San Diego Gas & Electric Company

Priority Review Projects Final Report

MARCH 31, 2021

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1. Port Electrification

Please note that pursuant to the attached report some of the information included herein is customer usage data, which is treated as confidential by law. In this instance, the program participants have affirmatively consented to the disclosure of their information as part of their participation in the program.

1.1. Executive Summary

On October 7, 2015, Senate Bill (SB) 350, *the Clean Energy and Pollution Reduction Act* (Chapter 547, Statutes of 2015) was signed into law, establishing new clean energy, clean air, and greenhouse gas (GHG) and reduction goals for California for 2030 and beyond. SB 350 requires utilities to undertake transportation electrification activities. As part of the SB 350 goals, San Diego Gas & Electric Company (SDG&E) proposed six Priority Review Projects (PRPs) in an application to the California Public Utilities Commission (Commission or CPUC) on January 7, 2017 and received approval in Decision (D.) 18-01-024 on January 11, 2018.

SDG&E's medium duty and heavy duty (MD/HD) and Forklift Port Electrification Project (Port Electrification) proposed to install, operate, maintain, and own electric vehicle (EV) charging infrastructure, load research meters, and data loggers for 30 to 40 installations within the Port District tidelands. The original intent was that each charging infrastructure installation supporting grant-funded MD/HD EVs or electric forklifts could include a combination of some or all funded components.

1.2. Project Description and Background

a. Goals

Overall, SDG&E's six approved PRPs were designed to achieve the following goals:

- facilitate rapid deployment of transportation electrification as a means to meet California's aggressive GHG reduction goals, thereby improving the health of all ratepayers and creating a cleaner environment;
- fill and/or jump start sectors within the EV market not significantly developed or currently lacking sustainable infrastructure or capital investment;
- create opportunities for private sector participation in the EV market by increasing EV-related demand (e.g., increased EV sales, increased need for charging and data collection infrastructure, increased need for a trained and qualified EV-related workforce);
- promote market integration by facilitating safe and equitable access to electricity as a transportation fuel, including for those living in disadvantaged communities (DACs), while improving the efficient use of SDG&E's electric system;
- provide data that will help test and measure the flexibility of EV charging loads and the degree to which the efficient integration of EV loads can yield cost savings to all customers by avoiding future utility infrastructure additions, increasing utilization of renewable resources, or more efficiently using the electric grid; and
- provide education and outreach to residential and commercial customers currently lacking the knowledge or experience necessary to reach the conclusion that investment in EVs or EV infrastructure is economical, safe, and good for the public at large.

For the Port Electrification project, the main goal was to gain key insights for optimized grid integration of electrified MD/HD vehicle and forklift applications.

b. Procedural history

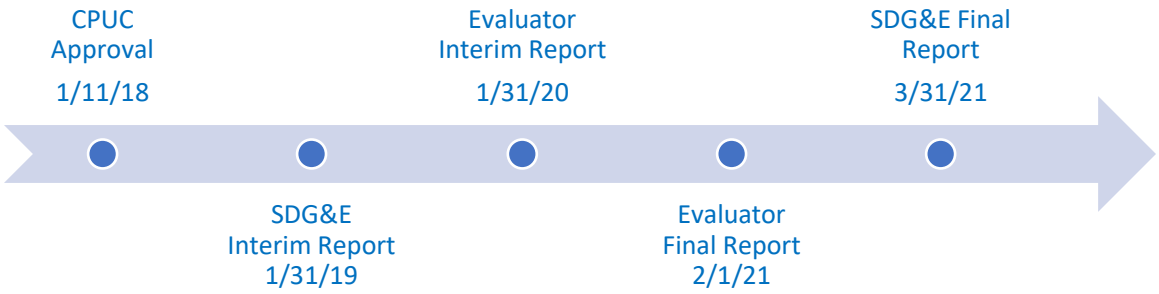

Figure 1. Port Electrification Procedural History

SDG&E received approval from the Commission to begin implementation of six Priority Review Projects on January 11, 2018 in D.18-01-024. The Port Electrification project was approved as proposed. SDG&E issued an interim report on January 31, 2019. The independent evaluator submitted a Joint Investor-Owned Utility (IOU) Interim Report on January 31, 2020 and a final Joint-IOU Independent Evaluator Report on February 1, 2021.[1] SDG&E submits this Final Report on March 31, 2021.

c. Background research

SDG&E did not have any previous related pilots at the time this application was filed.

d. Implementation timeline and milestones

The following summarizes SDG&E's Port Electrification Project planning and implementation:

- SDG&E engaged with ten port tenants and conducted exploratory site walks. However, timing was an issue and several customers decided to opt out for various reasons described in section 1.3.b below.
- Ultimately, two customers – the Port of San Diego Cruise Ship Terminal and Pasha – received infrastructure from this program. The Port of San Diego Cruise Ship Terminal received forklifts and Pasha obtained HD trucks. Figure 2 below provides an overview of the project timeline with these customers.
- SDG&E's negotiations with Dole lasted a number of months but ended in November 2019 without a signed participation agreement.
- Contract discussions with Four Seasons, who expressed interest in the program, also did not result in a contract.

[1] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021.

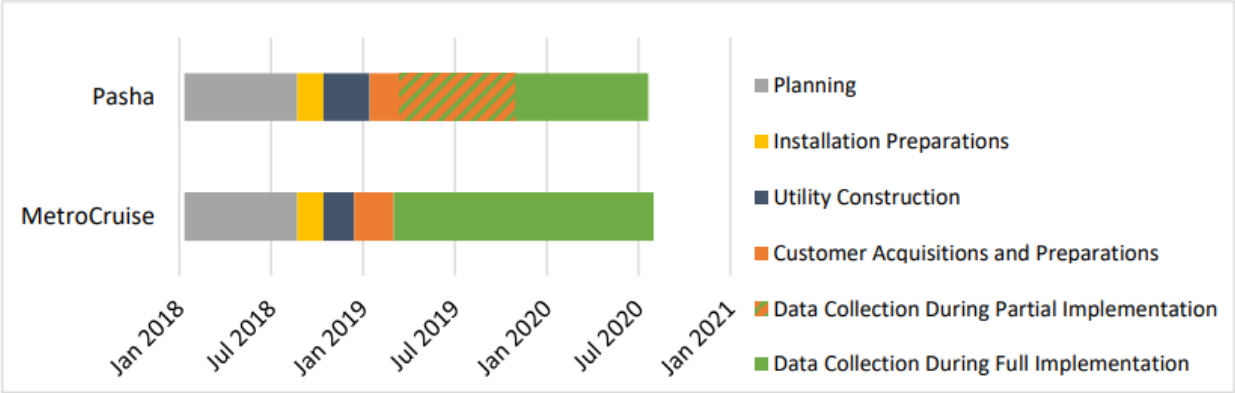

Figure 2. Port Electrification Implementation Timeline and Milestones

Forklifts - Port of San Diego Cruise Ship Terminal

- Design – Complete Q4 2018
- Construction – Complete Q4 2018
- Data Collection – Began Q1 2019
- The installation at the Cruise Ship Terminal was completed by the end of 2018, but the chargers were not commissioned until March 4, 2019, when they started to be used in regular operations.
- The EVs and the Electric Vehicle Service Equipment (EVSE) at the Cruise Ship Terminal were available for operational data collection for more than a year for this evaluation, but there were significant durations when the equipment was not used. While this is typical for cruise ship operators due to summer offseason, it was especially pronounced during the COVID-19 pandemic, which essentially halted all cruise ship activity.

Heavy-Duty Trucks - Pasha

- Design – Complete Q4 2018
- Construction – Complete Q1 2019
- Data Collection – Began Q1 2019
- The Pasha installation was completed in January 2019 (there were some weather delays) and commissioned on March 15, 2019.
- The Pasha infrastructure was monitored for 17 months following commissioning, but Pasha's truck usage was sporadic and mostly limited to a single electric truck because of operational challenges and technical issues with the vehicles. In August 2020, Pasha decommissioned the chargers temporarily to move them to a more convenient location and the re-installation should be completed early 2021.

1.3. Project participants

a. Description of customers and sites

Nine forklifts chargers were installed on the Port of San Diego Cruise Ship Terminal for use by one of the Port Tenants – Metro Cruise. With the Port of San Diego being the customer of record, the infrastructure may be used by a different tenant in the future, at the customer's discretion. A separate meter was installed as part of this project to bill for charging consumption. The Port of San Diego will receive a separate bill which will be passed down to their tenant, Metro Cruise as a part of their lease agreement.

Pasha charging infrastructure was installed for use by their fleet of MD/HD trucks, and will not be available for use to the public. Pasha receives a direct bill from SDG&E and the additional load will be

added to their existing rate. No existing transportation electrification (TE) infrastructure was available at either of the sites, however the current design takes into consideration the ability for the customers to scale up their electric fleet in the future.

b. Barriers to participation

As mentioned above, ten port tenants applied to participate in the program. While SDG&E had a targeted list of port tenants who were designated as recipients of grant funded vehicles, timing was an issue. Twenty percent of the tenants received their vehicles prior to the approval of the Priority Review Program and chose to install the infrastructure on their own. Twenty percent of the tenants chose to install the infrastructure outside of Port Tidelands, making them ineligible for the Program. The biggest obstacle SDG&E faced was negotiating with the customers on signing an easement/license agreement, resulting in thirty percent of customers opting out of the program. There is additional complexity for all the customers because they are tenants of the Port, and therefore do not have jurisdiction of the land.

c. Disadvantaged Community participation

All Port Electrification sites are in SDG&E territory DACs according to California Office of Environmental Health Hazard Assessment's California Communities Environmental Health Screening Tool Version 3.0 (CalEnviroScreen 3.0).

Forklifts

The Cruise Ship Terminal at the San Diego Port is not in a statewide defined DAC according to CalEnviroScreen 3.0 but is in an SDG&E DAC (applying the same statewide DAC definition to only SDG&E territory).

Heavy-Duty Trucks

Pasha's terminal operates along the San Diego Port with their route going back and forth to Otay Mesa where they transport cargo. This area is in a statewide defined DAC according to CalEnviroScreen 3.0. Therefore, 100 percent of the economic and emission benefits are attributed to disadvantaged communities.

d. Diverse customer outreach and engagement

In conjunction with filing its application, SDG&E provided support and technical expertise to the Port of San Diego and the San Diego Port Tenants Association for several transportation electrification grant applications that would benefit various port tenants. Upon approval of the Port Electrification program, SDG&E targeted the tenants, including locally owned and minority owned businesses, that would be recipients of grant funded MD/HD vehicles and electric forklifts, to provide charging infrastructure support. Additionally, SDG&E conducted outreach through various channels including presentations at the Port of San Diego maritime meetings, San Diego Port Tenant Association board meeting and funding presentations, Regional Energy Working Group, etc.

e. Project partners

SDG&E partnered with the Port of San Diego, Metro Cruise Lines, and Pasha during this project.

1.4. Costs

a. Actual and forecast utility direct costs

Table 1 below sets forth SDG&E's proposed costs for the Port Electrification project.

Table 1. Port Electrification PRP Proposed Costs

	Capital Costs	O&M Expenses	Total PRP Costs
Transformer and Install	N/A	N/A	N/A
Electrical Service	$ 849,570	N/A	$ 849,570
EVSE Costs	$ 991,005	N/A	$ 991,005
Purchased and SD Software	N/A	N/A	N/A
Measurement and Evaluation	N/A	$ 150,000	$ 150,000
Education and Outreach	N/A	$ 110,000	$ 110,000
Billing Support	N/A	$ 80,000	$ 80,000
SDG&E Clean Transportation PM	N/A	$ 200,000	$ 200,000
First-Year O&M Service Calls	N/A	$ 15,000	$ 15,000
First-Year O&M for Charging Equipment	N/A	$ 10,000	$ 10,000
Total Direct Costs	**$ 1,840,575**	**$ 565,000**	**$ 2,405,575**

The Port Electrification project direct and total costs as of February 2021 are set forth in the table below (presented in categories reported by SDG&E).

Table 2. Port Electrification PRP Costs as of February 2021

	Actual Capital Costs	Actual O&M Costs	Total Actual Costs	Total Budget	Variance
Construction	$ 173,260	-	$ 173,260	$ 966,045	$ (792,785)
Engineering Design	$ 104,544	-	$ 104,544	-	$ 104,544
Chargers, Meter Pedestals, Transformer, & Other Materials	$ 63,923	-	$ 63,923	$ 874,530	$ (810,607)
Internal SDG&E Labor	$ 12,408	$ 126,804	$ 139,212	$ 280,000	$ (140,788)
IT Costs, Measurement & Evaluation	$ 123,548	$ 78,876	$ 202,424	$ 246,223	$ (43,799)
Customer Engagement / Outreach	-	$ 4,050	$ 4,050	$ 110,000	$ (105,950)
Other	$ 37,349	$ 35	$ 37,384	$ 25,000	$ 12,384
Direct Costs	$ 515,032	$ 209,765	$ 724,797	$ 2,501,798	$ (1,777,001)
Non-Direct Costs (Overheads, AFUDC, & Property Taxes)	$ 180,626	$ 127,737	$ 308,364	$ 1,239,883	$ (931,520)
Total Costs	**$ 695,658**	**$ 337,502**	**$ 1,033,161**	**$ 3,741,681**	**$ (2,708,521)**

Variances:

- SDG&E did not move forward with two sites where engineering design work was performed.
- Proposed costs assumed less than $10,000 per site for engineering design and permitting by using existing electrical services; however, separate service lines were designed and installed.

- IT costs were not contemplated in proposed costs.
- Site conditions included unforeseen environmental costs and complicated trenching.
- Cost underrun driven by fewer installations constructed than proposed.

b. Utility expenditures in Disadvantaged Communities

Both project sites are located within an SDG&E territory DAC. Table 2 above sets forth the project DAC expenditures.

c. Customer costs

Customers incurred one-time cost for the acquisition of electric vehicles, which may have been fully or partially offset by grant funding, as well as ongoing maintenance and fuel cost of the electric vehicles to be serviced by the infrastructure installed under this Program. There was no assessment of Total Cost of Ownership/Operation of an electric fleet performed by the utility for these customers.

d. Leveraged funding

The PRP does not provide funding for EVs, but they are a requirement for customers to participate in the project, which means some customers leveraged grants to cover vehicles costs. Pasha received grant-funded vehicles delivered with respective proprietary chargers.

1.5. Equipment and Competitive Markets

a. Equipment procurement or qualification process

A competitive Request for Proposal (RFP) was issued for EVSE and related services establishing all requirements for communication, connector safety, and functionality. Responses were evaluated based on technical, functional requirements as well as price. Respondents were selected for award of Master Service Agreement.

Requirements and Standards for EV Equipment established in the RFP:

- The proposed EVSE shall have successfully passed Nationally Recognized Testing Laboratory (NRTL) testing, or be listed by UL.
- The proposed EVSE shall be compliant with National Electrical Code (NEC) Article 625.
- The proposed EVSE shall be compliant with Federal Communications Commission (FCC) Part 15 Class A.
- In addition, Company encourages Bidder to offer EVSEs that are compliant with the appropriate sections of National Institute of Standards and Technology (NIST) Handbook 44 related to Technical Requirements for Weighing and Measuring devices.
- EVSE and Components Housing:
    - The EVSE and any subcomponents shall be housed in a National Electrical Manufacturers Association (NEMA) 3R enclosure or better, rated for outdoor use.
    - The EVSE shall be installed in a stationary manner, either on an appropriate included pedestal or wall-mounted in certain locations.
- EVSE Temperature Requirements:
    - The EVSE should have an operational temperature range of -30 degrees C to +50 degrees C (-22 degrees F to 122 degrees F)
- EVSE Networking Equipment:
    - Contractor communication system shall be independent of the Site Host to allow for the management and administration of the Charging Stations, authenticate users, reset equipment, download updated firmware, and transmit consumption data.

- While Contractor communication systems at each Facility may use a secure 802.11 Wi-Fi connection to communicate with each other, the method of communicating to the back office cannot depend on a Site Host Wi-Fi network.

- EVSE Remote Connectivity:
  - For purposes of troubleshooting and maintenance, the EVSE shall be capable of receiving a “reset” or “reboot” signal remotely when necessary.
  - The EVSE shall be able to accept a firmware or software update remotely via the communications system. If, for any reason, the update fails to properly install, the previous revision of firmware or software will continue to be used.

b. Equipment installation

The PRPs have two active design engineering firms, Asplundh and EPI, and the sites are split between the two companies. The PRP sites are split between two active construction contractors: Baker Electric and A.M. Ortega. SDG&E encouraged its contractors to create diversity sub-contracting plans.

The following equipment was installed at the respective Port Electrification Sites:

Forklifts

Webasto (formerly AeroVironment) was selected for forklifts and GSE due to their specialization in Off-Road/Non-Standard EV Charging Equipment. (9) x Posicharge ProCore 10 kilowatt (kW) AC EV Chargers were qualified and selected for the Port of San Diego.

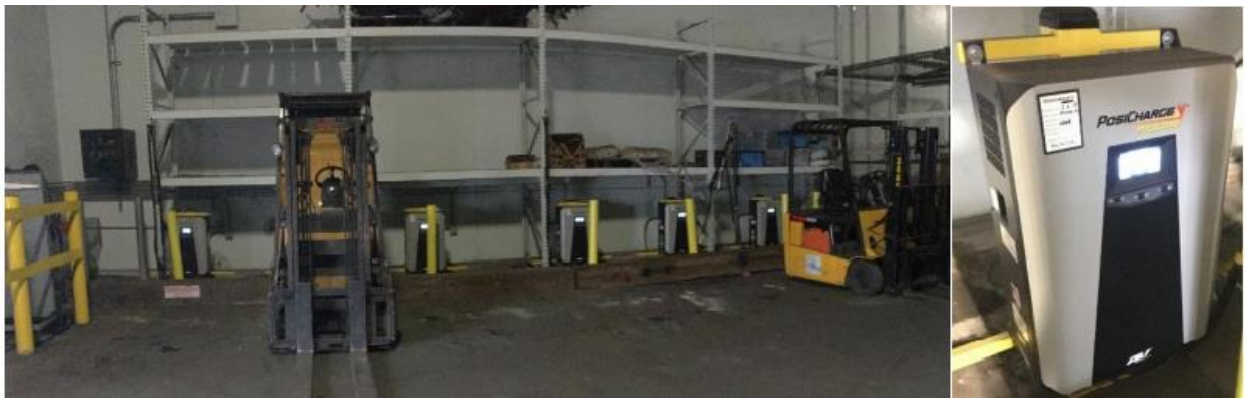

Figure 3. Equipment Installation at Port of San Diego

Heavy-Duty Trucks

Due to the proprietary nature of the vehicles acquired by Pasha, BYD supplied 40kW, 80kW, and 100 kW DCFC EV chargers funded through the grant received by Pasha.

Figure 4. Equipment Installation at Pasha

c. Risks of stranded assets

One lessoned learned during the project with Pasha is that customers have a potential to change business operations, locations, etc. and the Utility must have resources available to manage the removal and/or relocation of EV Charging Infrastructure.

1.6. Load Management and Grid Integration

a. Demand at project sites

Forklifts

With approximately 2,000 kilowatt-hours (kWh) of energy consumption in April, May, and November 2019 were the highest recorded months of energy consumption (Figure 5 below). While a substantial amount of charging took place during on-peak hours (4 and 9 PM), much of the demand was seen during weekend off-peak hours during these months.

Nearly 18 megawatt-hours (MWh) at an average cost of $0.35/kWh have been consumed over the lifetime of the Port Electrification project as of the end of May 2020 – more than the average estimate of 13 MWh based on the 12-month billing period from March 13, 2019 through March 14, 2020. The spike in average cost during summer of 2019 can be attributed to demand charges spread over very little consumption, increasing the average cost per kWh. These forklifts have been in operation for several years, so the operation is considered relatively mature with little increase in cost after October 2019 due to the learnings associated with this PRP.

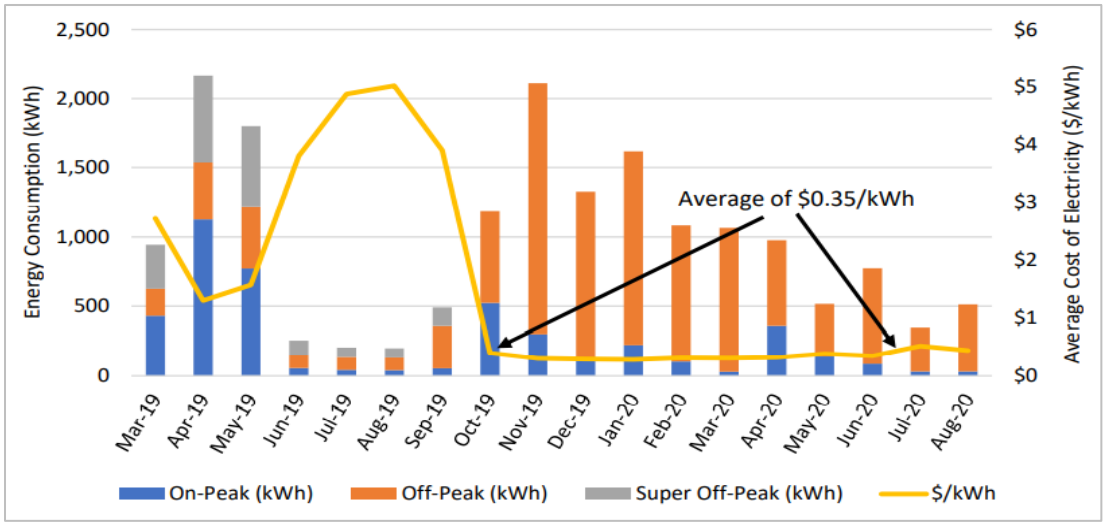

Figure 5. Demand at Port of San Diego

Heavy-Duty Trucks

No charging session data could be collected directly from the BYD chargers installed for charging Pasha's trucks because they are non-networked and lack energy management features resulting in significant on-peak charging; the trucks were frequently plugged between 1 and 4 PM at the end of the shift and charged during peak hours. The total electricity consumption for all 3 EVs through May 2020 was nearly 18 MWh with drayage truck averaging just under 3 kWh per mile in 2020, and May 2020 was the highest month of drayage truck usage during the 15 months of data collection as shown in Figure 6 below.

The long-range drayage truck accounted for about 80% of the consumed energy. More than 5 MWh of electricity was consumed for vehicle charging, signifying 1,550 miles traveled by the long-range electric drayage truck which averages consumption of 3.25 kWh per mile (based on utility meter data). Specific details of charging periods in May 2020 are indicated in the third-party evaluator report.[2]

[2] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, Page 114.

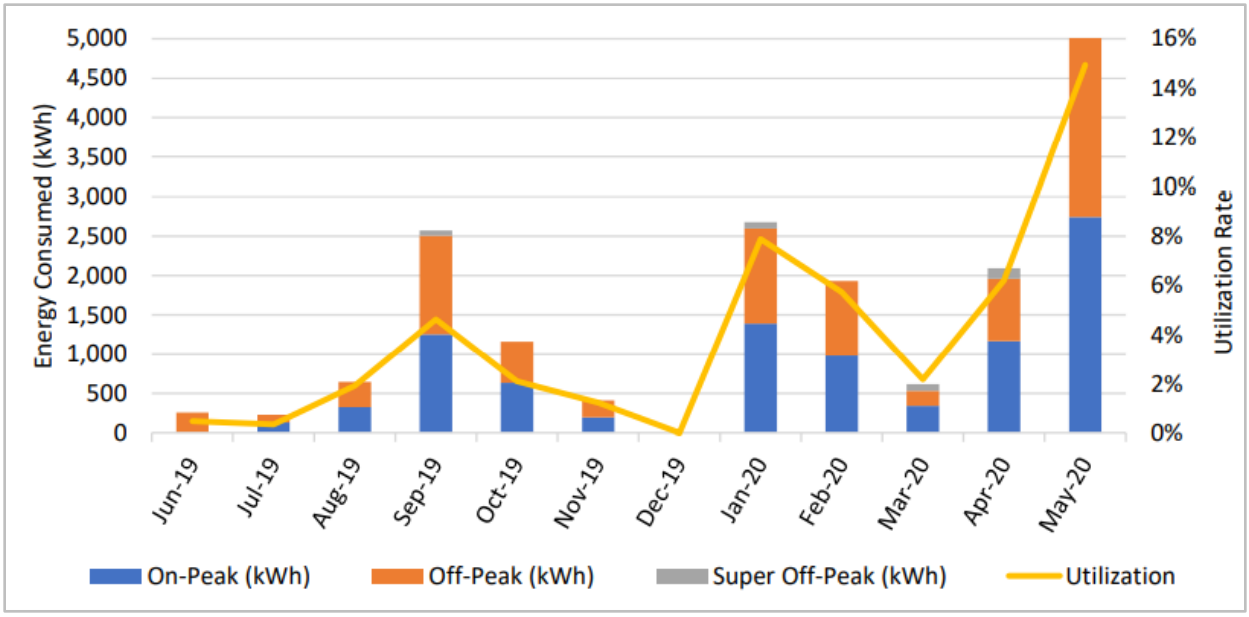

Figure 6. Demand at Pasha

b. Description of load management and/or grid integration requirements

Forklifts

The Webasto PosiCharge chargers installed for the Port Forklifts were purchased by SDG&E and have smart charging capabilities. While not initially utilized, the chargers were eventually programmed to allow for scheduled charging during off-peak hours after 9 PM.

Heavy-Duty Trucks

The BYD chargers installed for charging Pasha's trucks are non-networked and have no energy management features. Lack of energy management features resulted in significant on-peak charging of Pasha's trucks as they were typically plugged in at the end of the shift between 1 and 4 PM.

c. Customer outreach strategies used to incentivize managed charging

Forklifts

In October 2019, at the request of the Port and after working with an SDG&E account manager to find a more suitable rate, the electric rate for this site was changed to a small commercial rate without demand charges. Additionally, SDG&E and Webasto assisted the Port to program the EV chargers to delay charging, and block 4-9 PM weekday charging to reduce peak demand charges.

Heavy-Duty Trucks

The BYD chargers installed for charging Pasha's trucks are non-networked and have no energy management features. Given this, the SDG&E account manager for Pasha worked with the customer to develop a manual load management plan to avoid grid impacts and demand charges.

i. Effectiveness of outreach

Forklifts

The Port of San Diego was responsive and appreciative of SDG&E reaching out to inform them that they could achieve an overall lower cost per kWh by taking advantage of the scheduled charging feature of the charging equipment. The Port of San Diego requested more information and immediately scheduled a session with the charging equipment vendor to implement the scheduled charging parameters.

Heavy-Duty Trucks

Although the BYD chargers installed by Pasha did not have energy management features, SDG&E used smart meter utilization and billing data to analyze usage and provide load management recommendations to the customer.

ii. Communication methods for sending pricing signals to customers

SDG&E publishes its time-of-use (TOU) rate levels online for customers. Additionally, SDG&E sends mail to customers with information about TOU and includes comparisons and recommendations on bills.

d. Responsiveness of customers to load management requirements or pricing

Due to the ongoing COVID-19 pandemic, the effects of the change from on-demand to scheduled charging at the Port of San Diego were not observed during the data collection period. Once normal operations resume, however, it is expected that the implementation of scheduled charging at the Port of San Diego will result in a lower overall cost per kWh.

e. Demand response participation

Demand Response features are not applicable to the Port Electrification PRP.

1.7. Outreach and Education

a. Description of customer outreach and education activities

In conjunction with filing its application, SDG&E provided support and technical expertise to the Port of San Diego and the San Diego Port Tenants Association for several transportation electrification grant applications that would benefit various Port Tenants. Upon approval of the Port Electrification program, SDG&E targeted the tenants, including locally owned and minority owned businesses, that would be recipients of grant funded MD/HD vehicles and electric forklifts, to provide charging infrastructure support. Additionally, SDG&E conducted outreach through various channels including presentations at the Port of San Diego maritime meetings, San Diego Port Tenant Association board meeting and funding presentations, Regional Energy Working Group, etc.

b. Customer surveys and metrics

i. Description and sample of customer surveys

No surveys were conducted within the scope of this project, however, in depth interviews were conducted post implementation by the Independent Evaluator and SDG&E in preparation for this Final Report and are the source of information in the subsequent sections.

*ii. Customer satisfaction with **project***

Forklifts

Both the Port (as a landlord) and the forklift operator (as a tenant) have had a good experience with the installation of the utility owned chargers and make-ready infrastructure. The Port was in the process of issuing an RFP for installing the charging infrastructure to serve the forklifts that their tenant already operated before their relocation on the Cruise Ship Terminal. All the infrastructure, charger costs, and construction was relatively quick and smooth as no trenching, only above ground conduit, was needed.

Heavy-Duty Trucks

The heavy-duty truck operator also had a good experience working with the utility as part of this PRP. The utility managed the planning, design, and installation of the fleet-owned chargers and utility-owned make ready infrastructure. Locating the chargers next to an existing transformer minimized the trenching and resulted in a relatively quick and cost-effective construction.

The operator's only surprise was that the chargers were installed facing away from the trucks. The location of the yard tractor's charger proved to be inconvenient as it was on the opposite end of the terminal compared to where the tractors are parked and operated.

This was the first EV experience for the fleet operator and the EVs and chargers were fully covered by a California Energy Commission (CEC) grant. The 3 EVs were not intended to be a direct replacement for diesel vehicles but solely for the operator to gain experience with electrification to aid in achieving their sustainability goals. The operator observed and reported several technology limitations:

1. The shorter-range drayage truck did not meet the minimum range needed. It was unable to consistently reach 80 miles between charges with 10 percent state of charge remaining. This range is needed to complete two consecutive drayage shuttle trips without charging.
2. The yard truck lacked functionality and ergonomics to operate onboard a roll-on roll-off cargo ship. The operation requires numerous adjustments of the fifth wheel height to account for angle of the ramp during the ingress and egress of the ship. The electric tractor requires shifting into neutral to adjust the fifth wheel height, whereas the conventional truck can do so while in gear. This causes not only inconvenience and delays, but also safety concerns among the drivers. Additionally, the seat or cab design does not allow swiveling like some conventional trucks do, therefore limiting the ability to maneuver the truck in tight areas on the ship.

iii. Customer-reported incremental vehicle adoption due to project

Heavy-Duty Trucks

Pasha acquired two BYD electric drayage trucks and one BYD electric yard tractor through a CEC grant.

Carbon BLU instrumented the three trucks with dataloggers to report on utilization.

Forklifts

Metro Cruise operates nine electric forklifts, several pallet jacks and golf carts to serve loading and unloading needs of large cruise ships that dock at the port.

iv. Effectiveness of customer outreach methods

Given the limited scope and location of this PRP in the Port District tidelands, SDG&E was able to effectively engage with most targeted participants through the methods described in section 1.7a above. Direct contact with grant applicants/recipients and introducing the program to captive audiences at various port organizations meetings was more effective, in this case, than other methods such as social media or email campaigns. Educating representatives from the Port of San Diego and the San Diego Port Tenants Association about the program offerings proved to be fruitful as they served as ambassadors of the program and assisted in generating new leads.

1.8. Safety

a. Summary of relevant safety requirements

The Port Electrification project adhered to the Final Safety Requirements Checklist[3] developed by Commission staff. SDG&E filed Advice Letter 3403-E[4] on July 11, 2019 describing compliance efforts to the safety requirements checklist.

[3] www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882
[4] http://regarchive.sdge.com/tm2/pdf/3403-E.pdf

b. Safety issues reported during project and actions taken to correct them

No safety issues were reported/observed during the Port Electrification project.

1.9. Lessons Learned

a. Summary Table

The following table summarizes key lessons learned from the Port Electrification project.

Table 3. Port Electrification Lessons Learned

Issue	Resolution	Recommendations
SDG&E described program design elements within testimony, making some design parameters and requirements overly prescriptive. For example: describing the exact mix of chargers for each Green Shuttle site in testimony.	SDG&E utilized the language in the decision that allowed for program modifications via an approved Tier 2 Advice Letter.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs.
Local and state governments and other regulated entities have internal processes, which delayed schedules. For example: The Port of San Diego and National City DSD each have their own internal processes which may be duplicative.	Encourage tenant to engage w/ port sooner in process	Build additional time into project schedules to accommodate partner entities' internal processes.
Customers often lacked sufficient knowledge of rates and load management functionality of EVSE.	SDG&E worked with both the customer and EVSPs to inform and educate customer of rate details and capability of EVSE to manage charging.	SDG&E will perform rate analysis and host Load Management discussions with each Program Participant and document Participants rate selection and Load Management Plan.
Construction costs can significantly increase if on-site conditions are not considered (e.g., concrete and environmental constraints).	Performed cost estimates prior to offering customer agreement, turned down prospective participant due to cost.	Continue to perform cost estimates and environmental review prior to offering customer agreement.
Data collection for the PRPs was rather difficult, especially when working with EVSPs whose data collection resources are not mature enough to meet the demands.	Implemented a manual process to physically collect data from chargers and EVs.	Test/validate EVSE capability prior to approval

b. Project Assessment

Charging infrastructure for nine forklift chargers and three BYD electric trucks were successfully installed at two separate locations within the Port District, which has provided SDG&E additional experience in

installing EV charging infrastructure along with more accurate cost information. This experience will help SDG&E and the Port support future electrification of the Port District tenants' cargo handling equipment and vehicles. From an infrastructure standpoint, the PRPs were successful in implementing smart meters and charging equipment that helped monitor charging activity. This insight helped the participants better manage the costs of charging and lowered their cost of ownership.

The Port District tenants provide a scalable mix of operations with a variety of heavy-duty trucks and forklift options becoming available to meet their needs. However, limited real estate and restrictions of where infrastructure can be located can increase costs and make large scale deployments a challenge. Additionally, distribution system upgrades might be required to meet the increased load capacity requirements.

The Port Electrification Project has met its intended goal to support electrification of Forklifts and MD/HD EVs and provided valuable data on usage, load management, lessons learned, insight into unique operational challenges, and cost validation. SDG&E considers the pilot successful and continues electrification efforts through the SDG&E Power Your Drive for Fleets program. SDG&E and The Port of San Diego are currently collaborating to evaluate infrastructure needs to support the expected level of EV adoption; construction is expected to begin in 2022.

Forklifts

The third-party evaluator for the PRPs, Energetics, has provided an assessment of the existing market and scalability of Forklifts and Heavy-Duty Trucks at the Port.[5]

According to recent CEC reports, there are approximately 100,000 forklifts in the state of California.[6] Assuming these follow the national sales trends over the past 10 years,[7] 37,000 of those forklifts will be internal combustion based. If half of these (18,500) were converted to electric, the benefits shown in Table 4 below could be achieved as well as a petroleum reduction 3.4 million gasoline gallon equivalent (GGE).

Table 4. Port Electrification Forklift Scale Up Potential – Annual Emisions

	GHG (MT/yr)	SO_x (MT/yr)	NO_x (MT/YR)	CO (MT/YR)	PM (MT/YR)	VOC (MT/YR)
Net Reduction	16,070	Negligible	91	379	0.3	Negligible

Source: Evaluator Calculations

Heavy-duty Trucks

Scale-up of this project may be challenging due to acceptance rates; however, as electric class 8 trucks become more widely available, battery capacity increases, as well as charging rates, the opportunity is quite significant. A drayage truck able to travel 150 miles daily (200-mile total range) could serve this purpose well as long as the owner/operators were willing to adapt their operations to accommodate a

[5] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 118-119

[6] CEC, "Zero Emission Forklifts," available at: https://ww2.arb.ca.gov/our-work/programs/zero-emission-forklifts/about.

[7] Industrial Truck Association, "United States Factory Shipments," available at: https://www.indtrk.org/wp-content/uploads/2019/02/United-States-Factory-Shipments-Table-2018.pdf.

stop for on-route charging. Alternatively, drayage trucks with 250-mile range between charges would be needed.

It was not apparently clear how many drayage trucks exist within the state of California; however, given an estimated 12,000 active at the San Pedro Ports,[8] it is likely that there are upwards of 30,000 active drayage trucks in the state. An estimate of 5,000 of these are likely to have duty cycles favorable towards electrification today, with the remaining 25,000 developing as battery pack sizes increase and charging times and costs decrease. With a fleet of 5,000 drayage trucks, the benefits shown in Table 5 below could be realized as well as a petroleum reduction of 17.3 million gasoline gall equivalent (GGE).

Table 5. Port Electrification Heavy Duty Trucks Scale Up Potential – Annual Emisions

	GHG (MT/yr)	SO_x (MT/yr)	NO_x (MT/YR)	CO (MT/YR)	PM (MT/YR)	VOC (MT/YR)
Net Reduction	132,713	14	390	136	7	48

Source: Evaluator Calculations

1.10. Vehicle Adoption

a. Description of customer's vehicles before project

Heavy-Duty Trucks

Prior to the adoption of the 3 BYD trucks acquired as part of this program, Pasha operated a fleet of diesel drayage and yard tractors. The heavy-duty electric trucks were additions to Pasha's fleet to test new technologies for future scalability. Pasha received their grant funded electric trucks as they applied to participate in this pilot, acquiring the vehicles and the charging equipment at the same time.

Forklifts

The charging stations installed at the cruise ship terminal are currently being operated by Metro Cruise who owned electric forklifts but needed a smart efficient way to charge them. SDG&E worked with the Port of San Diego to install the chargers which will permanently be located at the site and may be used by other tenants going forward.

b. Electric vehicles served by project

Heavy-Duty Trucks

Pasha acquired two BYD electric drayage trucks and one BYD electric yard tractor through a CEC grant.

Carbon BLU instrumented the three trucks with dataloggers to report on utilization.

Forklifts

Metro Cruise operates nine electric forklifts, several pallet jacks and golf carts to serve loading and unloading needs of large cruise ships that dock at the port.

[8] Tetra Tech / Gladstein, Neandross & Associates, "San Pedro Bay Ports Clean Air Action Plan," Tetra Tech / Gladstein, Neandross & Associates, May 2020.

c. Petroleum reduction

The anticipated benefits discussed in SDG&E's testimony supporting its Application[9] were calculated based on 13 EVs (modeled as forklifts) replacing diesel, gasoline, and propane vehicles. As planned, the number of EVs supported by this PRP's charging infrastructure is nine electric forklifts and three MD/HD electric trucks (using calculation factors from the fleet delivery vehicles as a similar application used in the Testimony). SDG&E attributes all consumption that occurs on the charging infrastructure to the program, even if those vehicles/equipment were already electrified.

Per the Evaluator Report the pilot's forklifts consumed 13,877 kWh of electricity from March 2019 to February 2020. During this time period, 38% of the consumption occurred on peak.[10] This consumption displaced 819 GGE of propane, the baseline fuel for forklifts in this industry.

As implemented, only one MD/HD electric truck experienced regular use and therefore is the only one providing benefits compared to the baseline vehicles. Annualized consumption for the period from September 2019 – May 2020 was 22,167 kWh, with 53% of consumption occurring during peak hours. This is estimated to be 1,400 gallons of diesel per year. GGE diesel usage is converted by using the 1.155 GGE per gallon of diesel factor, resulting in 1,652 GGE of reduced diesel.

1.11. Greenhouse Gas Emissions Reductions

a. Emissions reductions

SDG&E attributes GHG reductions to all program infrastructure. This approach results in emissions reductions from forklift operations and HD vehicle usage. The third-party evaluator estimated that the pilot achieved annualized GHG reductions of 15,000 kg/year from best observed forklift operations.[11]

Table 6 and Table 7 below show the fossil fuel reductions from forklifts, and HD freight operations enabled by SDG&E infrastructure. The baseline fuel for forklifts is assumed to be propane, and the baseline fuel for freight operations is assumed to be diesel.

Table 6. Port Electrification Forklifts Annual Emission Reduction

Forklifts	GHG (kg/yr)	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM (kg/yr)	VOC (kg/yr)
Propane	7,258		24.25	93.91	0.65	
Electric	3,065	1.04	3.38	2.80	0.58	0.57
% Reduction	58%		87%	97%	11%	

Source: Evaluator Calculations

[9] Prepared Direct Testimony of Randy Schimka https://www.sdge.com/sites/default/files/Direct%2520Testimony%2520Chapter%25203%2520-%2520Priority%2520Review%2520Projects.pdf.

[10] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 104.

[11] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 105.

Table 7. Port Electrification Freight Operations Emission Reductions

MD/HD	GHG (kg/yr)	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM (kg/yr)	VOC (kg/yr)
Diesel	18,510	2.83	37.60	15.66	1.49	4.88
Electric	7,446	1.65	5.40	4.48	0.92	0.91
% Reduction	60%	42%	86%	71%	38%	81%

Source: Evaluator Calculations

b. Calculation methodology

As directed by the Commission's reporting requirements, SDG&E adopted the emissions reductions estimate methodology agreed upon by the third-party evaluator (Energetics), the IOUs, and the Energy Division staff. The only significant departure from Energetics' approach is that SDG&E attributes benefits from all consumption to the program. For example, benefits from forklift charging enabled by the program would be attributed to SDG&E, even if those forklifts were already electrified before the program began. This simplifying assumption is consistent with the approach used to estimate benefits across SDG&E's transportation electrification portfolio.

Annual fuel usage is the starting point for electric and pollutant emissions. This is established in the third-party evaluator emissions calculations, where an operational period is selected and applied in an annualized view.

c. Baseline emissions assumptions and methodology

Emission factors for forklifts were based on the OFFROAD2017-ORION emissions inventory. Baseline fuel emissions are estimated using annual fuel use.

Table 8. Port Electrification Propane Forklift Baseline Emission

GHG (g/hr)	SO_x (g/hr)	NO_x (g/hr)	CO (g/hr)	PM (g/hr)	VOC (g/hr)
6,720	Negligible	23.37	86.96	0.60	Negligible

Source: CARB ORION 2017

On-road vehicle baseline emissions were determined using California GREET 3.0[12] to estimate wheel-to-wheels emissions for the specified fuel. Drayage trucks diesel fuel emissions factors are shown in grams per million Btu using the California GREET 3.0 model.

Emission factors and emission reductions for electric trucks utilize the calculated annual kWh and baseline fuel combined with the energy factor of 128,488 Btu per gallon of diesel fuel.

Table 9. Port Electrification Diesel Baseline Emission

GHG (g/mmBtu)	SO_x (g/mmBtu)	NO_x (g/mmBtu)	CO (g/mmBtu)	PM (g/mmBtu)	VOC (g/mmBtu)
100,723	15.39	204.60	85.20	8.13	26.54

Source: GREET 3.0

[12] https://ww2.arb.ca.gov/resources/documents/lcfs-life-cycle-analysis-models-and-documentation.

1.12. Criteria Pollutant Reductions

Criteria pollutants can have both health and environmental impacts. The tables below summarize the annualized criteria pollutant reduction benefits from the pilot.

Table 10. Port Electrification Forklifts Annual Emission Reduction

Forklifts	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM (kg/yr)	VOC (kg/yr)
Propane		25.24	93.91	0.65	
Electric	1.04	3.38	2.80	0.58	0.57
% Reduction		87%	97%	11%	

Source: Evaluator Calculations

Table 11. Port Electrification Freight Operations Emission Reductions

MD/HD	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM (kg/yr)	VOC (kg/yr)
Diesel	2.83	37.60	15.66	1.49	4.88
Electric	1.65	5.40	4.48	0.92	0.91
% Reduction	42%	86%	71%	38%	81%

Source: Evaluator Calculations

a. Emissions reductions

i. Ozone

The ozone emission type is not a criteria pollutant included in the California 3.0 GREET model. Neither SDG&E nor the Evaluator Report included ozone as part of the emission reductions criteria.

ii. Nitrogen oxides

Nitrogen oxides (NO_x) emissions – reductions support healthy air quality standards. The third-party evaluator estimated that this pilot reduced annualized NO_x emission by ~85%.[13] See tables below for additional details provided in the Evaluator Report.

Table 12. Port Electrification NO_x Emissions (kg/yr)

	Forklift	HD
Baseline Fuel	25.24	37.60
Electric	3.38	5.40
% Reduction	87%	86%

Baseline fuel for forklifts is propane, HD is diesel

iii. Particulate matter

Particulate matter (PM) are airborne particles that negatively affect health and can be reduced by electrifying transportation. The table below shows the PM benefits of port electrification.

[13] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 105.

Table 13. Port Electrification PM Emissions (kg/yr)

	Forklift	HD
Baseline Fuel	0.65	1.49
Electric	0.58	0.92
% Reduction	11%	38%

Baseline fuel for forklifts is propane, HD is diesel

v. Volatile organic compounds

Volatile organic compounds (VOCs) include a range of chemicals, some of which may have short- and long-term negative health effects and can be reduced by electrifying transportation. The table below shows the VOC benefits of port electrification.

Table 14. Port Electrification VOC (kg/yr)

	Forklift	HD
Baseline Fuel	-	4.88
Electric		0.91
% Reduction	-	81%

Baseline fuel for forklifts is propane, HD is diesel

b. Calculation methodology

Port Electrification calculation methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

c. Baseline emissions assumptions and methodology

Port Electrification baseline emission assumptions methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

2. Airport Ground Support Equipment (GSE)

Please note that pursuant to the attached report, some of the information included herein is customer usage data, which is treated as confidential by law. In this instance, the program participants have affirmatively consented to the disclosure of their information as part of their participation in the program.

2.1. Executive Summary

On October 7, 2015, Senate Bill (SB) 350, *the Clean Energy and Pollution Reduction Act* (Chapter 547, Statutes of 2015) was signed into law, establishing new clean energy, clean air, and greenhouse gas (GHG) and reduction goals for California for 2030 and beyond. SB 350 requires utilities to undertake transportation electrification activities. As part of the SB 350 goals, San Diego Gas & Electric Company (SDG&E) proposed six Priority Review Projects (PRPs) in an application to the California Public Utilities Commission (Commission) on January 7, 2017 and received approval in Decision (D.) 18-01-024 on January 11, 2018.

This project was designed to encourage and support the electrification of ground support equipment (GSE) at San Diego International Airport (SDIA) (Airport GSE Project). In the first phase of the project, SDG&E proposed retrofitting 16 existing charging ports, with an optional second phase to increase the amount of charging ports at SDIA by up to 45. This PRP was designed to help mitigate the grid impacts additional charging load from the GSE through data collection and analysis through load research meters, and the integration of SDIA's 5.5 megawatt (MW) photovoltaic (PV) system.

Based on the results of the first phase of this project, the ongoing COVID-19 pandemic, and availability of the SDG&E Power Your Drive for Fleets Program, SDG&E declined to implement a second phase of the Airport GSE Project at SDIA. SDG&E informed the Commission in Advice Letter 3628-E,[14] which was accepted by the Commission on February 24, 2021.

2.2. Project Description and Background

a. Goals

Overall, SDG&E's six approved PRPs were designed to achieve the following goals:

- facilitate rapid deployment of transportation electrification as a means to meet California's aggressive GHG reduction goals, thereby improving the health of all ratepayers and creating a cleaner environment;
- fill and/or jump start sectors within the EV market not significantly developed or currently lacking sustainable infrastructure or capital investment;
- create opportunities for private sector participation in the EV market by increasing EV-related demand (e.g., increased EV sales, increased need for charging and data collection infrastructure, increased need for a trained and qualified EV-related workforce);
- promote market integration by facilitating safe and equitable access to electricity as a transportation fuel, including for those living in disadvantaged communities (DACs), while improving the efficient use of SDG&E's electric system;
- provide data that will help test and measure the flexibility of EV charging loads and the degree to which the efficient integration of EV loads can yield cost savings to all customers by avoiding

[14] Advice Letter 3628-E, *Update on SDG&E's Priority Review Projects Implementation Plans in Compliance with Decision 18-01-024* http://regarchive.sdge.com/tm2/pdf/3628-E.pdf.

future utility infrastructure additions, increasing utilization of renewable resources, or more efficiently using the electric grid; and

- provide education and outreach to residential and commercial customers currently lacking the knowledge or experience necessary to reach the conclusion that investment in EVs or EV infrastructure is economical, safe, and good for the public at large.

A major goal of the Airport GSE project is to use data collection and analysis to better understand eGSE (electric ground support equipment) load and incorporate it with the grid.

b. Procedural history

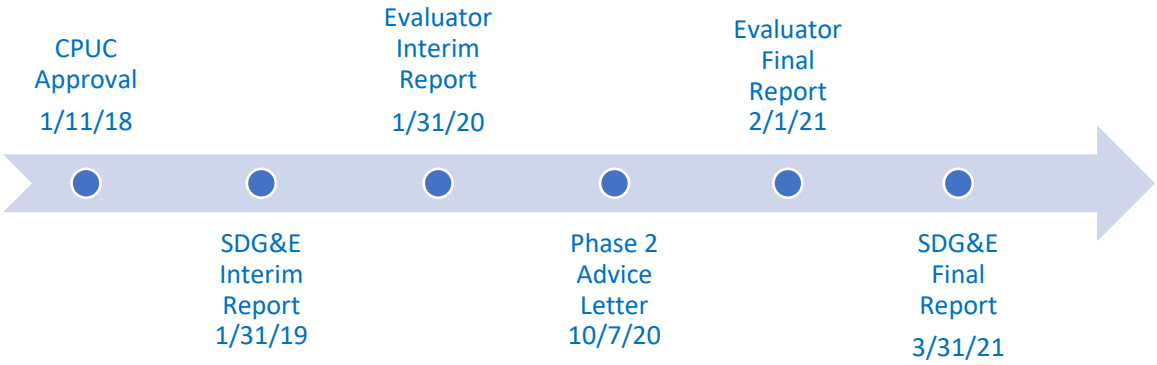

Figure 7. Airport GSE Procedural History

SDG&E received approval from the Commission to begin implementation of six Priority Review Projects on January 11, 2018 in D.18-01-024. The Airport GSE Project was approved as proposed. SDG&E issued an interim report on January 31, 2019. The independent evaluator submitted a Joint-IOU Interim Report on January 31, 2020 and a final Joint-IOU Independent Evaluator Report on February 1, 2021. SDG&E submits this Final Report on March 31, 2021.

c. Background research

SDG&E did not have any previous related pilots at the time this application was filed.

d. Implementation timeline and milestones

The following summarizes SDG&E's Airport GSE Project planning and implementation:

- Design - Completed September 2019
- Construction – Completed November 2019
- Data Collection – Began December 2019
- Load Management Study and Plan – August 2020

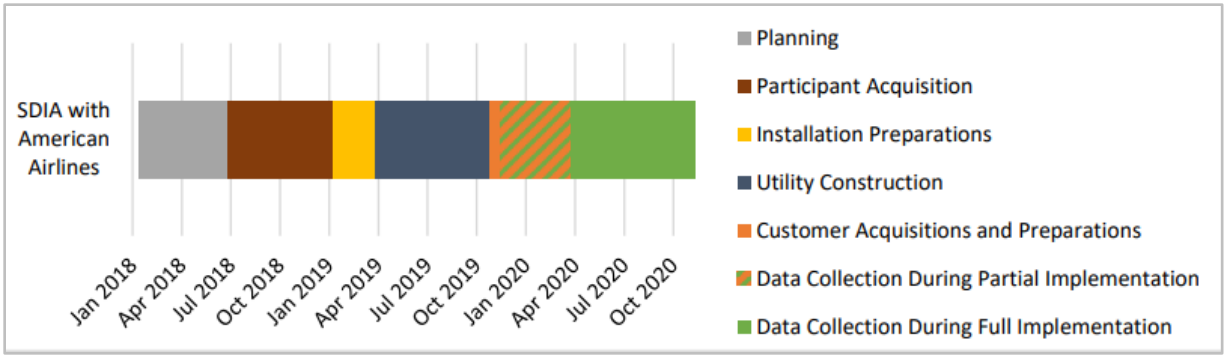

Figure 8. Airport eGSE Implementation Timeline and Milestones

2.3. Project participants

a. Description of customers and sites

This project was implemented in Terminal 2 of SDIA at the following locations:

Table 15. Airport GSE Description of Customers and Sites

Location	Configuration	Ports
Between gates 33 and 23	3 dual-port chargers	6
Between gates 23 and 25	3 dual-port chargers	6
Between gates 35 and 34	2 dual-port chargers	4

The existing infrastructure was replaced with the new "smart" charging equipment. After conducting outreach to SDIA tenants (including locally-owned and minority owned businesses), SDG&E selected American Airlines as the candidate for these retrofits because the existing equipment was outdated and did not provide data for load management. SDIA was the customer of record for the project, and separate meters were installed as part of this project to collect charging consumption information, but the energy used will be aggregated with all SDIA's consumption.

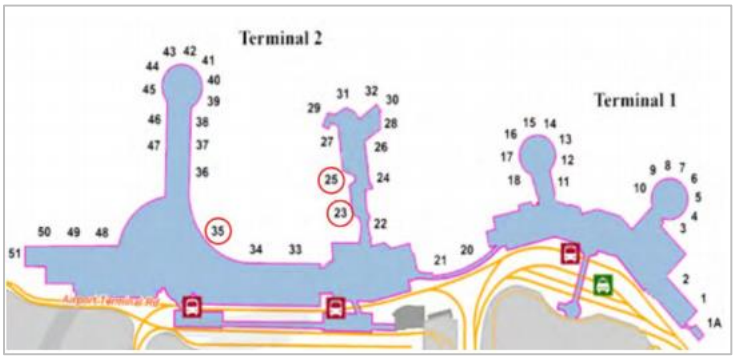

Figure 9. SDIA Gate Map

Source: SDIA

b. Barriers to participation

On November 14, 2018, SDG&E was invited to speak at the monthly Airlines Meeting at SDIA. At the meeting, SDG&E reviewed the Project's goals, the potential second phase of the Project, and asked the airlines to respond to a survey. The survey was designed to understand the airlines' different needs, barriers, and goals of electrifying their GSE fleet in the future. Survey results showed that infrastructure, procurement cycles, and limited available eGSE models were the main barriers.

c. Disadvantaged Community participation

Although the census tract for the airport is adjacent to DACs, SDIA is not evaluated in the CalEnviroScreen 3.0 screen report.

d. Diverse customer outreach and engagement

SDG&E worked closely with SDIA during the application process. The strategy around the GSE electrification project was based on a collaborative effort with SDIA. As part of phase 1, SDG&E was authorized to retrofit existing ports. After conducting outreach to SDIA tenants, including locally owned and minority owned businesses, American Airlines was selected as the candidate for those retrofits because their existing charging equipment is outdated, less efficient, and provides no data to help guide users as to when they need to charge.

e. Project partners

SDG&E partnered with the San Diego Airport Authority (the Authority) and American Airlines to retrofit their existing chargers.

2.4. Costs

a. Actual and forecast utility direct costs

The approved PRP had an anticipated total direct cost of $2,839,738, consisting of $2,405,598 in capital and $434,140 in expense. Table 16 below sets forth SDG&E's proposed costs for the Port Electrification project.

Table 16. SDG&E Airport GSE PRP Proposed Costs

	Capital Costs	O&M Expenses	Total PRP Costs
Transformer and Install	N/A	N/A	N/A $
Electrical Service	$ 912,333	N/A	$ 912,333
EVSE Costs	$ 1,493,265	$ 22,140	$ 1,515,405
Purchased and SD Software	N/A	N/A	N/A
Measurement and Evaluation	N/A	$ 200,000	$ 200,000
Billing Support	N/A	$ 80,000	$ 80,000
SDG&E Clean Transportation PM	N/A	$ 100,000	$ 100,000
First-Year O&M Service Calls	N/A	$ 22,000	$ 22,000
First-Year O&M for Charging Equipment	N/A	$ 10,000	$ 10,000
Total Direct Costs	**$** 2,405,598	**$ 434,140**	**$** 2,839,738

The Airport GSE Project direct and total costs as of February 2021 are set forth in the table below (presented in categories reported by SDG&E).

Table 17. SDG&E Airport GSE PRP Costs As Of February 2021

	Actual Capital Costs	Actual O&M Costs	Total Actual Costs	Total Budget	Variance
Construction	$ 167,214	-	$ 167,214	$ 1,101,258	$ (934,044)
Engineering Design	$ 58,186	-	$ 58,186	$ 89,100	$ (30,914)
Chargers, Meter Pedestals, Transformer, & Other Materials	$ 246,078	-	$ 246,078	$ 1,215,240	$ (969,162)
Internal SDG&E Labor	$ 15,289	$ 111,967	$ 127,256	$ 180,000	$ (52,744)
IT Costs, Measurement & Evaluation	$ 123,548	$ 93,212	$ 216,760	$ 313,590	$ (96,829)
Customer Engagement / Outreach	-	-	-	-	-
Other	$ 112,794	$ 12	$ 112,806	$ 54,140	$ 58,666
Direct Costs	$ 723,108	$ 205,191	$ 928,299	$ 2,953,327	$ (2,025,028)
Non-Direct Costs (Overheads, AFUDC, & Property Taxes)	$ 109,932	$ 112,732	$ 222,664	$ 1,337,599	$ (1,114,935)
Total Costs	**$ 833,041**	**$ 317,923**	**$ 1,150,964**	**$ 4,290,926**	**$ (3,139,962)**

Variances:

- Unanticipated IT costs for data collection functionality.
- Smart Meter Installations (data collection meters). SDG&E proposed to use data collection smart meters in areas that have existing infrastructure.
- Significant operational challenges building infrastructure on secure airside including access issues, operational hazards requiring engineered protective barriers, and delayed time for engineering and construction reviews due to a stringent internal SDIA Tenant Improvement process.
- Proposed costs included both phases, cost underrun due to opting out of the second phase

b. Utility expenditures in Disadvantaged Communities

Not applicable to the Airport GSE Project.

c. Customer costs

Customer costs include ongoing maintenance and fuel cost of the electric vehicles to be serviced by the infrastructure installed under this Program. There were no assessments of total cost of ownership/operation of an electric fleet performed by the utility for these customers.

d. Leveraged funding

Not applicable to the Airport GSE Project.

2.5. Equipment and Competitive Markets

a. Equipment procurement or qualification process

A competitive Request for Proposal (RFP) was issued for the Electric Vehicle Service Equipment (EVSE) and related services establishing all requirement for communication, connector safety, and functional requirement. Responses were evaluated based on technical, functional requirements as well as price. Respondents were selected for award of Master Service Agreement. Webasto (formerly AeroVironment)

was selected for eGSE charging equipment due to their specialization in Off-Road/Non-Standard EV Charging Equipment.

Requirements and Standards for EV Equipment established in the RFP:

- The proposed EVSE shall have successfully passed Nationally Recognized Testing Laboratory (NRTL) testing, or be listed by UL
- The proposed EVSE shall be compliant with National Electrical Code (NEC) Article 625
- The proposed EVSE shall be compliant with Federal Communications Commission (FCC) Part 15 Class A
- In addition, Company encourages Bidder to offer EVSEs that are compliant with the appropriate sections of NIST Handbook 44 related to Technical Requirements for Weighing and Measuring devices.
- EVSE and Components Housing:
    - The EVSE and any subcomponents shall be housed in a National Electrical Manufacturers Association (NEMA) 3R enclosure or better, rated for outdoor use
    - The EVSE shall be installed in a stationary manner, either on an appropriate included pedestal or wall-mounted in certain locations

EVSE Temperature Requirements:

- The EVSE should have an operational temperature range of -30 degrees C to +50 degrees C (-22 degrees F to 122 degrees F)

EVSE Networking Equipment:

- Contractor communication system shall be independent of the Site Host to allow for the management and administration of the Charging Stations, authenticate users, reset equipment, download updated firmware, and transmit consumption data
- While Contractor communication systems at each Facility may use a secure 802.11 Wi-Fi connection to communicate with each other, the method of communicating to the back office cannot depend on a Site Host Wi-Fi network

EVSE Remote Connectivity:

- For purposes of troubleshooting and maintenance, the EVSE shall be capable of receiving a “reset” or “reboot” signal remotely when necessary
    - The EVSE shall be able to accept a firmware or software update remotely via the communications system. If, for any reason, the update fails to properly install, the previous revision of firmware or software will continue to be used

b. Equipment Installation

The PRPs have two active design engineering firms - Asplundh and EPI. The sites are split between the two companies. The PRP sites are split between two active Construction contractors - Baker Electric and A.M. Ortega. SDG&E encouraged its contractors to create diversity sub-contracting plans.

(8) x Posicharge DVS-400 Dual Port pedestal mounted chargers were qualified and selected for the San Diego International Airport eGSE project.

Figure 10. Equipment Installation (Airport eGSE)

c. Risks of stranded assets

The equipment installed at San Diego International Airport is owned and maintained by SDG&E, so there is little to no risk for stranded assets related to this project. One lessoned learned during the course of the Priority Review Projects is that customers have a potential to change business operations, locations, etc. and the Utility must have resources available to manage the removal and/or relocation of EV Charging Infrastructure.

2.6. Load Management and Grid Integration

a. Demand at project sites

The following chart represents the maximum demand experienced at each hour of the day during any given quarter. Actual monthly load curves are similar in shape.

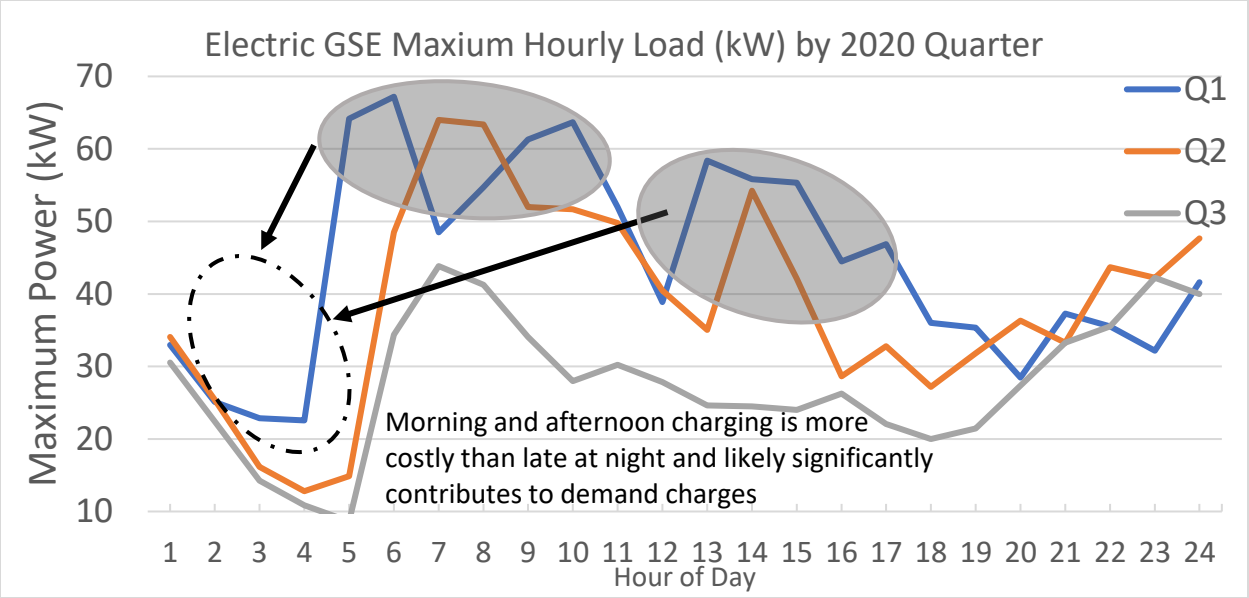

Figure 11. Airport GSE Monthly Energy Consumption (kWh) by Hour of Day

During the highest utilization month studied by the third-party evaluator, ~20% of usage occurred during on-peak.[15] The third-party evaluator's review of charging session data showed that demand peaked at nearly 70 kilowatts (kW) during off peak morning hours. If it is operationally feasible, any load shifting opportunities could potentially help decrease fuel costs[16].

b. Description of load management and/or grid integration requirements

SDG&E evaluated the GSE fleet's charging behavior and duty cycles and developed a load management plan which incorporates SDIA's 5.5MW solar array to help SDIA assess opportunities for further electrification of GSE. Mid-day when solar generation is high and late night when grid usage is low are ideal for load managed charging.

c. Customer outreach strategies used to incentivize managed charging

SDG&E provided training and documentation to SDIA management, American Airlines, eGSE operators and maintenance crews. Topics included best practices related to the load management plan and managed charging. The utility along with SDIA Management continue to emphasize the importance of adhering to these best practices to operators and maintainers.

i. Effectiveness of outreach

With one customer, SDIA, and one tenant, American Airlines, limited efforts for customer outreach were required except for what's noted above. However, SDG&E facilitated education around technical troubleshooting of charging equipment and eGSE between SDG&E technicians, the equipment vendor, airline operator, ground personnel, and SDIA operations personnel.

[15] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, Page 86

[16] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, Page 83

*ii. Communication methods for sending pricing signals to **customers***

SDG&E publishes TOU prices online for customers and sends mail to customers with information about TOU and includes comparisons and recommendations on bills. Additionally, pricing plan information was covered during the training referenced above, to ensure all applicable parties were informed about TOU time frames.

d. Responsiveness of customers to load management requirements or pricing

San Diego International Airport was responsive to and appreciative of SDG&E's load analysis and load management recommendations. The Airport did not implement hardware or software-based Load Management tactics due to the nature of operations, however, they communicate the best practice to vehicle operators and reinforce scheduled based charging as much as operationally possible to take advantage of off-peak charging rates

e. Demand response participation

*i. Summary of demand **response requirements***

Demand Response features are not applicable to the San Diego International Airport eGSE project.

ii. Customer participation rates

Demand Response features are not applicable to the San Diego International Airport eGSE project.

iii. Load impacts of participation

Demand Response features are not applicable to the San Diego International Airport eGSE project.

2.7. Outreach and Education

a. Description of customer outreach and education activities

SDG&E collaborated closely with SDIA during the application process. In November 2018, SDG&E and SDIA representatives met with a number of airlines and GSE operators in order to further assess opportunities for GSE electrification at SDIA. SDG&E then conducted a survey of GSE operators in which four of the seven operators that completed the survey expressed their interest in adopting new eGSE.

Due to limited scope and potential participants in this pilot, SDG&E was able to target all significant airline tenants through collaboration with SDIA. Although only one airline, American Airlines, was chosen for phase 1, subsequent discussions with other SDIA airlines for potential phase 2 through direct conversations with operations personnel proved an effective method of outreach.

b. Customer surveys and metrics

i. Description and sample of customer surveys

In depth interviews were conducted post implementation by the Independent Evaluator and SDG&E in preparation for this Final Report and are the source of information in the subsequent sections.

In preparation for phase 2 of the Airport eGSE PRP, SDG&E spoke with SDIA representatives and tenants in November 2018 and administered a survey to GSE operators at SDIA, which seven operators completed. The survey was intended to learn about the airline's needs, barriers to participation, and electric GSE goals. Four of the survey participants expressed interest in adopting new electric GSE, and participants indicated that more charging stations would make it easier to adopt electric GSE. Operators also expressed some concerns including limited charging options, lack of suitable equipment, and procurement cycles.

ii. Customer satisfaction with project

Airport management said that working with the utility was a positive experience and hopes to leverage subsequent programs to further electrify airside and other transportation needs.

iii. Customer-reported incremental vehicle adoption due to project

Because the scope of the first phase of this pilot was limited to retrofitting existing charging infrastructure, the customer did not procure incremental eGSE as a result of this program.

iv. Effectiveness of customer outreach methods

Given the limited scope and location of this PRP within SDIA, SDG&E was able to effectively engage with targeted participants through the methods described in section 2.7.a above.

2.8. Safety

a. Summary of relevant safety requirements

The Airport eGSE project adhered to the Final Safety Requirements Checklist[17] developed by Commission staff. SDG&E filed Advice Letter 3403-E[18] on July 11, 2019 describing compliance efforts to the safety requirements checklist.

b. Safety issues reported during project and actions taken to correct them

No Safety Issues were reported/observed during the Airport eGSE electrification project.

2.9. Lessons Learned

a. Summary Table

The following table summarizes key lessons learned from the SDIA eGSE project.

Table 18. Airport GSE Lessons Learned

Issue	Resolution	Recommendations
SDG&E described program design elements within testimony, making some design parameters and requirements overly prescriptive. For example: describing the exact mix of chargers for each Green Shuttle site in testimony.	SDG&E utilized the language in the decision that allowed for program modifications via an approved Tier 2 Advice Letter.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs.
Local and state governments and other regulated entities have internal processes, design standards, and documentation which delayed schedules. For example: the SDIA has their own processes in place, called the tenant improvement process.	SDG&E worked closely with these entities and understanding their processes during these pilots.	Build additional time into project schedules to accommodate partner entities' internal processes.

[17] www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882
[18] http://regarchive.sdge.com/tm2/pdf/3403-E.pdf

Experienced significant operational challenges building infrastructure on secure airside including access issues, operational hazards requiring engineered protective barriers, and lengthy engineering and construction reviews due to a stringent internal SDIA tenant improvement process.	Adhered to specs and requirements, worked closely with SDIA management to review and resolve issues quickly.	Retain corporate knowledge by documenting customers specific requirements. Build additional time into project schedules to accommodate partner entities' internal processes.
Frequent change of operators and maintainers proved making consistent policy and procedures regarding maintenance and use of EVSE a challenge.	Conducted several training sessions with management, maintainers, and operators. Developed Best Practices document.	Continue to monitor operations and performance, provide feedback and training as necessary.

b. Project Assessment

The third-party evaluator for the PRPs, Energetics, has provided an assessment of the existing market and scalability of eGSE at SDIA.[19]

In the state of California, as of 2018, there were over 3,500 combustion-fueled ground support vehicles at airports that could be converted to electric with little to no negative effects on performance. Approximately 27% of GSE within the state (1,300 vehicles) are already electrically driven. 533 of the combustion GSE at California airports are baggage tractors or belt loaders using spark ignition; this project demonstrates that these vehicles represent a significant opportunity to further electrify.[20] Converting these vehicles to electric could achieve the benefits seen in Table 19**.**

When evaluating the optional phase 2 of the Airport GSE project, SDG&E engaged with SDIA and four major airlines to discuss future electrification of eGSE. Though all airlines stated that they currently have halted current plans to expand their electrification programs due to the financial uncertainty around the pandemic, they all stated they would re-evaluate when operations return to normal with plans to electrify or provide 100% alternative fuel eGSE to comply with existing SDIA agreements. The potential for all airlines to scale up to 100% eGSE within 3 years is high and is only limited to the number of eGSE needed to support flight operations.

Table 19. Airport GSE Scale-Up Potential in Annual Emissions

	GHG (MT/yr)	SO_X (MT/yr)	NO_X (MT/YR)	CO (MT/YR)	PM (MT/YR)	VOC (MT/YR)
Net Reduction	8,353	3	43	3,587	0.4	7

Source: Evaluator Calculations

[19] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 95.

[20] California Air Resources Board, "Public Workshop to Discuss the Zero-Emission Airport Ground Support Equipment," CARB, 6 June 2018. [Online]. Available: https://ww2.arb.ca.gov/sites/default/files/2020-06/GSE%20Workshop%20Presentation%20-%20June%206.pdf. [Accessed 30 December 2020].

Additionally, there are 409 diesel-powered baggage tugs and belt loaders which would have different emissions profiles but would likely have a similar scale of reductions.

The Airport GSE project has met its intended goal to support electrification of support equipment and provided valuable data on usage, load management, lessons learned, insight into unique operational challenges, and cost validation. SDG&E considers the pilot successful and continues electrification efforts through the Power Your Drive for Fleets program. SDG&E and SDIA are currently collaborating to evaluate the infrastructure needs to support this expected level of eGSE adoption; construction is expected to begin in 2022.

2.10. Vehicle Adoption

a. Description of customer's vehicles before project

SDIA hosts 840 GSE of which 27% are electric. Many of the pre-PRP chargers are an older version of what this project used (supporting a single fleet). Other chargers are similar to what this project replaced; fixed-voltage (e.g. 36 volts), non-communicating or programmable, lead-acid chemistry only, and lower powered."

b. Electric vehicles served by project

This project had a specific focus on the electrification of the airport support equipment which embodied a wider scope of electrification needs. Phase 1 of this PRP involved the installation of 8 chargers with a total of 16 ports. Charging session data of the pilot's time frame of December 2019 to August 2020 indicate the use of 31 vehicles including 19 baggage tugs and 12 belt loaders.

c. Petroleum reduction

Because phase 1 of this PRP only involved retrofits of exiting chargers, no new emission benefits were captured throughout the pilot's time frame of December 2019 to August 2020

The annualized analysis allocates ~17% of the 73,693 kWh to on- peak hours, with a 7.5 kWh avg for baggage tugs, and a total of 9,826 hours of use a year. Baggage tugs has an average of consuming 1.5 gallons per hour, resulting in 14,739 gallons of gasoline consumption per year being removed from PRP electrification.

Table 20. Airport GSE Annualized Petroleum Reduction Benefits

	Planned (Phase 1 –15 charger retrofits to support existing eGSE)	Implemented (16 new charging ports to support 31 eGSE)	Optimized (16 new charging ports to support 31 eGSE)
Petroleum Reduction	None	14,739 GGE	19,318 GGE

Source: Evaluator Calculation

2.11. Greenhouse Gas Emissions Reductions

a. Emissions reductions

GHG emission reduction benefits were founded upon key assumptions of fuel type, efficiency, and annual mileage. They represent GHG emission reductions from likely baseline fuels and time of consumption.

Table 21. Airport GSE Annualized Reduction Benefits

	Planned (Phase 1 –15 charger retrofits to support existing eGSE)	Implemented (16 new charging ports to support 31 eGSE)	Optimized (16 new charging ports to support 31 eGSE)
GHG Emissions	None	358 MT of CO2	470 MT of CO2

b. Calculation methodology

As directed by the reporting requirements, SDG&E has adopted the emissions reductions estimate methodology agreed upon by the third-party evaluator (Energetics), the IOUs, and the Energy Division staff. A significant departure from this methodology is SDG&E'S is that SDG&E attributes all benefits GHG reductions from electricity consumption to the project whereas the third-party evaluator excludes these benefits because the installations were retrofits that supported existing electric GSE. SDG&E also did not include the charging benefits from the 30-45 charging ports in in phase 2.

From the observed time period, charging data captured 71% of energy consumed is allocated to baggage tugs, while the remaining 29% is attributed to belt loaders.

Table 22. Airport GSE Emission Reduction Benefits

	GHG (kg/yr)	SO_x (g/hr)	NO_x (g/hr)	CO (g/hr)	PM (g/hr)	VOC (g/hr)
Gasoline	371	122	1,931	159,156	19	300
Electric	13	6	18	15	3	3
% Reduction	97%	95%	99%	100%	83%	99%

c. Baseline emissions assumptions and methodology

Baseline emission factors uses the same partition of allocation of belt loader and baggage tugs mentioned above and integrates EPA's gasoline emission factors with California's GREET ratios to provide the GSE mix baseline emission factors demonstrated in the table below.

Table 23. Airport GSE Mix Baseline Emission Factors

	GHG (g/hr)	SO_x* (g/hr)	NO_x (g/hr)	CO (g/hr)	PM (g/hr)	VOC* (g/hr)
Baggage Tug	43,583	14.3	226.6	18,678	2.2	35.2
Belt Loader	23,773	7.8	123.6	10,188	1.2	19.2
Blended Rate	37,798	12.4	196.5	16,199	1.9	30.5

**SO_x and VOC are based on California GREET ratios and EPA factors for NOx and PM, respectively.*

2.12. Criteria Pollutant Reductions

Criteria pollutant emissions reductions benefits from the Airport GSE pilot program are an important consideration because the location is adjacent to a disadvantaged community. Improving air quality in DACs and DAC adjacent areas is an important way that utility programs can benefit our communities.

a. Emissions reductions

SDG&E attributes the emissions reductions from pre-existing electrified equipment that are served by our charging infrastructure to the pilot.

Table 24. Airport GSE Criteria Pollutant Emission Reduction Benefits

	Planned (Phase 1 –15 charger retrofits to support existing eGSE)	Implemented (16 new charging ports to support 31 eGSE)	Optimized (16 new charging ports to support 31 eGSE)
Criteria Pollutants	None	159 MT of CO* 1.9 MT of NO_X* 297 kg of VOC* 116 kg of SO_X* 16 kg of PM*	209 MT of CO* 2.5 MT of NO_X* 389 kg of VOC* 152 kg of SO_X* 20 kg of PM*

i. Ozone

The ozone emission type is not a criteria pollutant included in the California 3.0 GREET model. Neither SDG&E nor the third-party evaluator report included ozone as part of the emission reductions criteria.

ii. Nitrogen oxides

Nitrogen oxides (NO_x) emissions reductions support healthy air quality standards. The third-party evaluator estimated that this pilot nearly eliminated NOx emissions during the time period evaluated.

Table 25. Airport GSE NO_x Emissions (kg/yr)

	GSE
Baseline Fuel	1,931
Electric	18
% Reduction	99%

Baseline fuel for GSE is gasoline

The pilot reduced annualized NO_x emissions by 1.9 MT per year, or 99% compared to the standard baseline fuel.

iii. Particulate matter

Particulate matter (PM) are airborne particles that negatively affect health and can be reduced by electrifying transportation. The table below shows the PM benefits of the airport GSE electrification

Table 26. Airport GSE Particulate Matter Emissions (kg/yr)

	GSE
Baseline Fuel	19
Electric	3
% Reduction	83%

Baseline fuel for GSE is gasoline

Electrification of the pilot's airport GSE reduced PM by nearly 85% compared to the standard baseline fuel (gasoline).

iv. Volatile organic compounds

Volatile organic compounds (VOCs) include a range of chemicals, some of which may have short- and long-term negative health effects and can be reduced by electrifying the transportation sector. The table below shows the VOC benefits of the airport GSE electrification pilot.

Table 27. Airport GSE VOC Emissions (kg/yr)

	GSE
Baseline Fuel	300
Electric	3
% Reduction	99%

Baseline fuel for GSE is gasoline

Electrification of baggage tugs and belt loaders almost completely eliminates VOC emissions compared to the baseline fuel of gasoline.

b. Calculation methodology

Airport GSE calculation methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

c. Baseline emissions assumptions and methodology

Airport GSE baseline emission assumptions methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

Appendix A: SDG&E Airport Ground Support Equipment Pilot Project Specific Questions

a. Technology or hardware needed to develop load management plan

SDG&E was directed to retrofit, install load research meters on existing electric GSE, assess the existing fleet's charging behavior and duty cycles, collect the data, and use it to develop a load management plan for the existing fleet that better aligns with grid conditions. This program encompasses 16 charging ports supporting 32 pieces of GSE for American Airlines in Terminal 2 of SDIA. The load management plan was developed from 3 sources of data including SDIA's primary meter consumption, solar generation data provided by SDIA, and "load research" meters installed for each bank of charging stations.

b. Incorporation of SDIA's solar array into the GSE load management plan

SDIA provided solar generation in 15-minute increments. SDG&E coupled the solar generation data with EVSE usage data from SDG&E's two load research meters to determine optimal times to charge the eGSE when net load at the Airport was low and renewable resources were abundant.

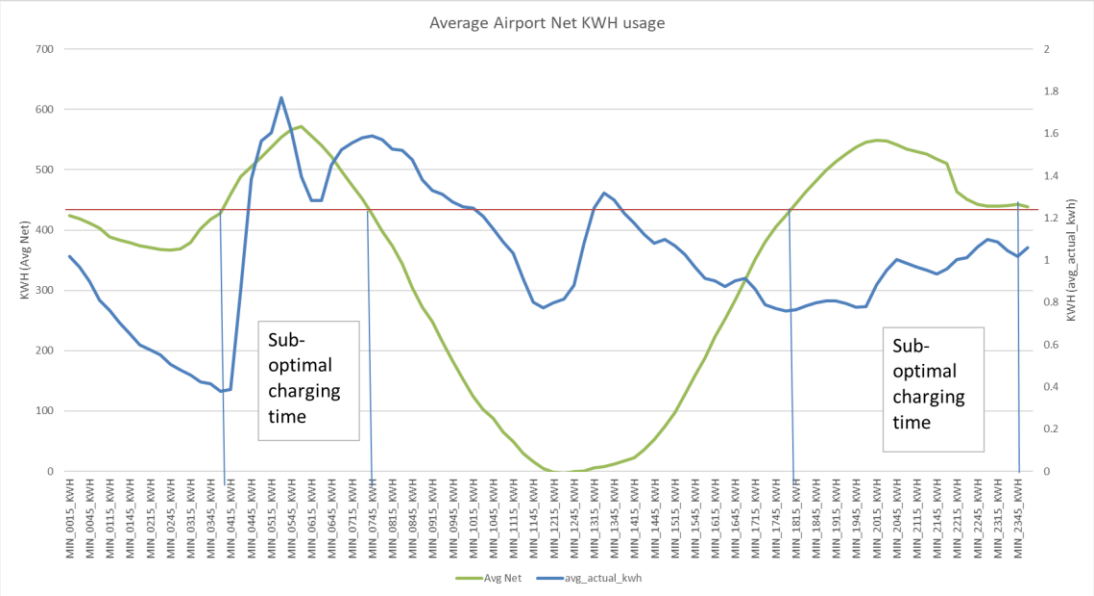

Figure 12. SDIA Average Net Usage

3. Electrify Local Highways

3.1. Executive Summary

On October 7, 2015, Senate Bill (SB) 350, *the Clean Energy and Pollution Reduction Act* (Chapter 547, Statutes of 2015) was signed into law, establishing new clean energy, clean air, and greenhouse gas (GHG) and reduction goals for California for 2030 and beyond. SB 350 requires utilities to undertake transportation electrification activities. As part of the SB 350 goals, San Diego Gas & Electric Company (SDG&E) proposed six Priority Review Projects (PRPs) in an application to the California Public Utilities Commission (Commission) on January 7, 2017 and received approval in Decision (D.) 18-01-024 on January 17, 2018.

SDG&E's Electrify Local Highways (ELH) project proposed to install, own, operate and maintain 80 level 2 (L2) and 8 direct current fast chargers (DCFC) chargers at four Caltrans-owned park-and-ride locations. Caltrans would provide land rights, parking spaces, and expertise to help with design, permitting, and installation efforts while SDG&E studied the charging patterns and usage data. As part of this PRP, SDG&E is also testing time-of-use (TOU) rates served to drivers for charging in the public domain, standards for public charging signage, rate display, and general retail EV fuel dispensers.

3.2. Project Description and Background

a. Goals

Overall, SDG&E's six approved PRPs were designed to achieve the following goals:

- facilitate rapid deployment of transportation electrification as a means to meet California's aggressive GHG reduction goals, thereby improving the health of all ratepayers and creating a cleaner environment;
- fill and/or jump start sectors within the EV market not significantly developed or currently lacking sustainable infrastructure or capital investment;
- create opportunities for private sector participation in the EV market by increasing EV-related demand (e.g., increased EV sales, increased need for charging and data collection infrastructure, increased need for a trained and qualified EV-related workforce);
- promote market integration by facilitating safe and equitable access to electricity as a transportation fuel, including for those living in disadvantaged communities (DACs), while improving the efficient use of SDG&E's electric system;
- provide data that will help test and measure the flexibility of EV charging loads and the degree to which the efficient integration of EV loads can yield cost savings to all customers by avoiding future utility infrastructure additions, increasing utilization of renewable resources, or more efficiently using the electric grid; and
- provide education and outreach to residential and commercial customers currently lacking the knowledge or experience necessary to reach the conclusion that investment in EVs or EV infrastructure is economical, safe, and good for the public at large.

The ELH project was designed to study charging patterns and usage data for modeling charging infrastructure at park-and-ride locations and testing EVTOU pricing in the public domain, in addition to testing public charging signage, rate display, and general retail EV fuel dispensers.

b. Procedural history

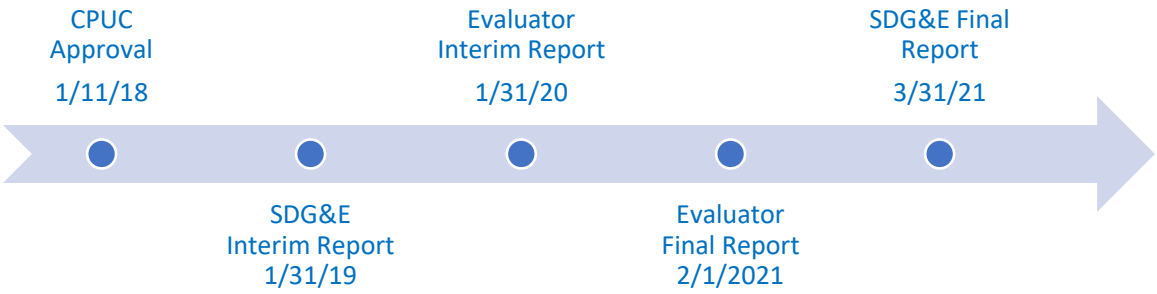

Figure 13. Electrify Local Highways Procedural History

SDG&E received approval from the Commission to begin implementation of six Priority Review Projects on January 11, 2018 in D.18-01-024. Electrify Local Highways was approved as proposed. SDG&E issued an interim report on January 31, 2019 and the evaluator submitted a Joint-IOU Interim Report on January 31, 2020, a final Joint-IOU Independent Evaluator report on February 1, 2021, and a Final Report on March 31, 2021.

c. Background research

SDG&E did not have any previous pilots at the time of this application filing.

d. Implementation timeline and milestones

Electrify Local Highways Milestones:

- Design - Completed November 2019
- Construction – Completed April 2019
- Data Collection – Began April 2020

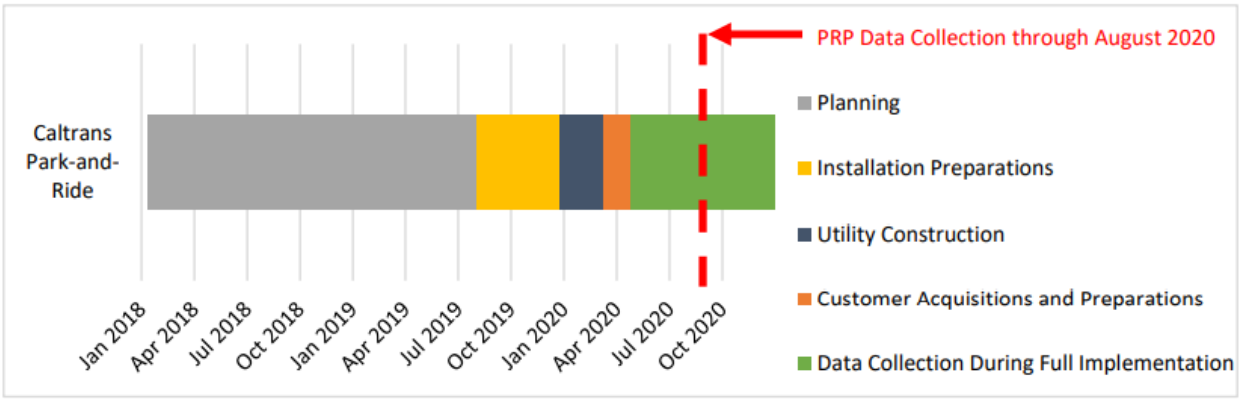

Figure 14. Electrify Local Highways Implementation Timeline and Milestones

3.3. Project participants

a. Description of customers and sites

SDG&E collaborated with Caltrans District 11 to select and design sites. All the sites are publicly used park-and-rides. Three of the four sites did not have any existing transportation electrification (TE) infrastructure at the onset of the project, and one site had been recently constructed with TE make-ready by a contractor hired by Caltrans. Unfortunately, the make-ready that was put in place was not

sufficient to meet the needs of the chargers and was not sufficiently protected from the elements after construction, meaning it needed to be replaced.

Each Electrify Local Highways PRP site consists of 250 kilowatt (kW) of charging capacity with 20 ChargePoint L2 EV supply equipment (EVSE) at 6.6 kW each and two ChargePoint DCFC at 62.5 kW with both CHAdeMO and CCS connectors.

b. Barriers to participation

Although SDG&E had been working with Caltrans since before the application on these sites, more time than allocated was needed when working with government agencies due to the number of interdepartmental complexities that require input before final approval.

c. Disadvantaged Community participation

Two of the four ELH sites, Chula Vista and National City, are in an SDG&E territory DACs according to CalEnviroScreen 3.0.; the other two, El Cajon and Oceanside, are adjacent to SDG&E territory DACs.

d. Diverse customer outreach and engagement

SDG&E worked closely with Caltrans during the application process. Most of the sites were identified prior to the application and SDG&E continues to collaborate on site design and permitting. This program is not applicable for participation by small, locally-owned, minority-owned, and women-owned businesses. Given that all four sites are public and located in or adjacent to DACs, SDG&E conducted media pitching upon go-live to maximize the awareness of the chargers. An email campaign was also sent to existing customers on existing SDG&E EV rates, including those living in DACs to notify them of charger availability post go-live.

e. Project partners

SDG&E partnered with Caltrans for the Electrify Local Highway project for the placement/location of the charging equipment.

3.4. Costs

a. Actual and forecast utility direct costs

The approved PRP had an anticipated total direct cost of $4,000,000, consisting of $3,309,212 in capital and $690,788 in expense. Table 28 sets forth SDG&E's proposed costs for the ELH project.

Table 28. Electrify Local Highways PRP proposed costs

	Capital Costs	O&M Expenses	Total PRP Costs
Transformer and Install	$ 147,000	$ 3,316	$ 150,316
Electrical Service	$ 559,372	N/A	$ 559,372
EVSE Costs	$ 1,757,728	$ 32,472	$ 1,790,200
Purchased and SD Software	$ 845,112	N/A	$ 845,112
Customer Engagement	N/A	$ 200,000	$ 200,000
Measurement and Evaluation	N/A	$ 250,000	$ 250,000
Billing Support	N/A	$ 80,000	$ 80,000
SDG&E Clean Transportation PM	N/A	$ 100,000	$ 100,000
First-Year O&M Service Calls	N/A	$ 15,000	$ 15,000
First-Year O&M for Charging Equipment	N/A	$ 10,000	$ 10,000
Total Direct Costs	**$** 3,309,212	**$ 690,788**	**$** 4,000,000

The Electrify Local Highways project direct and total costs as of February 2021 are set forth in the table below (presented in categories reported by SDG&E).

Table 29. Electrify Local Highways PRP costs as of February 2021

	Actual Capital Costs	Actual O&M Costs	Total Actual Costs	Total Budget	Variance
Construction	$ 613,640	-	$ 613,640	$ 1,285,097	$ (671,456)
Engineering Design	$ 199,287	-	$ 199,287	$ 134,600	$ 64,687
Chargers, Meter Pedestals, Transformer, & Other Materials	$ 878,884	-	$ 878,884	$ 1,044,403	$ (165,519)
Internal SDG&E Labor	$ 48,345	$ 211,229	$ 259,574	$ 180,000	$ 79,574
IT Costs, Measurement & Evaluation	$ 432,418	$ 131,300	$ 563,718	$ 1,255,112	$ (691,394)
Customer Engagement / Outreach	-	-	-	$ 200,000	$ (200,000)
Other	$ 98,559	$ 106	$ 98,665	$ 60,788	$ 37,877
Direct Costs	$ 2,271,134	$ 342,635	$ 2,613,769	$ 4,160,000	$ (1,546,231)
Non-Direct Costs (Overheads, AFUDC, & Property Taxes)	$ 371,811	$ 203,568	$ 575,379	$ 2,059,395	$ (1,484,016)
Total Costs	**$ 2,642,945**	**$ 546,203**	**$ 3,189,148**	**$ 6,219,395**	**$ (3,030,248)**

Variances:

- Cost underruns primarily due to lower actual construction installation and materials costs.

b. Utility expenditures in Disadvantaged Communities

Two of the four sites are located within an SDG&E territory DAC and 50% of the project costs were related to DAC sites. Reference Table 29 above for project expenditures.

c. Customer costs

The infrastructure installed under the Electrify Local Highway project was 100% funded by SDG&E. Customers incur cost for the fuel consumed by the electric vehicles serviced by the infrastructure installed under this Program.

d. Leveraged funding

Not applicable to the Electrify Local Highways PRP.

3.5. Equipment and Competitive Markets

a. Equipment procurement or qualification process

A competitive Request for Proposal (RFP) was issued for the EVSE and related Services establishing all requirements for communication, connector safety, and functional requirement. Responses were evaluated based on technical, functional requirements as well as price. Respondents were selected for award of Master Service Agreement.

Requirements and Standards for EV Equipment established in the RFP:

- The proposed EVSE shall have successfully passed Nationally Recognized Testing Laboratory (NRTL) testing, or be listed by UL LLC

- The proposed EVSE shall be compliant with National Electrical Code (NEC) Article 625
- The proposed EVSE shall be compliant with Federal Communications Commission (FCC) Part 15 Class A
- In addition, Company encourages Bidder to offer EVSEs that are compliant with the appropriate sections of NIST Handbook 44 related to Technical Requirements for Weighing and Measuring devices.
- EVSE and Components Housing:
    - The EVSE and any subcomponents shall be housed in a National Electrical Manufacturers Association (NEMA) 3R enclosure or better, rated for outdoor use
    - The EVSE shall be installed in a stationary manner, either on an appropriate included pedestal or wall-mounted in certain locations

EVSE Temperature Requirements:

- The EVSE should have an operational temperature range of -30 degrees C to +50 degrees C (-22 degrees F to 122 degrees F)

EVSE Networking Equipment:

- Contractor communication system shall be independent of the Site Host to allow for the management and administration of the Charging Stations, authenticate users, reset equipment, download updated firmware, and transmit consumption data
- While Contractor communication systems at each Facility may use a secure 802.11 Wi-Fi connection to communicate with each other, the method of communicating to the back office cannot depend on a Site Host Wi-Fi network

EVSE Remote Connectivity:

- For purposes of troubleshooting and maintenance, the EVSE shall be capable of receiving a "reset" or "reboot" signal remotely when necessary
- The EVSE shall be able to accept a firmware or software update remotely via the communications system. If, for any reason, the update fails to properly install, the previous revision of firmware or software will continue to be used

b. Equipment installation

The PRPs have two active design engineering firms - Asplundh and EPI. The sites are split between the two companies. The PRP sites are split between two active Construction contractors - Baker Electric and A.M. Ortega. SDG&E encouraged its contractors to create diversity sub-contracting plans.

ChargePoint was selected as the EVSP for the Electrify Local Highways project based on their ability to provide public access charging, with multiple payment options, and meter accuracy test results.

Each Electrify Local Highways PRP site consists of 250 kW of charging capacity with 20 ChargePoint CT 4000 L2 EVSE at 6.6 kW each and two ChargePoint CPE-250 DCFC at 62.5 kW with both CHAdeMO and CCS connectors.

Figure 15. Electrify Local Highways Equipment Installation

c. Risks of stranded assets

The equipment installed at the (4) Electrify Local Highway sites is owned and maintained by SDG&E, there is little to no risk for stranded assets related to this project. One lessoned learned during the course of the PRPs is that customers have a potential to change business operations, locations, etc. and the Utility must have resources available to manage the removal and/or relocation of EV Charging Infrastructure.

3.6. Load Management and Grid Integration

a. Demand at project sites

Each Electrify Local Highways PRP site consists of 250 kW of charging capacity with 20 ChargePoint L2 EVSE at 6.6 kW each and two ChargePoint DCFC at 62.5 kW with both CHAdeMO and CCS connectors.

An analysis, conducted by the Independent Evaluator, utilizing the utility meter 15-minute interval demand data provided by SDG&E for the date range from July 6 to August 30 showed that most demand peaks for these sites hit approximately 50 kW. Chula Visit reached 76 kW, El Cajon 52 kW, National City 65 kW, Oceanside 77 kW all during one weekday fifteen-minute period. The highest demand occurred at Oceanside (94 kW) during one weekend fifteen-minute period.

There are some differences in the maximum electricity demand between weekdays and weekends at these sites, but the demand is strongly influenced by DC fast charging events that occur sporadically almost any day of the week.

b. Description of load management and/or grid integration requirements

Load management and/or grid integration were not required or implemented within the scope of the Electrify Local Highways PRP. Drivers at Electrify Local Highways sites are charged on an EV TOU rate and theoretically incentivized to use the chargers during off-peak TOU time periods

Table 30. Electrify Local Highways EV-TOU Prices*

Time Period	Winter Cost	Summer Cost
12 am – 6 am	$0.20033 per kWh	$0.19951 per kWh
6 am – 4 pm	$0.30523 per kWh	$0.35071 per kWh
4 pm – 9 pm	$0.31396 per kWh	$0.59326 per kWh
9 pm – 12 am	$0.30523 per kWh	$0.35071 per kWh

*Prices as of 3/2021. Weekday TOU periods shown, excluding March and April.

c. Customer outreach strategies used to incentivize managed charging

SDG&E offers customers very affordable public charging rates through the ELH pilot. Drivers pay for charging on SDG&E's residential EV-TOU rate with a modest mark up to cover the EVSP's services. The Rate structure is communicated to the customers via a graphic pricing chart printed on every charger

and encourages the customers to defer to the ChargePoint app for the accurate price at time of charging.

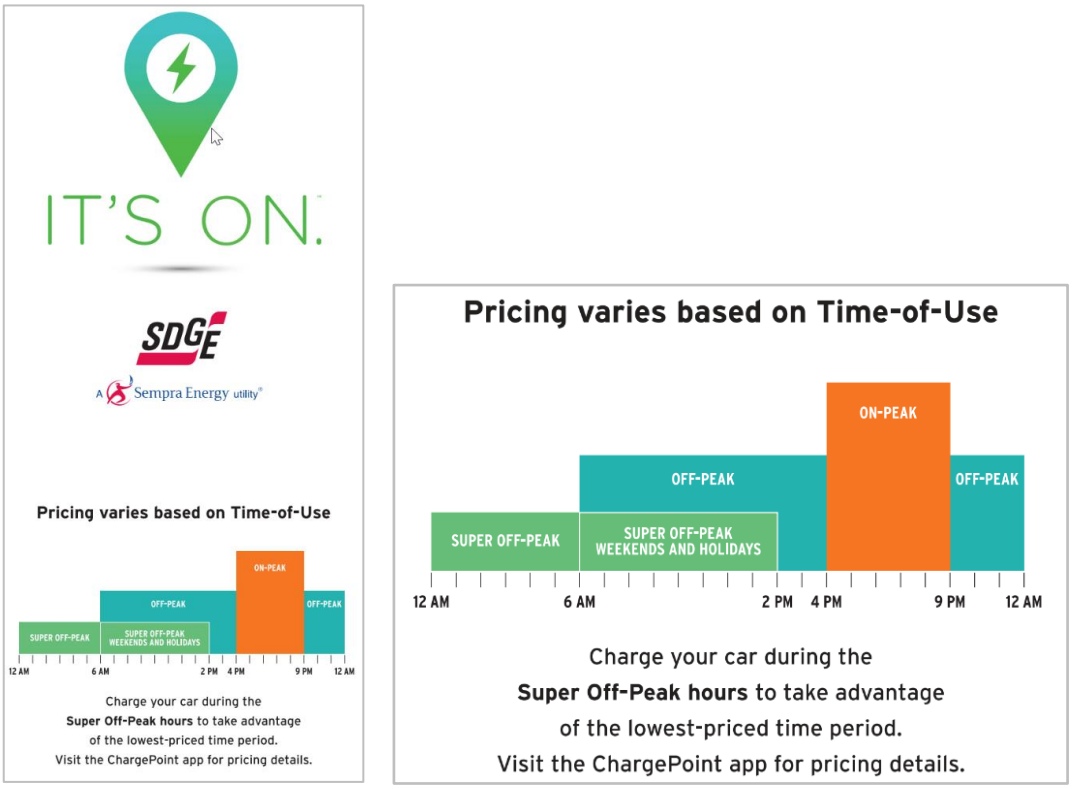

Figure 16. SDG&E TOU Signage at Electrify Local Highways Sites

i. Effectiveness of outreach

User feedback provided through Plugshare indicates that drivers are aware of the TOU periods and enjoy taking advantage of the low cost, off peak charging hours. The third-party evaluator estimated that pilot participants saved over $2,000 in fuel costs compared to gasoline on an annualized basis.

ii. Communication methods for sending pricing signals to customers

SDG&E publishes TOU prices online for customers. Additionally, SDG&E sends mail to customers with information about TOU and includes comparisons and recommendations on bills. For the end users at the Electrify Local Highway sites, pricing is also displayed on the charging equipment and within the EVSP smartphone apps.

d. Responsiveness of customers to load management requirements or pricing

User feedback provided through Plugshare indicates that drivers are aware and spreading the word to other EV drivers about the availability of public charging and enjoy taking advantage of the low cost, off peak charging hours.

e. Demand response participation

Demand Response features are not applicable to the Electrify Local Highways PRP. Passing TOU price signals to drivers is a strong incentive to avoid on-peak charging.

3.7. Outreach and Education

a. Description of customer outreach and education activities

One of the education tactics implemented for this project was to wrap each ELH charger with a custom label that provides information about the TOU pricing.

Once construction was completed at all four sites and the chargers were operational, the SDG&E Communications team published a press release announcing the launch of the program and pitched the story to the local media outlets. The initiative was reported on by Fox 5, CBS 8, KUSI, Times of San Diego, and Patch, bringing awareness of the new charging infrastructure to customers across the region.

Additionally, SDG&E sent a promotional email announcing the availability of the new public chargers to all EV-TOU rate customers on record.

b. Customer surveys and metrics

i. Description and sample of customer surveys

ChargePoint issued a short online survey to EV drivers that utilized the Electrify Local Highway charging sites. The survey reached 321 total unique users of the PRP stations between July 1, 2020 and October 26, 2020, with 39 users choosing to respond.

Questions covered charging station experience and satisfaction, EV purchasing motivation, impact of public charging station access, charging station usage, and driving habits.

*ii. Customer satisfaction **with project***

Overall customer feedback on these charging locations was positive. Appendix B discusses customer satisfaction with public charging in the project in more depth

iii. Customer-reported incremental vehicle adoption due to project

36% of the respondents to the Customer Survey selected access to public charging stations as a motivator for adopting electric vehicles. Three out of 36 respondents confirmed that they would not have purchased or leased an EV if public charging stations were not installed and eleven reported that they would drive their EV less often.

iv. Effectiveness of customer outreach methods

Since all four ELH sites are located in or adjacent to a DAC, the education and outreach efforts described in section a. above applies to all customers.

3.8. Safety

a. Summary of relevant safety requirements

Electrify Local Highways adhered to the Final Safety Requirements Checklist[21] developed by Commission staff. SDG&E filed Advice Letter 3403-E[22] on July 11, 2019 describing compliance efforts to the safety requirements checklist.

b. Safety issues reported during project and actions taken to correct them

No Safety Issues were reported/observed during the Electrify Local Highways project.

3.9. Lessons Learned

a. Summary Table

[21] www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882
[22] http://regarchive.sdge.com/tm2/pdf/3403-E.pdf

The following table summarizes key lessons learned from the Electrify Local Highways project.

Table 31. Electrify Local Highways Lessons Learned

Issue	Resolution	Recommendations
SDG&E described program design elements within testimony, making some design parameters and requirements overly prescriptive. For example: describing the exact mix of chargers for each Green Shuttle site in testimony.	SDG&E utilized the language in the decision that allowed for program modifications via an approved Tier 2 Advice Letter.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs.
Partnering with city/state or regulated entities can have delayed schedules. For example: the Caltrans and AHJs each have separate project approval and permitting processes required for each project site.	SDG&E worked closely with these entities and understanding their processes during these pilots.	Retain corporate knowledge by documenting customers specific requirements. Build additional time into our schedule.
State Agencies have additional project approval and contracting requirements; required a non-standard Customer Agreement.	Remained flexible to meet the requirements of State Agencies.	Retain corporate knowledge by documenting customers specific requirements. Build additional time into our schedule.
Public charging required a new set of requirements for EVSE, providing TOU rates, multiple payment options, etc.	Opted to contract with qualified EVSE with these capabilities.	Build additional budget and schedule into future filings for qualification of additional EVSEs
Public charging requires utility-grade metering in DCFCs, test capabilities had not been fully developed by not only SDG&E but within the industry.	Partnered with Engineering firm to design and perform testing of DCFC to validate accuracy.	Develop in-house capability to test DCFC
Installation of DCFC and L2 EVSE at a single site significantly increases costs.	Assume cost into actuals of single site dual voltage projects.	Incorporate knowledge into proposed budgets for Program Applications.

b. Project Assessment

The Electrify Local Highways Project has met its intended goal to provide access to public charging and support adoption of light-duty EVs. The project provided valuable data on usage, load management, lessons learned, insight into unique operational challenges, and cost validation. SDG&E considers the pilot successful and continues electrification efforts through the Power Your Drive for Parks and Beaches program. SDG&E is currently collaborating with local and state jurisdictions to evaluate infrastructure needs to support the level of EV adoption; construction is expected to begin in in Q1 of 2021.

The third-party evaluator for the PRPs, Energetics, has provided an assessment of the existing market and scalability of Public Charging in the SDG&E Territory.[23]

Significantly more charging stations are necessary to meet California's light-duty EV goals. While many current EV owners have at-home charging options, reaching new EV owners will require diverse charging options. Public chargers will provide options for drivers who cannot charge at home as well as for long distance drivers. Caltrans park-and-ride locations are an ideal charger location because vehicles regularly park there, and their locations just off the highway make them accessible. Caltrans expressed interest in fulfilling zero-emission vehicles (ZEV) goals and owning and operating charging stations, dissatisfaction with current third-party end-to-end solutions, and available space to install chargers they are a viable opportunity for scaling.

3.10. Vehicle Adoption

a. Description of customer's vehicles before project

Not Applicable to the Electrify Local Highways PRP.

b. Electric vehicles served by project

The sites and chargers in this PRP are open for public use, and therefore no specific vehicle type and model was targeted. These stations were placed with regular drivers in mind, so a variety of light-duty vehicle models were expected

c. Petroleum reduction

The observed performance period in this pilot was from May 2020 to September 2020. The average light-duty vehicles have a 3.46 mile per kWh efficiency, and a 24.9 miles per gallon (MPG) fuel economy. Looking at the charging stations dispersals from an annual basis, there was 48,980 kilowatt-hours (kWh) dispensed with 25% occurring through on-peak hours. This converts to 169,300 electric miles and 6,800 gallons of gasoline saved.

Table 32. Electrify Local Highways Annualized Petrolum Reduction Benefits

	Testimony/Planned (80 L2 + 8 DCFC providing 120 charge events per day)	Implemented (80 L2 + 8 DCFC providing 10 charge events per day)	Best Observed (80 L2 + 8 DCFC providing 133 charge events per day)
Petroleum Reduction	23,000 GGE	6,800 GGE	52,200 GGE

3.11. Greenhouse Gas Emissions Reductions

a. Emissions reductions

Light duty GHG emissions are an important factor for decarbonizing the transportation sector. CARB reported that gasoline emissions from on road passenger cars, trucks and SUVs make up approximately 75% of the State's transportation GHG inventory, and that these emissions were the key driver for increasing transportation emissions from 2013 – 2017.[24]

[23] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 148

[24] 2020, CARB, CA GHG Inventory: 2000 – 2018, https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/ghg_inventory_trends_00-18.pdf, page 8.

Table 33. Electrify Local Highways GHG Emission Reductions - Annualized Benefits

	Testimony/Planned (80 L2 + 8 DCFC providing 120 charge events per day)	Implemented (80 L2 + 8 DCFC providing 10 charge events per day)	Best Observed (80 L2 + 8 DCFC providing 133 charge events per day)
GHG Emissions Reduction	155 MT of CO2e	65 MT of CO2e	518 MT of CO2e

The ELH sites supported nearly 170,000 electric miles driven and avoided approximately 7,000 gallons of gasoline. This is ~85% reduction in annual GHGs.

b. Calculation methodology

As directed by the reporting requirements, SDG&E has adopted the emissions reductions estimate methodology agreed upon by the third-party evaluator (Energetics), the IOUs, and the Energy Division staff. Annual fuel usage is the starting point for electric and pollutant emissions. This is established in the party evaluator emissions calculations, where an operational period is selected and applied in an annualized view.

Table 34. Electrify Local Highways Charging Station Annual Emissions

	GHG (kg/yr)	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM (kg/yr)	VOC (kg/yr)
Gasoline	77,700	17	63	559	7.3	70
Electric	12,500	4	14	11	2.5	2
% Reduction	84%	75%	77%	98%	66%	97%

Source: Evaluator Calculations

For the purpose of calculation, an EV registration analysis of San Diego County was conducted to determine the average efficiency of a vehicle. This resulted in an estimated average efficiency of 3.46 miles per kWh.

c. Baseline emissions assumptions and methodology

Calculations were formulated by using the new average efficiency, the baseline fuel economy of 24.9 MPG, and the light-duty emission factors determined the California GREET 3.0 model on an mmBtu basis. See table below to view California GREET 3.0 model for light-duty gasoline baseline emissions.

Table 35. Electrify Local Highways Annual Emission Reduction

GHG (g/mmBtu)	SO_x (g/mmBtu)	NO_x (g/mmBtu)	CO (g/mmBtu)	PM (g/mmBtu)	VOC (g/mmBtu)
100,170	22.35	81.25	720.81	9.40	90.33

Light-duty gasoline baseline emissions factors from California GREET 3.0

3.12. Criteria Pollutant Reductions

a. Emissions reductions

Criteria pollutant reduction benefits from this pilot help improve air quality in San Diego's most vulnerable communities. ELH sites are located within or adjacent to DACs. In fact, the third-party evaluator attributed 75% of the pilot's emissions reductions to DACs.

Table 36. Electrify Local Highways Criteria Pollutants Emission Reductions Annualized Benefits

	Testimony/Planned (80 L2 + 8 DCFC providing 120 charge events per day)	Implemented (80 L2 + 8 DCFC providing 10 charge events per day)	Best Observed (80 L2 + 8 DCFC providing 133 charge events per day)
GHG Emissions Reduction	10 kg of NO_X 20 kg of VOC	49 kg of NO_X 68 kg of VOC 548 kg of CO 13 kg of SO_X 5 kg of PM	388 kg of NO_X 522 kg of VOC 4,212 kg of CO 104 kg of SO_X 40 kg of PM

i. Ozone

The ozone emission type is not a criteria pollutant included in the California 3.0 GREET model. Neither SDG&E nor the third-party evaluator report included ozone as part of the emission reductions criteria.

ii. Nitrogen oxides

Nitrogen oxides (NO_x) emissions reductions support healthy air quality standards. The third-party evaluator estimated that this pilot reduced annualized NO_x emission by ~75%.

Table 37. Electrify Local Highways NO_x Emissions (kg/yr)

	ELH
Baseline Fuel	63
Electric	14
% Reduction	77%

Baseline fuel for ELH is gasoline

iii. Particulate matter

Particulate matter (PM) are airborne particles that negatively affect health and can be reduced by electrifying transportation. The table below shows that electrify local highways resulted in ~65% reduction in PM emissions compared to gasoline as a baseline fuel.

Table 38. Electrify Local Highways PM Emissions (kg/yr)

	ELH
Baseline Fuel	7.3
Electric	2.5
% Reduction	66%

Baseline fuel for ELH is gasoline

iv. Volatile organic compounds

Volatile organic compounds (VOCs) include a range of chemicals, some of which may have short- and long-term negative health effects and can be reduced by electrifying transportation. The table below shows the VOC benefits of Electrify Local Highways.

Table 39. ELH VOC (kg/yr)

	ELH
Baseline Fuel	70
Electric	2
% Reduction	68%

Baseline fuel for ELH is gasoline

b. Calculation methodology

ELH calculation methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

c. Baseline emissions assumptions and methodology

ELH baseline emission assumptions methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

Appendix A: SDG&E Electrify Local Highways Pilot

a. Signage used to identify publicly available charging

These images illustrate the use of directional signage located on the major interstates directing EV drivers to the availability of EV Charging at the ELH Park & Ride sites. This signage was funded and installed by Caltrans.

Figure 17. Electrify Local Highways EV Charging Signs

Source: SDG&E

Figure 18. Electrify Local Highways EV Charging Signs

Source: Caltrans

b. Driver feedback on benefits of public charging

As discussed in section 3.7.b above, ChargePoint issued a five-minute online survey to drivers that utilized the ELH charging sites, reaching 321 unique users July 1, 2020 and October 26, 2020, with 39 users choosing to respond with 39 choosing to respond.

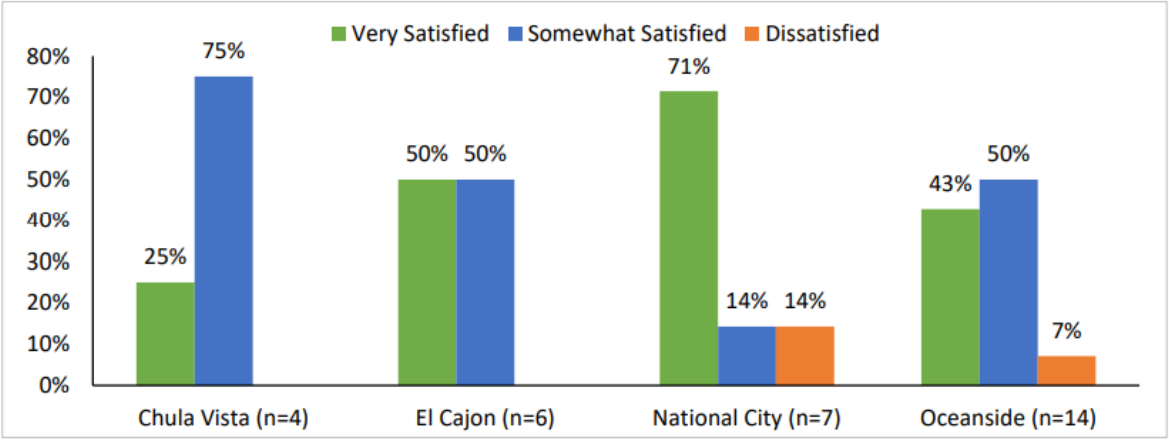

Figure 19. Electrify Local Highways Customer Satisfaction by Charger Location

Of the respondents who stated they had used public charging in the previous four months 92% (n=24) rated themselves as either very satisfied (50%) or somewhat satisfied (42%) with their charging station experience. Only 8% (n=2) indicated that they were very dissatisfied, with both citing EV charging pricing as the source of their dissatisfaction. Figure 20 below shows customer satisfaction broken out by charging station location.

Additional driver feedback is available on PlugShare, a user-based charging locator website and app. Overall, drivers like these locations and are able to recognize TOU pricing and the impacts on charging prices.

The survey also asked about motivations for purchasing or leasing an EV; respondents could select multiple from seven options. Figure 20 shows the breakdown of respondent motivation for purchasing or leasing an EV.

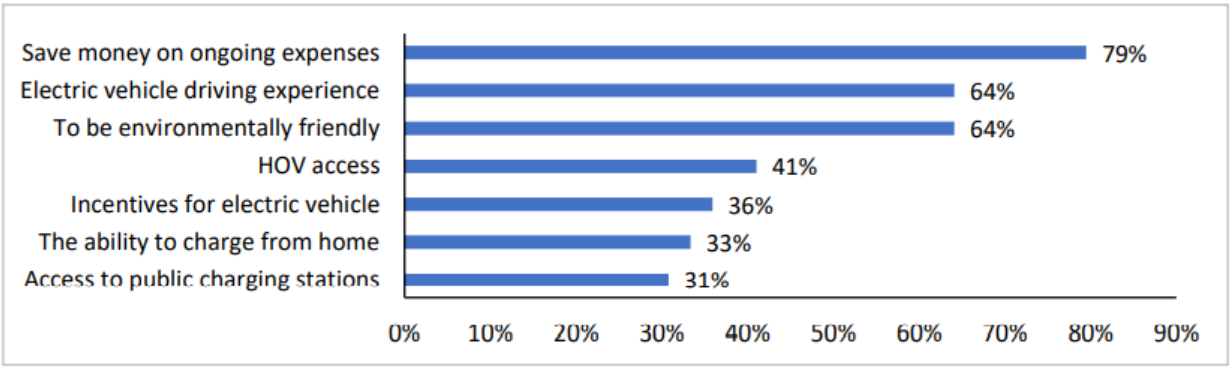

Figure 20. Purchasing Motivation and Impact of Public Charging

Additionally, Table 40 below compares respondent's answers to the questions "what motivated you to purchase or lease an electric vehicle?" (n=39) and "please select the parking situation that most reflects your home" (n=36). Notably, 50% (n=1) of single-home residents without parking and 40% (n=2) of multifamily residents with parking responded that access to public charging was a motivation to purchase or lease and EV.

Table 40. Motivation to Purchase an EV

Motivations to Purchase or Lease and EV	Single Family with Parking (n=28)	Multifamily with Parking (n=5)	Single Family without Parking (n=2)	Multifamily without Parking (n=1)
Save money on ongoing expenses	79%	80%	100%	100%
Electric vehicle driving experience	68%	40%	50%	0%
To be environmentally friendly	64%	60%	50%	0%
High-occupancy vehicle lane access	50%	40%	0%	0%
Incentives for electric vehicle	43%	40%	0%	0%
The ability to charge from home	43%	0%	0%	0%
Access to public charging stations	29%	40%	50%	0%

Those selected access to public charging stations as a motivation to purchase or lease an EV rated that influence. All respondents rated public charging station access as either *very influential* (n=7) or *somewhat influential* (n=4). When asked what specifically made access to public charging so influential, all respondents cited the convenience of public charging stations (n=11).

Table 41. Public Charging Stations Influence

Key Public Charging Station Influences	Very Influential (n=7)	Somewhat Influential (n=4)	Total (n=11)
Public charging is convenient	7	4	11
There is sufficient charging at my workplace	5	2	7
The price of the charging session	4	2	6
I do not have the ability to charge at home	1	0	1

Further questions asked, “How frequently do you typically charge your electric vehicle at home, at work, and at public charging stations: never, less than once a month, one or two times a month, one or two times a week, three or more times a week, or whenever there is an opportunity to charge?”, with 36 drivers responding. At-home charging was dominated by “whenever there is an opportunity to charge” (n=15) or “three or more times a week” (n=11). Almost half of respondents didn’t charge at work (n=17) or charged there infrequently. The frequency of public charger usage among respondents varied quite a bit; 41% responded “whenever there is an opportunity to charge” (n=15) and 28% charge in public “less than once a month” (n=10). Figure 21 shows the breakdown of stated charging frequencies at home, at work, and in public.

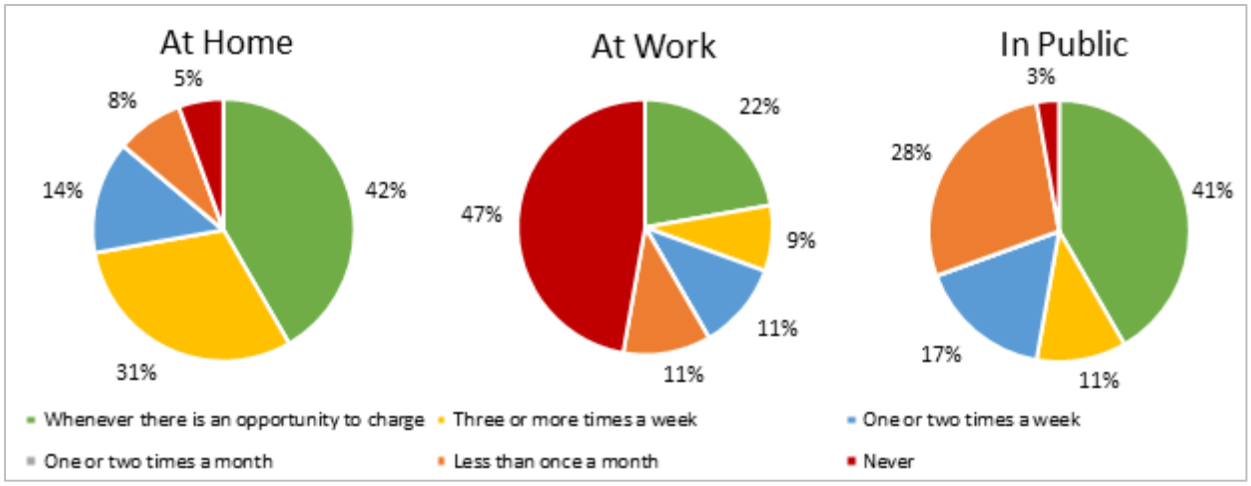

Figure 21. Charging Station Usage and Driving Habits

Drivers were asked, "How influential was access to public charging stations on your decision to purchase or lease an electric vehicle?" (n=38). Over half said they would drive their EV as often as they currently do if these stations were not installed (51%; n=19). Notably, three respondents answered that they would not have purchased or leased an EV if public charging stations had not been installed. Eleven respondents, who all previously answered that they have a home charger and five of whom cited access to public charging as an influence to purchase of lease an EV, indicated that they would not drive their EV as often if these chargers were not available.

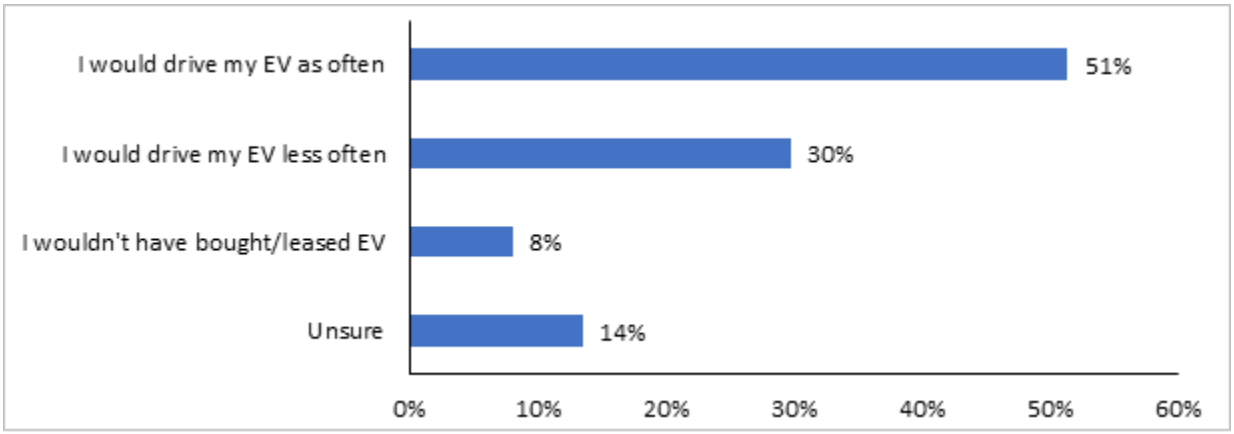

Figure 22. Adoption of EV based on Access to Public Charging

c. Comparison of utilization rates and charging prices to other DCFC sites

The charging fee structure for these sites is identical and is related to the cost of energy at the time of use. Prices vary winter (November through May) and summer (June through October).

Table 42. Electrify Local Highways Rate Structure

Time Period	Winter Cost	Summer Cost
12 am – 6 am	$0.20033 per kWh	$0.19951 per kWh
6 am – 4 pm	$0.30523 per kWh	$0.35071 per kWh
4 pm – 9 pm	$0.31396 per kWh	$0.59326 per kWh
9 pm – 12 am	$0.30523 per kWh	$0.35071 per kWh

*Prices as of 3/2021. Weekday TOU periods shown, excluding March and April.

Figure 23 illustrates total consumption at each of the TOU price points (rounded to the nearest $0.01). while only 11% of the total consumption occurs at the lowest price point of $0.20, it should be noted that this TOU period spans 12 am to 6 am and does not align with periods of heavy traffic expected at a Caltrans Park & Ride site.

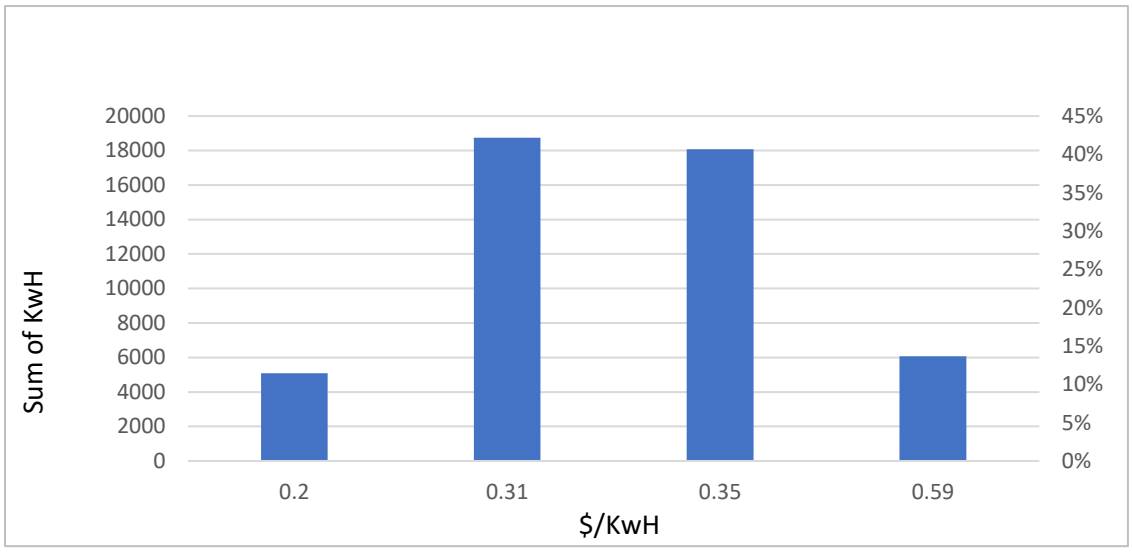

Figure 23. DCFC KwH Consumed by Price

Since the time period of 4-9 pm has a wide variation in price between winter ($0.31) and summer months ($0.59), it may be helpful to look at DCFC utilization from that perspective, however, Table 24**Error! Reference source not found.** reveals a nearly identical demand at all four sites during this time period during the winter months when the price is $0.31/kWh and summer months when the price is $0.59/kWh.

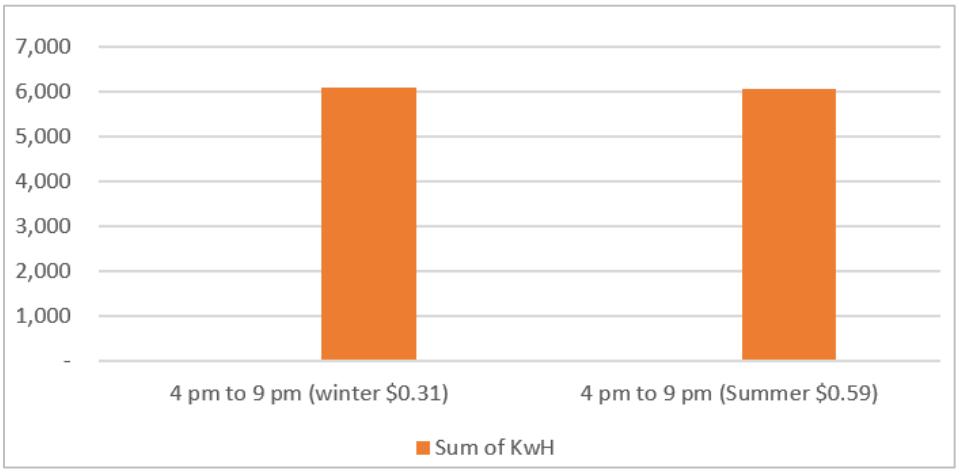

Figure 24. DCFC Utilization 4 pm to 9 pm

Electrify Local Highways customers are charged on an EV-TOU rate and theoretically incentivized to use the chargers during off-peak TOU time periods. However, it should be noted that this analysis does not include a full year of data compounded by COVID-19 travel restrictions. With that in mind, it may be too early to arrive at any conclusion regarding price impacts to utilization rates. The Oceanside ELH had the busiest day of the entire program during the second week of September 2020. The third-party evaluator found that on the busiest day during this period, there was an EV connected to the chargers 10% of the time. the Rocky Mountain Institute estimated that a 5% average utilization rate is typical for many

DCFCs).[25] RMI also released their "EVGO Fleet and Tariff Analysis" which suggested that average hourly utilization rates at EVgo sites rarely exceed 25% as shown in the sample site results in Figure 25.[26]

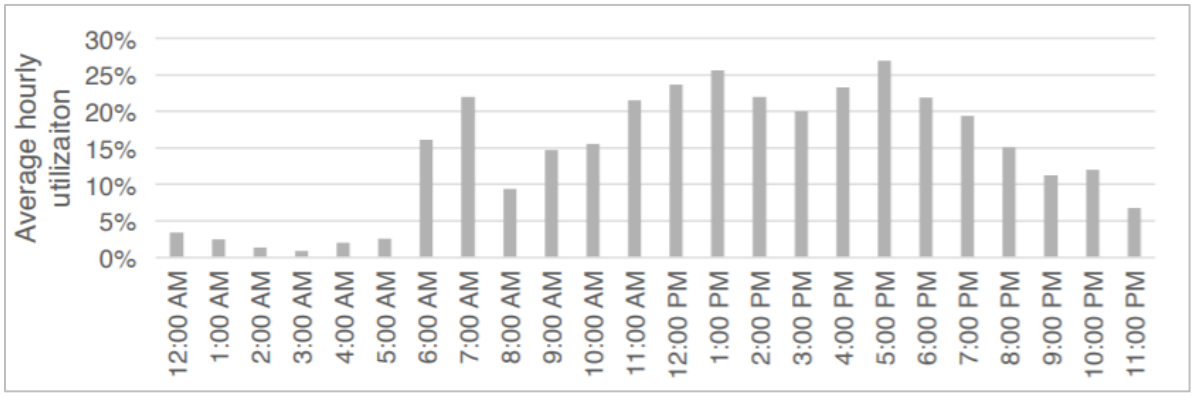

Figure 25. Hourly Utilzation Rates of an Individual EVgo Host Site

[25] The Rocky Mountain Institute "DCFC Rate Design Study" https://rmi.org/wp-content/uploads/2019/09/DCFC_Rate_Design_Study.pdf, page 6

[26] The Rocky Mountain Institute "EVGO Fleet and Tariff Analysis" https://rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf, page 4

4. Fleet Delivery

Please note that pursuant to the attached report, some of the information included herein is customer usage data, which is treated as confidential by law. In this instance, the program participants have affirmatively consented to the disclosure of their information as part of their participation in the program.

4.1. Executive Summary

On October 7, 2015, Senate Bill (SB) 350, *the Clean Energy and Pollution Reduction Act* (Chapter 547, Statutes of 2015) was signed into law, establishing new clean energy, clean air, and greenhouse gas (GHG) and reduction goals for California for 2030 and beyond. SB 350 requires utilities to undertake transportation electrification activities. As part of the SB 350 goals, San Diego Gas & Electric Company (SDG&E) proposed six Priority Review Projects (PRPs) in an application to the California Public Utilities Commission (Commission) on January 7, 2017 and received approval in Decision (D.) 18-01-024 on January 17, 2018.

The fleet delivery services PRP approved SDG&E to provide charging infrastructure to support up to 90 medium duty electric delivery vehicles at about six locations on time-varying rates. The program fleet delivery partners will develop a load management plan to optimize the EV charging with grid loads.

4.2. Project Description and Background

a. Goals

SDG&E's six approved priority review projects were designed to achieve the following goals:

- facilitate rapid deployment of transportation electrification as a means to meet California's aggressive greenhouse gas GHG reduction goals, thereby improving the health of all ratepayers and creating a cleaner environment;
- fill and/or jump start sectors within the EV market not significantly developed or currently lacking sustainable infrastructure or capital investment;
- create opportunities for private sector participation in the EV market by increasing EV-related demand (e.g., increased EV sales, increased need for charging and data collection infrastructure, increased need for a trained and qualified EV-related workforce);
- promote market integration by facilitating safe and equitable access to electricity as a transportation fuel, including for those living in disadvantaged communities, while improving the efficient use of SDG&E's electric system;
- provide data that will help test and measure the flexibility of EV charging loads and the degree to which the efficient integration of EV loads can yield cost savings to all customers by avoiding future utility infrastructure additions, increasing utilization of renewable resources, or more efficiently using the electric grid; and
- provide education and outreach to residential and commercial customers currently lacking the knowledge or experience necessary to reach the conclusion that investment in EVs or EV infrastructure is economical, safe and good for the public at large.

The key goals of the fleet delivery PRP is to assess fleet electrification feasibility and impact on daily operations, determine infrastructure needs including chargers and power levels, collect utilization data, and analyze said data for overall grid impacts.

b. Procedural history

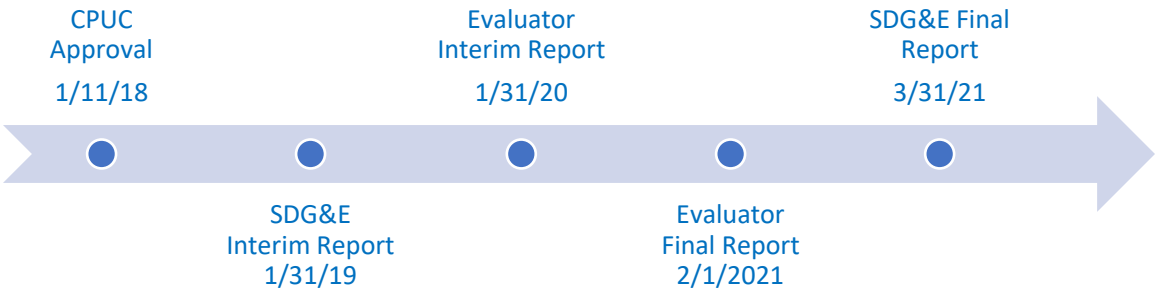

Figure 26. Fleet Delivery Procedural History

SDG&E received approval from the Commission to begin implementation of six Priority Review Projects on January 11, 2018 in D.18-01-024. The Fleet Delivery Project was approved as proposed. SDG&E issued an interim report on January 31, 2019 and the evaluator submitted a Joint-IOU Interim Report on January 31, 2020, a final Joint-IOU Independent Evaluator report on February 1, 2021, and a Final Report on March 31, 2021.

c. Background research

SDG&E did not have any previous pilots at the time of this application filing.

d. Implementation timeline and milestones

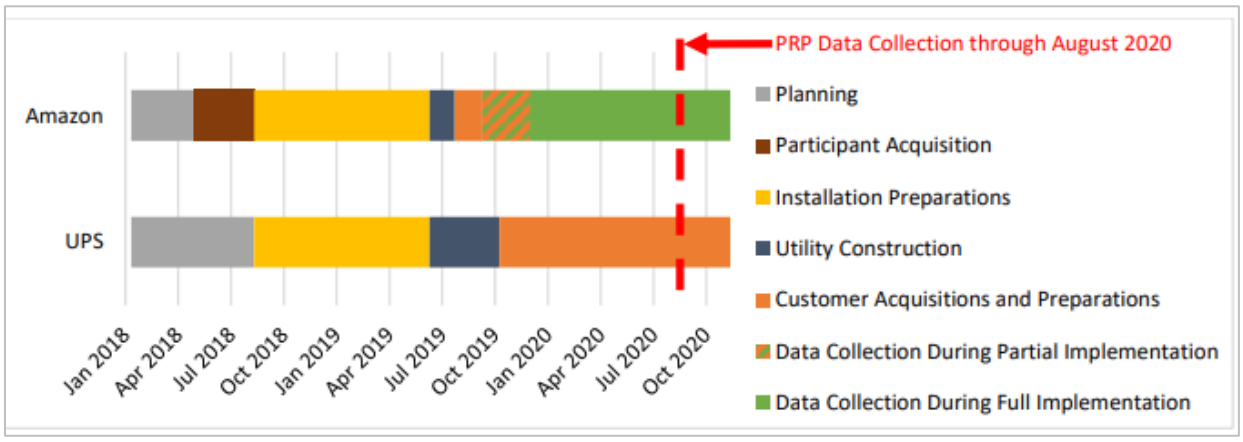

Figure 27. Fleet DeliveryImplementation Timeline and Milestones

The following summarizes SDG&E's fleet delivery project planning and implementation milestones:

Amazon

- Design – Complete Q2 2019
- Construction – Complete Q3 2019
- Data Collection – Began Q4 2019

United Parcel Service (UPS)

- Design – Complete Q2 2019
- Construction – Complete Q4 2019

- Data Collection – The UPS customer has not taken delivery of the EVs as of the date of this final report. Delivery has been delayed due to the coivd-19 impacts to the OEM production; delivery is expected in the second quarter of 2021.

- Site Enrollment:
    - Site enrollment completed for three UPS locations and one Amazon location. The current enrollment results in 75 EVs and 79 EVSEs.

4.3. Project participants

a. Description of customers and sites

All four locations support delivery operations. Three sites are UPS and one site is Amazon. The EVSEs are limited to use by the delivery entity or their contractors. The UPS locations support vehicle operations by UPS employee drivers. The Amazon location supports vehicle operations by smaller, independently owned operators known as Delivery Service Providers. UPS and Amazon will be the customer of record at their respective sites and will pay the electric utility bill to SDG&E.

b. Barriers to participation

Applications to the program were limited. Most of the discussions were proactively initiated by SDG&E. A potential barrier was D.18-01-024's requirement that additional participants be locally-owned, minority-owned and women-owned business. The requirement states that customers be "locally-owned business(es) or a Minority-owned Business Enterprise/Woman-owned Business Enterprise(s)". This limited the pool of potential participants. Of note, locally-owned businesses tend to be smaller and did not have a sufficiently large enough fleet to test out new vehicles (i.e., electric). In addition, vehicle procurement seemed to be a challenge for customers of all sizes. The medium-duty EV market is maturing and growing but has relatively limited options. Finally, the upfront capital cost of medium-duty EVs is a potential barrier. Discussions progressed furthest with UPS, Amazon, and a small local catering company. The local catering company decided not to move forward due to being risk averse in adopting an all-electric truck for their business operations. This resulted in Thirty-three percent of the customers not moving forward to design and construction.

c. Disadvantaged Community participation

Three of the four sites, UPS – San Diego, UPS – San Marcos, and Amazon are in SDG&E territory DACs according to CalEnviroScreen 3.0.

d. Diverse customer outreach and engagement

SDG&E held a Fleet Delivery Forum on January 23, 2018. Local and national customers, vendors and EV manufacturers were invited to attend. On February 13, 2018, email communication was sent to over 70 local businesses to educate them on the Fleet Delivery project and hopefully enroll them in the pilot. In addition, internal SDG&E departments contacted several locally-owned, minority-owned and women-owned business in SDG&E's service territory. There was limited interest due to lack of EV options, the cost of EVs and the lack of locally-owned, minority-owned, or women-owned entities in the delivery service business.

e. Project partners

SDG&E partnered with Amazon and United Parcel Service (UPS) for the Fleet Delivery PRP.

4.4. Costs

a. Actual and forecast utility direct costs

Table 43 below sets forth SDG&E's proposed costs for the Fleet Delivery Services project**.**

Table 43. Fleet Delivery Services PRP Proposed Costs

	Capital Costs	O&M Expenses	Total PRP Costs
Transformer and Install	$ 248,625	$ 3,731	$ 252,356
Electrical Service	$ 829,323	N/A	$ 829,323
EVSE Costs	$ 1,531,215	$ 35,055	$ 1,566,270
Purchased and SD Software	$ 622,800	N/A	$ 622,800
Measurement and Evaluation	N/A	$ 200,000	$ 200,000
Charging Equipment Maintenance	N/A	$ 15,000	$ 15,000
Billing Support	N/A	$ 80,000	$ 80,000
SDG&E Clean Transportation Project Management	N/A	$ 100,000	$ 100,000
First Year O&M Service Calls	N/A	$ 15,000	$ 15,000
First Year O&M for Charging Equipment	N/A	$ 15,000	$ 15,000
Total Direct Costs	$ 3,231,963	$ 425,000	$ 3,695,749

The Fleet Delivery Services project direct and total costs as of February 2021 are set forth in the table below (presented in categories reported by SDG&E).

Table 44. Fleet Delivery Services PRP costs as of February 2021

	Actual Capital Costs	Actual O&M Costs	Total Actual Costs	Total Budget	Variance
Construction	$ 1,322,097	$ 41	$ 1,322,138	$ 1,356,363	$ (34,225)
Engineering Design	$ 140,648	-	$ 140,648	$ 161,175	$ (20,527)
Chargers, Meter Pedestals, Transformer, & Other Materials	$ 517,955	-	$ 517,955	$ 1,091,625	$ (573,670)
Internal SDG&E Labor	$ 17,161	$ 97,752	$ 114,913	$ 180,000	$ (65,087)
IT Costs, Measurement & Evaluation	$ 123,548	$ 121,066	$ 244,614	$ 970,430	$ (725,816)
Customer Engagement / Outreach	-	-	-	-	-
Other	$ 132,479	$ 26,697	$ 159,176	$ 78,786	$ 80,390
Direct Costs	$ 2,253,888	$ 245,556	$ 2,499,444	$ 3,838,378	$ (1,338,935)
Non-Direct Costs (Overheads, AFUDC, & Property Taxes)	$ 416,603	$ 97,148	$ 513,750	$ 2,012,358	$ (1,498,607)
Total Costs	**$ 2,670,491**	**$ 342,703**	**$ 3,013,194**	**$ 5,850,736**	**$ (2,837,542)**

Variances:

- Data Logger costs. SDG&E has worked with data loggers in the past but did not realize the difference in costs between a class 1 vehicle data logger (~2K/logger) and a data logger for medium/heavy duty vehicles (~15-20K/logger). In order to get this data, we plan to work with Vehicle OEMs to get the telematics from the vehicle.
- Cost underruns due to fewer materials and fewer site installations, partially offset by higher construction installation costs.

b. Utility expenditures in Disadvantaged Communities

Three of the four sites are located within an SDG&E territory DAC and 75% of the project costs were related to DAC sites. Reference Table 44 above for project expenditures.

c. Customer costs

Customers incurred one-time cost for the acquisition of electric vehicles, which may have been totally or partially off-set by grant funding, as well as ongoing maintenance and fuel cost of the electric vehicles to be serviced by the infrastructure installed under this Program. There were no assessment of Total Cost of Ownership/Operation of an electric fleet performed by the utility for these customers.

d. Leveraged funding

The PRP does not provide funding for EVs, but they are a requirement for customers to participate in the project.

4.5. Equipment and Competitive Markets

a. Equipment procurement or qualification process

A competitive Request for Proposal (RFP) was issued for the Electric Vehicle Service Equipment ("EVSE") and related Services establishing all requirements for communication, connector safety, and functional requirement. Responses were evaluated based on technical, functional requirements as well as price. Respondents were selected for award of Master Service Agreement and PRP Participants were given a choice (if possible) as to which EVSP/EVSE were selected for their project site.

Requirements and Standards for EV Equipment established in the RFP:

- The proposed EVSE shall have successfully passed Nationally Recognized Testing Laboratory (NRTL) testing, or be listed by UL LLC
- The proposed EVSE shall be compliant with National Electrical Code (NEC) Article 625
- The proposed EVSE shall be compliant with Federal Communications Commission (FCC) Part 15 Class A
- In addition, Company encourages Bidder to offer EVSEs that are compliant with the appropriate sections of NIST Handbook 44 related to Technical Requirements for Weighing and Measuring devices.
- EVSE and Components Housing:
    - The EVSE and any subcomponents shall be housed in a National Electrical Manufacturers Association (NEMA) 3R enclosure or better, rated for outdoor use
    - The EVSE shall be installed in a stationary manner, either on an appropriate included pedestal or wall-mounted in certain locations
- EVSE Temperature Requirements:
    - The EVSE should have an operational temperature range of -30 degrees C to +50 degrees C (-22 degrees F to 122 degrees F)
- EVSE Networking Equipment:
    - Contractor communication system shall be independent of the Site Host to allow for the management and administration of the Charging Stations, authenticate users, reset equipment, download updated firmware, and transmit consumption data
    - While Contractor communication systems at each Facility may use a secure 802.11 Wi-Fi connection to communicate with each other, the method of communicating to the back office cannot depend on a Site Host Wi-Fi network
- EVSE Remote Connectivity:

- For purposes of troubleshooting and maintenance, the EVSE shall be capable of receiving a “reset” or “reboot” signal remotely when necessary
- The EVSE shall be able to accept a firmware or software update remotely via the communications system. If, for any reason, the update fails to properly install, the previous revision of firmware or software will continue to be used

Greenlots was selected as the EVSP for the Fleet Delivery project based on their offering of higher-powered Level 2 BTC Power 70A (EVP-2001-70-W-001) charging stations supplying 16.8 kilowatt (kW).

b. Equipment installation

The PRPs have two active design engineering firms - Asplundh and EPI. The sites are split between the two companies. The PRP sites are split between two active Construction contractors - Baker Electric and A.M. Ortega. SDG&E encouraged its contractors to create diversity sub-contracting plans.

A total of 79 BTC Power 70A (16.8 kW) (EVP-2001-70-W-001) charging stations were installed under the Fleet Delivery PRP.

33 BTC Power 70A (16.8 kW) (EVP-2001-70-W-001) were installed at the UPS San Diego location and 15 each at UPS Chula Vista and San Marcos location. An additional charging station was installed at each site in the maintenance area. A custom solution was designed for the UPS sites to position the chargers overhead and out of the way of the EV operating in the area.

16 BTC Power 70A (16.8 kW) (EVP-2001-70-W-001) were installed at the Amazon facility.

Figure 28. Fleet Delivery Equipment Installation

c. Risks of stranded assets

One lessoned learned during the course of the Priority Review Projects is that customers have a potential to change business operations, locations, etc. and the Utility must have resources available to manage the removal and/or relocation of EV Charging Infrastructure. Additionally, the availability of

electric vehicles has been a challenge and the assets installed under this project have seen little to no use for those partners that have been unable to take delivery of electric vehicles to date.

4.6. Load Management and Grid Integration

a. Demand at project sites

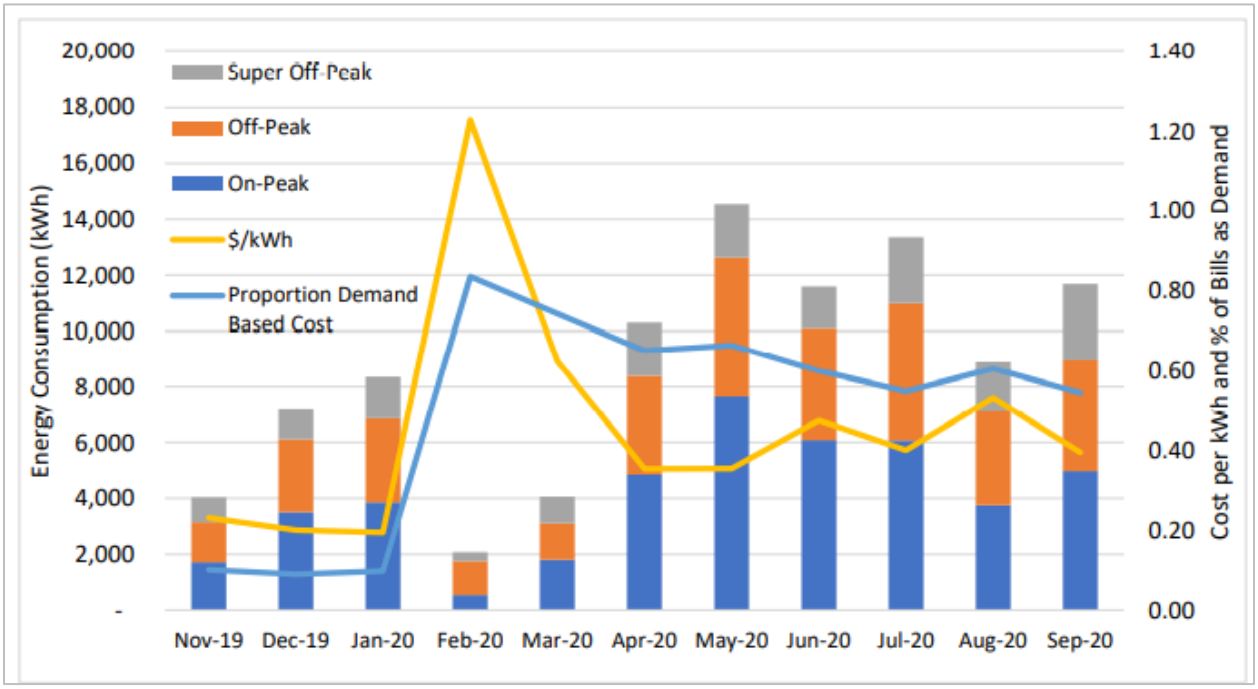

Figure 29. Fleet Delivery Demand at Project Site(s)

A significant proportion of energy was billed at on-peak time periods. For customers on SDG&E's default commercial AL-TOU rate, the average cost of electricity is highly sensitive to time-of-use (TOU) usage and maximum demand. A customer can reduce their average cost per kilowatt-hour (kWh) by consuming more for each kW of maximum demand or reducing maximum demand. The structure of this rate provides sufficient encouragement to customers to manage energy consumption, given a proper understanding of the rate and, in the case of fleets, the ability to manage charging through software or otherwise.

b. Description of load management and/or grid integration requirements

Amazon requested that SDG&E include a Flex Charge Manager (FCM) solution from Greenlots, a computer running a Linux kernel, which may be used to implement load limits on the collective group of chargers (i.e., 0% during on-peak hours, 100% during off-peak hours, or a different percentage during a certain established period). The FCM is expected also to have the capability to modify load limits per day-ahead critical peak pricing events.

UPS is currently working with Power Flex to incorporate Load Management at the UPS San Diego site. Integration with the SDG&E, Greenlots, BTC infrastructure is currently underway and anticipated to be implemented in 2021.

c. Customer outreach strategies used to incentivize managed charging

The SDG&E account manager for UPS and Amazon worked directly with the customers to perform a rate analysis and encourage off-peak charging that did not impact customer operations.

i. Effectiveness of outreach

Both UPS and Amazon were receptive to the education provided by the SDG&E account manager and distributed the information to the respective facilities and operations teams who would be plugging the vehicles in to ensure proper load management.

ii. Communication methods for sending pricing signals to customers

SDG&E publishes TOU prices online for customers. Additionally, SDG&E sends mail to customers with information about TOU and includes comparisons and recommendations on bills.

d. *Responsiveness of customers to load management requirements or pricing*

Initially, Amazon's account was assigned to the TOU-M rate which is an optional rate for customers with maximum demand between 20 and 40 kW. The rate was changed in late January 2020 to AL-TOU because the load exceeded that threshold. As a result, the average pricing increased from near $0.20 per kWh to over $0.40 per kWh. The biggest opportunity for savings at this point appears to be through avoiding charging during the on-peak time period and then reducing non-coincident demand (maximum demand at any time) as much as possible. Compared to TOU-M, AL-TOU does appear to offer lower energy charges and clear incentives to avoid certain time periods and minimize demand.

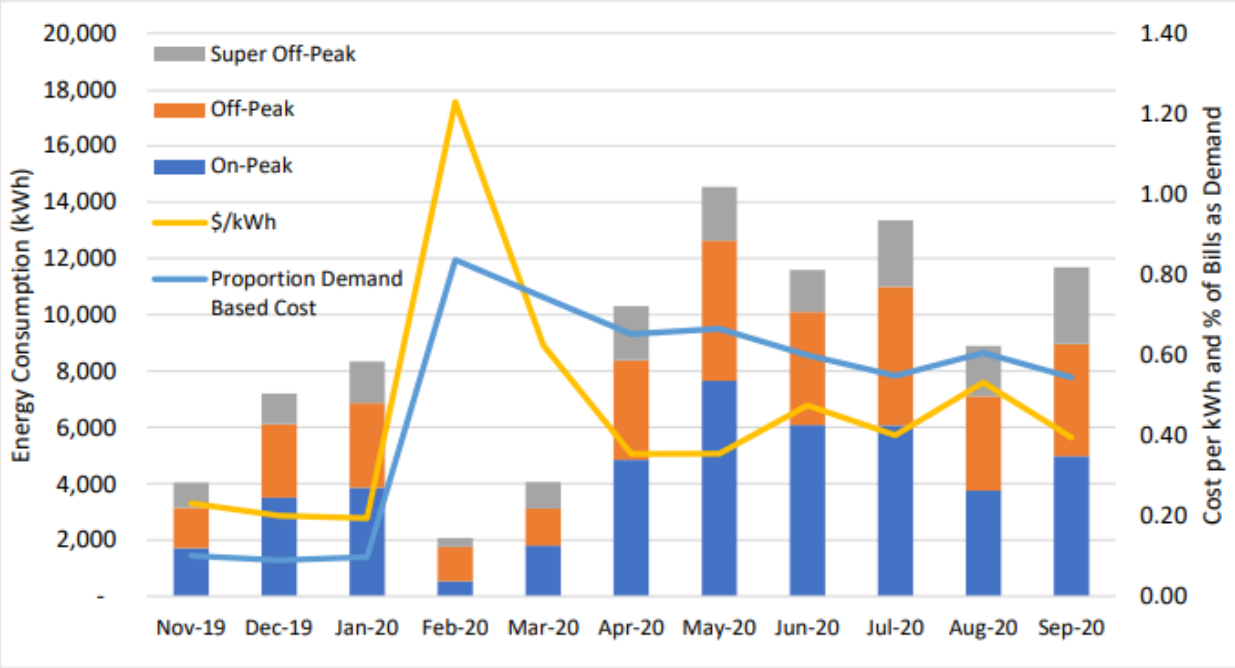

Figure 30. Fleet Electrification Utility Bill Analysis

e. Demand response participation

Demand Response features are not applicable to the Fleet Delivery PRP.

4.7. Outreach and Education

a. Description of customer outreach and education activities

SDG&E worked closely with the EVSP and the OEM to provide education to Amazon to prepare them for operations of the new EVs and respective chargers and provide best practices for load management. For UPS, SDG&E provided education about the infrastructure and best practices for load management to the facilities managers at each of the three sites. Since the vehicles have yet to be delivered, a refresher training may be required upon receipt of vehicles.

b. Customer surveys and metrics

i. Description and sample of customer surveys

No survey was conducted within the scope of this project, however, in depth interviews were conducted post implementation by the Independent Evaluator and SDG&E in preparation for this Final Report and are the source of information in the subsequent questions.

ii. Customer satisfaction with project

One fleet tracked nearly 100,000 miles and more than 100 megawatt-hours (MWh) during the data collection period of this project. The other fleet represented 75% of the charging port installations but had not yet received electric trucks. The single participating operator notes the importance of clear and direct communication with all partners on projects such as this. Because the vehicles, EVSE, and charging networks represent relatively new technology, there were situations when charging failed to occur and warnings were not provided to the end user. The EV service provider conducted several over the air updates and on a few occasions that caused chargers to error and become unavailable. The operator noted that $0.40 per kWh, which was the lowest average monthly electricity cost observed during this pilot, will seriously hinder EV fleet deployments. Electricity rates need to be much lower to cover the higher upfront vehicle costs and the cost of charging infrastructure to be competitive with conventionally fueled vehicles.

iii. Customer-reported incremental vehicle adoption due to project

Amazon procured 15 Lightning System Ford Transit EVs.

UPS has proposed to procure 60 Workhorse all-electric E-100 delivery trucks, delivery is expected to occur in Q1 2021.

iv. Effectiveness of customer outreach methods

Since all the infrastructure in this program is installed for private use, SDG&E worked directly with UPS and Amazon to educate them about the infrastructure and best practices for load management. No supplemental outreach was conducted for DACs.

4.8. Safety

a. Summary of relevant safety requirements

Fleet Delivery adhered to the Final Safety Requirements Checklist[27] developed by Commission staff. SDG&E filed Advice Letter 3403-E[28] on July 11, 2019 describing compliance efforts to the safety requirements checklist.

b. Safety issues reported during project and actions taken to correct them

No Safety Issues were reported/observed during the Fleet Delivery project.

4.9. Lessons Learned

a. Summary Table

The following table summarizes key lessons learned from the Fleet Delivery project.

[27] www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882
[28] http://regarchive.sdge.com/tm2/pdf/3403-E.pdf

Table 45. Fleet Delivery Lessons Learned

Issue	Resolution	Recommendations
SDG&E described program design elements within testimony, making some design parameters and requirements overly prescriptive. For example: describing the exact mix of chargers for each project site in testimony.	SDG&E utilized the language in the decision that allowed for program modifications via an approved Tier 2 Advice Letter.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs.
Vehicle availability – both participating fleets encountered challenges finding suitable vehicles and getting EV manufacturer commitments for meeting PRP timeline for vehicle delivery.	Supported the program participants selection of EVs, provided OEMs a market for vehicles.	Moving forward SDG&E will require a proof of purchase and estimated delivery date to coordinate construction activities.
Program flexibility – site design & engineering, alternate technology integration (solar, battery, load management)	SDG&E worked closely with these entities to understand their requirements and future development plans during these pilots.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs.
Program flexibility – contracting terms and duration, confidentiality, etc.	SDG&E worked closely with these entities to understand their requirements and address their concerns during these pilots.	Allow for broader descriptions in the project design when it comes to Participation Requirements; it is important to be flexible with market/customer needs.
Large fleet customers with 24/7 operations requires extra coordination; outages, construction, maintenance, etc.	SDG&E worked closely with these entities to understand their operational constraints, worked around these constraints to minimize impact to operations.	SDG&E will continue to work closely with Program Participants to work around their operational constraints and minimize impact to customer operations.

b. Project Assessment

SDG&E installed, owns, operates and maintains 79 L2 charging stations for two delivery fleets at four locations. This charging infrastructure currently only supports 15 delivery vehicles at one location, as the other three are still waiting for vehicle delivery. The Fleet Electrification Project has met its intended goal to support electrification of fleet delivery vehicles and provided valuable data on usage, load management, lessons learned, insight into unique operational challenges, and cost validation. SDG&E considers the pilot successful and will continue electrification efforts through the Power Your Drive for Fleets program. SDG&E is currently collaborating with over 100 medium to heavy duty EV fleet operators to evaluate infrastructure needs to support the expected level of EV adoption; the first site was put into service in early 2021.

The third-party evaluator for the PRPs, Energetics, has provided an assessment of the existing market and scalability of Fleet Electrification in the SDG&E Territory.[29]

California has an estimated 70,000 package delivery trucks;[30] it is assumed that 50% have daily routines of comparable or lower intensity than this pilot which could therefore be electrified. If 35,000 package delivery vehicles with similar operations to the best observed case in the Fleet Delivery project, 38,897 million gallons of gasoline could be displaced by 424,755 MWh of electricity (224,567 kWh) providing the emissions benefits shown in Table 46.

Table 46. Fleet Delivery Scale-Up Potential Annual Emissions

	GHG (MT/yr)	SO_x (MT/yr)	NO_x (MT/YR)	CO (MT/YR)	PM (MT/YR)	VOC (MT/YR)
Net Reduction	289,700	73	362	4,859	17	97

Source: Evaluator Calculations

4.10. Vehicle Adoption

a. Description of customer's vehicles before project

- Amazon
  - Ford Transit E250 diesel cargo vans
- UPS
  - UPS uses a mix of Medium-Duty/Heavy-Duty internal combustion engine vehicles

b. Electric vehicles served by project

Amazon procured 15 Lightning System Ford Transit EVs.

UPS has proposed to procure 60 Workhorse all-electric E-100 delivery trucks, delivery is expected to occur in Q1 2021.

c. Petroleum reduction

Performance calculations uses the demonstration period from November 2019 to August 2020. The baseline being delivery vehicles using gasoline, an average fuel economy of 13 MPG was utilized. Looking at energy usage, the annual kwh usage is of 102,339 kWh mileage, which equates to 121,832 annual miles, and therefore removing 9,372 gallons of gasoline per year.

Table 47. Fleet Delivery Annualized Benefits

	Testimony (90 Vehicles)	Planned (75 Vehicles)	Implemented (15 Vehicles)	Optimized (15 Vehicles)
Petroleum Reduction	203,000 GGE	169,167 GGE	9,372 GGE	16,670 GGE

Source: Evaluator Calculations

[29] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission 2/1/2021, page 53

[30] California Hybrid, Efficient and Advanced Truck Research Center. (2013). Battery Electric Parcel Delivery Truck Testing and Demonstration. Sacramento, CA: CEC Public Interest Energy Research Program (PIER)

4.11. Greenhouse Gas Emissions Reductions

a. Emissions reductions

Table 48. Fleet Delivery Services PRP GHG Emission Reductions

	Testimony (90 Vehicles)	Planned (75 Vehicles)	Implemented (15 Vehicles)	Optimized (15 Vehicles)
GHG Emissions Reduction	894 MT of CO2e	745 MT of CO2e	71 MT of CO2e	124 MT of CO2e

Source: Evaluator Calculations

b. Calculation methodology

As directed by the reporting requirements, SDG&E has adopted the emissions reductions estimate methodology agreed upon by the third-party evaluator (Energetics), the IOUs, and the Energy Division staff.

As vehicles were delivered and commissioned there was a steady increase in electrical consumption. Because of this, the observation period for this pilot ranges between November 2019 through August 2020.

Table 49. Fleet Delivery Operation Annual Emissions

	GHG (MT/yr)	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM (kg/yr)	VOC (kg/yr)
Baseline Fuel	106	25	112	1,191	8	28
Electric	36	8	25	21	4	4
% Reduction	67%	70%	78%	98%	49%	85%

Source: CARB ORION 2017

c. Baseline emissions assumptions and methodology

Emission calculations were determined on a per-mmBtu basis from the California GREET 3.0 system. The well-to-wheel emission factors use the *Light Duty Truck 2* methodology are used. GHG emissions include CO2, N2O, and CH4 values normalized to grams of CO2e. The vehicles are assumed to have a 13 mpg baseline fuel economy.

Table 50. Fleet Delivery Annual Emission Reduction

GHG (g/mmBtu)	SO_x (g/mmBtu)	NO_x (g/mmBtu)	CO (g/mmBtu)	PM (g/mmBtu)	VOC (g/mmBtu)
99,590	23.583	104.98	1,114.2	7.8976	68.414

Source: California GREET 3.0

4.12. Criteria Pollutant Reductions

Criteria pollutants emissions disproportionately affect those who live in disadvantaged communities. The third-party evaluator estimated that 35% of the miles driven by EVs participating in the pilot occurred within disadvantaged communities.

Table 51. Fleet Delivery Services Annualized Emission Reductions

	Testimony (90 Vehicles)	Planned (75 Vehicles)	Implemented (15 Vehicles)	Optimized (15 Vehicles)
Criteria Pollutant Emissions Reduction	810 kg of NO_X	670 kg of NO_X	87 kg of NO_X 18 kg of SO_X 24 kg of VOC 1,200 kg of CO	155 kg of NO_X 31 kg of SO_X 42 kg of VOC 2,100 kg of CO

a. Emissions reductions

i. Ozone

Ozone emissions are not a criteria pollutant included in the California 3.0 GREET model. Neither SDG&E nor the third-party evaluator report included ozone as part of the emissions reductions criteria.

ii. Nitrogen oxides

Nitrogen oxides (NO_x) emissions reductions support healthy air quality standards. The third-party evaluator estimated that this pilot reduced annualized NO_x emissions by ~75%.

Table 52. Fleet Delivery NO_x Emissions (kg/yr)

	Fleet Delivery
Baseline Fuel	112
Electric	25
% Reduction	78%

Baseline fuel for Fleet Delivery is gasoline

iii. Particulate matter

Particulate matter (PM) are airborne particles that negatively affect health and can be reduced by electrifying transportation. The table below shows that the Fleet delivery program resulted in ~50% reduction in PM emissions compared to gasoline as a baseline fuel.

Table 53. Fleet Delivery PM Emissions (kg/yr)

	Fleet Delivery
Baseline Fuel	8
Electric	4
% Reduction	49%

Baseline fuel for Fleet Delivery is gasoline

iv. Volatile organic compounds

Volatile organic compounds (VOCs) include a range of chemicals, some of which may have short and long-term negative health effects and can be reduced by electrifying transportation. The table below shows the VOC benefits of the Fleet Delivery pilot.

Table 54. Fleet Delivery VOC (kg/yr)

	Fleet Delivery
Baseline Fuel	28
Electric	4
% Reduction	85%

Baseline fuel for Fleet Delivery is gasoline

b. Calculation methodo*logy*

Fleet Delivery calculation methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

c. Baseline emissions assumptions and methodology

Fleet Delivery calculation methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Baseline Emissions Reductions section above.

5. Green Shuttle

5.1. Executive Summary

On October 7, 2015, Senate Bill (SB) 350, *the Clean Energy and Pollution Reduction Act* (Chapter 547, Statutes of 2015) was signed into law, establishing new clean energy, clean air, and greenhouse gas (GHG) and reduction goals for California for 2030 and beyond. SB 350 requires utilities to undertake transportation electrification activities. As part of the SB 350 goals, San Diego Gas & Electric Company (SDG&E) proposed six Priority Review Projects (PRPs) in an application to the California Public Utilities Commission (Commission) on January 7, 2017 and received approval in Decision (D.) 18-01-024 on January 17, 2018.

The Green Shuttle project received approval to support fixed route shuttles interested in electrification with grid-integrated charging facilities including direct current fast charging (DCFC) and Level 2 (L2) EVSE with a grid-integrated rate. SDG&E offered its new Public Grid Integrated Rate (GIR) at the charging stations it owns.

5.2. Project Description and Background

a. Goals

SDG&E's six approved priority review projects were designed to achieve the following goals:

- facilitate rapid deployment of transportation electrification as a means to meet California's aggressive greenhouse gas GHG reduction goals, thereby improving the health of all ratepayers and creating a cleaner environment;
- fill and/or jump start sectors within the electric vehicle (EV) market not significantly developed or currently lacking sustainable infrastructure or capital investment;
- create opportunities for private sector participation in the EV market by increasing EV-related demand (e.g., increased EV sales, increased need for charging and data collection infrastructure, increased need for a trained and qualified EV-related workforce);
- promote market integration by facilitating safe and equitable access to electricity as a transportation fuel, including for those living in disadvantaged communities, while improving the efficient use of SDG&E's electric system;
- provide data that will help test and measure the flexibility of EV charging loads and the degree to which the efficient integration of EV loads can yield cost savings to all customers by avoiding future utility infrastructure additions, increasing utilization of renewable resources, or more efficiently using the electric grid; and
- provide education and outreach to residential and commercial customers currently lacking the knowledge or experience necessary to reach the conclusion that investment in EVs or EV infrastructure is economical, safe and good for the public at large.

The key goals of the project were to gather data on fleet electrification and to explore the impact of the Public GIR, as well as to explore the optimal facility-to-vehicle charging ratio to achieve high usage without creating inconvenience for drivers.

b. Procedural history

SDG&E received approval from the Commission to begin implementation of six Priority Review Projects on January 11, 2018 in D.18-01-024. The Green Shuttle project was approved as proposed. SDG&E issued an interim report on January 31, 2019 and the evaluator submitted a Joint-IOU Interim Report on January 31, 2020, a final Joint-IOU Independent Evaluator report on February 1, 2021, and a Final Report on March 31, 2021.

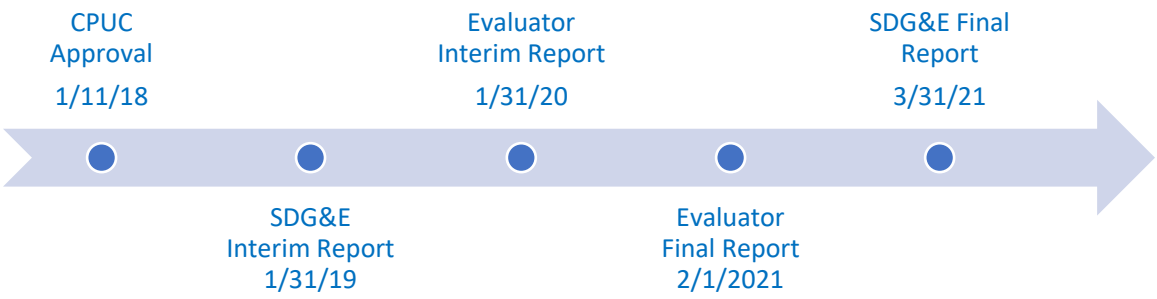

Figure 31. Green Shuttle Procedural History

c. Background research

SDG&E did not have any previous pilots at the time of this application filing.

d. Implementation timeline and milestones

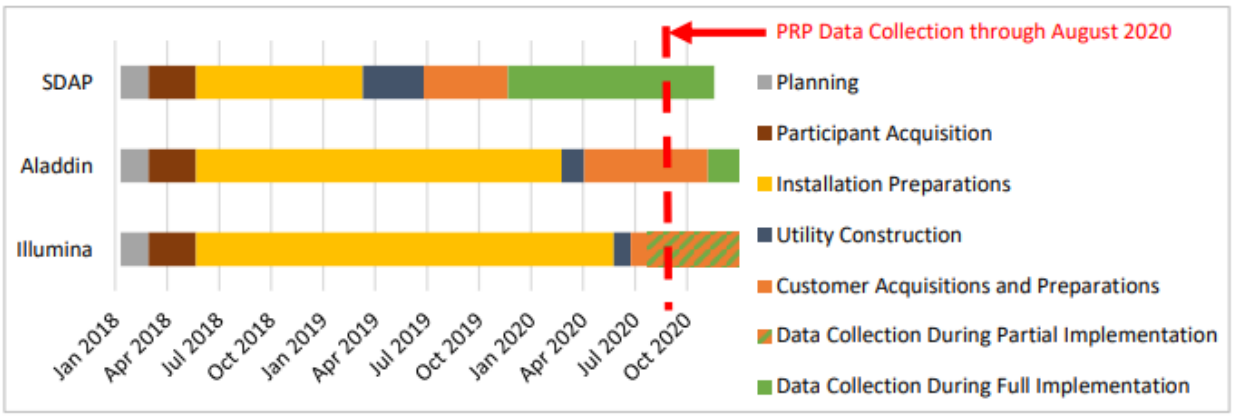

Figure 32. Green Shuttle Implementation Timeline and Milestones

The following summarizes SDG&E's Green Shuttle project planning and implementation milestones:

- Site Enrollment:
  - SDG&E engaged many customers and went into serious discussion with 17 customers about the program. This includes schools, workplaces, airport shuttles, hotel shuttles, etc. Ultimately, SDG&E proceeded with three customers, San Diego Airport Parking (SDAP), Aladdin Parking, and Illumina.

San Diego Airport Parking (SDAP)

- Design – Complete Q2 2019
- Construction – Complete Q3 2019
- Data Collection – Began Q3 2019

Aladdin

- Design – Complete Q1 2020
- Construction – Complete Q2 2020
- Data Collection – N/A due to delays related to covid-19 impacts to the OEM production; Delivery of vehicles occurred in Q1 2020

Illumina

- Design – Complete Q2 2020
- Construction – Complete Q2 2020

- Data Collection – N/A due to delays related to covid-19 impacts to the original equipment manufacturer (OEM) and customer operations; Vehicles were delivered in Q3 2020 but customer has not resumed operations as of the date of this final report.

5.3. Project participants

a. Description of customers *and sites*

These sites are for commercial customers with fixed route shuttles:

- San Diego Airport Parking. This customer runs an off-site airport parking lot and shuttles its customers to and from the Airport. This is a Power Your Drive and Green Shuttle site. This site is for private use and will not be publicly available. SDAP will be the customer of record and will be charged for all consumption under this new service.
- Illumina provides shuttles to its employees to go around the main campus, back and forth to the north campus, and back and forth to University Town Center mall. This is a Power Your Drive and Green Shuttle site. This site is for private use and will not be publicly available. Illumina will be the customer of record and will be charged for all consumption under this new service.
- Aladdin Parking. This customer runs an off-site airport parking lot and shuttles its customers to and from the Airport. The customer has about 5 L2 charging stations that it uses as a "value added" service to customers. This site is for private use and will not be publicly available. Aladdin will be the customer of record and will be charged for all consumption under this new service.

b. Barriers to participation

As mentioned above, SDG&E engaged 17 customers who expressed interest in the program. Unfortunately, the majority of the customers couldn't participate in the program due to following factors:

- Customer procurement cycle not aligning with the program – 30%
- The cost of the electric shuttles still being too high – 20%
- Other customers didn't fit the fixed route profile – 10%

Once we entered into contracting with the four existing customers there have been two additional barriers. One is the charging infrastructure that SDG&E was authorized to provide does not meet customer's needs. This has been addressed in a Tier 2 Advice Letter.[31] The final barrier has been vehicle procurement and lead times. Customers are having a hard time getting the EV OEMs to commit to vehicle delivery times.

c. Disadvantaged Community participation

Two of the three sites, SDAP and Aladdin, are in SDG&E territory DACs according to CalEnviroScreen 3.0.

d. Diverse customer outreach and engagement

SDG&E held a Green Shuttle Forum on January 23, 2018. Local customers that fit the decision requirements, vendors, and EV shuttle manufacturers were invited to attend. Local businesses include SDAP, who is participating in the program. SDG&E first reached out to any parking, hotels, or other

[31] AL-3332-E, Subject: Modification to the Green Shuttle Project in Compliance with Decision 18-01-024 http://regarchive.sdge.com/tm2/pdf/3332-E.pdf.

known fixed route shuttle providers in its service territory. SDG&E also relied on its internal resources to spread the word amongst their customers.

e. Project partners

SDG&E partnered with San Diego Airport Parking, Illumina, and Aladdin Parking for the Green Shuttle PRP.

5.4. Costs

a. Actual and forecast utility direct costs

Table 55 below sets forth SDG&E's proposed costs for the Green Shuttle project.

Table 55. Green Shuttle PRP Proposed Costs

	Capital Costs	O&M Expenses	Total PRP Costs
Transformer and Install	$ 75,100	$ 2,073	$ 77,173
Electrical Service	$ 440,865	N/A	$ 440,865
EVSE Costs	$ 1,317,522	$ 1,845	$ 1,319,367
Purchased and SD Software	$ 505,400	N/A	$ 505,400
Customer Engagement	N/A	$ 200,000	$ 200,000
Measurement and Evaluation	N/A	$ 410,000	$ 410,000
Billing Support	N/A	$ 80,000	$ 80,000
SDG&E Clean Transportation Project Mgmt.	N/A	$ 100,000	$ 100,000
First-Year O&M Service Calls	N/A	$ 15,000	$ 15,000
First-Year O&M for Charging Equipment	N/A	$ 10,000	$ 10,000
Total Direct Costs	**$ 2,338,887**	**$ 818,918**	**$ 3,157,805**

The Green Shuttle project direct and total costs as of February 2021 are set forth in the table below (presented in categories reported by SDG&E).

Table 56. Green Shuttle PRP costs as of February 2021

	Actual Capital Costs	Actual O&M Costs	Total Actual Costs	Total Budget	Variance
Construction	$ 374,201	-	$ 374,201	$ 763,455	$ (389,254)
Engineering Design	$ 135,497	-	$ 135,497	$ 109,750	$ 25,747
Chargers, Meter Pedestals, Transformer, & Other Materials	$ 292,740	$ 6,150	$ 298,890	$ 842,882	$ (543,992)
Internal SDG&E Labor	$ 22,445	$ 131,527	$ 153,972	$ 180,000	$ (26,028)
IT Costs, Measurement & Evaluation	$ 432,418	$ 103,676	$ 536,093	$ 1,159,112	$ (623,019)
Cust. Engagement / Outreach	-	-	-	$ 200,000	$ (200,000)
Other	$ 58,522	-	$ 58,522	$ 28,918	$ 29,605
Direct Costs	$ 1,315,823	$ 241,353	$ 1,557,175	$ 3,284,117	$ (1,726,941)
Non-Direct Costs (Overheads, AFUDC, & Property Taxes)	$ 267,804	$ 129,336	$ 397,140	$ 1,636,946	$ (1,239,805)
Total Costs	**$ 1,583,627**	**$ 370,689**	**$ 1,954,316**	**$ 4,921,063**	**$ (2,966,747)**

Variances:

- Cost underruns driven by less sites constructed than proposed.

b. Utility expenditures in Disadvantaged Communities

Two of the three sites are located within an SDG&E territory DAC and 66% of the project costs were related to DAC sites. Reference Table 56 above for project expenditures

c. Customer costs

Customers incurred one-time cost for the acquisition of electric vehicles, which may have been totally or partially off-set by grant funding, as well as ongoing maintenance and fuel cost of the electric vehicles to be serviced by the infrastructure installed under this Program. There were no assessments of Total Cost of Ownership/Operation of an electric fleet performed by the utility for these customers.

d. Leveraged funding

The PRP does not provide funding for EVs, but they are a requirement for customers to participate in the project meaning some customers leveraged grants to cover vehicles costs.

5.5. Equipment and Competitive Markets

a. Equipment procurement or qualification process

A competitive Request for Proposal (RFP) was issued for the EV supply equipment (EVSE) and related Services establishing all requirements for communication, connector safety, and functional requirements. Responses were evaluated based on technical, functional requirements as well as price. Respondents were selected for award of Master Service Agreement.

Requirements and Standards for EV Equipment established in the RFP:

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- The proposed EVSE shall be compliant with National Electrical Code (NEC) Article 625
- The proposed EVSE shall be compliant with Federal Communications Commission (FCC) Part 15 Class A
- In addition, Company encourages Bidder to offer EVSEs that are compliant with the appropriate sections of NIST Handbook 44 related to Technical Requirements for Weighing and Measuring devices.
- EVSE and Components Housing:
    - The EVSE and any subcomponents shall be housed in a National Electrical Manufacturers Association (NEMA) 3R enclosure or better, rated for outdoor use
    - The EVSE shall be installed in a stationary manner, either on an appropriate included pedestal or wall-mounted in certain locations
- EVSE Temperature Requirements:
    - The EVSE should have an operational temperature range of -30 degrees C to +50 degrees C (-22 degrees F to 122 degrees F)
- EVSE Networking Equipment:
    - Contractor communication system shall be independent of the Site Host to allow for the management and administration of the Charging Stations, authenticate users, reset equipment, download updated firmware, and transmit consumption data
    - While Contractor communication systems at each Facility may use a secure 802.11 Wi-Fi connection to communicate with each other, the method of communicating to the back office cannot depend on a Site Host Wi-Fi network
- EVSE Remote Connectivity:
    - For purposes of troubleshooting and maintenance, the EVSE shall be capable of receiving a “reset” or “reboot” signal remotely when necessary
    - The EVSE shall be able to accept a firmware or software update remotely via the communications system. If, for any reason, the update fails to properly install, the previous revision of firmware or software will continue to be used

b. Equipment installation

The PRPs have two active design engineering firms - Asplundh and EPI. The sites are split between the two companies. This PRP had three active Construction contractors - Baker Electric, Henkels and McCoy, and AM Ortega. The sites are split between the three companies. SDG&E encouraged its Contractors to create diversity sub-contracting plans.

The following equipment was installed at each of the Green Shuttle Project sites:

- San Diego Airport Parking (SDAP)
    - 2 ChargePoint CPE-250 (62.5 kilowatt [kW]) DCFC were installed at the SDAP site
- Aladdin
    - 2 ChargePoint CPE-250 (62.5 kW) DCFC were installed at the Aladdin site
- Illumina
    - 6 BTC Power 70A (16.8 kW) (EVP-2001-70-W-001) were installed at the Illumina site.

c. Risks of stranded assets

One lessoned learned during the course of the Priority Review Projects is that customers have a potential to change business operations, locations, etc. and the Utility must have resources available to manage the removal and/or relocation of EV Charging Infrastructure. Additionally, the availability of electric vehicles has been a challenge and the assets installed under this project have seen little to no use for those partners that have been unable to take delivery of electric vehicles to date.

5.6. Load Management and Grid Integration

a. Demand at project sites

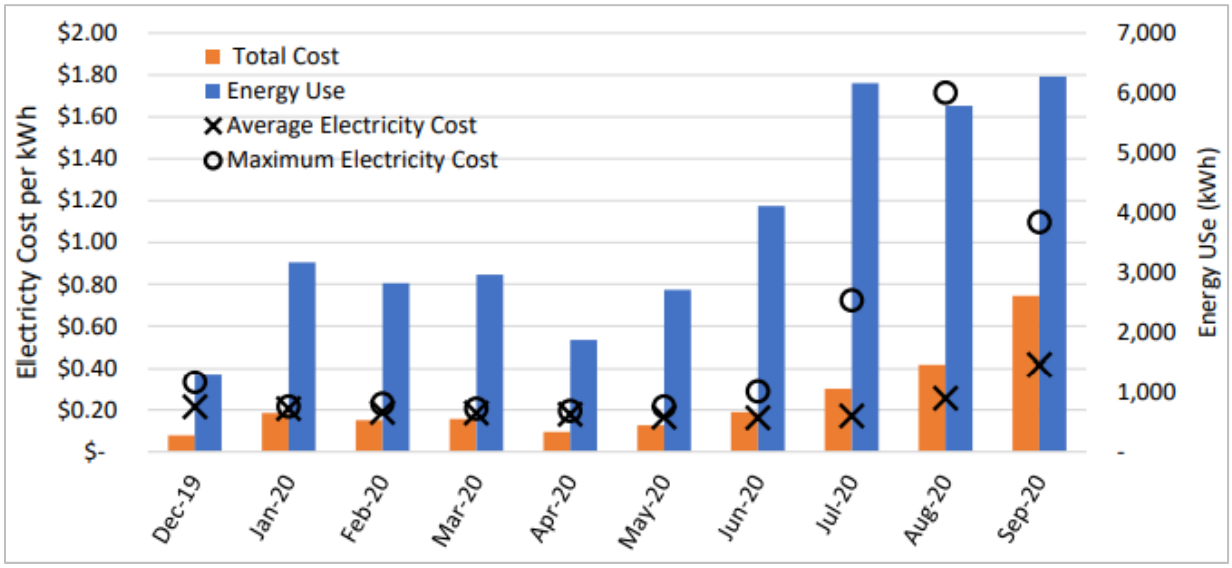


Figure 33. Green Shuttle Demand at Project Sites

Source: SDG&E Meter Data and Billing Statements

Figure 33 depicts ten months of utility billing for shuttle operations, beginning with charger installation in December 2019. The chart includes several months (notably summer and fall 2020) of maximum cost per kilowatt-hour observed on the Public GIR rate.

From December until March only one shuttle utilized DCFC; in March the second shuttle received DCFC capability. Operations from March through June were heavily impacted by the COVID-19 pandemic.

During the summer months daily consumption averaged 200 kilowatt-hours (kWh) and peaked near 400 kWh, or about 2-4 full charges of the larger battery. In June there was a significant increase in energy usage as operations began to recover from the pandemic. Current operation levels are still affected by the ongoing pandemic, but have stabilized around 6,000 kWh monthly. Charging sessions generally averaged 50 to 60 kW, with fewer than six hours of charging on most days.

b. Description of load management and/or grid integration requirements

The Green Shuttle sites used the Public GIR, an energy-only dynamic rate with prices that fluctuates by the hour and includes additional circuit and system adders for forecasted times of heavy demand. This approach is similar to the one used to determine the Power Your Drive rate.

Public GIR is sometimes heavily influenced by grid-load forecasting by SDG&E. The California Independent System Operator (CAISO) market day-ahead wholesale energy pricing provides year-round

variability which is reflected in the rate. The system adders for both the distribution circuit (the top 150 annual hours) and the overall system (the top 200 annual hours) also can add substantial costs, especially during the hottest hours of the year.

The working hypothesis was that such high pricing would encourage operators to charge during lower price hours, thereby avoiding adding load to the grid during peak impact hours.

c. Customer outreach strategies used to incentivize managed charging

The Public GIR was designed for the Green Shuttle Program; the program was initially designed with a similar day-ahead/day-of rate communication plan similar to the Power Your Drive vehicle-grid integration rate whereby rates are communicated to Fleet Managers via the EVSP's phone app, emails from SDG&E, and the SDGE.com website. The EVSP software enables customers to select a maximum price, above which charging will pause until rates decrease below the maximum price and charging resumes. These features were not initially available to the shuttle operators due to the EV Service Provider's inability to offer pricing management options for fleets. The feature became available in 2021 and SDG&E looks forward to further data collection and analysis to verify the impact of this feature on Fleet Electrification sites.

SDG&E and SDAP worked together to develop a load management plan which required SDAP to manually avoid using DCFCs between 8 AM and 8 PM during the summer months.

i. Effectiveness of outreach

SDAP proved to be very knowledgeable and experienced not only in Fleet operations but Fleet Electrification and was flexible with the implementation of an interim manual load management plan while EVSP software features were developed, tested, and rolled out to production.

ii. Communication methods for sending pricing signals to customers

In Power Your Drive, rates are communicated via the phone app, emails from SDG&E, and the website. The software enables customers to select a maximum price, above which charging will stop. These features were not initially available to the shuttle operators due to the EV Service Provider's inability to offer TOU or pricing options for fleet charge management on CPE 250 DCFC platform until the feature became available in 2021.

d. Responsiveness of customers to load management requirements or pricing

Mid-July into October 2020 marked unusually high temperatures for San Diego and California in general. Prior to this heat wave the GIR had not exhibited prices higher than $0.35 per kWh; during the heat wave prices reached up to $1.80 per kWh. In the absence of software automation, the operator developed a load management plan to avoid midday charging throughout the summer. This worked to some extent but was inconsistent as drivers worked in rotation and did not always adhere to it. Approximately 25% of costs could have been avoided through implementation of automated load management software.

As can be seen in Figure 34, midday charging was relatively constant in the summer, with substantial charging at midnight and just before the mid-day moratorium.

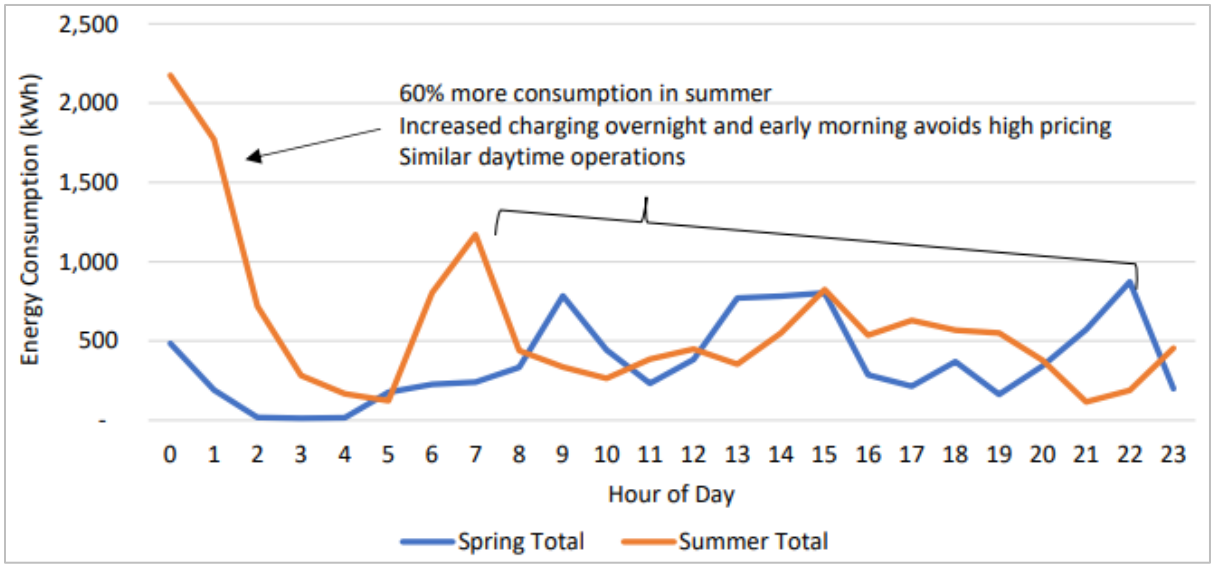


Figure 34. Green Shuttle Comparison of Total Charging Trends During Spring and Summer

Source: SDG&E Meter Data

Figure 35 summarizes the results and opportunity for managed charging throughout the lifetime of the project with the following:

- $6,000 spent on 34,000 kWh under $0.40/kWh, for an average of $0.17/kWh
- $2,550 spent on 3,726 kWh over $0.40/kWh, for an average of $0.68/kWh
- $1,900 in excess spending for charging that took place during hours with high pricing

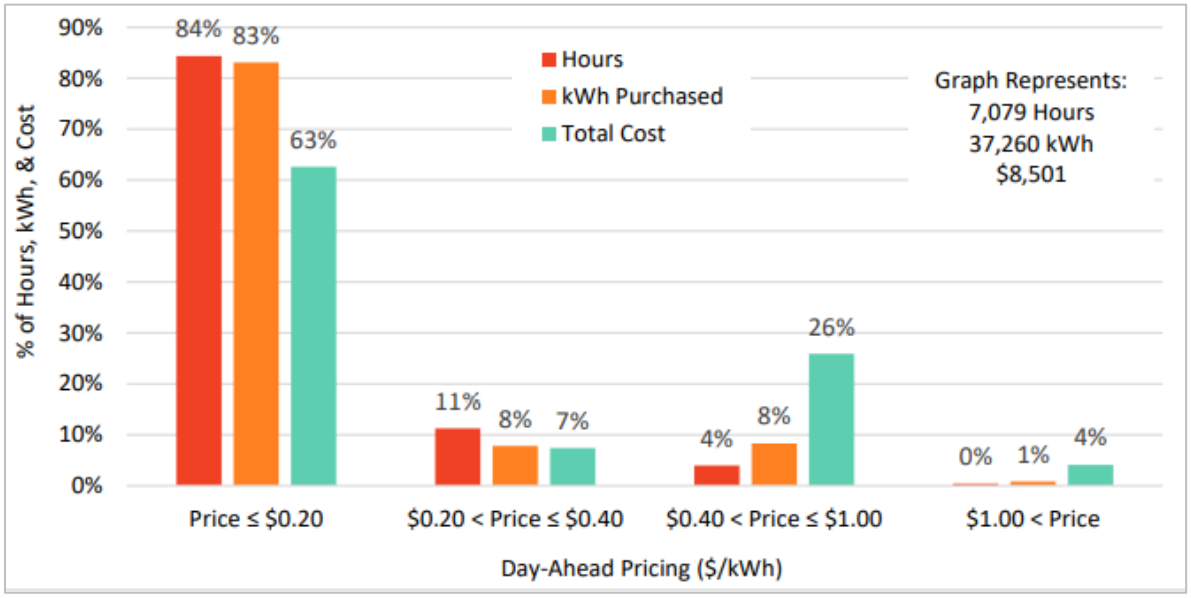


Figure 35. Green Shuttle Consumption by Price

Source: SDG&E Meter Data and Billing Statements

e. Demand response participation

Demand Response features are not applicable to the Green Shuttle PRP, though the highly variable Public GIR rate provides a strong incentive to avoid charging during peak periods.

5.7. Outreach and Education

a. Description of customer outreach and education activities

SDG&E facilitated customized educational sessions with each customer and the EVSP to ensure there was thorough understanding of charger functionality. Because all the chargers installed under this pilot are private, there was no mass outreach conducted for this program.

b. Customer surveys and metrics

i. Description and sample of customer surveys

No survey was conducted within the scope of this project; however In-Depth Interviews were conducted post implementation by the Independent Evaluator and SDG&E in preparation for this Final Report.

ii. Customer satisfaction with project

SDAP provided the positive feedback that faster charging allowed vehicles to remain in service for the full day; on the busiest days the electric shuttles charge for six hours each where on standard days they only require four hours of charging. DC fast charging allowed the electric shuttles to meet all the requirements of the previous diesel vehicles with fewer maintenance needs, as well as time savings without the need for the driver to visit fueling stations.

SDAP appreciated the utility support but was disappointed to not pilot integration of renewable (solar photovoltaic [PV]) energy and an energy storage system (battery). These options were originally proposed as part of the project, but were ultimately not pursued due to the high costs and limited potential savings. SDAP indicated that a number of fleets would be interested in these options for the operational cost management options and ability to avoid grid charging during high-priced hours, as well as resiliency during power outages.

SDAP also indicated that a broader selection of EV service providers would be beneficial; their options were limited to ChargePoint as the only EVSP that could power their GreenPower vehicles. ChargePoint requires annual networking and service agreements amounting to $3,000 per DCFC, which the fleets will be responsible for once the PRP funding ceases to cover them after the first five years.

Additionally, SDAP noted that they were unable to receive day ahead pricing information from the utility or the EVSP to support chagrining management strategies. The fleets relied on the Power Your Drive day ahead pricing published daily on SDG&E's website as a proxy. ChargePoint offered SDAP the option to limit charging automatically based on time of day and published energy prices; SDAP chose to avoid charging at prices above $0.45 per kWh. This will be implemented in 2021.

iii. Customer-reported incremental vehicle adoption due to project

- San Diego Airport Parking (SDAP)
    - 2 GreenPower Motor Company electric shuttle buses and 2 Zenizth EVs repowered with an electric powertrain by Maxwell Vehicles are serviced by EV charging stations installed at this location.
- Aladdin
    - 4 Briton Lightning System Ford E450 electric shuttles are serviced by the EV charging stations installed at this location.
- Illumina
    - 6 Briton Lightning System Ford E450 electric shuttles are serviced by the EV charging stations installed at this location

iv. Effectiveness of customer outreach methods

Since all the infrastructure in this program is installed for private use, SDG&E worked directly with the customers to educate them about the infrastructure and best practices for load management. No supplemental outreach was conducted for DACs.

5.8. Safety

a. Summary of relevant safety *requirements*

Green Shuttle adhered to the Final Safety Requirements Checklist[32] developed by Commission staff. SDG&E filed Advice Letter 3403-E[33] on July 11, 2019 describing compliance efforts to the safety requirements checklist.

b. Safety issues reported during project and actions taken to correct them

No Safety Issues were reported/observed during the Green Shuttle project.

5.9. Lessons Learned

a. Summary Table

The following table summarizes key lessons learned from the Green Shuttle project.

Table 57. Green Shuttle Lessons Learned

Issue	Resolution	Recommendations
SDG&E described program design elements within testimony, making some design parameters and requirements overly prescriptive. For example: describing the exact mix of chargers for each Green Shuttle site in testimony.	SDG&E utilized the language in the decision that allowed for program modifications via an approved Tier 2 Advice Letter.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs.
Vehicle availability: All three participating fleets encountered challenges finding suitable vehicles and getting EV manufacturer commitments for meeting PRP timeline for vehicle delivery.	Supported the program participants selection of EVs, provided OEMs a market for vehicles.	Moving forward SDG&E will require a proof of purchase and estimated delivery date to coordinate construction activities.
Incompatibility between EVs acquired by customers and EVSE supplied by the utility.	Removed and replaced incompatible equipment.	Obtain confirmation with program participants, EVSP, and OEMs of compatibility of EVs and EVSE prior to site design.

[32] www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882
[33] http://regarchive.sdge.com/tm2/pdf/3403-E.pdf

Program Flexibility – Contracting Terms and Duration, Confidentiality, etc.	SDG&E worked closely with these entities to understand their requirements and address their concerns during these pilots.	Allow for broader descriptions in the project design when it comes to Participation Requirements; it is important to be flexible with market/customer needs.
PV and Energy Storage – review of engineering and construction cost was not effective due to the limited financial benefit to the customer.	Opted out of PV/Energy Storage installation.	Incorporate lessons learned into program design and budgeting in future filings.

b. Project Assessment

The Green Shuttle Project has met its intended goal to support electrification of medium-duty electric vehicles and provided valuable data on usage, load management, lessons learned, insight into unique operational challenges, and cost validation. SDG&E considers the pilot successful and continues electrification efforts through the Power Your Drive for Fleets program. SDG&E is currently collaborating with over 100 medium to heavy duty EV fleet operators to evaluate infrastructure needs to support the expected level of EV adoption; the first site was put into service in early 2021.

The third-party evaluator for the PRPs, Energetics, has provided an assessment of the existing market and scalability of the Green Shuttle project in the SDG&E Territory.[34]

Within the state of California, there are many shuttle buses in use but fewer applications like those in this PRP with a vehicle of similar size. Recent CARB estimates are that there are 686 buses of similar size across the 13 California airports. Scaling the existing vehicles at 50,000 miles per year using January operational data from this PRP as a baseline provides the results shown in Table 58.

Table 58. Green Shuttle Scale-Up Potential Annual Emissions

	Fuel (GGE)	GHG (MT/yr)	SO_X (MT/yr)	NO_X (MT/YR)	CO (MT/YR)	PM (MT/YR)	VOC (MT/YR)
Net Reduction	2M	670	19	68	17	4	5

Source: Evaluator Calculations

5.10. Vehicle Adoption

a. Description of customer's vehicles before project

San Diego Airport Parking (SDAP)

- 3 Mercedes Sprinter and 1 Ford Transit vans fueled by renewable diesel were in use at this location prior to the Green Shuttle project.

[34] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission 2/1/2021, page 53

Aladdin

- 8 Ford E450 Cutaway buses fueled by propane were in use at this location prior to the Green Shuttle project.

Illumina

- 6 Ford E450 Cutaway buses fueled by propane were in use at this location prior to the Green Shuttle project.

b. Electric vehicles served by project

San Diego Airport Parking (SDAP)

- 2 GreenPower Motor Company electric shuttle buses and 2 Zenith EVs repowered with an electric powertrain by Maxwell Vehicles are serviced by EV charging stations installed at this location.

Aladdin

- 4 Briton Lightning System Ford E450 electric shuttles are serviced by the EV charging stations installed at this location.

Illumina

- 6 Briton Lightning System Ford E450 electric shuttles are serviced by the EV charging stations installed at this location.

c. Petroleum reduction

During the demonstration period of December 2019 to August 2020, SDAP replaced renewable diesel buses that had an average of 18.4 miles per gallon (MPG) fuel economy. On an annual basis, operations represented a use of 44,535 kWh per year. This energy usage equates to a total of 55,669 miles which would have required and equivalent of 3,494 gasoline gallon equivalent (GGE)'s of renewable diesel annually.

Table 59. Green Shuttle Petroleum Reduction Annualized Benefits

	Testimony (4 shuttles and 54 taxis/TNC EVs)	Planned (12 shuttles)	Implemented (2 shuttles)	Best Observed for Carbon Reduction (2 shuttles)
Petroleum Reduction	114,000 GGE	59,000 GGE	3,494 GGE	2,889 GGE

5.11. Greenhouse Gas Emissions Reductions

a. Emissions reductions

The third-party evaluator estimated that there was a slight increase in GHG emissions because the electric vehicles were replacing renewable diesel vehicles.[35]

[35] Final Evaluation Report California Investor-Owned Utility Transportation Electrification Priority Review Projects submitted to the Commission February 1, 2021, page 64.

Table 60. Green Shuttle GHG Emissions Reduction Annualized Benefits

	Testimony (4 shuttles and 54 taxis/TNC EVs)	Planned (12 shuttles)	Implemented (2 shuttles)	Best Observed for Carbon Reduction (2 shuttles)
GHG Emissions Reduction	769 MT of CO2e	492 MT of CO2e	-0.7 MT of CO2e	0.9 MT of CO2e

b. Calculation methodology

As directed by the reporting requirements, SDG&E has adopted the emissions reductions estimate methodology agreed upon by the third-party evaluator (Energetics), the IOUs, and the Energy Division staff.

Emission calculations are determined from an annual energy consumption, and a combination of baseline fuel with the energy factor of 128,488 Btu per diesel gallon as a renewable diesel equivalent.

Table 61. Green Shuttle Operation Annual Emissions

	GHG (kg/yr)	SO_x (kg/yr)	NO_x (kg/yr)	CO (kg/yr)	PM_{10} (kg/yr)	VOC (kg/yr)
Renewable Diesel	12,078	34	121	37	8	10
Electric	12,809	3	11	9	2	2
% Reduction	-6%	90%	91%	76%	76%	82%

Source: Evaluator Calculations

In this instance, vehicle electrification resulted in ~5% increase in GHG emissions.

c. Baseline emissions assumptions and methodology

Determined on a million Btu basis, emission factors for renewable diesel were modeled after the California GREET 3.0 and uses a *US mix* and *Light Duty trucks 2* simulation to provide a reasonable approximation of fuel emissions.

Table 62. Green Shuttle Renewable Diesel Baseline Emission Factors

CO_2 (g/mmBtu)	SO_x (g/mmBtu)	NO_x (g/mmBtu)	CO (g/mmBtu)	PM_{10} (g/mmBtu)	VOC (g/mmBtu)
31,069	87.09	311.22	95.50	20.31	25.77

5.12. Criteria Pollutant Reductions

While there were no meaningful GHG reductions from the pilot, electrification resulted in significant criteria pollutant reductions.

Table 63. Green Shuttle Criteria Pollutant Emissions Reduction Annualized Benefits

	Testimony (4 shuttles and 54 taxis/TNC EVs)	Planned (12 shuttles)	Implemented (2 shuttles)	Best Observed for Carbon Reduction (2 shuttles)
Criteria Pollutants	190 kg of NO_X 140 kg of VOC	130 kg of NO_X	110 kg of NO_X 31 kg of SO_X 8 kg of VOC 28 kg of CO	91 kg of NO_X 25 kg of SO_X 7 kg of VOC 23 kg of CO

Source: Evaluator Calculations

a. Emissions reductions

i. Ozone

The ozone emission type is not a criteria pollutant included in the California 3.0 GREET model. Neither SDG&E, nor the third-party evaluator report included ozone as part of the emission reductions criteria.

ii. Nitrogen oxides

Nitrogen oxides (NO_x) emissions – reductions support healthy air quality standards. The third-party evaluator estimated that this pilot reduced annualized NO_x emission by ~90%. See tables below for additional details provided in the evaluator report.

Table 64. Green Shuttle NO_X Emissions (kg/yr)

	Green Shuttle
Baseline Fuel	121
Electric	11
% Reduction	91%

Baseline fuel for Green Shuttle is renewable diesel

iii. Particulate matter

Particulate matter (PM) are airborne particles that negatively affect health and can be reduced by electrifying transportation. The table below shows the PM benefits of Green Shuttle electrification. PM emissions were reduced by ~75% due to pilot program electrification.

Table 65. Green Shuttle PM Emissions (kg/yr)

	Green Shuttle
Baseline Fuel	8
Electric	2
% Reduction	76%

Baseline fuel for Green Shuttle is renewable diesel

iv. Volatile organic compounds

Volatile organic compounds (VOCs) include a range of chemicals, some of which may have short- and long-term negative health effects and can be reduced by electrifying transportation. The table below shows the VOC benefits of Green Shuttle electrification.

Table 66. Green Shuttle VOC Emissions (kg/yr)

	Green Shuttle
Baseline Fuel	10
Electric	2
% Reduction	82%

Baseline fuel for Green Shuttle is renewable diesel

b. Calculation methodology

Green Shuttle calculation methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

c. Baseline emissions assumptions and methodology

Green Shuttle baseline emission assumptions methodology for criteria pollutants follows the same methodology described in the Greenhouse Gas Emissions Reductions section above.

6. Dealership Incentives

6.1. Executive Summary

On October 7, 2015, Senate Bill (SB) 350, *the Clean Energy and Pollution Reduction Act* (Chapter 547, Statutes of 2015) was signed into law, establishing new clean energy, clean air, and greenhouse gas (GHG) and reduction goals for California for 2030 and beyond. SB 350 requires utilities to undertake transportation electrification activities. As part of the SB 350 goals, San Diego Gas & Electric Company (SDG&E) proposed six Priority Review Projects (PRPs) in an application to the California Public Utilities Commission (Commission) on January 7, 2017 and received approval in Decision (D.) 18-01-024 on January 17, 2018.

The Dealership Incentives PRP was approved to enroll dealership staff in educational training and certification classes to help sell electric vehicles (EVs), battery electric vehicles (BEVs), and plug-in hybrid electric vehicles (PHEVs). The project also incentivized trained staff to sell more of these vehicles financially. SDG&E selected the plug-in vehicle advocacy program Plug-In America (PIA) to implement the program.

6.2. Project Description and Background

a. Goals

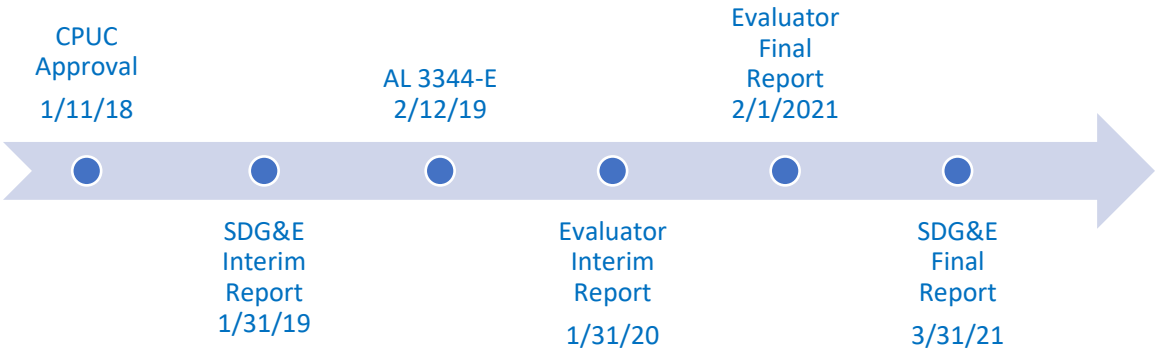
SDG&E's six approved priority review projects were designed to achieve the following goals:

- drive economic growth in the EV sales industry
- provide education and incentives to car dealerships and their sales teams to grow incremental sales of EVs facilitate rapid deployment of transportation electrification as a means to meet California's aggressive greenhouse gas ("GHG") reduction goals, thereby improving the health of all ratepayers and creating a cleaner environment;
- fill and/or jump start sectors within the electric vehicle (EV) market not significantly developed or currently lacking sustainable infrastructure or capital investment;
- create opportunities for private sector participation in the EV market by increasing EV-related demand (e.g., increased EV sales, increased need for charging and data collection infrastructure, increased need for a trained and qualified EV-related workforce);
- promote market integration by facilitating safe and equitable access to electricity as a transportation fuel, including for those living in disadvantaged communities, while improving the efficient use of SDG&E's electric system;
- provide data that will help test and measure the flexibility of EV charging loads and the degree to which the efficient integration of EV loads can yield cost savings to all customers by avoiding future utility infrastructure additions, increasing utilization of renewable resources, or more efficiently using the electric grid; and
- provide education and outreach to residential and commercial customers currently lacking the knowledge or experience necessary to reach the conclusion that investment in EVs or EV infrastructure is economical, safe and good for the public at large.

b. Procedural history

SDG&E received approval from the Commission to begin implementation of six Priority Review Projects on January 11, 2018 in D.18-01-024. The Dealership Incentives project was approved with modifications. SDG&E issued an interim report on January 31, 2019 and the evaluator submitted a Joint-IOU interim report on January 31,2020 and a final evaluator report on February 1, 2021.

SDG&E also filed Advice Letter 3344-E[36] in February 2019, waiving the requirement that customers enroll in an EV TOU rate before paying the dealership incentive. The CPUC issued Resolution E-5006 on August 1, 2019, approving this and a few other modifications, including a modified customer release form for reaching out to purchasers or lessees for evaluation and education follow up.



c. Background research

SDG&E did not have any previous pilots at the time of this application filing.

d. Implementation timeline and milestones

Dealership Incentives Estimated Milestones:

- Initial Pilot: Plug-In America was contracted to administer the program in Q2 2018. The program was launched in August with an initial pilot for a small set of participating dealerships and was active through December 31, 2018.
- Full Program Launch: 15 dealerships are registered to participate in the full Dealership Incentives program. At least two designated EV specialists from each dealership attended a 4-hour training session January 10th and are now eligible to submit incentive claims.
- Competition Launch: A Dealer was launched in June 2019 to promote a healthy competition and drive EV adoption amongst the participating dealerships. Data was collected for sales made June through December 2019. An award ceremony was held in January 2020 to award dealerships and salespeople that achieved the best results in categories such as “Top Selling Dealership” and “Most Improved Sales Person”.
- Closeout: All data and lessons learned from the program were consolidated by Plug-In America and provided to SDG&E in Q1 2020.

6.3. Project participants

a. Description of customers and sites

15 dealerships were enrolled in the program, geographically situated throughout the SDG&E service territory:

[36] Public Utilities Commission of the State of California. August 8, 2019. “Advice Letter 3344-E.” http://regarchive.sdge.com/tm2/pdf/3344-E.pdf

- Audi Carlsbad
- BMW of Escondido
- BMW of San Diego
- Courtesy Chevrolet of San Diego
- Quality Chevrolet of Escondido
- Weseloh Chevrolet
- Pacific Honda
- Mossy Honda Lemon Grove
- Jaguar Carlsbad
- Weseloh Kia Carlsbad
- Mercedes-Benz of San Diego
- MINI of San Diego
- Mossy Nissan Kearny Mesa
- Porsche Carlsbad
- Toyota of Poway

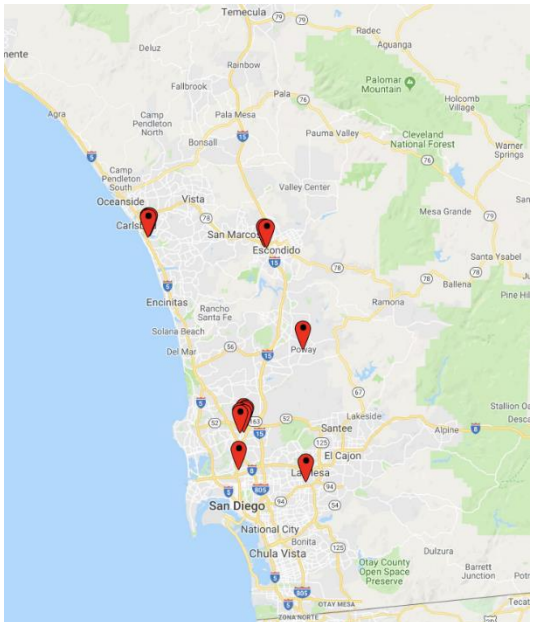


Figure 36. Map of Dealerships in the Initial Pilot Phase

b. Barriers to participation

The biggest barrier to program success was the requirement for the EV customers to enroll in an EV rate for the dealerships and sales staff to receive financial incentives. Advice Letter 3344-E was filed and approved, waiving this requirement as of March 14, 2019.

c. Disadvantaged Community participation

All the participating dealerships were either in or adjacent to DACs.

d. Diverse customer outreach and engagement

The recruitment process began by sending a bulletin through the San Diego New Car Dealer Association. This electronic bulletin invited all dealers registered with the San Diego New Car Dealer Association, including small, locally-owned, minority-owned, and women-owned businesses, to apply for the PlugStar program. After receiving roughly 40 applications, SDG&E and Plug-In America considered the following criteria:

- The dealer's EV Inventory and projected new EV models coming to market
- In or adjacent to a DAC
- DealerRater/Yelp Score
- Evidence of Commitment to EVs (i.e., SDG&E event participation, community outreach, EV advocates, EVs visible for test drives, charging infrastructure)

Those who met the requirements and were approved by both SDG&E and Plug-In America, were then invited to attend the Dealership Training that was held on January 10, 2019. Those dealers who attended the training or already had two certified PlugStar EV specialists, were then officially accepted into the program.

e. Project partners

Plug In America was a partnering organization in this program as they were hired to administer the training and incentive processing. REACH was a sub-contractor of Plug In America and was hired to execute all the ride and drive events for the outreach component of this program.

6.4. Costs

a. Actual and forecast utility direct costs

The PRP had an anticipated total direct cost of $1.79 million (for all operation and maintenance expenses). Of that, $750,000 was reserved for incentives, and the remaining budget was allocated for program education, outreach, and SDG&E program management. The actual PRP direct costs totaled $757,687, or 42% of the budget.

Table 67. Dealership Incentives PRP Costs as of February 2021

	Total Actual Costs	Total Budget	Variance
Customer Engagement and Outreach	$ 921,261	$ 1,675,000	$ (753,739)
SDG&E Program Management and Support	$ 116,427	$ 115,000	$ 1,427
IT Costs, Measurement & Evaluation	$ 58,728	$ 71,600	$ (12,872)
Direct Costs	$ 1,096,415	$ 1,861,600	$ (765,185)
Non-Direct Costs (Overheads, AFUDC, & Property Taxes)	$ 121,577	$ 351,786	$ (230,209)
Total Costs	**$ 1,217,993**	**$ 2,213,386**	**$ (995,394)**

Variances:

- Cost underrun driven by less actual incentives paid than was assumed in the program budget.
- Dealership Incentives did not include any internal IT costs to bring EV Rates into MyAccount.

b. Utility expenditures in Disadvantaged Communities

There were no expenditures specifically in DACs.

c. Customer costs

There were no customer costs for this project.

d. Leveraged funding

There was no leveraged funding for this project.

6.5. Equipment and Competitive Markets

a. Equipment procurement or qualification process

A competitive RFI and RFP was conducted in order to hire the program administrator for this project. Four bids were received for each and Plug In America was selected based on cost, experience, creativity and project plan.

b. Equipment installation

Not applicable to the dealership incentives program.

c. Risks of stranded assets

Not applicable to the dealership incentives program.

6.6. Load Management and Grid Integration

a. Demand at project sites

Not applicable to the dealership incentives program.

b. Description of load management and/or grid integration requirements

Not applicable to the dealership incentives program.

c. Customer outreach strategies used to incentivize managed charging

Not applicable to the dealership incentives program.

i. Effectiveness of outreach

Not applicable to the dealership incentives program.

ii. Communication methods for sending pricing signals to customers

Not applicable to the dealership incentives program.

d. Responsiveness of customers to load management requirements or pricing

Not applicable to the dealership incentives program.

e. Demand response participation

i. Summary of demand response requirements

Not applicable to the dealership incentives program.

ii. Customer participation rates

Not applicable to the dealership incentives program.

iii. Load impacts of participation

Not applicable to the dealership incentives program.

6.7. Outreach and Education

a. Description of customer outreach and education activities

In order to participate in the program, each dealership had to designate a minimum of two dedicated salespeople to go through training and become "EV Specialists". Throughout the life of the program, Plug In America trained 92 sales staff representing 15 dealerships and 11 car manufacturers.

- Two off-site EV Specialist Trainings were held on 9/25/18 and 1/10/19.
- Additionally, the team hosted 11 on-site EV trainings with dealership sales teams.

Each participating dealership was provided with training binders as well as educational collateral on SDG&E EV-TOU rate plans.

Promotional "Glovebox Kits" were created and provided to all new EV customers. Each kit was supplied with an "EV 101" manual that included information about charging, EV rates and more. Additionally, interactive "EV Kiosks" were developed and placed in the lobby of some of the participating dealerships. Each kiosk housed a tablet that had a special EV educational application installed, which was developed specifically for this project. The app allowed passing customers to interact and learn about EV rates and other benefits of driving electric, creating awareness for those that may not have been considering purchasing an EV.

Plug In America conducted a number of activities to ensure ongoing education and awareness of TOU rates to both dealers and consumers:

- Amending the Customer Release Form to highlight TOU rates
- Implementing the EV Support Program (call center), which provides general information on TOU rates and direct customers to SDG&E for more information
- Providing even more detailed training on TOU rates to dealers
- Updating PlugStar.com with more detailed rate information, including more details on TOU rates
- Providing TOU rate collateral to dealers for their information and to hand to customers at the dealership

b. Customer surveys and metrics

i. Description and sample of customer surveys

Between November 2019 and January 2020, PIA sent dealer review surveys to both PlugStar customers and PIA's larger national email list. The average PlugStar dealer rating was 4.6 out of 5 stars, this was higher than the national non-PlugStar dealer rating of 3.5 out of 5 stars. The questions from the PIA survey are included in Appendix B.

ii. Customer satisfaction with project

Customer completed a survey in response to their sales experience, as referenced above. The customer did not complete a survey in regards to the project.

iii. Customer-reported incremental vehicle adoption due to project

In the duration of the program, 357 dealer EV sales were reported.

iv. Effectiveness of customer outreach methods

10-20% of the EV customers said they visited PlugStar.com prior to purchasing an EV. Over 13,000 visitors to PlugStar.com came from the San Diego Metro area. PIA conducted 9 EV ride and drives with 1,286 EV experiences.

6.8. Safety

a. Summary of relevant safety requirements

Not applicable to the dealership incentives program.

b. Safety issues reported during project and actions taken to correct them

No Safety Issues were reported/observed during the dealership incentives program.

6.9. Lessons Learned

a. Summary Table

Table 68. Dealership Incentives Lessons Learned

Issue	Resolution	Recommendations
Overly prescriptive requirements – SDG&E went into program design within our testimony; not being so restrictive within the parameters of the design. Tying the EV-TOU rate requirement directly to the salesperson incentive substantially hindered program performance in San Diego when compared to Sacramento (SMUD), which did not have the EV-TOU rate requirement and was able to achieve greater total claims with lower incentive levels. San Diego dealers became discouraged when they were not receiving payment and in turn stopped reporting sales and giving SDGE permission to contact their customers about an EV-TOU rate.	SDG&E utilized the language in the decision that allowed for program modifications via an approved Tier 2 Advice Letter.	Allow for broader descriptions in the project design when it comes to future filings; it is important to be flexible with market/customer needs. An EV-TOU rate is not always the best option for our customers and that should not negatively affect the dealer/salesperson's financial incentive. Require that the salesperson provide customers with information on the EV-TOU rate and sign customers up to speak with SDGE about the rate, but not withhold the incentive based on whether the customer actually switches rates.

b. Project Assessment

This program successfully educated salespeople across the region to confidently speak to and answer questions about EVs. The PlugStar program empowers dealerships, increases sales, and pleases EV car-buyers.

For dealerships:

- The program witnessed that PlugStar trained sales staff sell ~4 times more EVs than their untrained counterparts.
- 100% of PlugStar dealers indicated they sold more EVs because of PlugStar training, even without a monetary incentive
- Dealerships were extremely happy with the program, as 100% of PlugStar dealers give the program 5-stars (1-5 scale)

For EV Customers:

- 10-20% of EV customers visited PlugStar.com prior to purchasing an EV.
- Plug In America sent dealer review surveys to both PlugStar customers and PIA's larger national email list. The average ***PlugStar dealer rating was 4.6 out of 5 stars***, this was higher than the national non-PlugStar dealer rating of 3.5 out of 5 stars.

The program can easily be scaled up with the appropriate resources. Since the implementation of the Dealership Incentives program, Plug In America has modified their training materials to accommodate

online training that can be completed at the users' own time. This will add efficiency as the sales staff doesn't have to be taken out of the stores to complete training and can do it on their own time.

6.10. Vehicle Adoption

a. Description of customer's vehicles before project

Not applicable to the dealership incentives program.

b. Electric vehicles served by project

Not applicable to the dealership incentives program.

c. Petroleum reduction

Not applicable to the dealership incentives program.

6.11. Greenhouse Gas Emissions Reductions

a. Emissions reductions

Not applicable to the dealership incentives program.

b. Calculation methodology

Not applicable to the dealership incentives program.

c. Baseline emissions assumptions and methodology

Not applicable to the dealership incentives program.

6.12. Criteria Pollutant Reductions

a. Emissions reductions

i. Ozone

Not applicable to the dealership incentives program.

ii. Nitrogen oxides

Not applicable to the dealership incentives program.

iii. Particulate matter

Not applicable to the dealership incentives program.

iv. Volatile organic compounds

Not applicable to the dealership incentives program.

b. Calculation methodology

Not applicable to the dealership incentives program.

c. Baseline emissions assumptions and methodology

Not applicable to the dealership incentives program.

Appendix A: SDG&E Dealership Incentives Program Additional Project-Specific Questions

a. Number of drivers enrolled in EV rate as a result of dealership incentives:

59 total customers enrolled in EV-TOU through the dealership incentives program.

Appendix B: In-Dealer PlugStar Survey Questions

1. Dealership Name
2. Full Name
3. How would you rate the PlugStar program overall on a scale of 1 to 5 (5 being best)?
4. What's the main reason you gave it this rating?
5. Monetary incentive aside, do you think the PlugStar program's training and support have resulted in your dealership selling more EVs than you might have otherwise?
6. If yes, which of the following contribute to selling more EVs (select all that apply):
7. Please explain
8. We stocked more EVs than we would have without it.
9. We sold more EVs than we would have without it.
10. We put more sales staff through PlugStar EV training than we would have without it.
11. Should the dealer incentive be more, less or the same amount to convince you to stock more EVs?
12. If not the same, by how much more or less?
13. Why?
14. The claims submission process was straightforward.
15. The amount of time it took to receive payment on claims was reasonable (met your business needs or expectations).
16. We got timely help with submitting claims.
17. We sold more EVs than we would have without the program.
18. Our sales staff are more confident in selling EVs.
19. We stocked or pursued stocking more EVs.
20. We have a stronger relationship with the sponsoring utility (e.g. SMUD, SDG&E.)
21. We understand how to communicate charging to customers better.
22. Adding a dealer incentive for the sale of used EVs would result in us selling more EVs.
23. How much would the used EV incentive need to be?
24. Why?
25. Training for sales and back office staff
26. The salesperson incentive for EV sales.
27. The dealership incentive for EV sales.
28. In-dealer visits by our PlugStar field rep.
29. The EV support helpline (phone/email).
30. How might we improve the program? Examples: - How we communicate with dealerships.- How we incentivize dealers.- How we train and support dealers.
31. Would you like more Glovebox EV Welcome kits?
32. Do the EV welcome kits add value?
33. How are your customers taking delivery of these EV kits?
34. If you had to pay for the kits, what would be an acceptable price?
35. Is there anything you'd like to see changed?
36. There are sometimes cases where a person who received PlugStar training does not submit EV sale claims. Why do you think this could be the case?
37. Which of the following most accurately describes your view of PlugStar training:
38. Please describe