Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

EVALUATION PLAN

FINAL

2023 Load Impact Evaluation of San Diego Gas and Electric's Vehicle Grid Integration Rates

Prepared for San Diego Gas & Electric

By Demand Side Analytics, LLC

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ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

Tables

1 INTRODUCTION

This evaluation plan lays out the analysis approach and requirements for evaluating impacts for SDG&E's Vehicle Grid Integration (VGI) rates, known as Power Your Drive (PYD).

There are two main objectives for this evaluation plan. The primary objective is to engage in science and avoid after-the-fact analysis and decisions where there is a temptation to modify models to find the desired results. This requires documenting the hypothesis, specifying the intervention, establishing the sample size and the ability to detect a meaningful effect, identifying the data that will be collected and analyzed, identifying the outcomes that will be analyzed and segments of interest, and documenting in advance the statistical techniques and models that will be used to estimate energy savings and demand reductions. The goal is to leave little to no ambiguity regarding what data will be collected or how the data will be analyzed. The secondary objective is to comply with the California Load Impact Evaluation Planning Protocols (Protocol #2). As a result, the evaluation plan is customized the explicitly address the 12 questions in the planning protocol.

Key issues that affect the evaluation approach are:

- Lack of an appropriate control pool. An appropriate pool of control customers would be multi-unit dwelling (MUD) and workplace level 2 charging stations that are not enrolled.
- The Power Your Drive Customers face wholesale market prices and at no time experience the otherwise applicable tariff. Thus, the analysis relies on estimating the relationship between charging behavior and market prices.
- Power Your Drive is a non-event based options. Once a customer enrolls on RTP, they are always on that rate and do not experience and the ON/OFF pattern common to dispatchable DR programs.

2 METHODS

Table 1 summarizes the key research questions pertinent to the evaluation of the PYD Program.

Table 1: Key Research Questions

	Research Question
1	How many charging stations are enrolled by customer type and how has this changed over time?
2	What is the utilization of charging stations by customer segment?
3	What was the load shift in 2023 under the VGI rate and adder events?
4	Can the impact of local T&D price signals be separately identified from system price signals? If so, what was the impact of local T&D price signals? Do impacts differ at sites located on circuits with a high number of called T&D events?
5	If sample size allows, how do customers that consistently use the same sites respond?
6	How do load impacts vary for different customer sizes, locations, and customer segments?
7	What concrete steps or experimental tests can be undertaken to improve program performance?

Error! Reference source not found. summarizes the data sources, segmentation and estimation m ethods that will be used. The segmentation is of particular importance because the evaluation will use a bottom up approach to estimate impacts for each segment and ensure that aggregate impacts across segments add up to the sum of the parts. This will be done to address discrepancies between segment and aggregate impacts in past evaluations which took a top down approach for aggregate impacts. Because impacts for each segment will be added together it is important that segmentation be structured to be mutually exclusive and completely exhaustive. In other words, every customer needs to be assigned to exactly one segment.

Table 2: Evaluation Methods PYD

Methodology Component	Approach
Data Sources/Samples	Our plan is to analyze the EV session data for all EV ports. The analysis will include all PY 2021, PY2022, and PY 2023 data. The data fill in gaps with zero values focus on charging (not just whether is plugged in)
Segmentation of impact results	The results will be segmented by: ▪ Aggregate and Average Customer;

	▪ Rate to Driver v. Rate to Host ▪ Multi-family v. Workplace ▪ Max Daily Price
Estimation Method: Ex-Post	The date will be analyzed in two ways. ▪ A panel regression with fixed effects and time effects that estimates the relationship between peak pricing and peak energy use (price elasticity) ▪ A panel regression that treats supply and distribution adders as events. ▪ No control group will be used. ▪ Separate regression will be estimated for multi-family, workplace rate-to-driver, and workplace rate-to-host ▪ Ex-post tables will be produced for PYD. To do so, we will assume that customers would have enrolled in the otherwise applicable rate used for the building.
Estimation Method: Ex-Ante	Ex-ante Impacts are not required for PYD

3 EVALUATION PLANNING PROTOCOL

Table 6 lists the study design question in the California Load Impact Protocols and details how the evaluation plan addresses each study design issue for each program.

Table 3: Evaluation Planning Questionnaire

#	Study design issue	PYD
1	Will the evaluation rely on a control group? If so, how will it be developed and what comparisons between the treatment and control group will be made?	No. The study will rely on daily and hourly price variation to assess the relationship between charging behavior and prices
2	Will the evaluation rely on pre-intervention data to establish a baseline?	No. Charging session without the real time pricing is not available
3	Will the study rely on a sample or include the full population receiving the intervention? If a sample is used, does it meet 90/10 precision requirements?	The study will include the full population receiving the intervention.
4	Is the study designed to detect a specific effect size? And, if so, how was statistical power assessed?	N/A
5	What is the study's threshold for statistical significance?	90% confidence using a two-tailed test
6	What is the size of the control and treatment groups, if applicable?	N/A
7	How will the evaluation address outliers?	Observation where usage exceeds the charger throughput will be dropped.
8	How will the evaluation address attrition?	Not applicable.
9	How will standard errors be calculated?	Time and fixed effects panel regression using clustered (at customer level), robust standard errors
10	Will estimates be developed for subcategories? If so, please define them.	Yes, refer to segmentation in Table 5
11	Will energy savings be estimated?	No
12	Will overlap with energy efficiency programs be estimated?	No

4 DATA NEEDED

Demand Side Analytics delivered a data request for the EV-TOU analysis on September 11th, 2022. At a high level, the data request includes five items:

1. A customer characteristic file for all sites on a PYD/VGI rate at any time in 2021 or 2022 and a random sample of residential non-participant sites.
2. PYD site characteristics
3. Hourly Vehicle charger sessions data for all EV chargers
4. Power Your Drive Hourly Pricing Data by location, ideally separating the hourly market prices, system capacity adder, and distribution capacity adder

5 TIMELINE

The evaluation work has been scoped into seven tasks. All but Task 6 (Project Management) have corresponding deliverables, laid out in Table 4.

Table 4: Evaluation Timeline and Deliverables

Task	Deliverable PY 2022	Due Date	Completed
Task 1 Conduct Project Initiation Meeting	PI Meeting:	September 2022	8/29/2023
	PI Meeting Memorandum:	Five business days after the PI Meeting	8/31/2023
Task 2 Develop Measurement and Evaluation Plan	Draft EM&V Plan:	October 2022	10/10/2023
	Final EM&V Plan:		
Task 3.1 Data Collection and Validation	Draft Data Request	Within 5 days of kickoff meeting	8/31/2023
	Final Data Request	Within 10 days of kickoff meeting	9/11/2023
Tasks 3 & 4 Impact Analysis & Reports	Draft Ex-Post LI Estimates (table generators/report)	Due late December, 2022	
	Final Ex-Post LI Estimates (table generators/report)	Due early January, 2024	
	Draft Ex-Ante LI Estimates (table generators/report)	Due February 15th, 2024	
	Final Ex-Ante LI Estimates (table generators/report)	Due March 1st, 2024	
	Final hourly and monthly Ex-Post and Ex-Ante datasets	Due March 1st, 2024	
	Executive Summary write-up for April 1st reports	Due March 15th, 2024	
	Non-technical abstract for CALMAC website	Due April 10th, 2024	
Task 5 Presentation of Results	Presentation	Date to be determined	
Task 7 Database documentation	Integrated project database	March 1st, 2024	
	Database specifications and documentation	March 1st, 2024	