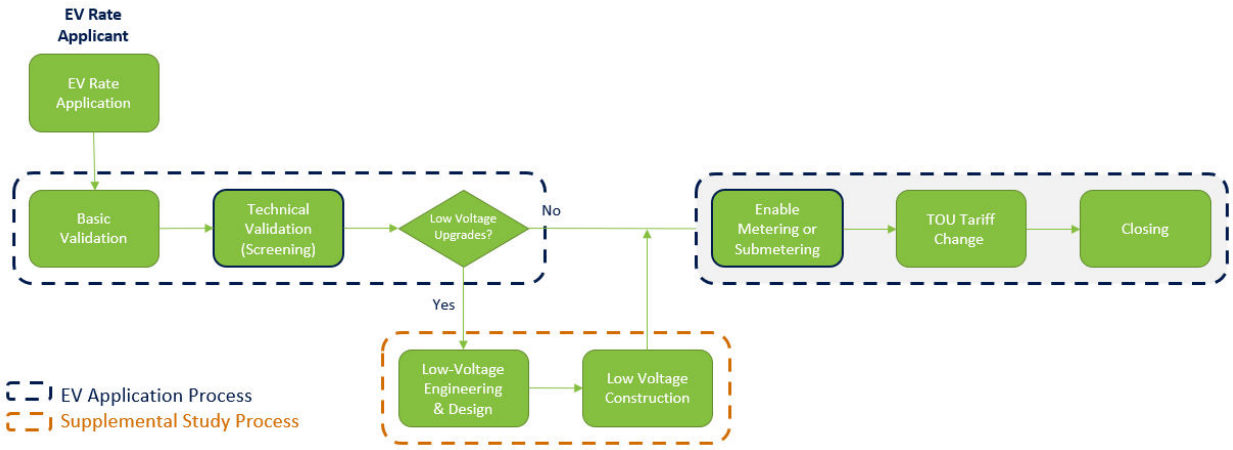
[70] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

LUMA will continue to monitor and evaluate system costs and EV charging consumption data to support the development of alternative rate options that provide appropriate price signals and encourage EV adoption for multiple types of customers. LUMA will further explore active managed charging capabilities based on available resources including personnel and technologies.

Target Customer Segment – The target customer segment in the near term is residential customers with their own dedicated EV charging infrastructure. LUMA will explore the potential for EV-specific rate options for low/moderate income customers, residential customers living in multi-dwelling buildings and using customers using public EV charging infrastructure.

Implementation Strategy – LUMA submitted the Revised EV Rate Proposal[71] to the PREB on July 21, 2022 and anticipates that PREB will initiate a new regulatory rate review proceeding. In the interim, LUMA will continue to develop the implementation plan for this rate including assessing the required implementation software technologies (e.g. customer portal, website), exploring alternative sources of EV charging metering data (e.g. charger telemetry), identifying the necessary billing system updates, developing meter data transfer protocols, training employees, and developing educational materials. Once the rate design is finalized and approved, metering data is available, and the necessary billing systems enhancements are available, LUMA will implement the rate, launch the associated educational and outreach campaign, and recruit and enroll customers in the rate. Further details are included in the Revised EV Rate Design Proposal. Figure 4-2 below provides an illustration of the anticipated process for customer application and enrolment in the EV TOU rate.

Figure 4-2: Draft EV TOU Rate Application Process



Equity Considerations – LUMA evaluated equity considerations to support EV adoption for residential customers in low/moderate income and underserved communities and those with DG and /or storage. LUMA expects lower EV ownership among low/moderate income customers for a considerable time given the high upfront costs of EVs and relatively lower historical vehicle ownership rate among low/moderate income customers. However, low/moderate income customers will have equitable access to

[71] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

participate in all residential EV rates offered by LUMA on the same terms and conditions as other residential customers.

Expected Outcomes

- Provide a more economical rate alternative for residential EV owners that will encourage greater EV adoption
- Reduce the electricity system impacts of residential EV charging

4.4.2 Coordination and Alignment with LUMA's Other Initiatives

Among LUMA's infrastructure programs discussed in Section 3.7, the Revised EV Rate Design Proposal (NEPR-MI-2021-0013) should be considered as an integral component of this EV Plan. The EV Rate Initiative will also leverage the reliability improvements flowing from LUMA's System Remediation and Improvement Plan as well as several other projects and activities within the System Remediation Plan and Improvement Plan including but not limited to AMI, modernization of customer service technology, better information on system and component loading, and critical energy management systems.

4.4.3 Potential Future Opportunities

In the longer-term, LUMA will leverage its experience and lessons learned from EV TOU rate implementation to:

- Evaluate additional pricing options for low/moderate-income customers
- Evaluate potential for a residential active managed charging program
- Evaluate public charging EV rates that support the EV infrastructure business case for developers while also encouraging greater EV adoption
- Evaluate pricing options for commercial customers that ensure charging an EV remains competitive and is affordable, and encourage charging behavior that supports the grid

5.0 Impacts of The EV Plan

This section sets out the expected outcomes from the EV Plan with respect to Puerto Rico's climate goals, Puerto Rico's electric grid and EV market competition.

5.1 Impacts on Puerto Rico's Climate Goals

LUMA recognizes that increasing EV adoption will be a key contributor to achieving Puerto Rico's clean energy and climate goals as set forth in Act 17-2019[72] and Act 33-2019[73]. The proposed portfolio of actions in the EV Plan will help promote the use of EVs in Puerto Rico and begin contributing to goals of the Puerto Rico Energy Public Policy Act and Climate Change Mitigation, Adaptation, and Resiliency Act. The relevant purposes of these Acts that are directly supported by the EV Plan are listed below:

- Puerto Rico's citizens and electric power service customers are educated and empowered to have more control over their energy consumption
- The cost of the electric power service is affordable, just, reasonable, and nondiscriminatory for all customers in Puerto Rico
- The use of fossil fuels is reduced to minimize GHG emissions and support initiatives in Puerto Rico that focus on the issue of climate change
- The processes for the interconnection of distributed energy resources to the distribution system reduce the interconnection time
- The appropriate planning studies on the operating voltages of the transmission and distribution system are conducted to ensure the reliable operation of the electric grid
- The development of electricity infrastructure is guaranteed to have sufficient capacity to respond to any additional electricity demand needed to support the growing EV adoption.

Specifically with respect to these purposes, the EV Plan is expected to bring a number of significant benefits to Puerto Rico. By directly addressing many of the key barriers to EV adoption, such as low awareness and concerns about electrical system reliability, LUMA expects that the EV Plan will contribute to greater EV adoption in Puerto Rico. Each additional EV purchased in Puerto Rico as a result of the EV Plan can contribute to lower fuel costs for Puerto Ricans and lower GHG emissions for Puerto Rico.

5.1.1 Customer Savings

Residential customers will have the opportunity to save on vehicle fuel costs when switching from a gasoline-powered vehicle to an EV. This savings can range from over $1,100 to almost $1,300 annually when converting to an EV. The assumptions and calculations underlying these estimates are provided below.

[72] Act 17-2019 - https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/17-2019.pdf

[73] Act 33-2019 - https://bvirtualogp.pr.gov/ogp/Bvirtual/leyesreferencia/PDF/2-ingles/0033-2019.pdf

Potential Annual Fuel Cost Savings for EV Drivers Calculation

Assumptions:

- Projected annual VMT in 2023 = 5,603.56 miles[74]
- Puerto Rico gasoline price = $5.243 per gallon[75]
- Gasoline light-duty vehicle fuel economy = 18.2 miles per gallon[76]
- Projected average EV fuel economy in 2023 = 0.2611 kWh per mile[77]
- Current residential rate = $0.310060 per kWh[78]

Annual Fueling/Charging Cost:

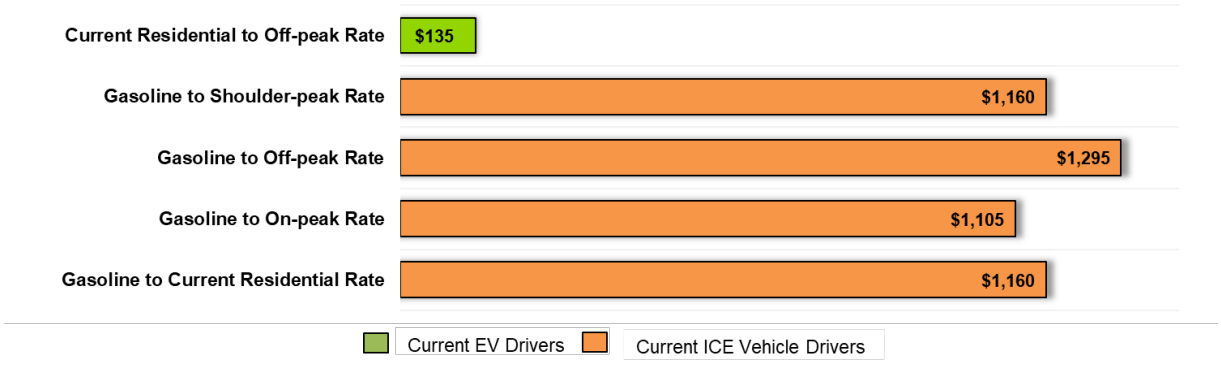
- Annual fueling cost for gasoline vehicle is (5,602.56/18.2)*5.243 = $1,613.97
- Annual charging cost for EV on current residential rate is (5,602.56*0.2611)*0.310060 = $453.62

Potential Annual Savings

- For ICEV drivers, fuel savings from switching to an EV on current residential rate = **$1,160.35** (1,613.97 - 453.62)

In addition, as shown in Figure 5-1 below, drivers who currently have an EV and who are charging their EV's at home can also save an estimated $135 annually when taking advantage of the proposed Off-peak residential electricity rate and shifting their EV charging to be done solely during Off-peak hours. See Exhibit 10.1 for supporting calculations.

Figure 5-1: Potential Annual Savings for EV Drivers (Per Vehicle)



[74] https://safety.fhwa.dot.gov/hsip/reports/pdf/2020/pr.pdf

[75] https://www.globalpetrolprices.com/Puerto-Rico/gasoline_prices/

[76] https://www.eia.gov/totalenergy/data/browser/?tbl=T01.08

[77] Transportation Research Center at Argonne National Lab and Fueleconomy.gov

[78] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

5.1.2 GHG Emissions Reductions

Currently, LUMA estimates that each EV will save 1,887 kg of GHG emissions annually compared to a gasoline vehicle based on Puerto Rico's current generation mix. The assumptions and calculations underlying these estimates are provided below.

GHG Emissions Savings per EV Calculation

EV emissions:

- Assume an EV will require 1.46 MWh/year (5,602 miles PR VMT[79]), representing approximately 1.62 MWh of output at the generation busbar (assuming 10% T&D losses)
- Current GHG emission intensity of the Puerto Rico grid is 525 kg CO_2/MWh[80]
- EV emissions for current generation mix are **854 kg CO_2/year** (1.62*525)

Gasoline vehicle emissions:

- Assuming a gasoline vehicle will achieve 18.0 miles per gallon[81] and drives 5,602 miles annually, 308 gallons of gasoline will be used annually. (5,602/18 = 308)
- Every gallon of gasoline produces 8.9 kg of CO_2[82]
- Gasoline vehicle emissions are **2,741 kg of CO_2/year** (8.9*308)

GHG emissions reduction per EV:

- 2,741 kg CO_2/year – 854 kg CO_2/year = **1,887 kg CO_2/year**

As more renewable generation is added to Puerto Rico's system mix, the GHG emissions savings will increase. Assuming an average GHG emissions intensity of 382 kg / MWh in 2025 after the latest tranche of solar PV and batteries are operational, each EV is expected to result in GHG emissions savings of 2,114 kg as compared to an ICE vehicle.

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[79] Federal Highway Administration and estimated 2023 total vehicle registration in PR

[80] Synapse Puerto Rico Avoided Cost Study: Avoided Capacity Costs Puerto Rico Energy Bureau – Technical Conference Presentation for Discussion Slide 23 Jennifer Kallay, Bob Fagan, and Jon Tabernero June 22, 2022

[81] *U.S. Energy Information Administration - EIA - independent statistics and analysis*. EIA. (n.d.). https://www.eia.gov/totalenergy/data/browser/?tbl=T01.08

[82] *Greenhouse Gas Emissions from a Typical Passenger Vehicle*. EPA. from https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

Accurately determining the impact of the EV Plan on each EV purchaser's buying decision will be challenging given the myriad of factors that influence such a large capital purchase. Many other utilities in the US are facing this same challenge. LUMA will review how other utilities have assessed the "attribution" of their EV programs to greater EV sales to identify best practices from these other jurisdictions that could be used to estimate the incremental EV sales than could be attributed to the EV Plan.

Assuming, for illustrative purposes, that the EV Plan results in 5% higher EV adoption than would have otherwise occurred, the EV Plan would contribute to 748 (= 5% x 14,965 (FY 2025 EV forecast)) more EVs on the road at the end of 2025 than if LUMA did not implement the plan. Using the savings estimates from above for 2025, this would represent:

- **$867,970** lower fuel costs for Puerto Ricans (748 x $1,160 gasoline-to-standard rate savings in the figure above).
- **1,581,272 kg** lower GHG emissions (748 x 2,114 kg/annual gasoline vehicle to EV savings based on FY2025 average GHG emissions intensity for Puerto Rican grid).

To the degree that the EV Plan results in higher EV penetration in Puerto Rico, LUMA also recognizes that there will also be follow-on impacts in terms of increased system demand and higher electricity use. The degree to which this impact from greater EV sales will be offset by shifting of charging times due to the introduction of the residential EV TOU rate (as discussed in the following subsection) will only be known after the EV Plan is implemented and evaluation results are available.

5.2 Impacts on the Electric Grid

Greater EV adoption is expected to have a minimal overall impact on Puerto Rico's electric grid in the near term as discussed in Section 3.3**.** However, by encouraging EV owners to shift their residential EV charging from the evening peak period to other periods through the proposed residential EV TOU rate, the EV Plan can help reduce the daily spike in peak demand from EV charging, and contribute to lower energy costs for customers. Additionally, the potential introduction of "active" managed charging over time will complement LUMA's other DR efforts and help improve resource adequacy through the direct control of charging infrastructure during periods when generation is insufficient to meet system demand.

5.2.1 Reduced Peak Demand and Lower Energy Costs

The residential EV TOU rate (essentially a form of "passive" managed charging) is designed to encourage residential EV owners to charge their EVs during the Shoulder-peak or Off-peak period when overall system demand is lower. By shifting residential EV charging from the evening peak period to other periods, the residential EV TOU rate will reduce peak demand and contribute to lower energy costs for Puerto Ricans.

These benefits will be limited in the near-term given Puerto Rico's relatively low EV penetration and EV charging load along with the uncertainty around the level of customer participation in the EV rate. However, EV penetration and load is growing rapidly, and so it is vital for LUMA to explore the load management opportunities available from EV charging in the near-term to fully realize the benefits that managed charging of EVs can provide in the long-term.

The near-term energy cost savings from the EV rate will be limited because Puerto Rico's current generation mix is predominantly fossil-fuel based and, as a result, the average cost of generation does

not vary significantly during the day. However, as more renewable generation is connected to the grid, daytime energy costs will become more varied and a regular pattern of lower energy costs during the day when solar PV is operating will develop. At that point, shifting of residential EV charging from evening to daytime or early morning will result in lower energy costs.

LUMA expects the proposed residential EV TOU rate will be attractive to residential EV owners. However, given the novelty of such a rate in Puerto Rico and lack of information regarding customer willingness to participate in the rate, LUMA is unable to accurately estimate the actual participation rate. Additionally, the degree to which participating customer will shift their EV charging consumption from the evening to other periods is currently unknown. Hence, LUMA is unable to quantify the potential impact of the rate on peak demand, resource adequacy and customer outages.

Assuming, for illustrative purposes, that 10% (1,500) of EV owners participate in the EV rate at the end of FY 2025 and that these participating customers shift 50% of their on-peak charging to the off-peak hours, this would result in a 324-kW reduction on a diversified basis in the on-peak period, as compared to a peak demand of 648 kW for these participants prior to shifting[83]. Due to clustering of EV ownership, localized impacts on the distribution grid would be proportionally higher than the diversified impacts given above. When this change in behavior is observed at higher levels of EV penetration and reflected in LUMA's 2024 Integrated Resource Plan, LUMA anticipates savings will accrue to all customers from reduced peak capacity requirements for generation, transmission, and distribution assets from what would otherwise be required if the rate were not introduced.

As noted in the previous subsection, LUMA also appreciates the challenge that new EV charging load will have on localized distribution system loading and is confident that the residential EV TOU rate will help to mitigate these impacts. The net effect of these competing factors will only be known after the EV Plan is implemented and evaluation results are available.

5.2.2 Improved Resource Adequacy and Reduced Customer Outages

By shifting consumption from the evening period when the grid typically has the most supply challenges, the residential EV rate will also help to improve resource adequacy and reduce customer outages. As discussed, the near-term magnitude of this benefit is limited given the relatively low number of EVs in Puerto Rico but will grow as more EVs are purchased and as more customers participate in the EV rate.

The potential addition of an active managed charging rate in the medium-term would offer an even more useful tool in mitigating reliability issues from future EV growth by allowing LUMA to directly control the charging of residential EVs during periods of system stress. This capability will bring a valuable new DR resource to Puerto Rico and complement LUMA's other DR efforts.

5.3 Impacts on EV Market Competition

As set forth in Section 2.4., LUMA's role will encourage the development of a robust marketplace for EV adoption and charging in Puerto Rico and contribute to a competitive marketplace while maintaining a good customer experience.

[83] Guidehouse calculations based on an estimated diversified peak demand of 432 W at 11pm for each EV owner prior to shifting, and 216 W after shifting.

LUMA will encourage collaboration among stakeholders in the EV ecosystem and support private sector investment in charging infrastructure deployment in Puerto Rico. The proposed portfolio of actions discussed in Section 4 will ensure that customers get improved reliability of electric services and receive fair charging prices while being encouraged to charge during off-peak hours, and that local businesses and other market participants are able to fairly compete in the emerging EV market.

LUMA believes the EV Plan strikes a balance between customer benefits and the promotion of competition in the EV infrastructure marketplace with the appropriate level of involvement to facilitate charging infrastructure investments in locations that optimize grid operations and create benefits for all customers.

6.0 Reporting

LUMA will prepare three annual reports summarizing expenditures to-date against budget, outlining progress on the expected outcomes and customer and/or stakeholder participation as appropriate for each of the actions and initiatives. Each report will be filed no later than 120 days following the end of each fiscal year, as shown in Table 6-1 below. The annual report for year three will also identify potential improvements that LUMA could implement to increase the overall effectiveness of the EV Plan in reducing customer barriers to EV adoption.

Table 6 -1: EV Plan Reporting Schedule

Reporting Period[84]	Report Filing Date
FY2023	Oct 2024
FY2024	Oct 2025
FY2025	Oct 2026

LUMA will continue to monitor the results of the J.D. Power customer surveys for any changes to customer awareness, perceptions, and intentions around EVs and charging infrastructure. Post-event surveys may also be administered to participants following key events to gain further insights into customer perceptions, better understand customer experience, and gauge the value of such events in increasing understanding and awareness of EVs. For the EV Rate initiative, LUMA will broadly follow the evaluation approach set out in the EV Rate Proposal.

[84] Reporting Period is aligned with LUMA's fiscal year – FY 2023 (July 2022 to June 2023), Reporting Filing date is 120 days from the end of the fiscal year which is in October.

7.0 Benefit Cost Analysis

LUMA is confident that the EV Plan will realize the benefits described above but is unable to accurately predict the magnitude of these benefits given 1) challenges around estimating and measuring the degree of influence that LUMA's initiatives will have on incremental EV sales (attribution), and 2) the novelty of the residential EV TOU rate and uncertainty around participation rates and participant behavior change. After the residential EV TOU Rate is implemented and information regarding customer participation rate and the degree of load shifting of the participating customers in response to the residential EV rate is available from the evaluation, LUMA will be able to accurately quantify these benefits.

The value of these benefits would then be determined, on a retrospective basis, using the PR Cost Test (NEPR-MI-2021-0009) and the most up-to-date results from the avoided costs study (NEPR-MI-2021-0009) that is still under development by PREB. This timing will also allow LUMA to leverage experience gained through any applications of the PR Cost Test to other LUMA initiatives prior to LUMA's application to the EV Plan. LUMA believes that applying the PR Test to other initiatives that are more directly suited to such a test before applying it to the EV Plan will help reduce uncertainty around which inputs should be considered and how these inputs should be treated within the PR Test.

8.0 Estimated Costs

LUMA is estimating a cost of $1,800,000 to deliver the EV Plan initiatives over three years. The estimated cost breakdown is shown in Table 8-1

Table 8-1: Estimated Costs by Initiative

Initiative	FY 1	FY 2	FY 3
Education and Outreach	$200,000	$160,000	$160,000
EV Infrastructure & System Improvement	$250,000	$250,000	$140,000
EV Rates & Load Management	$180,000	$210,000	$250,000
Total Estimated Costs	**$630,000**	**$620,000**	**$550,000**

LUMA estimated resources and costs associated with each initiative based on expected outcomes and past EV program development and implementation experience. Additionally, LUMA benchmarked its estimated costs of the EV Plan with other comparable EV programs offered or proposed by utilities in other jurisdictions.

Table 8-2: Estimated Costs by Spending Category

Category	FY 1	FY 2	FY 3
Internal Resources	$385,000	$376,000	$319,000
Third-Party Contractor	$245,000	$244,000	$231,000
Total Estimated Costs	**$630,000**	**$620,000**	**$550,000**

Table 8-2 shows a breakdown of the estimated costs by spending category with the majority of costs estimated being internal labor resources. The potential third-party vendor resources are also included as LUMA expected to require assistance from external contractor(s) to help implement the proposed portfolio of actions set forth in Section 4.

9.0 Proposed Cost Recovery

While LUMA is already undertaking a number of initiatives that will address system reliability – one of the key barriers to greater EV adoption – and is currently working with various stakeholders involved in the EV ecosystem, the initiatives proposed in this EV Plan will represent a significant additional effort by LUMA above and beyond the scope of LUMA's currently approved budget.

Clean Energy Program Rider

LUMA proposes to expand the scope of the proposed EE/DR Rider to include funding for this EV Plan. Recognizing the common purpose of the various initiatives that will be covered within this new rider, LUMA proposes a single rider that applies to all Clean Energy Programs (CEP). The CEP Rider would provide dedicated funding for the EV Plan to maximize the benefits realized. The specific naming convention for this Rider, its associated policies and procedures, and the timing of introduction should be carefully considered through a separate proceeding.

LUMA anticipates that the specific rate classes that would be subject to the new CEP Rider, and whether or not the value of the rider would vary by rate class, would depend on the degree to which any specific rate class would benefit from the initiatives covered within the rider. LUMA also notes that the primary beneficiaries of the EV Plan would be residential customers given the EV Plan's focus on the residential sector.

In the short-term prior to the introduction of the proposed CEP Rider and the availability of dedicated funding for the EV Plan, LUMA proposes to shift some existing budget and resources from other related initiatives to support implementation of the EV Plan. LUMA expects that, through careful co-ordination with other similar efforts, such as the EE/DR marketing activities, minimally adequate resources for the short-term needs of the EV Plan (i.e., FY2023 costs) could be shifted from other programs with limited impact on these other programs. However, the benefits realized would be somewhat less than would be realized if dedicated funding were available.

Anticipating introduction of the proposed CEP Rider sometime in FY2024, LUMA proposes to revisit the EV Plan costing later in FY2023. This review would incorporate lessons gained from implementation prior to the review and would propose appropriate funding levels for the various EV Plan initiatives for FY2024 and FY2025 based on this experience, changes in market dynamics and greater certainty regarding availability of dedicated funding to support the EV Plan.

Regardless of the cost recovery mechanism in effect over the course of the EV Plan, LUMA will continue to explore all avenues for external funding and/or collaboration of specific elements of the EV Plan. Depending on the specific conditions associated with the funding, external funding sources could either offset the EV Plan costs (thereby reducing the EV Plan costs borne by ratepayers) or provide additional funding to expand the scope of the current EV Plan. Pending guidance from the PREB on this matter, LUMA has conservatively assumed that, whenever possible, any external funding would be treated as a direct offset to the EV Plan costs.

10.0 Exhibits

The exhibits shown in this section provide supporting additional information on the list of EV initiatives and customer survey LUMA evaluated during the development of the EV Plan.

10.1 Time of Use Rate Fuel Savings Calculation

Assumptions:

- Projected annual VMT in 2023 = 5,602.56 miles[85]
- Puerto Rico gasoline price = $5.243 per gallon[86]
- Gasoline light-duty vehicle fuel economy = 18.2 miles per gallon[87]
- Projected average EV fuel economy in 2023 = 0.2611 kWh per mile[88]
- Current residential rate = $0.310060 per kWh[89]
- EV TOU rate – On-Peak = $0.347982 per kWh[5]
- EV TOU rate – Off-Peak = $0.218061 per kWh[5]
- EV TOU rate – Shoulder-Peak = $0.310060 per kWh[5]

Annual Fueling/Charging Cost:

- Annual fueling cost for gasoline vehicle is (5,602.56/18.2)*5.243 = $1,613.97
- Annual charging cost for EV on current residential rate is (5,602.56*0.2611)*0.310060 = $453.62
- Annual charging cost for EV on EV TOU On-Peak rate is (5,602.56*0.2611)*0.347982 = $509.10
- Annual charging cost for EV on EV TOU Off-Peak rate is (5,602.56*0.2611)*0.218061 = $319.03
- Annual charging cost for EV on EV TOU Shoulder-Peak rate is (5,602.56*0.2611)*0.310060 = $453.62

Potential Annual Savings

- For current ICEV drivers, savings from switching from:
  - Fueling gas to charging an EV on current residential rate = $1,160.35 (1,613.97 - 453.62)
  - Fueling gas to charging an EV on EV TOU On-Peak rate = $1,104.87 (1,613.97 - 509.10)
  - Fueling gas to charging an EV on EV TOU Off-Peak rate = $1,294.94 (1,613.97 - $319.03)
  - Fueling gas to charging an EV on EV TOU Shoulder-Peak rate = $1,160.35 (1,613.97 - 453.62)
- For current EV drivers, savings from switching from current residential rate to EV TOU Off-Peak rate = $134.60 (453.62- $319.03)

[85] https://safety.fhwa.dot.gov/hsip/reports/pdf/2020/pr.pdf

[86] https://www.globalpetrolprices.com/Puerto-Rico/gasoline_prices/

[87] https://www.eia.gov/totalenergy/data/browser/?tbl=T01.08

[88] Transportation Research Center at Argonne National Lab and Fueleconomy.gov

[89] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

10.2 List of Utility EV Initiatives

Below is a list of electric utilities that have developed education and outreach initiatives specifically tailored to educate their customers on electric vehicles and the benefits that EV's provide for drivers and society overall. These utility programs provide guidance for the education and outreach initiatives that LUMA has considered. As LUMA continues to support EV adoption, LUMA will continue monitoring the efforts of other peer utilities to incorporate best practices and methods of effectively engaging and educating drivers.

List of Utility Education and Outreach Initiatives

Utility Company Name	State	Program Name	Link to Source
Ameren Illinois	IL	Education & Outreach Strategy	Link
Avista Utilities	WA	Education & Outreach	Link
Madison Gas & Electric	WI	Explore My EV	Link
National Grid	MA	Fleet Advisory Services Program	Link
Pacific Gas & Electric	CA	EV Fleet TCO Calculator	Link
		EV Savings Calculator	Link
Philadelphia Electric Company	PA	Education & Outreach	Link
Xcel Energy Colorado	CO	EV Dealer Network	Link
Puget Sound Energy	WA	Up & Go Education & Outreach Pilot	Link

List of Utility EV Infrastructure & System Improvement Initiatives

Utility Company Name	State	Program Name	Link to Source
American Electric Power Oklahoma	OK	Charging Infrastructure Referral Program	Link
Austin Energy	TX	EV Connection Guide for Residential	Link

Utility Company Name	State	Program Name	Link to Source
Avista Utilities	WA	EV Charging Program - Residential	Link
Baltimore Gas and Electric	MD	BGE-owned and operated multifamily chargers	Link
Central Hudson Gas & Electric	NY	EV Make-Ready Program	Link
ComEd	IL	EV Charger Readiness	Link
ConEdison	NY	Hosting Capacity	Link
		EV Charging Station Installation Guide	Link
Consumers Energy	MI	EV Ready Checklist	Link
Dominion Energy Virginia	VA	Hosting Capacity Tool	Link
		Smart Charging Infrastructure Program	Link
DTE Energy	MI	Charging Forward	Link
Duke Energy Florida	FL	Park & Plug	Link
Eversource Energy	CT	Electric Vehicle Charging Program	Link
		Hosting Capacity Map and Interconnection Analysis Portal	Link
Georgia Power Company	GA	Make Ready EV Charging Infrastructure	Link
Hydro Quebec	Canada	EV Charging Stations Technical Installation Guide	Link
Liberty Utilities	CA	Parks and Schools Pilots	Link
		Electric Vehicle Program	Link
National Grid	RI	EV Charging Station Program	Link
Orange & Rockland Utilities	NY	EV Make-Ready Program	Link

Utility Company Name	State	Program Name	Link to Source
Pacific Gas & Electric Company	CA	EV Charge Network	Link
		A Guidebook to Fleet Electrification and Infrastructure	Link
Potomac Electric Power Company	DC	Taxi/Rideshare Chargers	Link
		EV Readiness Checklist	Link
Puget Sound Energy	WA	Up & Go EV Equity-Focused Pilot	Link
		Up & Go EV Multifamily Charging Pilot	Link
Xcel Energy	CO, MI, MN, NM, ND, SD, TX, WI	New Service for EV Charging	Link
Xcel Energy Colorado	CO	Multifamily EV solutions	Link
		Accelerate At Home	Link
Xcel Energy Minnesota	MN	Accelerate At Home	Link
Xcel Energy Wisconsin	WI	Accelerate At Home	Link

List of Utility EV Rates & Load Management Initiatives can be found in the Draft EV Rate Proposal[90]

[90] (2022, July 21) Submittal of Revised EV Rate Design Proposal NEPR–MI- 2021-0013 https://energia.pr.gov/wp-content/uploads/sites/7/2022/07/Motion-Submitting-Revised-EV-Rate-Design-NEPR-MI-2021-0013.pdf

10.3 Customer Survey Results

The J.D. Power survey consisted of a series of multiple-choice questions and was conducted in Q1 (February 1, 2022 to March 15, 2022) and Q2 (March 16, 2022 to May 16, 2022). There were 593 respondents in Q1 and 1310 respondents in Q2. Questions were focused on the customer's EV ownership, where customers charge, familiarity with EVs, concerns and factors that increase their interest. The survey results are detailed below.

Question 1: Do you own any of the following vehicle types? Mark all that apply.

Options:	Q1 (%)	Q2 (%)
Hybrid (HEV)	4.9	5
Plug-in hybrid (PHEV)	1.0	1
100% Electric (BEV)	1.3	2
None	93.1	93
Total	**100.0**	**100**

Q2: What percentage do you charge your vehicle at home or work/charging station?

Options:	Q1 & Q2 (%)
Home	83
Work/Charging Station	17
Total	**100**

Q3: Which of the following best describes your familiarity with electric vehicles?

Options:	Q1 (%)	Q2 (%)
I've heard of electric vehicles but don't know much about them	58	57
I have heard of electric vehicles and know quite a bit about them	28	29
I know a lot about electric vehicles	11	14
Total	**98**	**100**

Q4: Which of the following statements best describes your thoughts on buying or leasing an electric vehicle?

Options:	Q1 (%)	Q2 (%)
I plan on getting an electric vehicle for my next vehicle	7	7
I would consider getting an electric vehicle as my next vehicle	16	17
I have interest in getting an electric vehicle in the future, but not for my next vehicle	16	16
I have no interest in getting an EV	30	28
Don't know/haven't considered it.	30	32
Total	**100**	**100**

Q5: Which of the following was a greater concern in your decision to purchase an electric vehicle? Please rank them in order of importance. (Rank = 1)

Options:	Q1	Q2 (%)
Electricity system reliability	22	25
Price of electric vehicles	20	22
Don't know enough about EVs to make a decision	20	18
Price of electricity rates	19	15
Availability of public charging stations	6	5
Ability to charge it at home	3	4
Amount of time it takes to charge	2	3
Electric vehicle driving range	2	3
Ability to charge it at work	0.5	1
Availability of electric vehicles	1.3	1
Total	**100**	**100**

Q6: Which of the following would most likely increase your interest in purchasing or leasing an electric vehicle?

Options:	Q1 (%)	Q2 (%)
Improve the reliability of the electricity system	27	29
Offer discounted electricity rates for electric vehicle owners	29	26
Install public charging stations along highways	20	17
Provide information and assistance with installing a home charging station	10	12
Offer rebates to install a home charging station	7	9
Improve access to charging stations at apartment buildings	5	5
Improve access to workplace charging stations	1	2
Total	**100**	**100**

10.4 EV Interconnection Process Overview

Below is a simplified overview of the envisioned process LUMA plans to implement beyond the Phase 1 EV Plan. It consists of two main processes outlined below.

10.4.1 EV Application Process

EV charging applications will be recorded, and a basic validation will be performed to ensure consistency and completeness of the application documentation, a technical screening of the service transformer and distribution feeders capacity will follow to identify the need for either low voltage (LV) or medium voltage (MV) supplemental study or both. As described in section 10.4.2, should the need for mitigation be identified, it will be implemented. Next, metering capacity capable of collecting data for TOU application will be enabled and the EV application will be registered in the billing process before it is considered complete.

10.4.2 Supplemental Study Process

The supplemental study process comprises of the LV and MV system analysis process. Should an aggregated EV charging station capacity compromise service transformer capacity, a LV supplemental study will be triggered, and the mitigation work will be implemented before allowing additional EV charging installation. Should the aggregated EV charging capacity impact MV feeder balance or conductor or cable capacity, a MV supplemental system study will be triggered to implement a mitigation solution. Once mitigation is complete, TOU metering and billing processes are executed.

Figure 10-1. Overview - Level 2 or Level 3 EV Application Process