BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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Application of SAN DIEGO GAS & ELECTRIC COMPANY (U902E) for Approval of its Electric Vehicle-Grid Integration Pilot Program.	A.14-04-014 (Filed April 11, 2014)
And Related Matter.	Rulemaking 13-11-007 (Filed November 22, 2013)

LOAD RESEARCH REPORT COMPLIANCE FILING OF PACIFIC GAS AND ELECTRIC COMPANY (U 39 E), ON BEHALF OF ITSELF, SOUTHERN CALIFORNIA EDISON COMPANY (U 338 E), AND SAN DIEGO GAS AND ELECTRIC COMPANY (U 902 M) PURSUANT TO ORDERING PARAGRAPH 4 OF D.13-06-014

CHRISTOPHER J. WARNER

Pacific Gas and Electric Company
77 Beale Street, B30A
San Francisco, CA 94105
Telephone: (415) 973-6695
Facsimile: (415) 972-5220
E-Mail: CJW5@pge.com

Attorney for
PACIFIC GAS AND ELECTRIC COMPANY

Dated: December 24, 2015

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of SAN DIEGO GAS & ELECTRIC COMPANY (U902E) for Approval of its Electric Vehicle-Grid Integration Pilot Program.	A.14-04-014 (Filed April 11, 2014)
And Related Matter.	Rulemaking 13-11-007

LOAD RESEARCH REPORT COMPLIANCE FILING OF PACIFIC GAS AND ELECTRIC COMPANY (U 39 E), ON BEHALF OF ITSELF, SOUTHERN CALIFORNIA EDISON COMPANY (U 338 E), AND SAN DIEGO GAS AND ELECTRIC COMPANY (U 902 M) PURSUANT TO ORDERING PARAGRAPH 4 OF D.13-06-014

Pacific Gas and Electric Company, on behalf of itself, Southern California Edison, and San Diego Gas & Electric Company, hereby files the Load Reserarch Report, attached hereto as Appendix A, as required by Ordering Paragraph 4 of Decision (D.) 13-06-014. The Load Research Report was prepared based on the load reserarch methodology developed by the California Public Utilities Commission's Energy Division with input from stakeholders pursuant to Ordering Paragraph 3 of D.13-06-014.

Respectfully Submitted,

CHRISTOPHER J. WARNER

By: */s/ Christopher J. Warner*
CHRISTOPHER J. WARNER

Pacific Gas and Electric Company
77 Beale Street, B30A
San Francisco, CA 94105
Telephone: (415) 973-6695
Facsimile: (415) 972-5220
E-Mail: CJW5@pge.com

Attorney for
PACIFIC GAS AND ELECTRIC COMPANY

Dated: December 24, 2015

Joint IOU Electric Vehicle Load Research Report

4th Report

Filed on December 24, 2015

Electric Vehicle Load Research and Cost Studies

R.09-08-009/R.13-11-007 (AFV OIR)

Ordered in D.11-07-029 and D.13-06-014

Contents

Executive Summary

On July 25, 2011, the California Public Utilities Commission (CPUC or Commission) issued D.11-07-029 (the Phase 2 Decision) in the Alternative-Fueled Vehicle Rulemaking, R.09-08-009 (AFV OIR), to evaluate policies and develop infrastructure sufficient to overcome barriers for the deployment and use of Plug-in Electric Vehicles (PEV) in California. The Phase 2 Decision ordered California's investor-owned utilities (IOU), made up of Pacific Gas and Electric (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison (SCE), to conduct research to examine PEV customer charging behavior, as well as track service and distribution system upgrade costs related to PEV load. The IOUs filed the first Joint IOU Electric Vehicle Load Research Report (1st Load Research Report) in December 2012. Decision 13-06-014, issued July 3, 2013 (the Extension Decision), extended the research for an additional three years[1] with reports to begin in December 2013.[2] The Extension Decision also directed the Energy Division to work with stakeholders to revise the load research methodology.[3]

This December 2015 report (4th Load Research Report) includes data through October 2015 for service line and distribution system upgrades and for the period September 2014 through August 2015 for load research data, along with the conclusions reached through analyzing this data. Data from the 1st, 2nd, and 3rd Load Research Reports are considered in drawing conclusions. It is important to note that the PEV market is still evolving. New vehicle models, vehicle battery sizes, charging levels, charging equipment, and charging services are continually entering the PEV market. PEV manufacturers and charging providers are also leaving the market. This evolution is expected to continue in the near team as the PEV market grows and matures.

As of October 31, 2015, the IOUs estimate there are over 141,642 PEVs within the three service territories. Of the 141,642 vehicles estimated to be currently on the road, only 208, or 0.1%, have required a service line and/or distribution system upgrade solely to support the PEV load. Further, PG&E and SCE have completed more than 18,836 residential infrastructure checks related to PEVs[4] and only 208, or 1.1%, of the checks identified the need for an upgrade. In all but 29 instances, the standard allowance for residential service upgrades was sufficient to cover the portion of the service upgrade cost that is assigned to the utility.[5] The IOUs have evaluated the service and distribution system upgrades needed due to the addition of PEV load and have determined that the number of upgrades and associated costs to date is immaterial.

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1 D.13-06-014, p. 15.

2 D.13-06-014, Ordering Paragraph 4.

3 D.13-06-014, Ordering Paragraph 3.

4 SDG&E does not separately track distribution infrastructure checks related to PEVs, the service call is tagged as PEV only if a construction project is opened to perform an upgrade.

5 For a service line upgrade, the utility is responsible for the cost of the service conductor, connecters, support poles, and metering. These costs are covered by the residential allowance and any amount in excess of the allowance (absent the CPUC's current policy for the excess to be paid by all customers for upgrades related to PEVs) is billed to the customer. The customer is responsible for any trenching, conduit, substructures, or protective structures required for the upgrade. These costs are not covered by the residential allowance, or the CPUC policy currently in place that directs costs in excess of the allowance to be paid by all customers.

Generally, the usage and demand levels for customers on single-metered PEV rates are higher than that of the typical residential customer. PEV customers (separately-metered and single-metered) on Time-of-Use (TOU) rates take advantage of the lower off-peak costs and tend to charge their vehicles during the super off-peak period. Single-metered PEV customers tend to peak during the super off-peak period. Many of these customers use timers either equipped in the vehicle or on the charging station.

The IOUs tracked load research data on a monthly basis and have included 12 months of data in this report. The usage and demand of customers were tracked in each rate group. The goal of this structure was to determine how monthly usage varies, how rates impact peak demand, and how usage varies by time-of-use rate among different groups of customers.

Part 1: Introduction

California is the 15th largest emitter of greenhouse gases in the world, representing about 2% of worldwide emissions.[6] California's transportation sector is the largest contributor, consisting of 37% of the State's total greenhouse gas emissions. Passenger vehicles alone are responsible for almost 26% of California's greenhouse gas emissions. To address these vehicle emissions, the California Air Resources Board (CARB) proposed a comprehensive three pronged strategy, which includes the following: reduce greenhouse gas emissions from vehicles, reduce the carbon content of the fuel vehicles use, and reduce the miles vehicles travel. Electrification of vehicles is a critical component of this strategy.[7]

The CPUC opened the Alternative-Fueled Vehicle Rulemaking, R.09-08-009 (AFV OIR), to consider alternative-fueled vehicle tariffs, infrastructure, and policies to support California's Greenhouse Gas Emissions Reductions Goals.

At the time of this report, December 2015, Go Electric Drive lists on its online virtual showroom 17 PEVs currently for sale by dealers[8]: the Audi A3 Sportback, BMW i3, BMW i8, Chevrolet Volt, Fiat 500e, Ford C-Max Energi, Ford Focus Electric, Ford Fusion Energi SE, Honda Accord Plug-in, Honda Fit-EV, Mercedes-Benz B-Class Electric Drive, Mitsubishi iMiev, Nissan Leaf, Porsche Panamara S E-Hybrid, Tesla Model S, Toyota Prius Plug-in, , and Volkswagen E-Golf. These vehicles have on-board chargers capable of charging at levels ranging from 3.3 kW to 19.2 kW.

The IOUs estimate more than 141,642 PEV are in their service territories, as of October 31, 2015. The number of PEVs forecasted to be operating in the IOUs service territories from 2016 through 2022 are:

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6 *Climate Change Scoping Plan, A Framework for Change, Pursuant to AB 32, the California Global Warming Solutions Act of 2006* (herein ARB's 2008 Scoping Plan) at 11, adopted by the California Air Resources Board on December 11, 2008. The ARB 2008 Scoping Plan is available at: http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm.

7 D.11.07-029, p 3-4.

8 http://www.goelectricdrive.org/electric-cars/virtual-showroom.

Year	PG&E[9]	SCE[10]	SDG&E[11]
2016	122,000	103,270	16,036
2017	164,000	151,796	20,024
2018	211,000	211,534	24,289
2019	262,000	278,244	29,708
2020	316,000	356,324	37,311
2021	388,000	443,456	46,940
2022	473,000	540,308	61,618

This report includes data through October 2015 for service line and distribution system upgrades and for the period September 2014 through August 2015 for load research data along with the conclusions reached analyzing the data. Data from the 1st, 2nd, and 3rd Load Research Reports are also considered in drawing conclusions. It is important to note that the behavior of the early adopters of PEVs during this time period may not be representative of the average customer. While the data collected is illustrative of the behaviors of early adopters of PEVs, one cannot conclude that these behavior patterns will hold as PEV technology matures, charging technology and charging behaviors evolve, and PEVs achieve greater market adoption beyond the early adopter phase.

9 PG&E's EV forecast assumes sufficient customer demand in California to meet the CARB's Zero Emission Vehicle compliance requirements and sufficient installation and maintenance of EV infrastructure, including by electric utilities in the State, to support EV customer needs for EV charging infrastructure. If either of these assumptions is not accurate, then forecast EV market penetration likely will be significantly less than PG&E's forecast.

10 SCE's PEV Forecast Methodology Overview presentation to California Energy Commission (CEC) Integrated Energy Policy Report (IEPR) workshop on August 21, 2013.

11 SDG&E Electric Vehicle-Grid Integration Pilot Program Application (A.14-04-014), Direct Testimony of J.C. Martin, Revised July 29, 2014, page JCM-17.

Part 2: Scope of Load Research

In the Phase 2 Decision, the CPUC required the IOUs to perform load research to inform future Commission policy.[12] The CPUC determined that additional research is needed to inform policies for the next stages of PEV market development.[13] Specifically, the CPUC ordered the IOUs to:

1. Track and quantify all new load and associated upgrade costs in a manner that allows PEV load and related costs to be broken out and specifically identified. This information shall be collected and stored in an accessible format useful to the Commission.

2. Evaluate how metering arrangements and rate design impact PEV charging behavior.

3. To the extent relevant, determine whether participation in demand response programs impacts PEV charging behavior.

4. Determine how charging arrangements, including metering options and alternative rate schedules impact charging behavior at Multi-Dwelling Units (MDU).

5. Evaluate whether distribution costs are increased by different charging levels, i.e., Level 1, Level 2, and quick charging, in public locations.

6. Separately track costs associated with PEV-related residential service facility upgrade costs and treated as "common facility costs" between the effective date of this decision and June 30, 2013, and propose a policy and procedural mechanism to address these residential upgrade costs going forward.[14]

In collaboration with the Energy Division and other stakeholders, the IOUs developed a load research plan to meet these specific requirements and filed the plan with the CPUC on October 1, 2012.[15] The plan identified certain areas where data is not available or sufficient to produce data or conclusions. The CPUC further ordered the IOUs to complete the load research by January 1, 2013 and file a load research report by January 1, 2013.[16] The IOUs filed the 1st Load Research Report in December 2012. The Extension Decision extended the research an additional three years[17] to begin in December 2013[18] and directed the Energy Division to work with stakeholders to revise the load research methodology.[19] The deadline for the December 2013 report was extended to January 31, 2014 by CPUC Executive Director Paul Clanon, to allow the IOUs more time to prepare the report under the revised methodology. This December 2015 report is the fourth report to be filed.

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12 D.11-07-029, p. 3.
13 D.11-07-029, p. 60.
14 D.11-07-029, Ordering Paragraph 6.
15 *See* Advice Letters 2403-E for SDG&E, 2786-E for SCE, and 4115-E for PG&E.
16 D.11-07-029, Ordering Paragraph 7.
17 D.13-06-014, p. 15.
18 D.13-06-014, Ordering Paragraph 4.
19 D.13-06-014, Ordering Paragraph 3.

Part 3: Cost Tracking Data, Findings, and Policy Recommendations

Introduction

In the Phase 2 Decision the CPUC ordered that "Between July 25, 2011 and June 30, 2013, all residential service facility upgrade costs in excess of the residential allowance shall be treated as common facility costs rather than being paid for by the individual plug-in hybrid and electric vehicle customer."[20] The CPUC further ordered "the IOUs to separately track costs associated with PEV-related residential service facility upgrade costs and treated as 'common facility costs' and propose a policy and procedural mechanism to address these residential upgrade costs going forward."[21] Lastly, the CPUC ordered that "The IOUs should evaluate whether distribution costs are increased by different charging levels, i.e., Level 1, Level 2, and quick charging, in public locations."[22]

The Extension Decision extended the "common facility treatment" for costs in excess of the allowance to June 30, 2016,[23] and extended the cost tracking and research an additional three years[24] with reporting to begin in December 2013.[25]

Approach

Based on notification of a PEV's location, such as from the customer or auto Original Equipment Manufacturers (OEM) the utilities' service planning departments may conduct assessments of the customer's service line and the distribution system supporting the customer's electric service (such as the secondary line, transformer, etc.) to determine whether the new PEV load can be served by the existing infrastructure. The assessment considers factors such as voltage drop and flicker on the service and diversity of load on the local distribution system feeder. If the assessment indicates that existing infrastructure can accommodate the new PEV load, no upgrade is needed and the assessment is complete. If the existing infrastructure cannot accommodate the new PEV load, then the customer service line and the distribution system supporting the customer service are evaluated to determine if one or both need to be upgraded. As part of the evaluation, the service planning departments consider if the upgrade was needed before the addition of the PEV, and the PEV simply brought attention to the need for the upgrade. If an upgrade was needed before the addition of the PEV, then the upgrade is not attributed to the PEV because the PEV did not cause the need for the upgrade.[26] Similarly, if the customer is adding a PEV plus other new load such as a room addition, air conditioner, or pool pump, and an upgrade is needed, the upgrade is not attributed to the PEV since it was not the sole source of

[20] D.11-07-029, Ordering Paragraph 5.
[21] D.11-07-029, Ordering Paragraph 6.
[22] D.11-07-029, Ordering Paragraph 6.
[23] D.13-06-014, Ordering Paragraph 1.
[24] D.13-06-014, p 15.
[25] D.13-06-014, Ordering Paragraph 4.
[26] That is, if a customer notified the utility she intended to buy a PEV and the utility did an infrastructure check that determined an upgrade was needed even before the addition of the PEV load, even if the customer ultimately decided not to purchase the car the upgrade would still be completed because it was needed absent the PEV.

the new load.[27] Once the evaluation is complete, a new project is opened for the upgrade and attributed to the PEV if it was the sole source of the new load and an upgrade was not needed before the PEV was added. The utilities create PEV-specific work orders to capture the upgrade costs and track them for reporting purposes when the upgrade work is complete. This is the most practical way for the IOUs to capture and report upgrade costs attributable solely to PEVs.

Upgrade costs related to PEVs fall into three general categories:

- Equipment on the customer side of meter
- The individual customer service line, and
- The utility distribution system that serves multiple customers.

The costs for each category are treated differently.

Costs for equipment on the customer side of the meter are borne by the customer and the utility does not have information on these costs. Therefore, they are not included in this report.

The table on the following page illustrates how costs for upgrades to the individual customer service line are split between the customer and the utility. The customer's assigned costs are the costs incurred in fulfilling the Applicant Responsibility of Rule 16. The utility's contribution toward the utility-assigned costs is limited to the amount of the residential allowance and any costs in excess of the allowance are billed to the customer. The customer is responsible for the costs of the service line upgrade that are assigned to them. These costs are not covered by the residential allowance or by the CPUC policy currently in place that directs costs in excess of the allowance to be paid by all customers. The utility does not have information on the costs borne by the customer for the service upgrade and they are not included in this report.

Costs for upgrades to the utility distribution system, including secondary lines and transformers, are paid by the utility and recovered through distribution rates. The following table summarizes the types of costs in each category and the party responsible for the costs.

[27] The upgrade would be completed absent the PEV because other new load is being added.

Table IOU-1: Summary of Upgrade Costs and Responsibilities

	Customer Assigned Costs	Allowance?	Utility Assigned Costs
Equipment on Customer Side of Meter	Customer pays all costs for charging equipment, including costs to plan, design, install, own, maintain, and operate facilities and equipment beyond the Service Delivery Point		
Service Line Upgrade	• Excavation: trenching, backfilling, and other digging as required including permit fees • Furnishing, installing, owning, and maintaining all Conduits (including pulling tape) and Substructures, furnishing riser materials • Protective Structures: Furnishing, installing, owning, and maintaining all necessary Protective Structures as specified by utility for utility's facilities	Yes, to cover work responsibility assigned to utility. Customer pays amount exceeding allowance. This is in addition to Customer assigned costs. **NOTE: CPUC policy exemption in place through June 2016 for residential upgrades when PEV load is added. Under exemption, amount exceeding allowance is not paid by customer and instead paid by utility and recovered through distribution rates.**	• Underground Service: Service conductors and connectors • Overhead Service: conductors and support poles • Metering: meters and associated utility owned metering equipment
Secondary Lines/ Transformer Upgrade (serving 2 or more Service Lines)			Utility pays all costs for upgrading and maintaining the distribution system. Recovered through distribution rates.

Summary Data

Table IOU-2 summarizes the PEV-related service line and distribution system upgrade costs for July 2011 through October 2015.

Table IOU-2: Summary of Service Line and Distribution System Upgrades

	PG&E	SCE	SDG&E	Total
Residential Customers				
Estimated PEV customers through September 30, 2015	73,542	50,100	18,000	141,642
Residential Upgrades				
Number of PEV-related Infrastructure Checks Completed	6,543	12,293	Not[28] tracked	18,836
Number PEV-related Service Line and/or Distribution System Upgrades[29]	162	32	14	208
Total Costs Incurred by Utility for Upgrades	$3,411,115	$161,655	$33,917	$3,606,687
Range of Costs for Upgrades	$148-$275,817	$274 to $33,499	$258 to $11,604	N/A
Average Cost for Distribution System Upgrade[30]	$19,481	$6,524	$4,089	N/A
Average Cost for Service Line Upgrade	$1,603	$2,241.27	$853	N/A
Number of Service Line Upgrades Exceeding Residential Allowance	29	0	0	29
Current Residential Allowance	$1,918[31]	$3,038	$2,841[33]	N/A
Amount of Foregone Billings to Customers for Service Line Upgrades Pursuant to "Common Facility Treatment" Policy Exemption for PEVs	$152,750	$0	$0	$152,750

[28] SDG&E does not separately track distribution infrastructure checks related to PEVs, the service call is tagged as PEV only if a construction project is opened to perform an upgrade.

[29] If a both a service line upgrade and distribution line upgrade was performed at the same residence, it is counted as one upgrade.

[30] For upgrades that included both a distribution system and service line upgrade PG&E and SDG&E broke them out between the distribution upgrade and service line upgrade line items. SCE reported total amount in distribution system upgrade line item.

[31] PG&E Electric Rule 15, Section C.3: http://www.pge.com/tariffs/tm2/pdf/ELEC_RULES_15.pdf.

[32] SCE Electric Rule 15, Section C.3: https://www.sce.com/NR/sc3/tm2/pdf/Rule15.pdf.

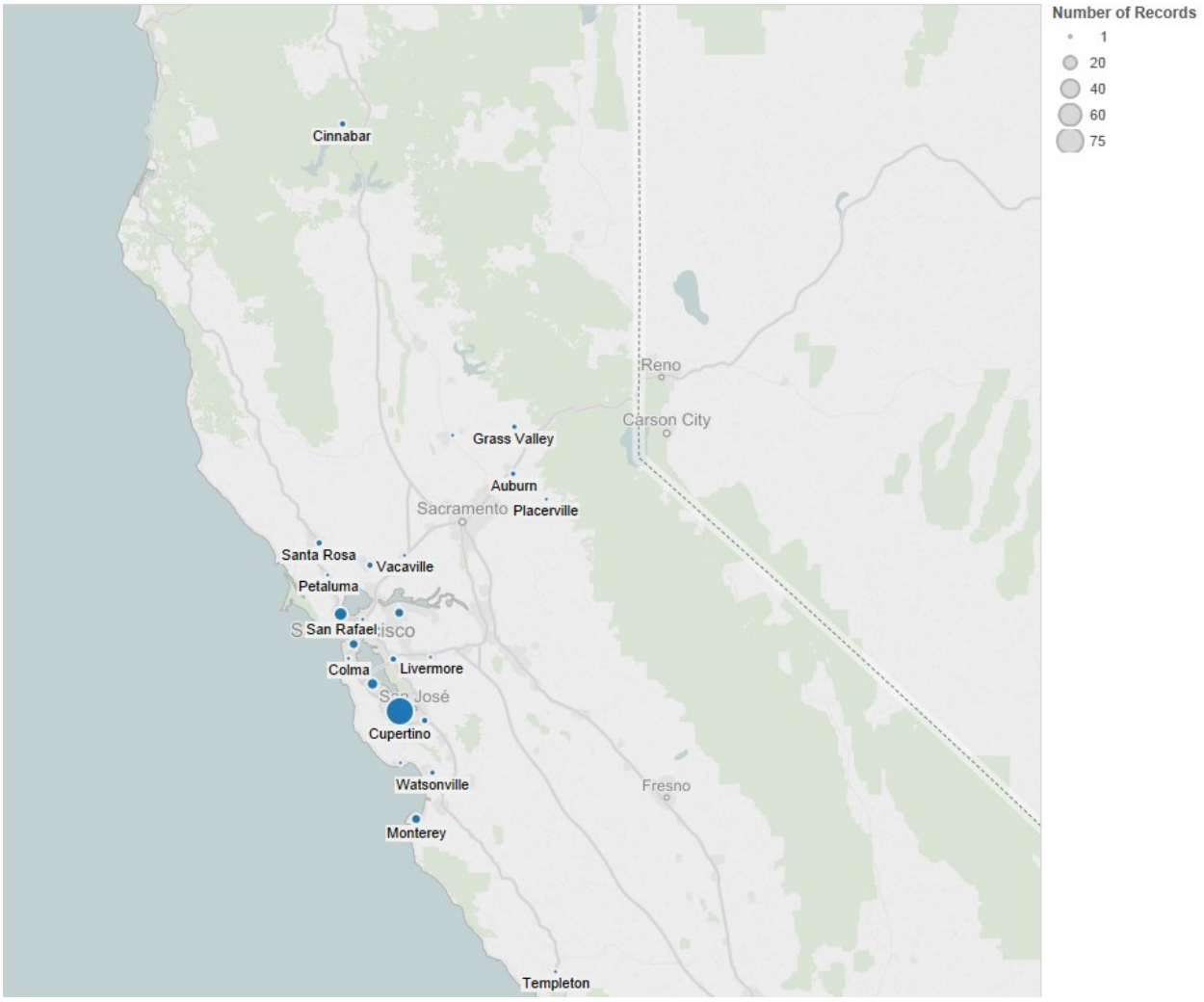
[33] SDG&E Electric Rule 15, Section C.3: http://regarchive.sdge.com/tm2/pdf/ELEC_ELEC-RULES_ERULE15.pdf.

PG&E Specific Details

As of October 2015, PG&E's best estimate of the number of PEVs in the PG&E service territory is 73,542. This value reflects all PEVs registered in PG&E service territory according to data obtained via EPRI from R. L. Polk (a third party Department of Motor Vehicles (DMV) data aggregator).

While PG&E's total estimate of PEVs in the service territory is 73,542, PG&E is only able to perform service assessments for customers that notify the utility of their PEV status. As of October 31, 2015, PG&E had completed 6,543 such service assessments. Of the 6,543 service assessments completed to date, 162, or 2.4%, have required upgrades due solely to the addition of PEV load. In 29 instances the allowance was not sufficient to cover the portion of the service upgrade assigned to the utility, and the customer would have incurred additional costs had the exemption not been in place. The total cost of the excess over the allowance for the 29 customers combined was $152,750. The map below identifies the locations of all 162 upgrades.

Figure PG&E-1: Location of Customers in the PG&E's Service Territory Requiring a Residential Upgrade Due to a PEV in 2015 (as of October 2015)



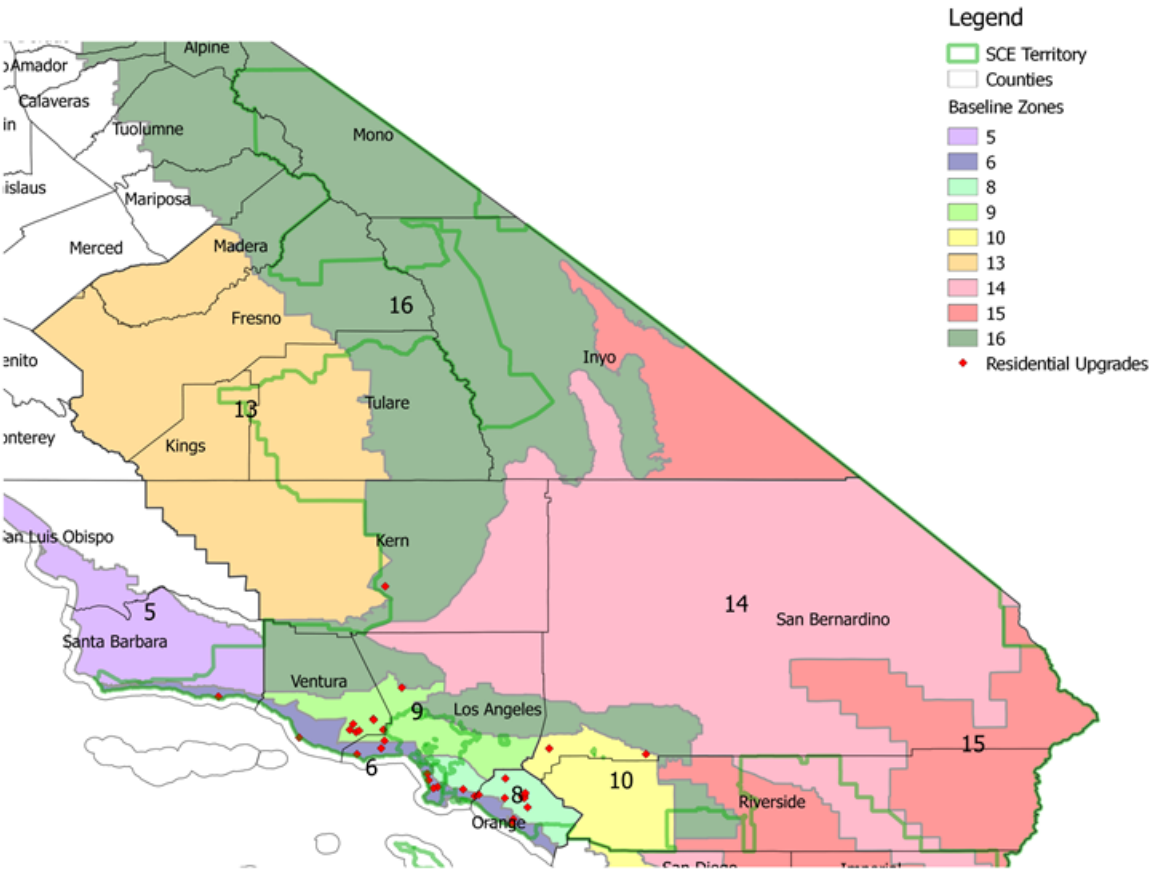
SCE Specific Details

As of October 2015, SCE's best estimate of the number of PEVs registered to residential customers in SCE's service territory is about 50,100. The data source for this estimate are: PEV count received through a third-party DMV vendor (as of September 30, 2015), completed by estimates as of October 31, 2015, derived from national sales. There is some amount of uncertainty in this number.

SCE is only able to perform a residential service assessment when it has been notified of the street address of a charging location. As a result, as of October 31, 2015, SCE had completed approximately 12,293 such on-site residential service assessments out of the 50,100 electric vehicles estimated in its service territory. SCE conducts on-site infrastructure assessments for those residential customers with a PEV capable of charging at 6.6 kW and higher.

Of the 12,293 residential service assessments completed to date, 32, or 0.26%, have required upgrades due solely to the addition of PEV load. The locations of the upgrades are depicted on this map.

Figure SCE-1: PEVs in the SCE Service Territory Requiring a Residential Upgrade as of October 2015



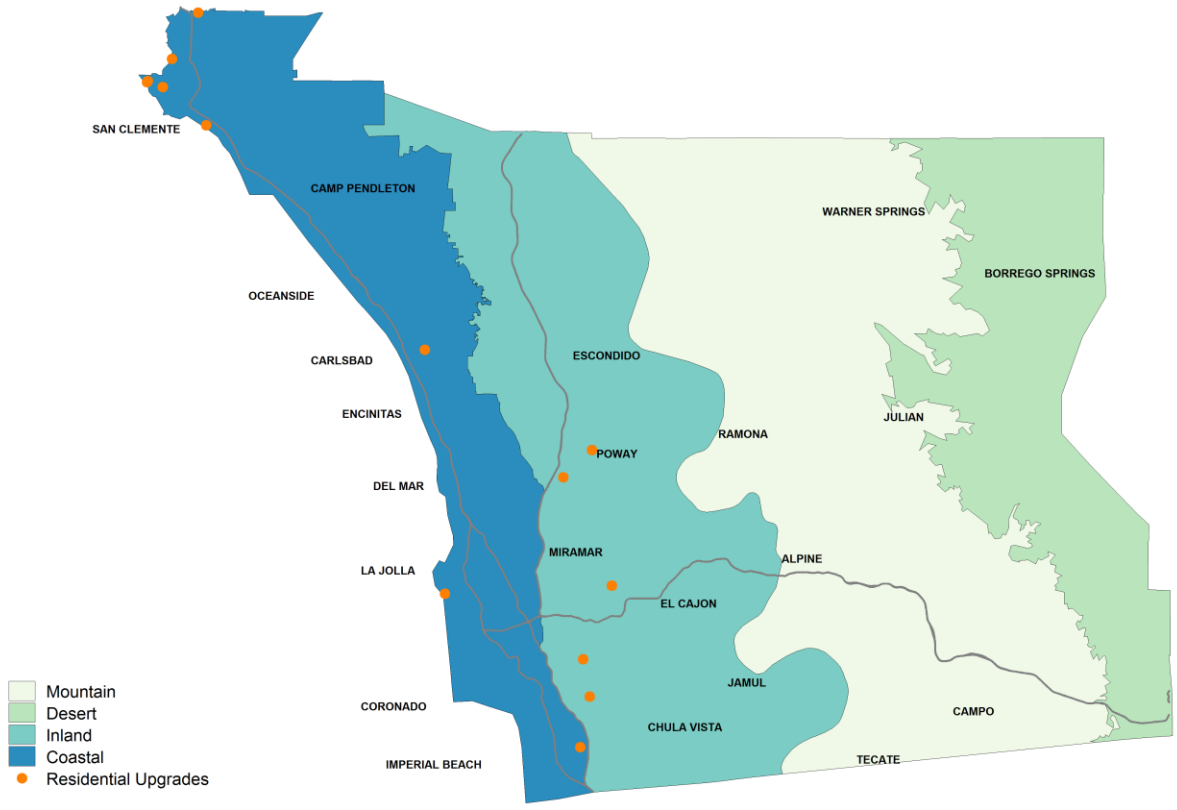
SCE also had 53 upgrades relating to the commercial installation of PEV charging stations totaling approximately $130,742.

SDG&E Specific Details

As of October 2015 SDG&E's best estimate of the number of PEVs registered to residential customers in the SDG&E service territory is 18,000. The data sources for this estimate are: customer self-identification, OEM opt-in notification, car dealership reporting, and PEV counts received through a third party DMV vendor. There is some uncertainty in this number and it is appropriately considered to be a lower bound of the number of PEVs in the SDG&E service territory.

Of the approximately 18,000 residential vehicles in SDG&E's service territory, 14, or 0.1%, have required upgrades where the PEV was the sole source of the new load. The locations of the PEV-related upgrades are depicted on the map that follows.

Figure SDG&E-1: Location of PEVs Requiring a Residential Upgrade in the SDG&E Service Territory as of October 2015



SDG&E also completed 10 commercial upgrades for the installation of PEV charging, totaling approximately $226,000.

Conclusions/Recommendations

As of October 31, 2015, the IOUs estimate there are approximately 141,642 PEVs within the three service territories. Of the 141,642 vehicles estimated to be currently on the road, only 208, or 0.1%, have required a service line and/or distribution system upgrade. Further, PG&E and SCE have completed more than 18,836 residential infrastructure checks[34] and only 188, or 1.2%, of the checks identified the need for an upgrade. In all but 29 instances, the allowance for residential service upgrades was sufficient to cover the portion of the service upgrade cost that is assigned to the utility. The IOUs have evaluated the service and distribution system upgrades needed due to the addition of PEV load and have determined that the number of upgrades and associated costs to date to be immaterial.

[34] SDG&E does not separately track distribution infrastructure checks related to PEVs, the service call is tagged as PEV only if a construction project is opened to perform an upgrade.

Part 4: Load Research and Customer Behavior on Rates in Various Settings

Introduction

The Extension Decision directed the IOUs to continue its load research reporting related to PEVs for an additional three years, beginning in 2013. The Extension Decision along with the Phase 2 Decision provided direction on scope and instructed the IOUs to work with the Energy Division on revising and continuing PEV load research reporting. In the Phase 2 Decision the IOUs were ordered to:

- Evaluate how metering arrangements and rate design impact PEV charging behavior.
- To the extent relevant, determine whether participation in demand response programs impacts PEV charging behavior.
- Determine how charging arrangements, including metering options and alternative rate schedules impact charging behavior at MDU.[35]

To satisfy these requirements, metering data was collected to provide insight into residential charging behavior under:

- EV-A – a whole house TOU rate available to customers with PEVs (known as "single–metered")
- EV-B – a TOU rate available to customers with PEVs that have a separate meter installed to supply their electric vehicle meter (known as "separately–metered")
- Tiered Residential rates

This metering data provided the basis for analysis as to how charging behavior has been impacted by tariff rates or charging levels. Additionally, the recorded metrics allowed for the evaluation of metering scenarios on PEV charging behavior for customers in the following residential categories:[36]

- Single Family Home (SF)
- Multi Family Dwelling Unit (MDU)
- Net Energy Metering (NEM)
- Demand Response (DR)

The data for this 4th Load Research Report covers the 12-month period of September 2014 to August 2015. Distinctions between single metering and separate metering are shown, as well as NEM and DR program participation. The usage and demand of customers were tracked in each rate group. The goal of this structure was to determine how monthly usage varies, how rates impact peak demand and how usage varies by time-of-use rate among different groups of customers. A baseline for residential customers has been analyzed for context in the form of an average for a month during the season being examined.

[35] D.11-07-029, Ordering Paragraph 6.

[36] The MDU and SF categories are mutually exclusive. However, the others categories can overlap. For example, a NEM customer that is also on DR would appear in three categories.

To the extent possible, the IOUs provided similar information for easy comparisons. However, there are some cases where this is simply not possible due to differences in the underlying IOU data. Metrics with less than 15 customers are clearly noted and not reported due to confidentiality concerns described in the 15/15 Rule adopted by the Commission in Decision 97-10-031 and Decision 14-05-016. All statistics in this report are provided as an average on a per-customer basis in each rate group and are based on interval data collected by each IOU. All time periods are reported in 24-hour time, except for SCE's load profiles, which are reported in Pacific Standard Time. Time-of-use periods vary across the IOUs and will be explicitly defined within each separate section below.

Pacific Gas and Electric Company

Single-Metered (EV-A) and Separately-Metered (EV-B) PEV Rates

As of the date of this report, PG&E has two residential PEV rates, EV-A and EV-B, as described in Schedule EV[37] for single and separately-metered PEVs respectively. The EV-A rate is designed for residential customers who have their typical load and electric vehicle charging on the same meter. The EV-B rate is designed for customers who wish to bill their vehicle charging separately and who have installed a separate meter to do so. Both rate plans use an un-tiered TOU rate structure. They offer on-peak, partial peak, and off-peak energy prices according to the time periods in Table PG&E-1a.

Regardless of season, or day of the week, both rates seek to encourage usage in off-peak hours from 11:00 p.m. to 7:00 a.m. The rates further encourage weekend usage by removing the "partial-peak" time periods on Saturdays and Sundays.

[37] Pacific Gas and Electric Company. Electric Schedule EV. Residential Time-of-Use Service for Plug-in Electric Vehicle Customers. Retrieved from http://www.pge.com/tariffs/tm2/pdf/ELEC_SCHEDS_EV.pdf.

Table PG&E-1a: Tariff Type and Rate ($/kWh)

Hour	Winter Weekday	Winter Weekend / Holidays	Summer Weekday	Summer Weekend / Holidays
12mn - 1am	0.10034	0.10034	0.09746	0.09746
1am - 2am	0.10034	0.10034	0.09746	0.09746
2am - 3am	0.10034	0.10034	0.09746	0.09746
3am - 4am	0.10034	0.10034	0.09746	0.09746
4am - 5am	0.10034	0.10034	0.09746	0.09746
5am - 6am	0.10034	0.10034	0.09746	0.09746
6am - 7am	0.10034	0.10034	0.09746	0.09746
7am - 8am	0.17106	0.10034	0.22282	0.09746
8am - 9am	0.17106	0.10034	0.22282	0.09746
9am - 10am	0.17106	0.10034	0.22282	0.09746
10am - 11am	0.17106	0.10034	0.22282	0.09746
11am - 12nn	0.17106	0.10034	0.22282	0.09746
12nn - 1pm	0.17106	0.10034	0.22282	0.09746
1pm - 2pm	0.17106	0.10034	0.22282	0.09746
2pm - 3pm	0.29101	0.10034	0.42464	0.09746
3pm - 4pm	0.29101	0.29101	0.42464	0.42464
4pm - 5pm	0.29101	0.29101	0.42464	0.42464
5pm - 6pm	0.29101	0.29101	0.42464	0.42464
6pm - 7pm	0.29101	0.29101	0.42464	0.42464
7pm - 8pm	0.29101	0.10034	0.42464	0.09746
8pm - 9pm	0.29101	0.10034	0.42464	0.09746
9pm - 10pm	0.17106	0.10034	0.22282	0.09746
10pm - 11pm	0.17106	0.10034	0.22282	0.09746
11pm - 12mn	0.10034	0.10034	0.09746	0.09746

Hour	Winter Weekday	Winter Weekend / Holidays	Summer Weekday	Summer Weekend / Holidays
12mn - 1am	0.09991	0.09991	0.09706	0.09706
1am - 2am	0.09991	0.09991	0.09706	0.09706
2am - 3am	0.09991	0.09991	0.09706	0.09706
3am - 4am	0.09991	0.09991	0.09706	0.09706
4am - 5am	0.09991	0.09991	0.09706	0.09706
5am - 6am	0.09991	0.09991	0.09706	0.09706
6am - 7am	0.09991	0.09991	0.09706	0.09706
7am - 8am	0.16807	0.09991	0.22004	0.09706
8am - 9am	0.16807	0.09991	0.22004	0.09706
9am - 10am	0.16807	0.09991	0.22004	0.09706
10am - 11am	0.16807	0.09991	0.22004	0.09706
11am - 12nn	0.16807	0.09991	0.22004	0.09706
12nn - 1pm	0.16807	0.09991	0.22004	0.09706
1pm - 2pm	0.16807	0.09991	0.22004	0.09706
2pm - 3pm	0.28503	0.09991	0.41908	0.09706
3pm - 4pm	0.28503	0.28503	0.41908	0.41908
4pm - 5pm	0.28503	0.28503	0.41908	0.41908
5pm - 6pm	0.28503	0.28503	0.41908	0.41908
6pm - 7pm	0.28503	0.28503	0.41908	0.41908
7pm - 8pm	0.28503	0.09991	0.41908	0.09706
8pm - 9pm	0.28503	0.09991	0.41908	0.09706
9pm - 10pm	0.16807	0.09991	0.22004	0.09706
10pm - 11pm	0.16807	0.09991	0.22004	0.09706
11pm - 12mn	0.09991	0.09991	0.09706	0.09706

Legend:

	Winter	Summer
On		
Part		
Off		

* While the table depicts 24-hour time, there is a daylight saving time adjustment as described in the tariff.

** Changes to EV-A and EV-B since the 2013 report occurred on October 1, 2014; however, there were no changes to the time of use periods. For details see Electric Schedule EV, Residential Time-of-Use Service for Plug-in Electric Vehicle Customers, retrieved from http://www.pge.com/tariffs/tm2/pdf/ELEC_SCHEDS_EV.pdf.

These rates change seasonally, rising in summer and dropping in winter. Table PG&E-1b depicts price ratios for the TOU periods by season to illustrate this seasonal difference.

Table PG&E-1b: Price Ratios

	EV-A Tariff		EV-B Tariff	
Season	Between Off-Peak and Partial Peak	Between Off-Peak and Peak Period	Between Off-Peak and Partial Peak	Between Off-Peak and Peak-Period
Winter	0.59	0.34	0.59	0.35
Summer	0.44	0.23	0.44	0.23

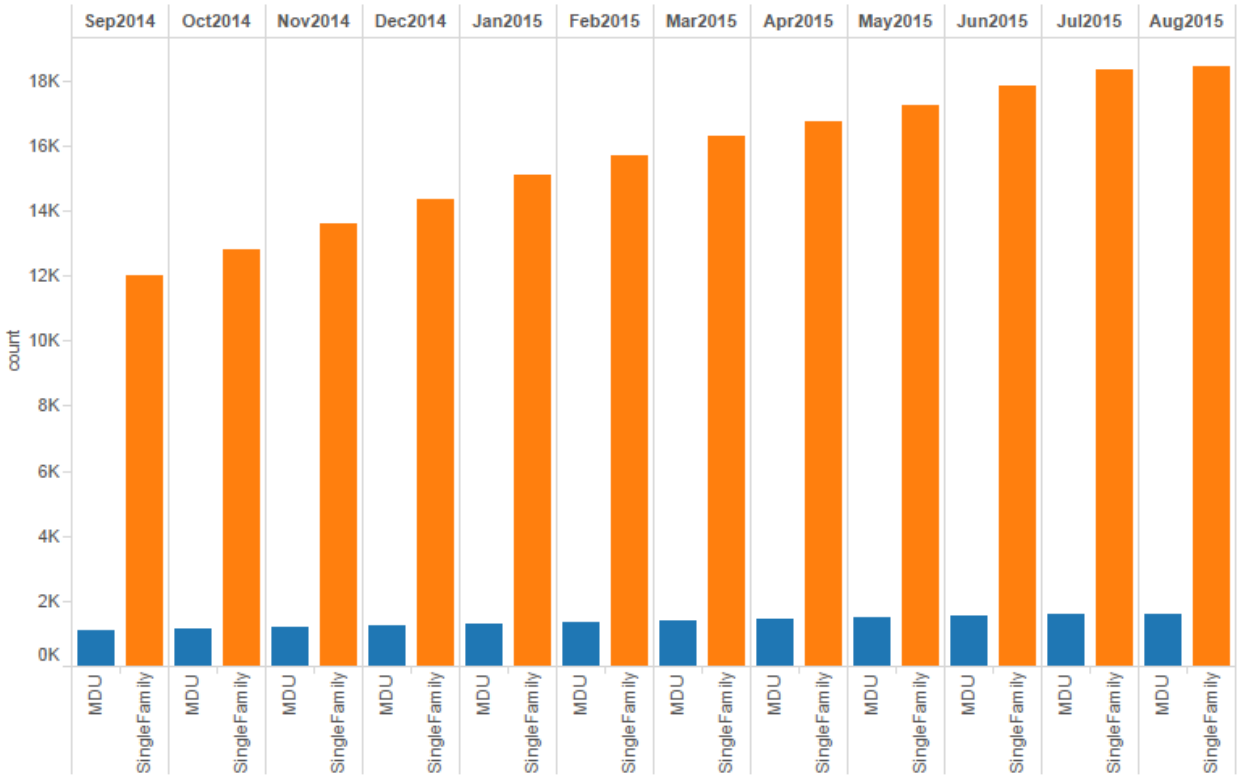
Single Metering (EV-A) Rate Growth

Participation in both EV-A and EV-B has increased during the study period. However, not all PEV customers have adopted PEV rates.[38] The vast majority of PEV rate participants are on the EV-A single metering rate.

All EV-A Customers: Chart PG&E-1 below displays the total customers on the EV-A rate. During the study period, there was a steady increase in EV-A overall, as well as the Single Family and MDU subcategories. Between September 2014 and August 2015, the number of accounts in the EV-A group as a whole increased by 57% at the last reported month compared to the base month.

[38] Data obtained by PG&E from auto manufacturers and other sources cannot be verified by the due date of this report to produce a load analysis for Chart 9 or Tables 10, 11, or 12 from Energy Division's reporting requirements. PG&E will seek to include these data in future reports, if feasible. Therefore, the load research figures in this report only represent the number of PG&E PEV customers on PEV rates, not all PEV customers.

Chart PG&E-1: Single Metering Accounts by Customer Type



NEM EV-A Customers: NEM customers on the PEV rates are an important group to consider. Of all the PG&E customers who were on a PEV rate up to 18% were also on NEM at any given time during the study period. Virtually all of these dual PEV Rate/NEM customers were on the single-metered EV-A rate (see Tables PG&E-2 and PG&E-4).

The fact that NEM customers with PEVs predominately use the EV-A rate presents a load research challenge. The presence of onsite distributed generation (DG) alongside a PEV behind these customers' meters indicates that their utility energy usage data does not reflect their gross consumption. This is because the DG will have offset some portion of consumption. However, without additional metering of the DG, it is not feasible to isolate the effect PEV ownership has on usage patterns for this group using utility metering data alone.[39]

[39] While there are numerous other demographic and behavioral attributes of this early PEV adopter group that affect usage, there was insufficient data or resources to isolate and identify their contribution to load shapes.

Table PG&E-2: Single Metering NEM Program Enrollment by Customer Type

Year	Month	Total Single Metering NEM (n)	NEM % of Single Metering	NEM % of SF Single Metering	NEM % of MDU Single Metering
2014	Sep	2,254	17%	18%	6%
2014	Oct	2,373	16%	17%	6%
2014	Nov	2,491	16%	17%	6%
2014	Dec	2,634	16%	17%	6%
2015	Jan	2,799	17%	18%	6%
2015	Feb	2,933	17%	18%	6%
2015	Mar	3,190	17%	18%	6%
2015	Apr	3,261	18%	19%	6%
2015	May	3,394	18%	19%	7%
2015	Jun	3,564	18%	19%	6%
2015	Jul	3,711	18%	19%	6%
2015	Aug	3,883	18%	19%	7%

DR EV-A Customers: DR program participating customers on the PEV rates are another important group to consider. Of all the PG&E customers who were on a PEV rate up to 8% were also participating in a DR program at any given time during the study period. Virtually all of these dual PEV Rate/DR customers were on the single-metered EV-A rate (see Tables PG&E-3 and PG&E-5). This dual participation is important to consider because DR customers are familiar with altering their usage patterns in response to TOU price signals. Consequently, these customers should respond to the PEV rate price signals and charge their vehicles during partial or off-peak periods.

Table PG&E-3: Single Metering DR Program Enrollment by Customer Type[40]

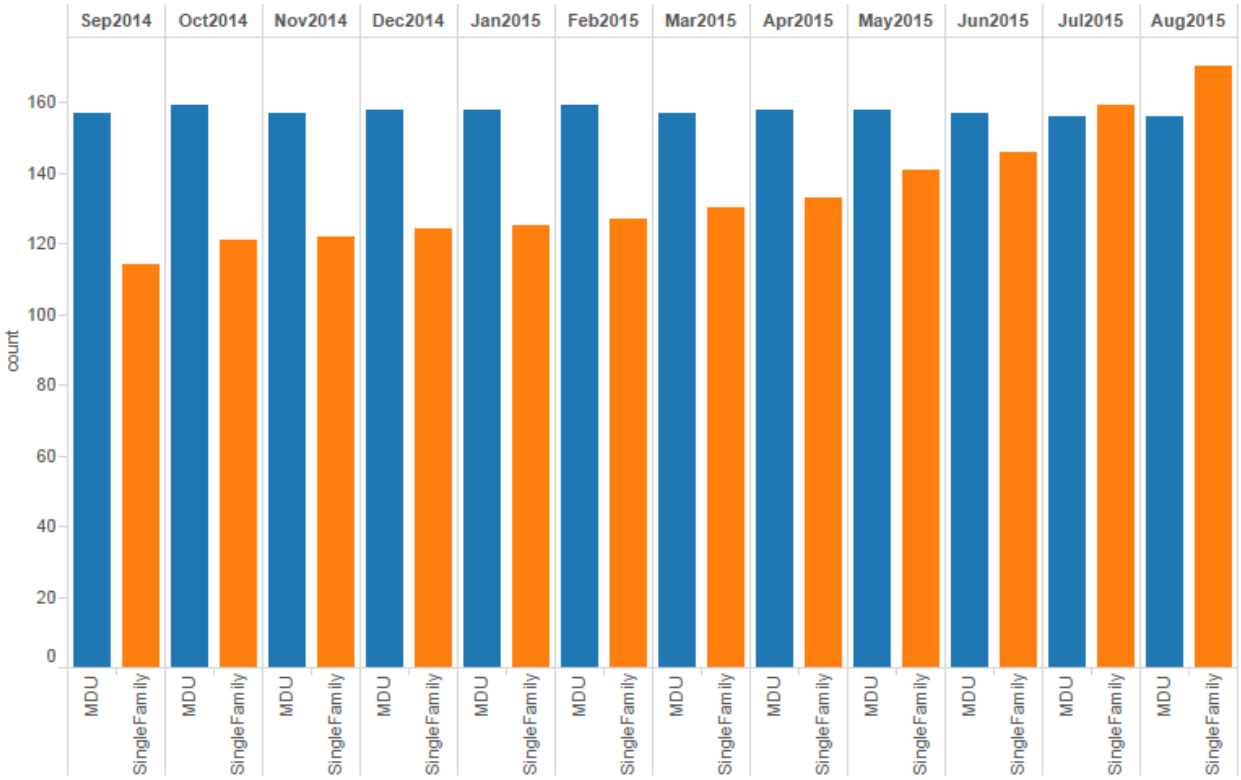
Year	Month	Total Single Metering DR (n)	DR % of Single Metering	DR % of SF Single Metering	DR % of MDU Single Metering
2014	Sep	1,116	8%	8%	9%
2014	Oct	1,187	8%	8%	9%
2014	Nov	1,235	8%	8%	9%
2014	Dec	1,295	8%	8%	8%
2015	Jan	1,286	8%	8%	8%
2015	Feb	1,266	7%	7%	8%
2015	Mar	1,300	7%	7%	8%
2015	Apr	1,312	7%	7%	8%
2015	May	1,334	7%	7%	8%
2015	Jun	1,301	7%	6%	7%
2015	Jul	1,291	6%	6%	7%
2015	Aug	1,256	6%	6%	7%

Separate Metering (EV-B) Rate Growth

All EV-B Customers: The EV-B rate also saw steady growth over the study period. Despite this growth (see Chart PG&E – 2), separate metering remains a much less popular option for PEV rate customers than single metering.

[40] The 2014 Demand Response enrollment population used for this report considers both the enrollment date and de-enrollment date. Previous reports only considered the enrollment date.

Chart PG&E-2: Separate Metering Accounts by Customer Type



NEM EV-B Customers: Though the number of PEV rate customers on EV-B and NEM increased during the study period, the growth was minor and inconsequential. This trend is not surprising as customers with PEVs on NEM can offset their PEV load with retail rate credits for their DG system production. PEV customers with a separate PEV meter currently cannot offset their load with DG production on a separate meter. Therefore, the EV-A rate is a more attractive option for PEV customers on NEM despite the aforementioned challenges it poses to load research.

Table PG&E-4: Separate Metering NEM Program Enrollment by Customer Type

Year	Month	Total Separate Metering NEM (n)	NEM % of Separate Metering	NEM % of SF Separate Metering	NEM % of MDU Separate Metering
2014	Sep	9	3%	4%	2%
2014	Oct	9	3%	4%	2%
2014	Nov	9	3%	4%	3%
2014	Dec	9	3%	4%	2%
2015	Jan	9	3%	4%	2%
2015	Feb	9	3%	4%	2%
2015	Mar	10	3%	5%	2%
2015	Apr	10	3%	4%	2%
2015	May	10	3%	4%	2%
2015	Jun	10	3%	4%	2%
2015	Jul	10	3%	4%	2%
2015	Aug	11	3%	4%	2%

DR EV-B Customers: Similar to dual participation in NEM and PEV rates, there was minimal dual participation during the study period in EV-B and a DR program.

Table PG&E-5: Separate Metering DR Program Enrollment by Customer Type[41]

Year	Month	Total Separate Metering DR (n)	DR % of Separate Metering	DR % of SF Separate Metering	DR % of MDU Separate Metering
2014	Sep	1	0%	0%	1%
2014	Oct	1	0%	0%	1%
2014	Nov	1	0%	0%	1%
2014	Dec	1	0%	0%	1%
2015	Jan	1	0%	0%	1%
2015	Feb	1	0%	0%	1%
2015	Mar	1	0%	0%	1%
2015	Apr	1	0%	0%	1%
2015	May	1	0%	0%	1%
2015	Jun	1	0%	0%	1%
2015	Jul	1	0%	0%	1%
2015	Aug	1	0%	0%	1%

[41] The 2014 Demand Response enrollment population used for this report considers both the enrollment date and de-enrollment date. Previous reports only considered the enrollment date.

Notes of Caution Regarding Reliance upon Load Research Data

The reader should take careful note of the following issues that make the load research data ill-suited for drawing conclusions for policymaking at this time.

1. The PEV owners on the EV-A rates cannot be compared to a similar group of PEV owners not on EV rates. The most accurate and reliable way to measure load impacts is to identify a comparison case, or control group, that represents how customers would have behaved had they not been on the rate or program being measured. PG&E has attempted to identify a control group of EV owners on a non-EV rate (E-1) by testing algorithms to analyze load profiles. To gauge the effectiveness of the algorithm, PG&E sent surveys to a randomly selected subset of 1,500 customers with a high likelihood of owning EVs in order to confirm EV ownership. The results collected through August 2015 indicate that the algorithm has weak predictive power, 31% of survey respondents have thus far confirmed they own an EV, and 69% have indicated they do not. PG&E believes there is room for learning and improvement. Furthermore, the results should be considered in the context of a low incidence rate environment, effectiveness of the test will improve as EV adoption increases. However, these early results demonstrate how difficult it may be to accurately collect data and report metrics related to EVs.
2. The current group of PEV owners is comprised of early adopters who are likely to be materially different than later PEV owners. These differences could include, but are not limited to, income, pre-PEV ownership usage habits, NEM penetration, altruistic tendencies, and willingness to adopt usage patterns beneficial to grid stability.
3. The types of PEVs available in the market fluctuate through the year, suggesting that the types of PEVs owned by PEV rate customers would have changed during that same time frame. New vehicles and charging requirements will likely lead to changes in charging profiles in the future (i.e., differing charging demands and durations).
4. The study period was relatively short and the customer counts were fairly small in all cases. This is particularly true for EV-B data derived from PG&E's load research sample.
5. The mix of customers being evaluated changed over time due to customers joining or leaving the EV-A or EV-B.
6. While PEV charging for EV-A (single meter) may be fairly obvious if peak customer demand occurs during off-peak rate periods, the lack of on-site survey or end-use data to help disaggregate other loads from PEV charging prevents the identification of PEV charging in other periods (particularly partial-peak) where multiple significant loads are likely present.

Therefore, while the data collected are illustrative of the behaviors of early adopters based on the types of vehicles that are currently available in the market, one cannot conclude that these behavior patterns will hold as PEV technology matures, as charging technology and charging behaviors evolve, and as PEVs achieve greater market adoption beyond the early adopter phase. Data that is sufficiently reliable for policymaking can only be obtained via an appropriately funded and carefully designed study that controls for the above issues.

Average Monthly Usage for PEV Rate Customers

Keeping in mind the above cautions about the data collected, Chart PG&E-3 displays the average monthly usage for each EV-A category including NEM customers, which means that the average monthly usage of these categories is net of behind the meter generation. Chart PG&E-4 displays the average monthly usage for each EV-A category but does not include NEM customers. NEM customers are not segregated in the EV-B rate class for Chart PG&E-5 due to much lower penetration.

Chart PG&E-3: Single Metering Average Monthly Usage (kWh) by Customer Type With NEM

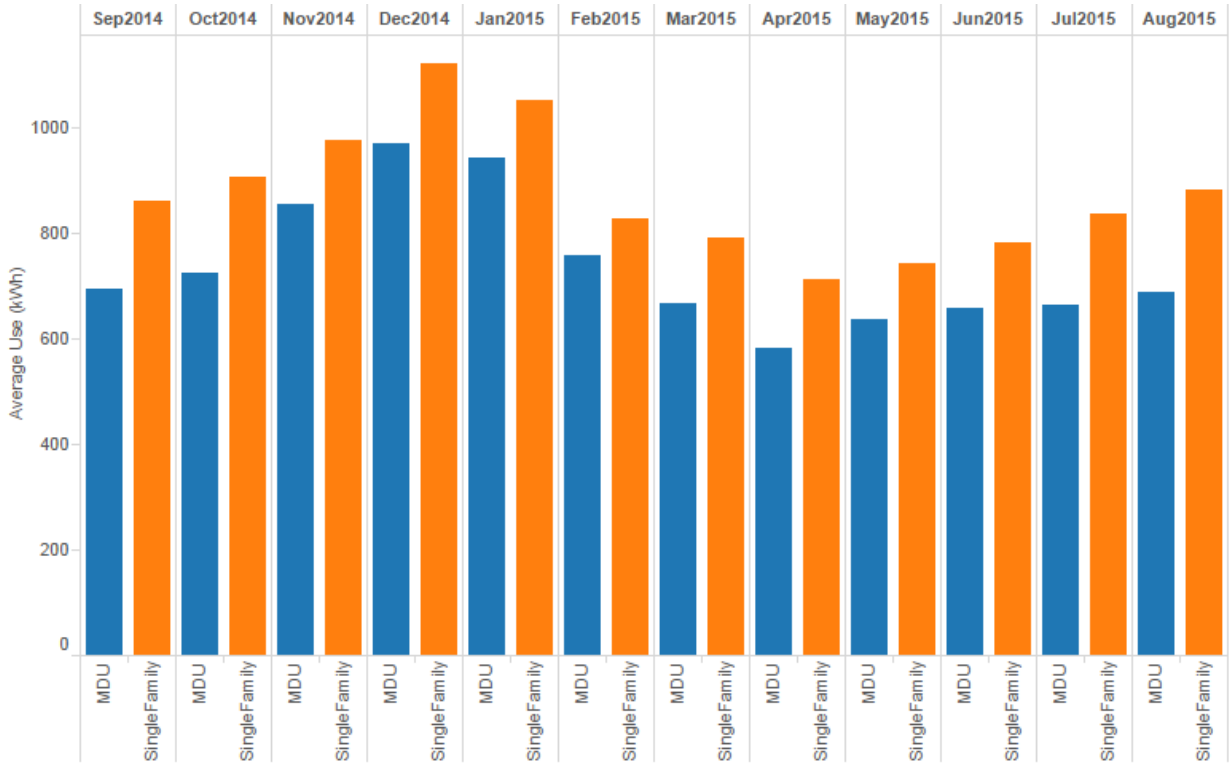
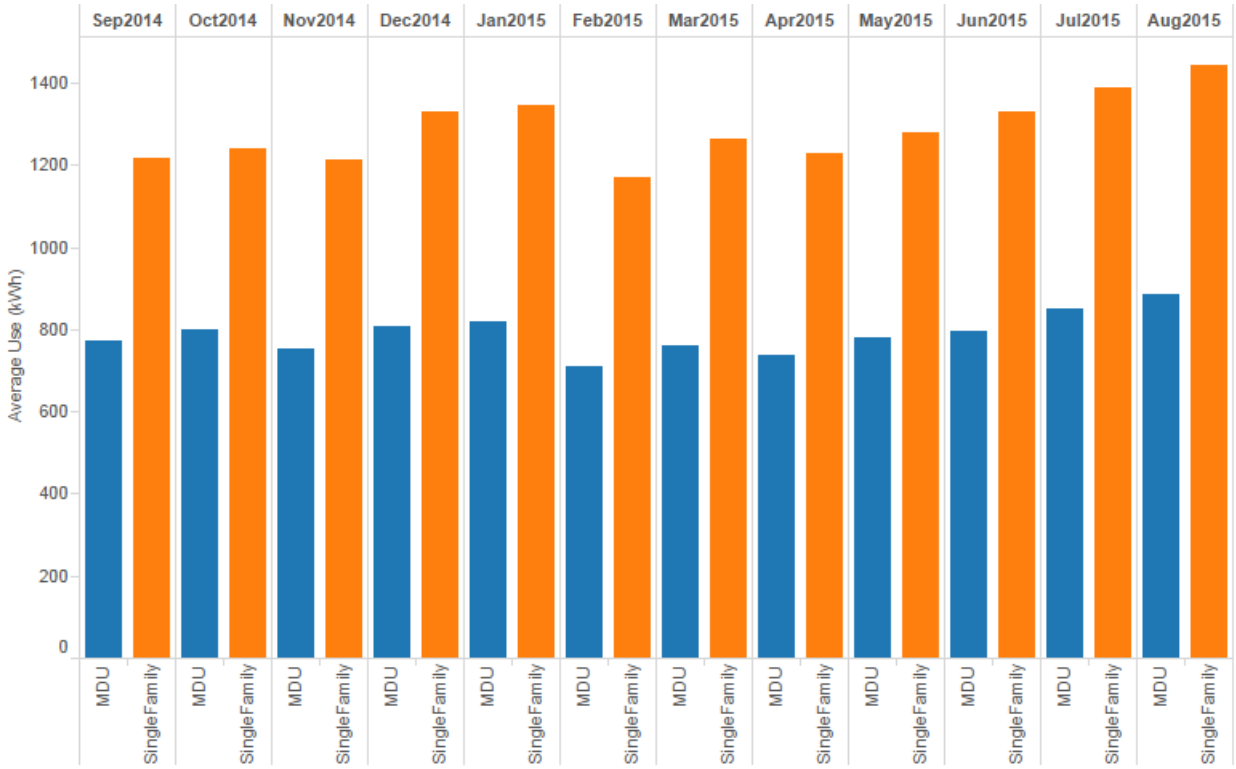
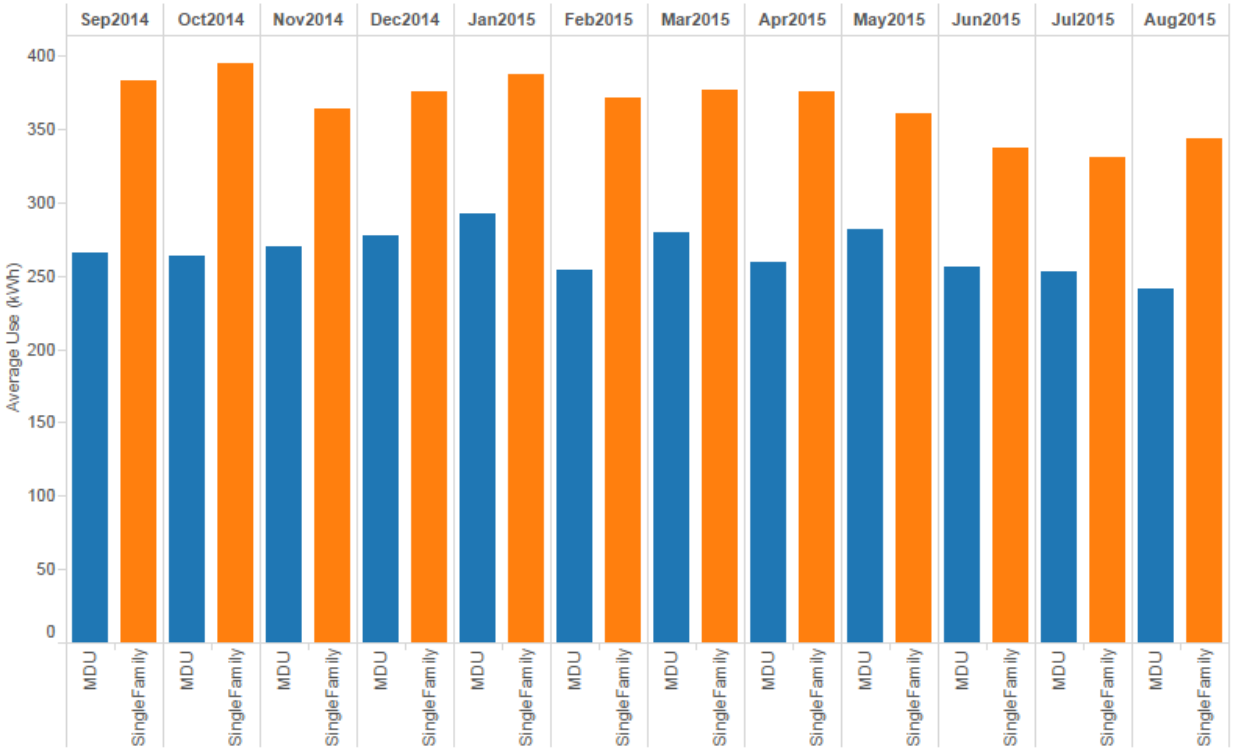


Chart PG&E-4: Single Metering Average Monthly Usage (kWh) by Customer Type Without NEM



A comparison of Charts PG&E 3 and 4 reveals an unsurprising result for both sectors: absent the NEM accounts, usage is flatter for both PEV rate customers throughout the study period. This result demonstrates that offsetting consumption with behind-the-meter generation obfuscates researchers' ability to parse PEV load from other site loads for NEM customers using their consumption data alone.

Chart PG&E-5: Separate Metering Average Monthly Usage (kWh) by Customer Type



The results depicted in Chart PG&E-5 demonstrate that absent other loads on the meter, researchers can better observe PEV rate customers' charging patterns. For example, the increase in single family usage during summer months (June to August), relative to fall and winter months (September to February), suggests increased charging in spring/summer months to support the typical increased driving and travel patterns during that period.

Average Usage during Time of Use Periods

TOU PEV rates are designed to discourage charging during on-peak hours and instead encourage charging during off-peak hours when the grid is less stressed and generation costs are lower. For both EV-A and EV-B customers, the time of use periods are defined in Table PG&E-1a.

One useful way to determine whether the TOU PEV rates are achieving their goal of avoiding peak PEV charging is to measure the distribution of charging in the various time periods. Given that NEM customers have a very unique usage profile, they are segregated from all other EV-A customers groups in Tables PG&E-6, 7 and 8.

- Table PG&E-6 shows the EV-A and EV-B customers share of peak usage by sector, with and without NEM, compared to the peak usage of PG&E's entire residential population. Non-NEM customers on EV-A used an average of 11% less energy than the average PG&E residential customer and NEM customers on EV-A used 17% less energy than the residential population.

Likewise non-NEM customers on EV-B used an average of 26% less energy, and NEM customers on EV-B used 15% less than the residential population. As previously noted the small customer population of NEM customers on EV-B detracts from the meaningfulness of results produced by its data. Because the goal of PEV rates is to encourage customers to charge their vehicles during off-peak hours, the fact that PEV rate customers' peak period usage is reasonably below that of non-PEV customers indicates that the rates are not having an adverse effect on PEV customers' usage. Consequently, the EV TOU rates are achieving their goal among this group of early PEV adopters by avoiding PEV charging during the peak period.

- Table PG&E-7 shows the EV-A and EV-B customers share of off-peak usage by sector, with and without NEM, compared to the off-peak usage of PG&E's entire residential population. Consistent with performance expectations for customers on EV rates, during the study period, non-NEM customers on EV-A used an average of 9% more energy than the average PG&E residential customer and NEM customers on EV-A used 29% more energy than the residential population. Likewise non-NEM customers on EV-B used an average of 37% more energy and NEM customers on EV-B used 24% more than the residential population. Consequently, all groups met the off-peak performance expectations for their EV TOU rate by consuming more energy during this period than non-PEV customers.
- Table PG&E-8 shows the EV-A and EV-B customers share of partial peak usage by sector, with and without NEM, compared to the partial peak usage of PG&E's entire residential population. During the study period non-NEM customers on EV-A used an average of 1% less energy than the average PG&E residential customer, and NEM customers on EV-A used 11% less energy than the residential population. Non-NEM customers on EV-B used an average of 10% less energy and NEM customers on EV-B used 8% less than the residential population. Non-NEM EV-A usage was driven by significantly higher usage in November through January than non-PEV customers which could correspond with increased PEV and household load commensurate with holiday activities. However, these data do not provide sufficient granularity to explain the drivers behind this result. Consequently, although non-NEM customers on EV-A had slightly higher usage than non-PEV customers, the other three groups met the performance expectations for their EV TOU rate by consuming less energy during this period than non-PEV customers.

Collectively, the data Tables PG&E-6, 7 and 8 show that for both EV-A and EV-B customers a smaller percentage of their usage is in on-peak and a larger percentage is in off-peak as compared to customers not on a PEV rate. Furthermore, non-NEM separately-metered EV-B customers are completing 80% of their charging in the off-peak period on average and 5% on average during the on-peak period. This suggests that customers on the PEV rates are responding to the price signal embedded in their rates and charging during the off-peak periods.

Table PG&E-6: Share of On-Peak Usage by Tariff and Customer Type

Year	Month	Total Residential Population*	All Single Metering, excluding NEM	SF Single Metering, excluding NEM	MDU Single Metering, excluding NEM	Single Metering NEM	All Separate Metering excluding NEM	SF Separate Metering, excluding NEM	MDU Separate Metering, excluding NEM	Separate Metering NEM
2014	Sep	34%	21%	21%	21%	16%	7%	8%	7%	24%
2014	Oct	32%	20%	20%	21%	18%	7%	7%	6%	21%
2014	Nov	29%	19%	19%	18%	17%	4%	5%	2%	14%
2014	Dec	31%	19%	19%	18%	17%	2%	3%	1%	7%
2015	Jan	29%	19%	19%	18%	16%	2%	3%	2%	8%
2015	Feb	29%	18%	18%	18%	15%	3%	5%	1%	9%
2015	Mar	28%	19%	19%	18%	14%	3%	5%	1%	9%
2015	Apr	29%	18%	18%	18%	8%	5%	5%	4%	9%
2015	May	31%	19%	19%	19%	8%	7%	6%	7%	11%
2015	Jun	34%	22%	22%	22%	14%	7%	7%	7%	21%
2015	Jul	35%	22%	22%	23%	15%	8%	9%	7%	32%
2015	Aug	34%	22%	22%	23%	17%	7%	7%	7%	31%
Max		35%	22%	22%	23%	18%	8%	9%	7%	32%
Average		31%	20%	20%	20%	14%	5%	6%	4%	16%

* Load data used for the analysis are from January 2014 to December 2014.

Table PG&E-7: Share of Off-Peak Usage by Tariff and Customer Type

year	month	Total Residential Population*	All Single Metering, excluding NEM	SF Single Metering, excluding NEM	MDU Single Metering, excluding NEM	Single Metering NEM	All Separate Metering excluding NEM	SF Separate Metering, excluding NEM	MDU Separate Metering, excluding NEM	Separate Metering NEM
2014	Sep	42%	56%	56%	56%	73%	81%	81%	82%	66%
2014	Oct	41%	56%	56%	56%	70%	80%	78%	82%	65%
2014	Nov	49%	56%	56%	57%	62%	79%	79%	80%	61%
2014	Dec	42%	55%	55%	56%	58%	80%	78%	82%	53%
2015	Jan	44%	56%	56%	56%	63%	79%	79%	79%	59%
2015	Feb	45%	57%	57%	57%	69%	81%	79%	82%	68%
2015	Mar	46%	55%	55%	55%	75%	75%	76%	73%	76%
2015	Apr	43%	57%	57%	57%	82%	78%	80%	77%	81%
2015	May	44%	58%	58%	58%	82%	82%	82%	81%	83%
2015	Jun	41%	55%	55%	55%	76%	82%	81%	83%	75%
2015	Jul	40%	54%	54%	54%	74%	82%	80%	84%	57%
2015	Aug	42%	55%	55%	55%	74%	83%	83%	83%	64%
Max		49%	58%	58%	58%	82%	83%	83%	84%	83%
Average		43%	56%	56%	56%	72%	80%	80%	81%	67%

* Load data used for the analysis are from January 2014 to December 2014.

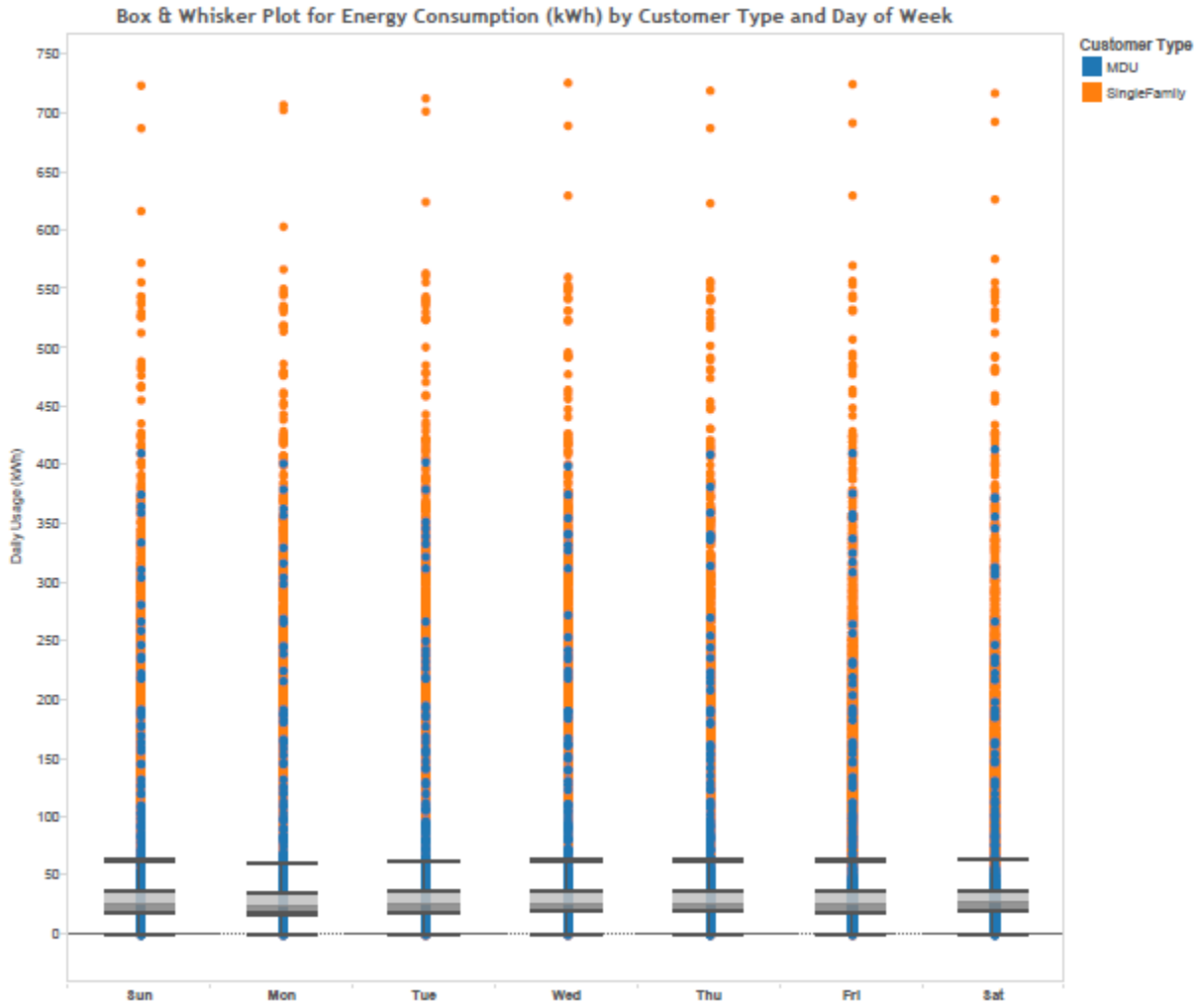
Table PG&E-8: Share of Partial-Peak Usage by Tariff and Customer Type

year	month	Total Residential Population*	All Single Metering, excluding NEM	SF Single Metering, excluding NEM	MDU Single Metering, excluding NEM	Single Metering NEM	All Separate Metering excluding NEM	SF Separate Metering, excluding NEM	MDU Separate Metering, excluding NEM	Separate Metering NEM
2014	Sep	24%	23%	23%	22%	11%	11%	11%	11%	10%
2014	Oct	27%	24%	24%	23%	13%	13%	14%	12%	14%
2014	Nov	22%	25%	25%	25%	20%	17%	16%	18%	26%
2014	Dec	27%	25%	25%	26%	25%	18%	19%	17%	40%
2015	Jan	27%	26%	26%	26%	21%	18%	17%	19%	34%
2015	Feb	26%	25%	25%	25%	16%	16%	16%	16%	23%
2015	Mar	26%	26%	26%	26%	12%	22%	19%	26%	15%
2015	Apr	28%	25%	25%	25%	10%	17%	15%	19%	11%
2015	May	24%	23%	23%	23%	10%	12%	11%	12%	6%
2015	Jun	25%	24%	24%	23%	10%	11%	12%	10%	4%
2015	Jul	25%	24%	24%	23%	10%	10%	11%	10%	11%
2015	Aug	23%	23%	23%	22%	9%	10%	10%	9%	5%
Max		28%	26%	26%	26%	25%	22%	19%	26%	40%
Average		25%	24%	24%	24%	14%	15%	14%	15%	17%

* Load data used for the analysis are from January 2014 to December 2014.

Chart PG&E-6 displays a box and whisker plot for PEV energy consumption (kilowatt-hours (kWh)) by customer type and day of the week. Looking past the outliers with usage above 100 kWh/day, the similarity of the interquartile range values depicted by the "boxes" below demonstrate that daily differentiation between average consumption is minimal with the weekend (Friday to Sunday) demonstrating slightly higher usage patterns than weekdays (Monday to Thursday).

Chart PG&E-6: Box & Whisker Plot for Energy Consumption (kWh) by Customer Type and Day of Week (Sunday through Saturday)



Average Load Profiles for PEV Rates

Depicted below are the average daily load profiles for the EV-A and EV-B rate groups for each sector during the study period. The load profiles demonstrate that for all rates and sectors, high off-peak usage corresponds to the PEV rate price signals, i.e., customers are largely responding to the price signal and charging during off-peak hours (12:00 a.m. to 5:00 a.m.). This responsiveness is more clearly depicted in the data from the EV-B customers (Charts PG&E-8a and 8b) where the vast majority of the usage occurs during off-peak hours.

Chart PG&E-7a: Average Load Profile for SF Single Metering by Day of the Week

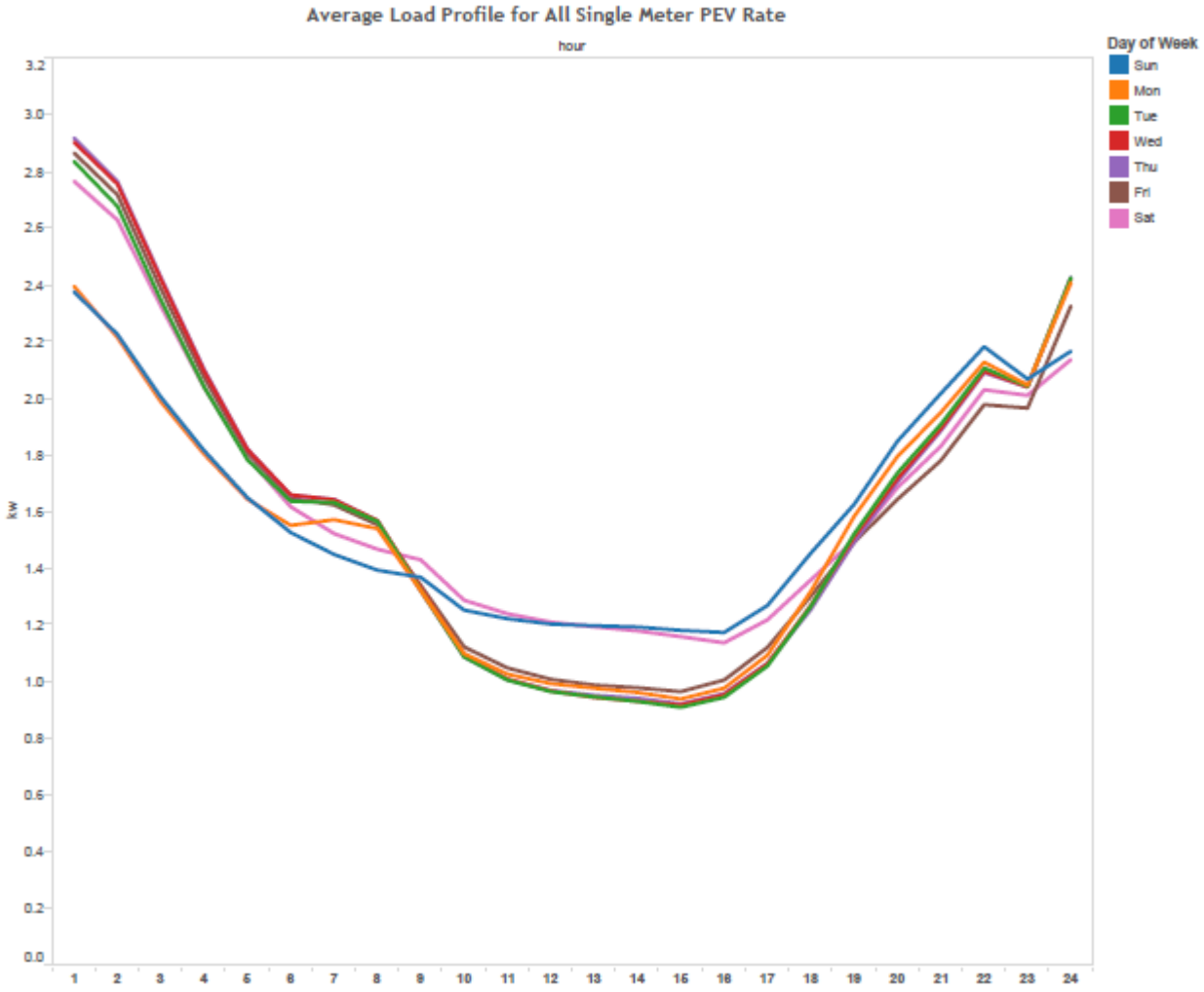


Chart PG&E-7b: Average Load Profile for MDU Single Metering by Day of the Week

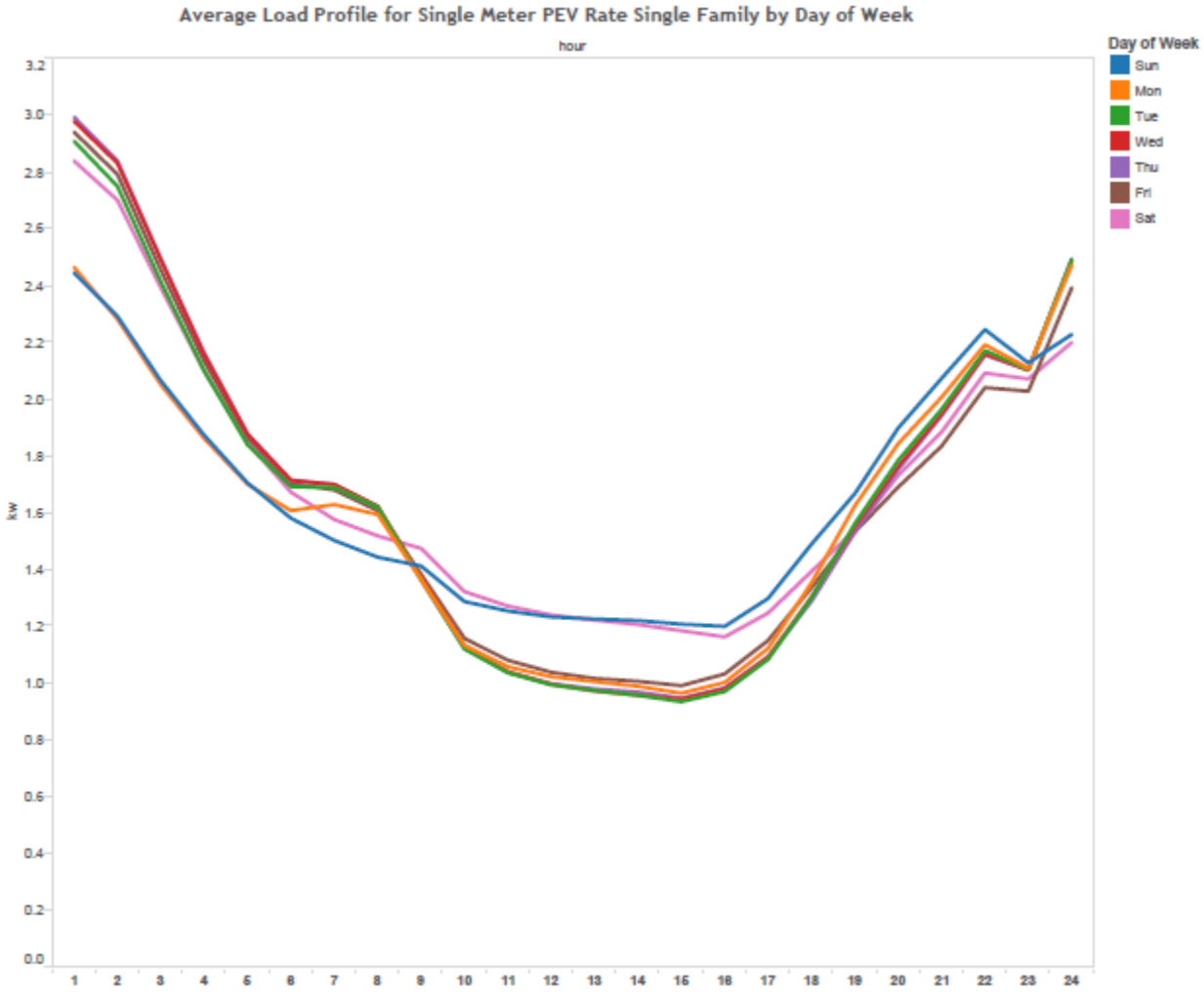
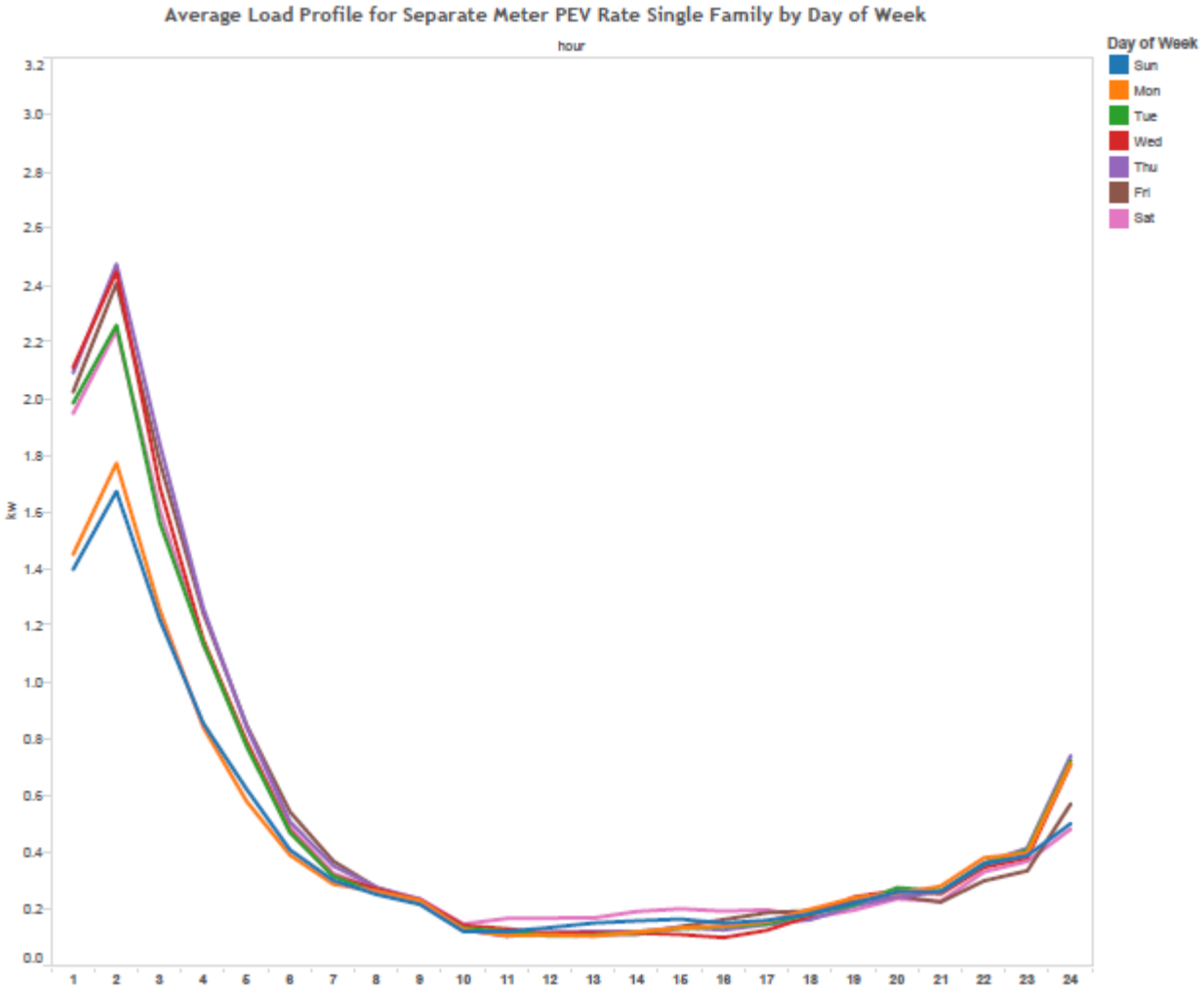


Chart PG&E-8: Average Load Profile for SF Separate Metering by Day of the Week



Non-Coincident Peak Load

Collectively, the data in Table PG&E-9 and Charts 10a, 10b, 11a, and 11b suggest that, despite the fact that charging is primarily occurring in the off-peak hours, the average household with a PEV will have a higher maximum demand that must be accommodated by the electric distribution system as compared to the average household without a PEV.

- Table PG&E-9 shows the monthly comparison of the average non-coincident peak for the EV-A and EV-B customer sectors and the full residential population. The average non-coincident peak was 3.66 kW higher for the EV-A group category compared to the average residential peak.[42] This was 3.79 kW higher for single family customers and 2.16 kW higher for multi-family customers. The average non-coincident peak was 3.17 kW higher for the EV-B group category compared to the average residential peak.
- Charts PG&E-9a and 9b display the average monthly non-coincident peak loads for EV-A and EV-B customers, respectively.
- Charts PG&E-9a and 9b display the hour at which the non-coincident peak load occurred for EV-A and EV-B customers, respectively. The accompanying table provides the data points depicted in each chart.

[42] The average non-coincident peak was calculated by denoting the maximum hourly interval for each account within the month. These maximum values were then summed for each category. The average is then calculated by dividing the total by the number of customers. The average non-coincident peak is therefore an approximation of the maximum demand for customer in each stratum.

Table PG&E-9: Monthly Average Non-Coincident Peak Load (kW)

Year	Month	Residential Population*	Single Family Population*	MDU Population*	All Single Metering	Single Family Single Metering	MDU Single Metering	All Separate Metering	Single Family Separate Metering	MDU Separate Metering
2014	Sep	4.17	4.82	2.68	7.61	7.73	6.27	6.98	7.60	6.54
2014	Oct	3.92	4.49	2.59	7.56	7.68	6.22	6.93	7.71	6.34
2014	Nov	3.71	4.27	2.44	7.47	7.59	6.08	7.17	8.07	6.47
2014	Dec	4.18	4.84	2.64	7.77	7.91	6.23	7.21	7.81	6.74
2015	Jan	3.86	4.40	2.59	7.68	7.81	6.18	7.18	7.61	6.83
2015	Feb	3.90	4.46	2.59	7.42	7.55	5.93	7.00	7.45**	6.65
2015	Mar	3.75	4.29	2.50	7.37	7.49	6.01	7.34	8.00	6.79
2015	Apr	3.70	4.19	2.56	7.38	7.51	5.92	7.37	8.06	6.78
2015	May	3.96	4.53	2.65	7.48	7.61	5.94	7.33	8.11	6.64
2015	Jun	4.28	4.96	2.71	8.01	8.15	6.42	7.25	7.96	6.58
2015	Jul	4.49	5.28	2.68	8.02	8.16	6.36	7.20	7.91	6.49
2015	Aug	4.25	4.92	2.69	8.22	8.37	6.53	7.15	7.94**	6.29
Average		4.01	4.62	2.61	7.67	7.80	6.17	7.18	7.85	6.59

* Load data used for the analysis are from January 2014 to December 2014.

** Italicized fields are estimates with a precision greater than +/- 10% at a 90% confidence interval.

Chart PG&E-9a: Average Non-Coincident Peak Load (kW) for Single Metering by Customer Type by Month

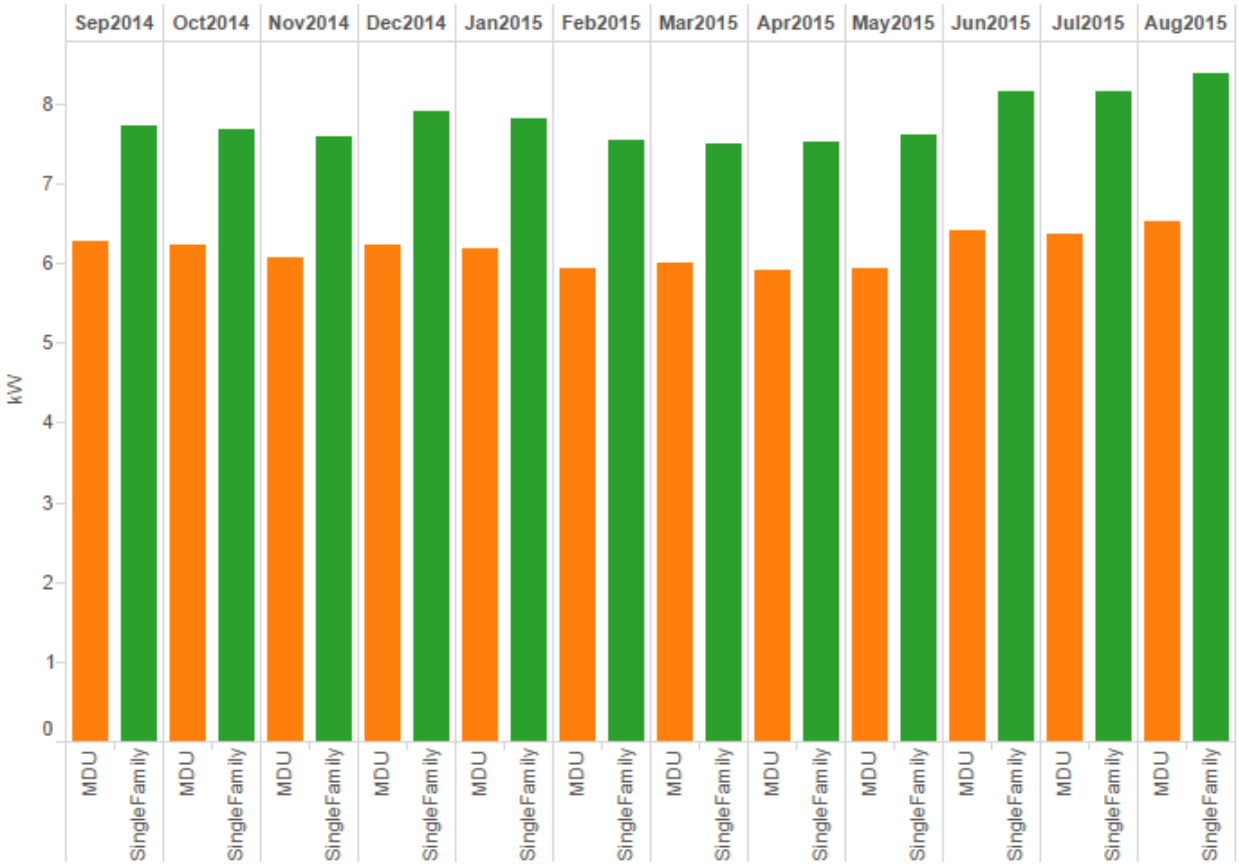


Chart PG&E-9b: Average Non-Coincident Peak Load (kW) for Separate Metering by Customer Type by Month

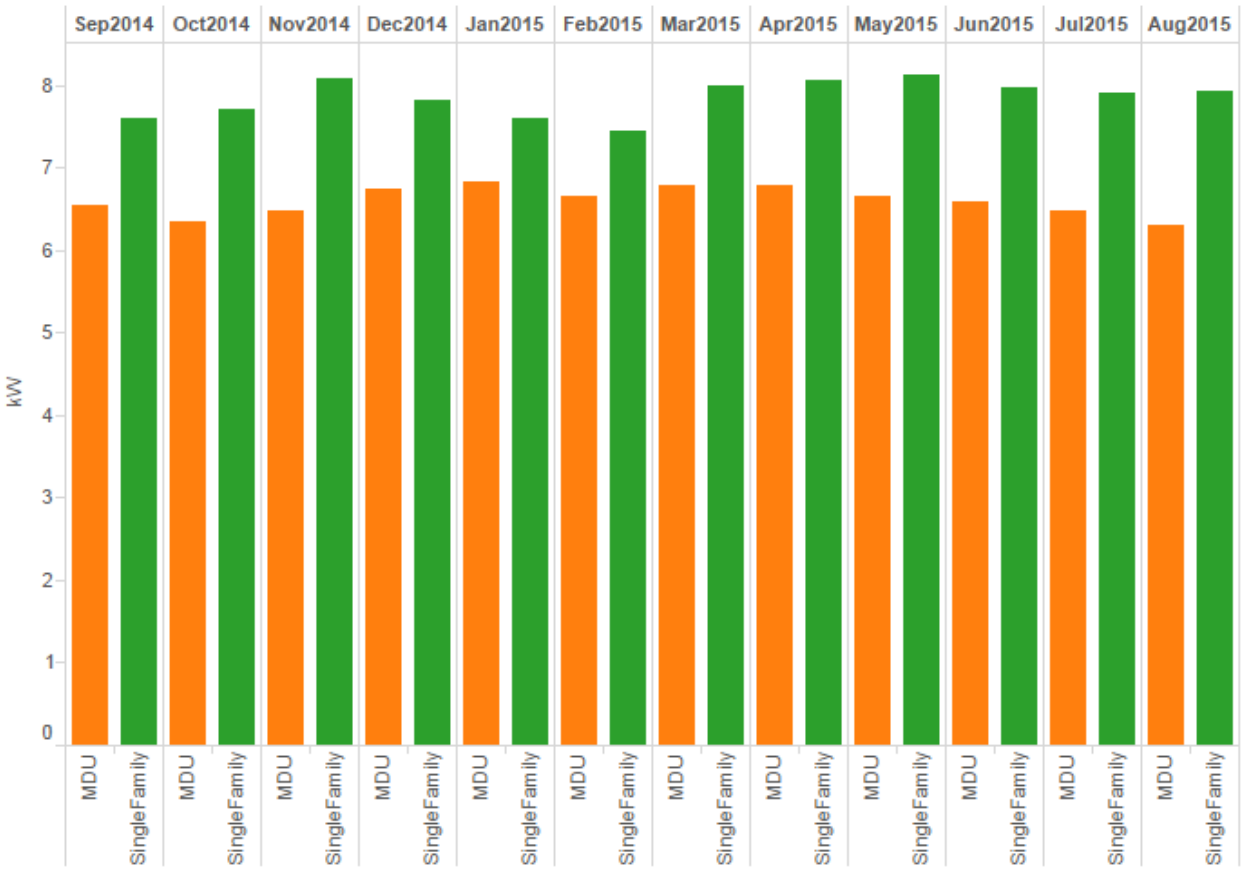


Chart PG&E-10a: Histogram of the Hour at Which the Non-Coincident Peak Load Occurred for Single Metering by Customer Type

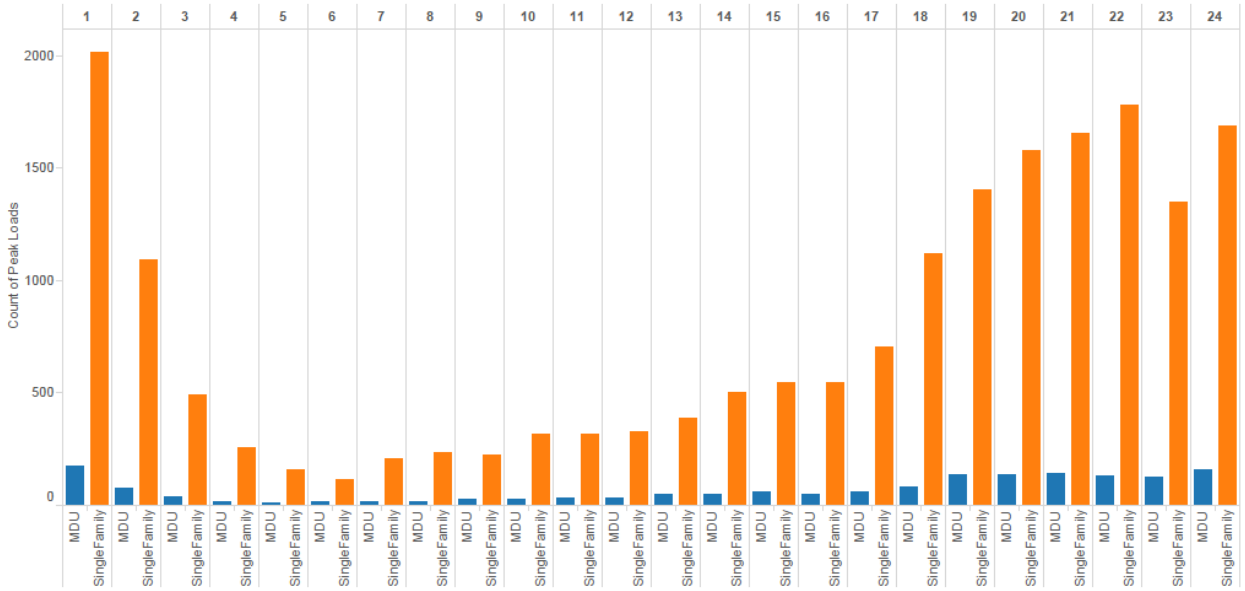
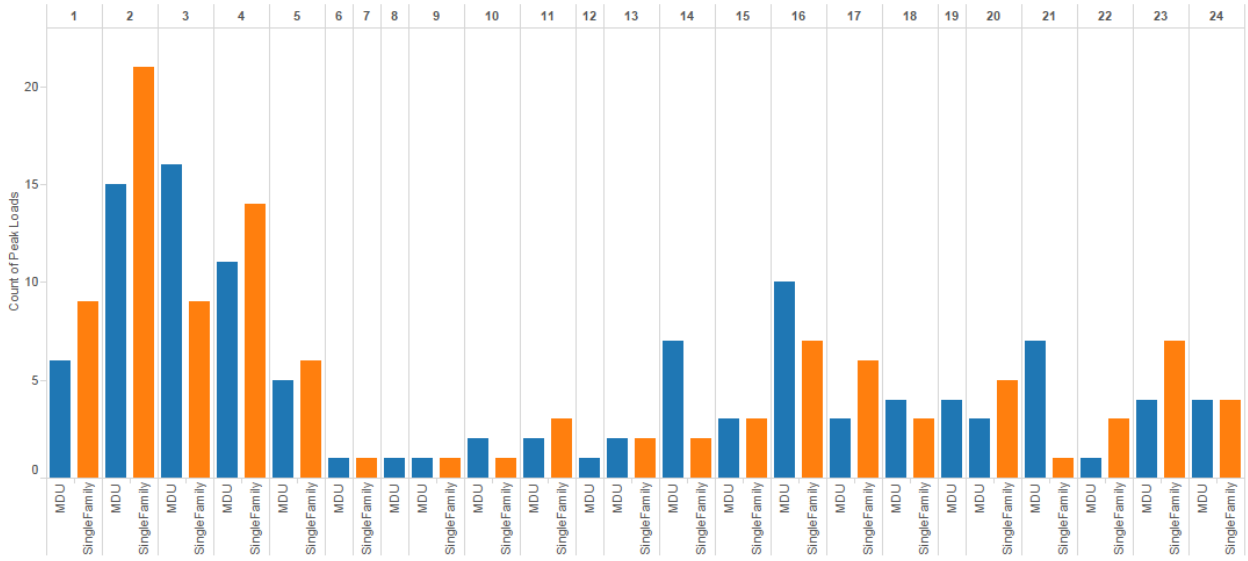


Chart PG&E-10b: Histogram of the Hour at Which the Non-Coincident Peak Load Occurred for Separate Metering by Customer Type



Data Accompanying Charts PG&E 10a and 10b

Peak Hour	Residential Population	Single Family Population	MDU Population	All Single Metering	SF Single Metering	MDU Single Metering	All Separate Metering	SF Separate Metering	MDU Separate Metering
1	1%	1%	1%	11%	11%	10%	7%	8%	5%
2	1%	1%	1%	6%	6%	5%	16%	18%	13%
3	1%	1%	1%	3%	3%	2%	11%	8%	14%
4	0%	0%	0%	1%	1%	1%	11%	12%	10%
5	0%	0%	0%	1%	1%	1%	5%	5%	4%
6	0%	0%	0%	1%	1%	1%	0%	0%	1%
7	1%	1%	1%	1%	1%	1%	0%	1%	0%
8	1%	2%	1%	1%	1%	1%	0%	0%	1%
9	2%	2%	2%	1%	1%	2%	1%	1%	1%
10	2%	2%	2%	2%	2%	2%	1%	1%	2%
11	2%	2%	2%	2%	2%	2%	2%	3%	2%
12	2%	2%	2%	2%	2%	2%	0%	0%	1%
13	2%	2%	2%	2%	2%	3%	2%	2%	2%
14	2%	2%	2%	3%	3%	3%	4%	2%	6%
15	2%	2%	2%	3%	3%	3%	3%	3%	3%
16	3%	3%	4%	3%	3%	3%	7%	6%	9%
17	4%	4%	4%	4%	4%	4%	4%	5%	3%
18	9%	9%	9%	6%	6%	5%	3%	3%	3%
19	16%	16%	15%	7%	7%	8%	2%	0%	3%
20	17%	17%	17%	8%	8%	8%	3%	4%	3%
21	14%	14%	14%	9%	9%	9%	3%	1%	6%
22	9%	10%	9%	9%	9%	8%	2%	3%	1%
23	5%	5%	5%	7%	7%	7%	5%	6%	3%
24	3%	3%	3%	9%	9%	9%	3%	3%	3%

Diversified Peak Load

The time of diversified peak load gives the time that the group peaks as a whole. The time of diversified (or group) peak load is generally the same for all categories of EV-A and EV-B customers. Table PG&E-10 shows that the diversified peak load occurs between 6-9pm for all categories in all months for both rates. This suggests that the early adopter group of customers on the PEV rates is charging during the off-peak periods thereby achieving the intent of the rate designs.

Table PG&E-10: Time and Associated Demand of Diversified Peak Load – Entire Residential Population

Year	Month	Residential Population Demand*	Residential Population Hour*	SF Population Demand*	SF Population Hour*	MDU Population Demand*	MDU Population Hour*
2014	Sep	1.57	19	1.83	19	0.98	18
2014	Oct	1.32	19	1.53	19	0.83	20
2014	Nov	1.11	19	1.28	19	0.71	19
2014	Dec	1.29	20	1.51	20	0.79	20
2015	Jan	1.15	19	1.32	19	0.75	19
2015	Feb	1.18	20	1.36	20	0.77	20
2015	Mar	1.06	21	1.22	21	0.70	20
2015	Apr	1.07	21	1.22	21	0.72	21
2015	May	1.31	20	1.52	19	0.86	20
2015	Jun	1.78	19	2.08	19	1.09	19
2015	Jul	1.76	19	2.08	19	1.01	18
2015	Aug	1.70	19	1.98	19	1.06	19

Table PG&E-10 (Cont'd): Time and Associated Demand of Diversified Peak Load – Single Meter EV

Year	Month	Single Metering Demand	Single Metering Hour	Single Family Single Metering Demand	Single Family Single Metering Hour	MDU Single Metering Demand	MDU Single Metering Hour
2014	Sep	2.95	1	3.04	1	2.17	1
2014	Oct	2.95	1	3.02	1	2.16	1
2014	Nov	2.95	1	3.03	1	2.14	1
2014	Dec	3.02	1	3.09	1	2.21	1
2015	Jan	3.06	1	3.13	1	2.22	1
2015	Feb	2.97	1	3.05	1	2.14	1
2015	Mar	3.02	1	3.10	1	2.16	1
2015	Apr	2.91	1	2.98	1	2.09	1
2015	May	2.97	1	3.04	1	2.20	1
2015	Jun	3.24	1	3.32	1	2.33	1
2015	Jul	3.26	1	3.35	1	2.28	1
2015	Aug	3.23	1	3.32	1	2.27	1

Table PG&E-10 (Cont'd): Time and Associated Demand of Diversified Peak Load – Separate Meter EV

Year	Month	Separate Metering Demand	Separate Metering Hour	Single Family Separate Metering Demand	Single Family Separate Metering Hour	MDU Separate Metering Demand	MDU Separate Metering Hour
2014	Sep	2.55	2	2.97	2	2.41	1
2014	Oct	2.55	2	3.51	2	2.47	2
2014	Nov	2.63	2	2.97	2	2.50	2
2014	Dec	2.96	2	3.40**	2	2.77	2
2015	Jan	2.78	2	3.16	2	2.62**	1
2015	Feb	2.55	2	2.96**	1	2.61**	1
2015	Mar	2.70	2	3.14	2	2.45**	1
2015	Apr	2.72	2	3.37	2	2.31	2
2015	May	2.55	2	3.07	2	2.30	1
2015	Jun	2.44	2	2.75**	2	2.27	2
2015	Jul	2.35	2	2.81**	2	2.34	2
2015	Aug	2.39	2	2.93**	2	2.26	2

* Load data used for the analysis are from January 2014 to December 2014.

** Italicized fields are estimates with a precision greater than +/- 10% at a 90% confidence interval.

Taken together, Table PG&E-10 and Data Accompanying Charts PG&E 10a and 10b suggest that although the early adopter PEV customers may have a higher average maximum demand, those customers on the PEV rates tend to hit their maximum demand while non-PEV customers are at their lowest usage. Thus, there is a diversity benefit created by the TOU rates. However, at the most local service assessment level perspective (i.e., a single household or set of households serviced by a single transformer), the value of this diversity is limited by the fact that the distribution system must still be prepared to accommodate PEV charging during the peak period since these customers can, and occasionally do, charge during those times.

Average Load Coincident With System Peak

The average load coincident with system peak is the average load occurring at the same time that the system peak occurs. The system peak days and times were used to extract the appropriate hourly load at the time of system peak. The average group load coincident with system peak was calculated taking the total group load and dividing by the number of customers.

The average load coincident with system peak amongst the general population is very similar to that of each EV-A category (See Table PG&E – 11). This suggests that, for this particular group of early adopters, customers on a PEV rate are not doing a substantial amount of charging during the on-peak period.

Table PG&E-11: Average Load Coincident With System Peak (kW/Customer)

Year	Month	Residential Population*	Single Family Population*	MDU Population*	All Single Metering	Single Family Single Metering	MDU Single Metering	All Separate Metering**	Single Family Separate Metering**	MDU Separate Metering**
2014	Sep	1.30	1.52	0.80	1.44	1.48	1.02	0.13	0.24	0.05
2014	Oct	1.06	1.23	0.67	1.29	1.32	0.95	0.06	0.13	0.01
2014	Nov	0.87	1.00	0.57	1.43	1.47	0.90	0.16	0.14	0.17
2014	Dec	1.24	1.44	0.77	2.03	2.09	1.34	0.13	0.16	0.11
2015	Jan	1.03	1.18	0.67	1.90	1.95	1.34	0.11	0.18	0.06
2015	Feb	1.09	1.26	0.69	1.63	1.67	1.13	0.14	0.23	0.07
2015	Mar	1.06	1.21	0.70	1.89	1.94	1.26	0.28	0.21	0.34
2015	Apr	0.87	1.00	0.58	1.94	2.00	1.29	0.11	0.14	0.08
2015	May	1.20	1.39	0.78	1.13	1.16	0.82	0.21	0.31	0.13
2015	Jun	1.59	1.86	0.99	2.04	2.09	1.49	0.12	0.18	0.06
2015	Jul	1.57	1.85	0.94	2.01	2.06	1.43	0.11	0.17	0.04
2015	Aug	1.53	1.78	0.95	2.20	2.25	1.57	0.21	0.23	0.19

* Load data used for the analysis are from January 2014 to December 2014.

** Italicized fields are estimates with a precision greater than +/- 10% at a 90% confidence interval.

Geographic Concentration of PEVs

The following tables and figures illustrate the geographic concentrations of PEVs in PG&E's service territory. Tables PG&E-12a and 12b as well as Figure PG&E-2 demonstrate that PEV customers are predominantly located in the San Francisco Bay Area and Central Coast (California Energy Commission Climate Zones 3 and 4[43]). Furthermore, dual participating NEM and PEV rate customers are highly concentrated in the Bay Area per Figure PG&E-3.

Table PG&E-12a: Geographic Concentration of PEVs by Climate Zone

Climate Zone	% Single Metering	% Separate Metering	% Residential Population
Z01	2%	1%	1%
Z02	10%	5%	8%
Z03	37%	42%	31%
Z04	28%	40%	14%
Z05	1%	1%	3%
Z06	0%	0%	0%
Z09	0%	0%	0%
Z11	2%	0%	7%
Z12	17%	10%	21%
Z13	2%	1%	13%
Z16	0%	0%	1%
Total	100%	100%	100%

Table PG&E-12b: Geographic Concentration of PEVs (Top Five Zip Codes by Rate)

Rate	Zip Code	Customers	% Total
Single Meter	94539	504	2.71
	95120	386	2.08
	95070	376	2.02
	95014	331	1.78
	94582	321	1.73
Separate Meter	95014	49	2.77
	95120	49	2.77
	95138	47	2.65
	95035	46	2.60
	95135	33	1.86

[43] California Energy Commission (2013). California Building Climate Zones with 2012 Zip Codes. Retrieved from: http://www.energy.ca.gov/maps/renewable/Climate_Zones_Zipcode.pdf.

Figure PG&E-2: Customer on EV Rates by Rate Schedule as of August 2015

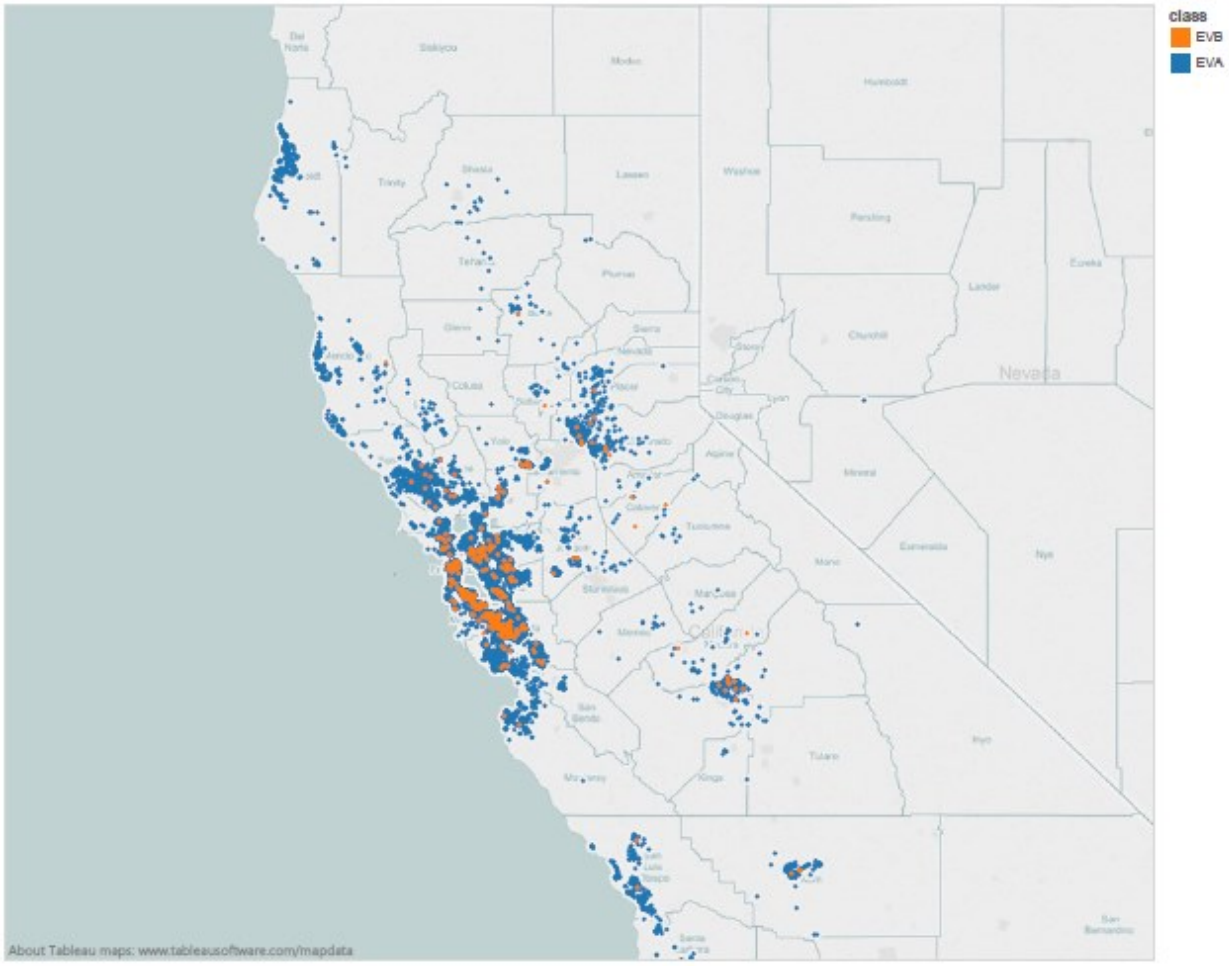
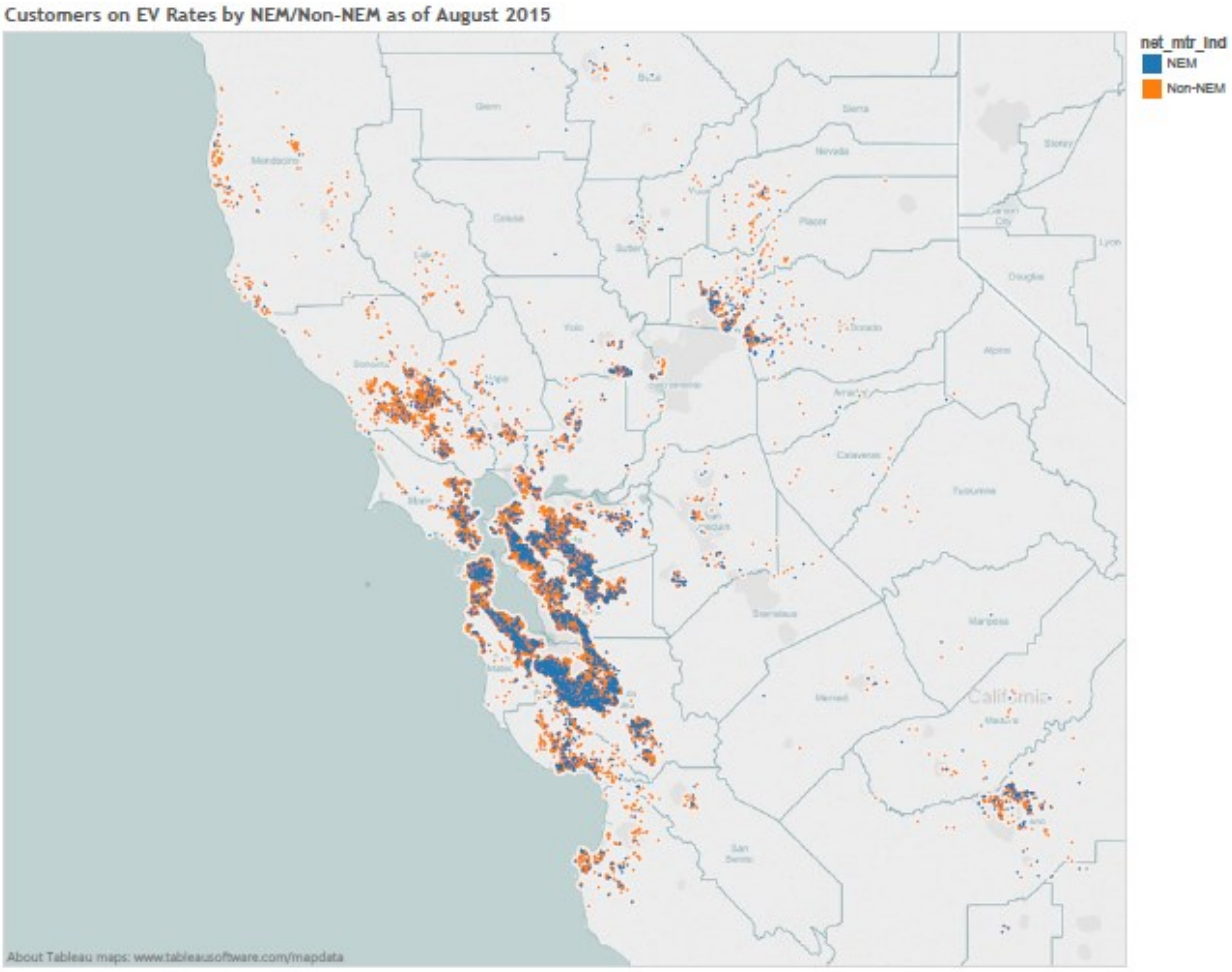


Figure PG&E-3: Electric Vehicles on EV Rates in the PG&E Service Territory as of August 2015



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SCE continues to offer residential customers two rates options [44] designed to facilitate the charging of PEVs. Both of these rates employ price-differentiated time-of-use periods. The following section will report the monthly usage characteristics from September 2014 through August 2015 for the identified PEV owners on these tariffs. One rate option allows for both regular household loads and the PEV charging loads to be recorded with a single meter under time-of-use periods designed to accommodate PEV charging requirements. During this reporting period this includes both the TOU-D-TEV tariff and the new TOU-D-A/B tariff. The second option, TOU-EV-1, requires a second meter dedicated to measuring the electricity used at the PEV charger. Additionally, customers may remain under their existing tariff, likely Schedule D (domestic rate plan). SCE believes that the majority of PEV owners in its service territory choose to remain on the domestic rate plan.

As a result of SCE's 2013 Rate Design Window application, the TOU-D-TEV rate was closed as of January 1, 2015 and replaced with the TOU-D-A/B which most notably removed the tiered structure and extended the off-peak charging window to better accommodate the charging cycles of PEVs. Also the TOU-D-TEV tariff required PEV ownership. However all residential customers are eligible to take service under TOU-D-A/B tariff, whether they own a PEV or not. Current customers under the TOU-D-TEV tariff were migrated to TOU-D Option A or B in the first half of 2015. Whereas previously SCE could rely on the exclusivity of the TOU-D-TEV rate to identify PEV owners to include in this annual report, SCE must now have alternative means of identifying which of the TOU-D-A/B accounts belong to PEV owners. New and existing TOU-D-TEV accounts as of December 2014 were included in the analysis for the remainder of the months reported in this analysis given that they remained on either TOU-D-TEV or TOU-D-A/B. Additionally, all customers who self-identified as PEV owners with SCE as a result of applying for a cash incentive at the California Center for Sustainable Energy's (CCSE) were included as of the first full month following their purchase. Some accounts were also identified through a previous OEM notification program. Both the self-identification process and the OEM notifications provide vehicle purchase dates necessary to determine the applicable load for observation.

Single-Metered Whole House Rate

The single-metered TOU tariff aimed at accommodating PEV charging available as of this reporting date is the TOU-D. This tariff superseded the TOU-D-TEV tariff and most notably removed the tiered structure found in the TOU-D-TEV tariff and extended the off-peak TOU window. Additionally, it has two options the customer can choose from, Option A or Option B. Both Options A and B of the TOU-D tariff maintain the same low rate during the off-peak period throughout the year. Option B however has a Basic Charge of $0.54/meter/day but significantly lower mid-peak and on-peak rates as compared to Option A. Option A also includes a $0.10/kWh Baseline Credit. Both options have pricing which varies seasonally.

[44] SCE also offers two PEV TOU rates for commercial customers: TOU-EV-3 and TOU-EV-4. As of the beginning of August 2015, there were 26 TOU-EV-3 accounts and 37 TOU-EV-4 accounts.

The TOU periods for both of these tariffs are defined as follows:

TOU-D-A/B (effective 1/1/2015)	
On-peak	2:00 p.m. - 8:00 p.m., weekdays all year, except holidays.
Off-peak	10:00 p.m. - 8:00 a.m., daily.
Mid-peak	All other hours.
TOU-D-TEV (closed as of 1/1/2015)	
On-peak	10:00 a.m. - 6:00 p.m., weekdays all year, except holidays.
Off-peak	12:00 (midnight) - 6:00 a.m., daily.
Mid-peak	All other hours.

The rate factors for the TOU-D-A/B structure were updated three times during the period covered in this report. Table SCE – 1a presents the rates that were effective as of June 1, 2015 as these rates were current after the bulk of the migration from the TOU-D-TEV[45] was complete. The additional iterations of the TOU-D-A/B as well as the TOU-D-TEV rates, can be found in Appendix A in Table A (1a-1b) and Table B (1a-1c) respectively.

[45] This rate had a tiered rate structure meaning the price during any given hour of the day would depend on the previous amount of consumption during the current billing period. The tiers of the TOU-D-TEV rate were denoted as Level I and Level II which corresponded to the tiers in the regular domestic rate; Tiers 1 and 2 of the domestic rate are collapsed into Level I and Tiers 3 and 4 into Level II.

Table SCE – 1a: Single Meter (TOU-D-A/B) Tariff[46] ($/kWh) – Effective 6/1/2015

	Option A				Option B			
Clock Hour Ending	Winter		Summer		Winter		Summer	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
1	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
2	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
3	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
4	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
5	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
6	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
7	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
9	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
10	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
11	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
12	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
13	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
14	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
15	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
16	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
17	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
18	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
19	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
20	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
21	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
22	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
23	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
24	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11

Option A: 0.10 Baseline Credit, 0.03 SF or 0.02 MDU meter/day Basic Charge

Option B: 0.54 meter/day Basic Charge

[46] https://www.sce.com/wps/portal/home/regulatory/tariff-books.

Table SCE – 2a: Single-Metered PEV Rate (TOU-D-A/B) Price Ratios

	Summer On-peak : Mid-peak : Off-peak	Winter On-peak : Mid-peak : Off-peak
Option A	4.2 : 2.7 : 1.0	3.3 : 2.4 : 1.0
Option B	3.2 : 1.6 : 1.0	2.3 : 1.3: 1.0

Separately-Metered PEV Rate

The TOU-EV-1 rate is designed for residential customers who have a separate meter exclusively for PEV charging. Therefore, the TOU-EV-1 rate only reflects the customer's charging load. The second meter is provided and installed at no additional cost, however the home's electrical infrastructure needs to be upgraded with a second panel and wiring to the charging location. Any costs related to the changes to the home's electrical infrastructure are the responsibility of the customer. For this rate plan, lower rates apply during off-peak hours of 9:00 p.m. to 12:00 noon, and rates change seasonally. For usage between noon and 9 p.m., rates are higher in summer. The following are the TOU periods for the separately-metered rate:

On-peak	12:00 noon – 9:00 p.m., daily
Off-peak	All other hours.

The TOU-EV-1 rate underwent multiple rate changes over the course of the reporting period. The most relevant rate factors are reported in the following table, Table SCE – 1b. Other applicable rate factors for the TOU-EV-1 tariff are listed in Appendix A, Table C (1a-1c).

Table SCE – 1b: Separate Meter (TOU-EV-1) Tariff ($/kWh) – Effective 3/2/2015

Clock Hour Ending	Winter Weekday	Winter Weekend	Summer Weekday	Summer Weekend
1	0.11	0.11	0.12	0.12
2	0.11	0.11	0.12	0.12
3	0.11	0.11	0.12	0.12
4	0.11	0.11	0.12	0.12
5	0.11	0.11	0.12	0.12
6	0.11	0.11	0.12	0.12
7	0.11	0.11	0.12	0.12
8	0.11	0.11	0.12	0.12
9	0.11	0.11	0.12	0.12
10	0.11	0.11	0.12	0.12
11	0.11	0.11	0.12	0.12
12	0.11	0.11	0.12	0.12
13	0.23	0.11	0.36	0.12
14	0.23	0.11	0.36	0.12
15	0.23	0.11	0.36	0.12
16	0.23	0.11	0.36	0.12
17	0.23	0.11	0.36	0.12
18	0.23	0.11	0.36	0.12
19	0.23	0.11	0.36	0.12
20	0.23	0.11	0.36	0.12
21	0.23	0.11	0.36	0.12
22	0.11	0.11	0.12	0.12
23	0.11	0.11	0.12	0.12
24	0.11	0.11	0.12	0.12

Table SCE – 2b: Separately-Metered PEV Rate (TOU-EV-1) Price Ratios

Summer On-peak : Off-peak	Winter On-peak : Off-peak
3.0 : 1.0	2.1 : 1.0

Program Enrollment

The percentage of NEM accounts remained consistently around 27% throughout the reporting period as shown in Table SCE – 3a. The percent of single metered accounts on DR, shown in Table SCE – 4, also remained very stable at 20% and shows no perceptible change from the previous year.

Table SCE – 3a: NEM Program Enrollment for Single Metering by Customer Type

Month	NEM Customers with Single Metering	NEM as % Single Metering	NEM as % SF Single Metering	NEM as % MDU Single Metering
Sep. 2014	1503	28%	31%	12%
Oct. 2014	1565	28%	31%	12%
Nov. 2014	1624	28%	31%	12%
Dec. 2014	1662	28%	31%	11%
Jan. 2015	1721	28%	31%	11%
Feb. 2015	1716	27%	31%	11%
Mar. 2015	1714	27%	31%	11%
Apr. 2015	1717	27%	31%	11%
May 2015	1727	27%	30%	11%
Jun. 2015	1726	27%	30%	11%
Jul. 2015	1728	27%	30%	11%
Aug. 2015	1723	27%	30%	11%

Table SCE – 4: DR Program Enrollment for Single Metering by Customer Type

Month	DR Customers with Single Metering	DR as % Single Metering	DR as % SF Single Metering	DR as % MDU Single Metering
Sep. 2014	1085	20%	22%	14%
Oct. 2014	1126	20%	22%	13%
Nov. 2014	1184	20%	22%	13%
Dec. 2014	1210	20%	21%	14%
Jan. 2015	1255	20%	21%	14%
Feb. 2015	1258	20%	21%	14%
Mar. 2015	1256	20%	21%	13%
Apr. 2015	1259	20%	21%	13%
May 2015	1285	20%	22%	13%
Jun. 2015	1307	20%	22%	14%
Jul. 2015	1320	20%	22%	14%
Aug. 2015	1323	20%	22%	14%

NEM and DR are associated with the energy use of the whole house and as such are attached to the meter recording the whole house usage, therefore there are no separately-metered (TOU-EV-1) NEM and DR customers (i.e., Table 3b: NEM Program Enrollment by Separate Metering and Table 5: DR Program Enrollment by Separate Metering are not applicable).

Number of PEV Time-of-Use Accounts

As noted previously, the ability of SCE to identify new accounts with PEVs has decreased with this year's report. In addition, it is believed that the vast majority of PEV owners remain on their current rate, likely Schedule D, and are therefore unknown. Nevertheless, a mild but consistent increase in accounts with PEVs for both single-family and multi-family units can be seen in Chart SCE – 1 through January 2015. This trend becomes somewhat weaker after the advent of the TOU-D-A/B rate in January 2015. SF units grew 17% through January and 4% over the remainder of the reporting period.

Chart SCE – 1: Single Meter (TOU-D-TEV and TOU-D-A/B) –
Number of Accounts by Customer Type at the Beginning of Each Month

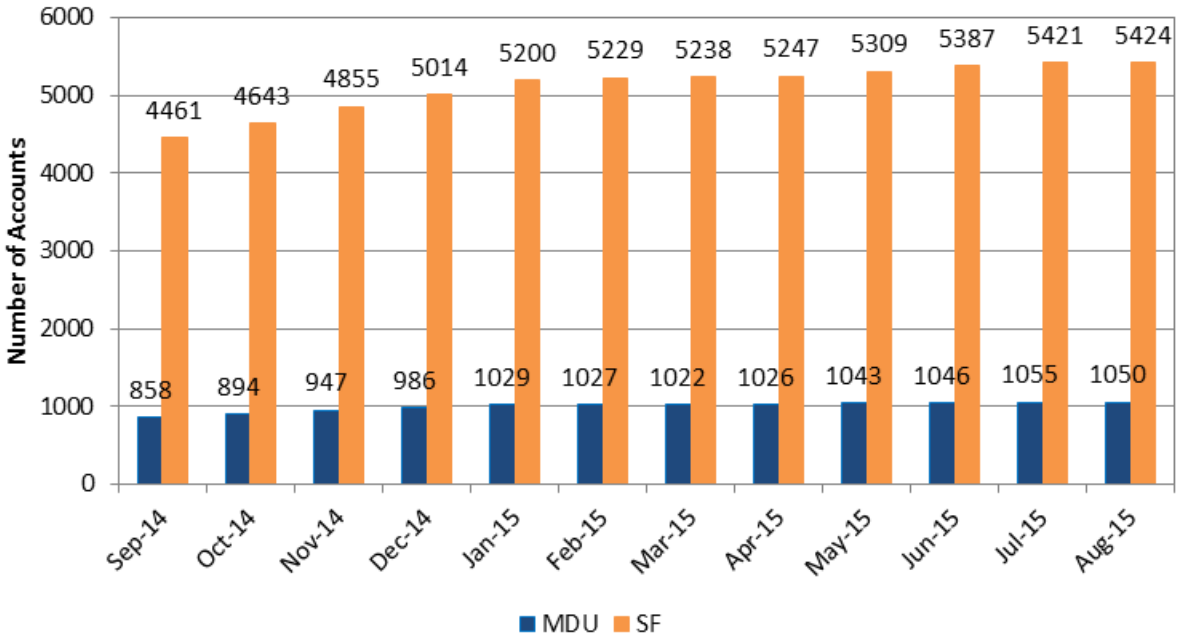
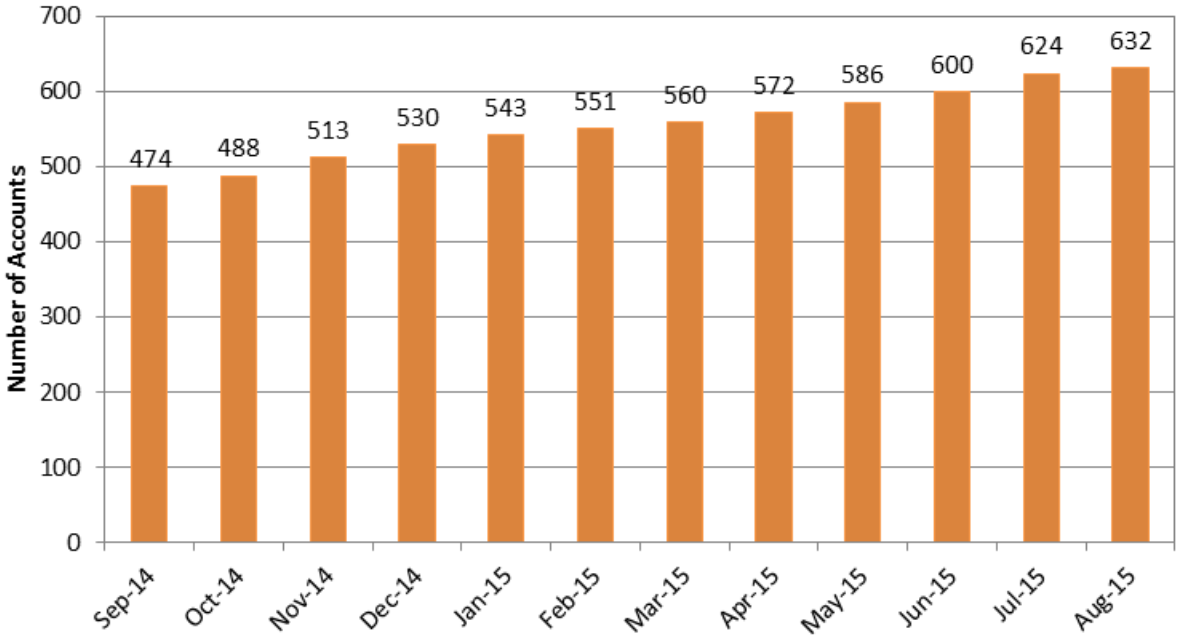


Chart SCE – 2 shows a similar, mild yet persistent increase of 158 in separately-metered accounts over the entire reporting period. This 33% increase in the number of accounts is down from the prior annual reported increase of 60%.

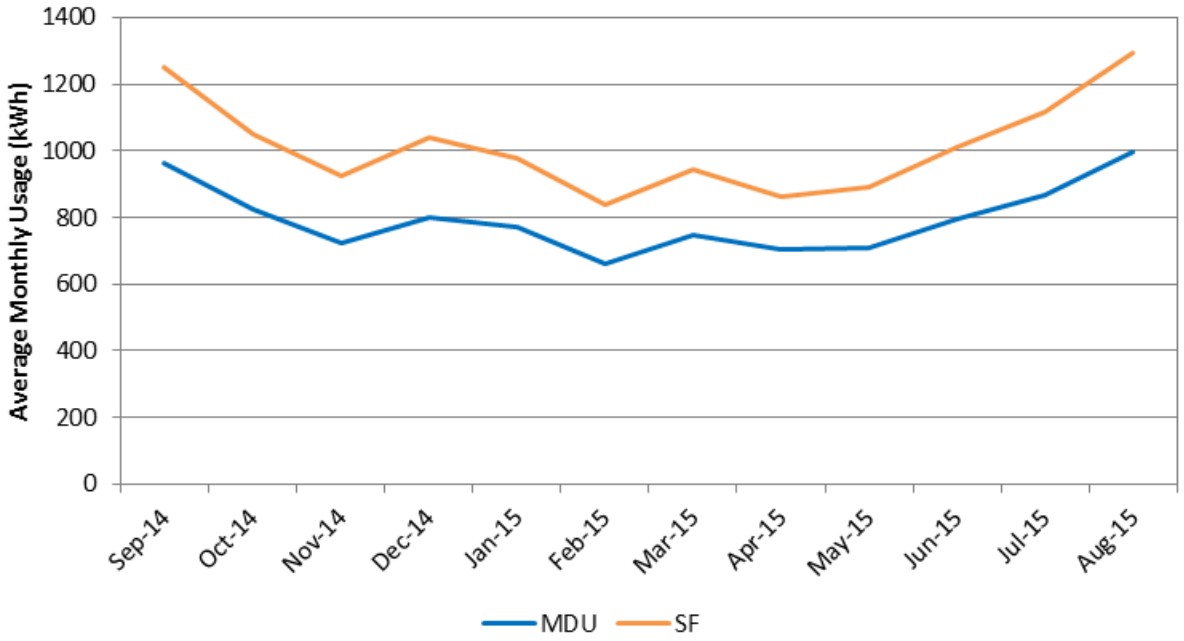
Chart SCE – 2: Separate Meter (TOU-EV-1) – Number of Accounts at the Beginning of Each Month



Average Monthly Usage for TOU Accounts With a PEV

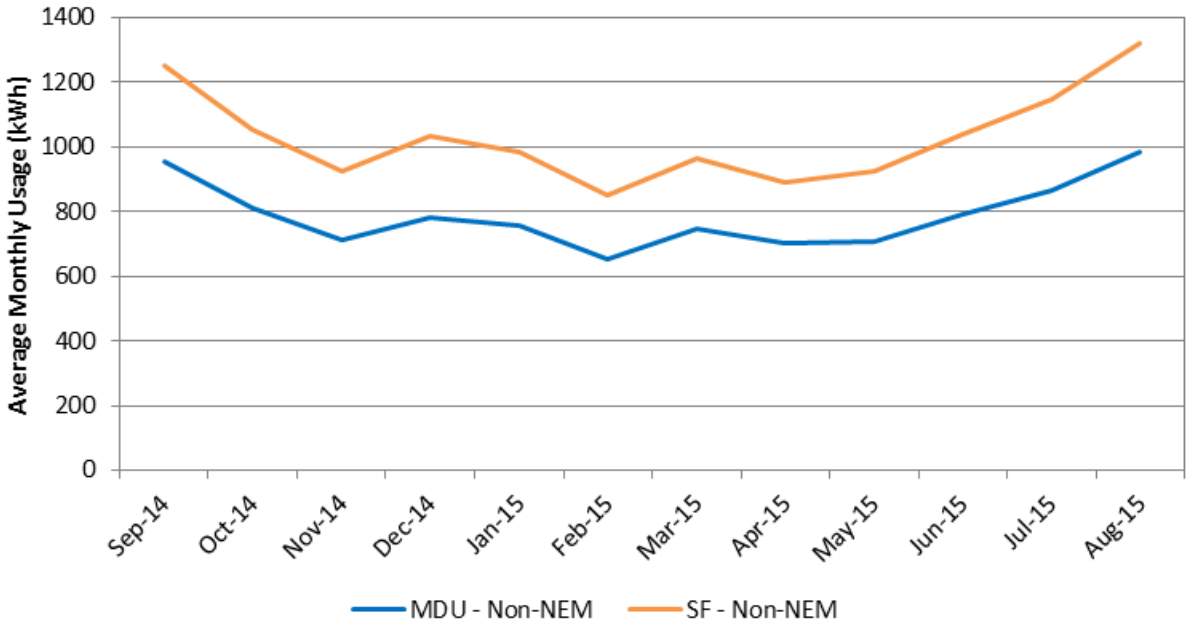
The average monthly household usage for single-metered households with a PEV shown in Chart SCE – 3 depicts similar behavior as seen in previous years. Single-family dwellings have higher usage levels than Multi-family units but the same pattern over the course of the year with usage trending down into the winter and then trending up from February into the summer months. The greatest usage for both dwelling types occurs in August at 1,259 kWh for SF and 995 kWh for MDU. This broad seasonal pattern is likely primarily driven by seasonal household load other than the PEVs such as cooling.

Chart SCE – 3: Single Meter (TOU-D-TEV and TOU-D-A/B) –
Average Monthly Usage (kWh) by Customer Type Including NEM



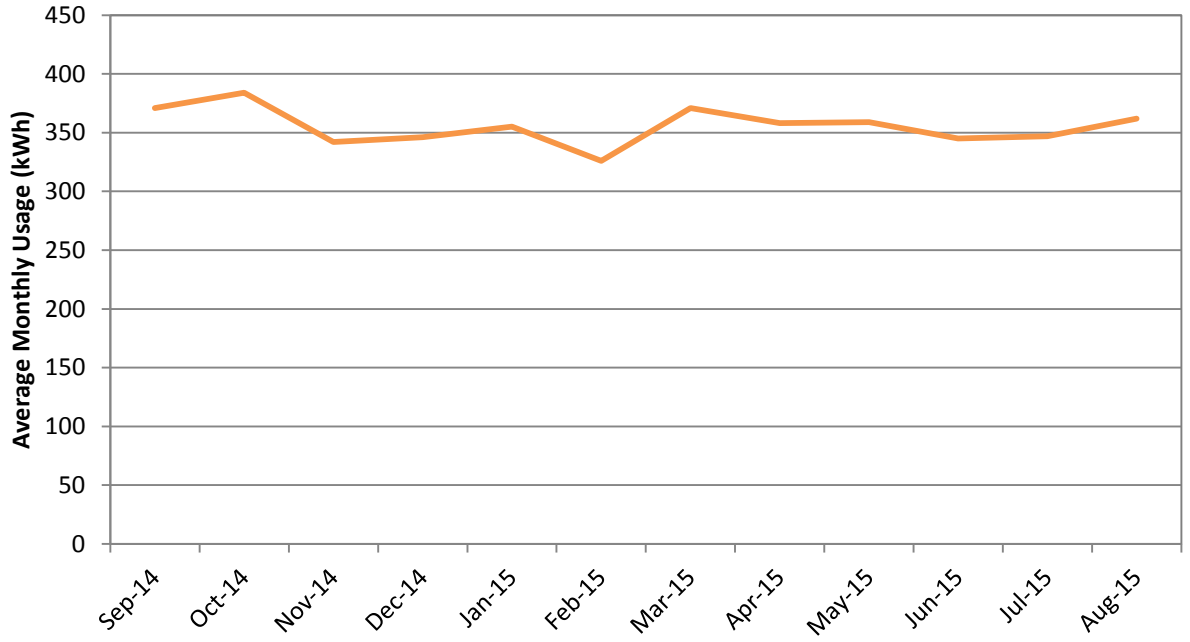
The NEM accounts have very little impact on the average monthly usage of PEV owners as seen in Chart SCE – 4. The annual monthly usage pattern remains identical to that in Chart SCE – 3. The usage is slightly lower than when NEM accounts are excluded indicating that the NEM housholds are larger electricity consumers than the non-NEM PEV owners.

Chart SCE – 4: Single Meter (TOU-D-TEV and TOU-D-A/B) – Average Monthly Usage (kWh) by Customer Type Excluding NEM



The average monthly usage for separately metered PEVs was quite stable, averaging 356 kWh per month as displayed in Chart SCE – 5. The consistent usage by the separately metered PEVs supports the presumption that the seasonal trends seen in the household usage of singly-metered PEV owners is not inherent to PEV charging.

Chart SCE – 5: Separate Meter (TOU-EV-1) – Average Monthly Usage



Average Usage During Time-of-Use Periods

Some of the subsequent load profiles and demand metrics will also include the average residential customer as a benchmark for the single-metered PEV customers. This data is derived from SCE's 2014 Domestic Rate Group Load Study which is based on the 2014 calendar year. As such the statistics for the residential population are not in chronological order and the months January 2015 through August 2015 are from the corresponding months in 2014.

Because the time-of-use periods changed from the TOU-D-TEV tariff to the TOU-D-A/B tariff, the TOU usage statistics are presented separately for any accounts with usage on each tariff for the given month. Table SCE – 6b-8b show the percent of usage occurring during the On-peak, Mid-peak and Off-peak periods respectively for the TOU-D-A/B tariff. The same is shown for the TOU-D-TEV in Table SCE - 6a-8a.

Within the 10-hour off-peak window of the TOU-D-A/B tariff, PEV owners have the greatest share of their usage with a monthly average of 50%. Under the previous single-metered TOU tariff, TOU-D-TEV, with a six hour off-peak window they used and monthly average of 34% with the plurality of their usage occurring during the mid-peak period. Under TOU periods of each tariff, the residential population as a whole has the greatest portion of their usage falling in the mid-peak period.

Table SCE – 6a: Single Meter (TOU-D-TEV) – On Peak* TOU Distribution

Month	All Residential	Single: Non-NEM	SF: Non-NEM	MDU: Non-NEM	NEM
Sep. 2014	27.1%	18.8%	19.0%	17.5%	11.3%
Oct. 2014	25.8%	17.3%	17.5%	16.2%	9.6%
Nov. 2014	19.8%	13.8%	14.0%	13.0%	9.1%
Dec. 2014	22.9%	16.9%	17.0%	16.3%	12.5%
Jan. 2015	22.2%	15.1%	15.2%	14.3%	9.3%
Feb. 2015	21.4%	14.8%	14.9%	13.9%	7.2%
Mar. 2015	21.2%	15.3%	15.5%	14.5%	5.2%
Apr. 2015	24.6%	16.8%	16.8%	17.0%	3.7%
May 2015	24.3%	n/a	n/a	n/a	n/a
Jun. 2015	25.8%	n/a	n/a	n/a	n/a
Jul. 2015	27.7%	n/a	n/a	n/a	n/a
Aug. 2015	26.1%	n/a	n/a	n/a	n/a

* On-peak period is defined as 10:00 a.m. - 6:00 p.m., weekdays all year, except holidays.

Table SCE – 7a: Single Meter (TOU-D-TEV) – Mid-Peak* TOU Distribution

Month	All Residential	Single: Non-NEM	SF: Non-NEM	MDU: Non-NEM	NEM
Sep. 2014	56.5%	50.6%	50.6%	50.4%	51.8%
Oct. 2014	56.6%	48.2%	48.2%	48.2%	49.1%
Nov. 2014	61.8%	51.8%	51.9%	51.6%	49.7%
Dec. 2014	58.3%	50.3%	50.4%	49.9%	49.4%
Jan. 2015	58.4%	50.3%	50.3%	50.5%	49.3%
Feb. 2015	59.4%	49.6%	49.6%	49.6%	48.7%
Mar. 2015	59.7%	49.8%	49.8%	50.0%	49.4%
Apr. 2015	56.6%	51.9%	51.2%	54.1%	48.0%
May 2015	58.5%	n/a	n/a	n/a	n/a
Jun. 2015	57.4%	n/a	n/a	n/a	n/a
Jul. 2015	55.8%	n/a	n/a	n/a	n/a
Aug. 2015	57.4%	n/a	n/a	n/a	n/a

* Mid-peak period is defined as all other hours that are not On-peak or Off-peak.

Table SCE – 8a: Single Meter (TOU-D-TEV) – Off-Peak* TOU Distribution

Month	All Residential	Single: Non-NEM	SF: Non-NEM	MDU: Non-NEM	NEM
Sep. 2014	16.3%	30.6%	30.4%	32.1%	36.9%
Oct. 2014	17.5%	34.5%	34.3%	35.6%	41.3%
Nov. 2014	18.4%	34.4%	34.2%	35.4%	41.2%
Dec. 2014	18.8%	32.8%	32.6%	33.7%	38.0%
Jan. 2015	19.4%	34.6%	34.5%	35.2%	41.4%
Feb. 2015	19.2%	35.6%	35.5%	36.5%	44.1%
Mar. 2015	19.1%	34.8%	34.7%	35.5%	45.4%
Apr. 2015	18.7%	31.3%	32.0%	28.9%	48.3%
May 2015	17.2%	n/a	n/a	n/a	n/a
Jun. 2015	16.9%	n/a	n/a	n/a	n/a
Jul. 2015	16.5%	n/a	n/a	n/a	n/a
Aug. 2015	16.5%	n/a	n/a	n/a	n/a

* Off-peak period is defined as 12:00 (midnight) - 6:00 a.m., daily.

Table SCE – 6b: Single Meter (TOU-D-A/B) – On Peak* TOU Distribution

Month	All Residential	Single: Non-NEM	SF: Non-NEM	MDU: Non-NEM	NEM
Sep. 2014	24.8%	n/a	n/a	n/a	n/a
Oct. 2014	24.0%	n/a	n/a	n/a	n/a
Nov. 2014	18.1%	n/a	n/a	n/a	n/a
Dec. 2014	21.3%	n/a	n/a	n/a	n/a
Jan. 2015	20.6%	n/a	n/a	n/a	n/a
Feb. 2015	19.5%	13.0%	13.1%	n/a	12.3%
Mar. 2015	18.7%	13.5%	13.4%	13.5%	9.9%
Apr. 2015	22.0%	14.7%	14.7%	14.3%	10.6%
May 2015	22.3%	12.7%	12.7%	12.4%	8.7%
Jun. 2015	23.5%	17.2%	17.3%	16.8%	13.6%
Jul. 2015	25.1%	18.4%	18.5%	17.7%	14.5%
Aug. 2015	23.7%	17.7%	17.9%	16.9%	15.3%

* On-peak period is defined as 2:00 p.m. - 8:00 p.m., weekdays all year, except holidays.

Table SCE – 7b: Single Meter (TOU-D-A/B) – Mid-Peak* TOU Distribution

Month	All Residential	Single: Non-NEM	SF: Non-NEM	MDU: Non-NEM	NEM
Sep. 2014	44.8%	n/a	n/a	n/a	n/a
Oct. 2014	43.1%	n/a	n/a	n/a	n/a
Nov. 2014	47.4%	n/a	n/a	n/a	n/a
Dec. 2014	43.1%	n/a	n/a	n/a	n/a
Jan. 2015	43.0%	n/a	n/a	n/a	n/a
Feb. 2015	44.2%	33.7%	34.3%	n/a	22.9%
Mar. 2015	45.2%	33.2%	33.3%	31.9%	20.2%
Apr. 2015	42.5%	33.1%	33.3%	32.3%	23.3%
May 2015	45.1%	35.8%	36.0%	35.0%	24.0%
Jun. 2015	44.8%	34.8%	34.9%	34.1%	25.1%
Jul. 2015	44.4%	35.2%	35.4%	34.2%	25.7%
Aug. 2015	45.7%	38.8%	39.0%	38.0%	28.9%
* Mid-peak period is defined as all other hours that are not On-peak or Off-peak.					

Table SCE – 8b: Single Meter (TOU-D-A/B) – Off-Peak* TOU Distribution

Month	All Residential	Single: Non-NEM	SF: Non-NEM	MDU: Non-NEM	NEM
Sep. 2014	30.4%	n/a	n/a	n/a	n/a
Oct. 2014	32.9%	n/a	n/a	n/a	n/a
Nov. 2014	34.5%	n/a	n/a	n/a	n/a
Dec. 2014	35.6%	n/a	n/a	n/a	n/a
Jan. 2015	36.4%	n/a	n/a	n/a	n/a
Feb. 2015	36.3%	53.3%	52.6%	n/a	64.8%
Mar. 2015	36.1%	53.4%	53.2%	54.6%	69.9%
Apr. 2015	35.5%	52.2%	51.9%	53.4%	66.1%
May 2015	32.5%	51.5%	51.3%	52.6%	67.3%
Jun. 2015	31.7%	48.0%	47.8%	49.2%	61.3%
Jul. 2015	30.5%	46.4%	46.1%	48.1%	59.8%
Aug. 2015	30.5%	43.4%	43.1%	45.1%	55.8%
* Off-peak period is defined as 10:00 p.m. - 8:00 a.m., daily.					

PEV owners with a separate meter for their vehicle charge nearly 90% of their usage during the off-peak period as shown in Table SCE – 6c. Similar results were seen in the prior year as well.

Table SCE – 6c: Separate Meter (TOU-EV-1) – Usage During Time-of-Use Periods

Month	On-peak	Off-peak
Sep. 2014	10.5%	89.5%
Oct. 2014	10.3%	89.7%
Nov. 2014	11.7%	88.3%
Dec. 2014	11.5%	88.5%
Jan. 2015	11.9%	88.1%
Feb. 2015	10.5%	89.5%
Mar. 2015	10.3%	89.7%
Apr. 2015	10.8%	89.2%
May 2015	11.0%	89.0%
Jun. 2015	11.0%	89.0%
Jul. 2015	11.2%	88.8%
Aug. 2015	11.8%	88.2%

Charts SCE – 6a for SF with a single meter, 6b for MDU with a single meter, and 6c for separately-metered PEVs illustrate the dispersion of individual average consumption for each day of the week. The average consumption for each account was calculated for each day of the week and then the distribution of all accounts for each day is displayed. What is most notable for both rates and both SF and MDU accounts is the prevalence of accounts with extremely high average usage. However within the single-metered group, the MDU accounts tend to have lower usage and do not have any accounts that average more than 150 kWh for any day of the week, whereas the SF customers have a handful of accounts with average consumption greater than 150 kWh and up to about 450 kWh per day.

The following three charts, Charts SCE – 6a-6c, show boxplots[47] depicting the distribution of average daily usage for individual accounts. The median average usage for individual accounts and the inter-quartile range are quite similar for each day of the week for the single-metered groups. The separately metered PEV median usage shown in Chart SCE – 6c is lowest on Saturday and Sunday.

[47] Rectangular boxes represent the range of the middle 50% of the accounts by size (inter-quartile range), where the middle value (median) is denoted by a line and separates the upper and lower halves of the distribution. The whiskers extend 1.5 times the inter-quartile range above the 75th percentile and below the 25th percentile. Points farther than the whisker from the interquartile range are commonly considered outliers and are plotted.

Chart SCE – 6a: Single Meter (TOU-D-TEV and TOU-D-A/B), SF –
Box-and-Whisker Plot of Individual Average Daily Consumption(kWh) by Day of the Week

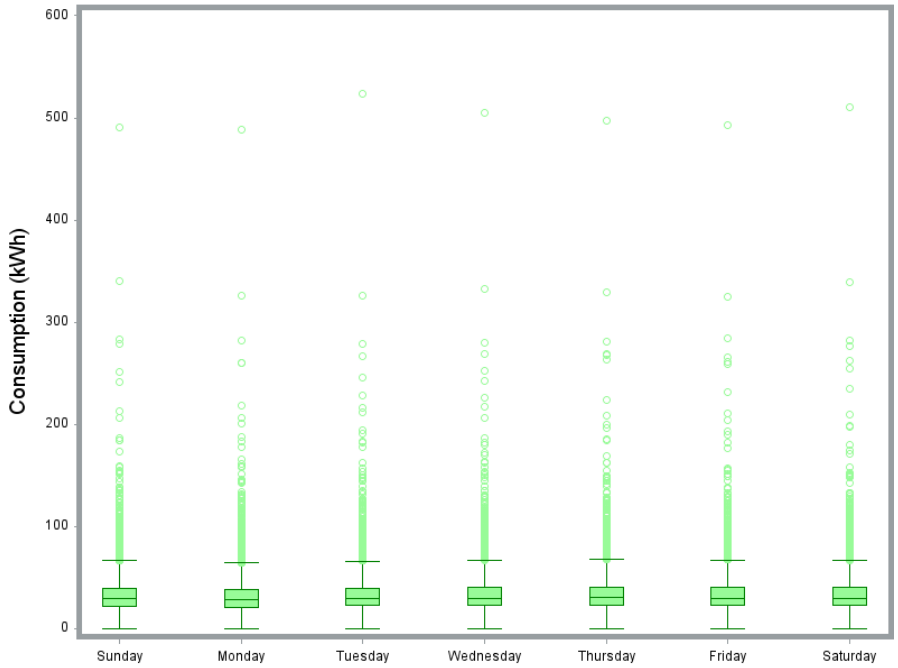


Chart SCE – 6b: Single Meter (TOU-D-TEV and TOU-D-A/B), MDU –
Box-and-Whisker Plot of Individual Average Daily Consumption(kWh) by Day of the Week

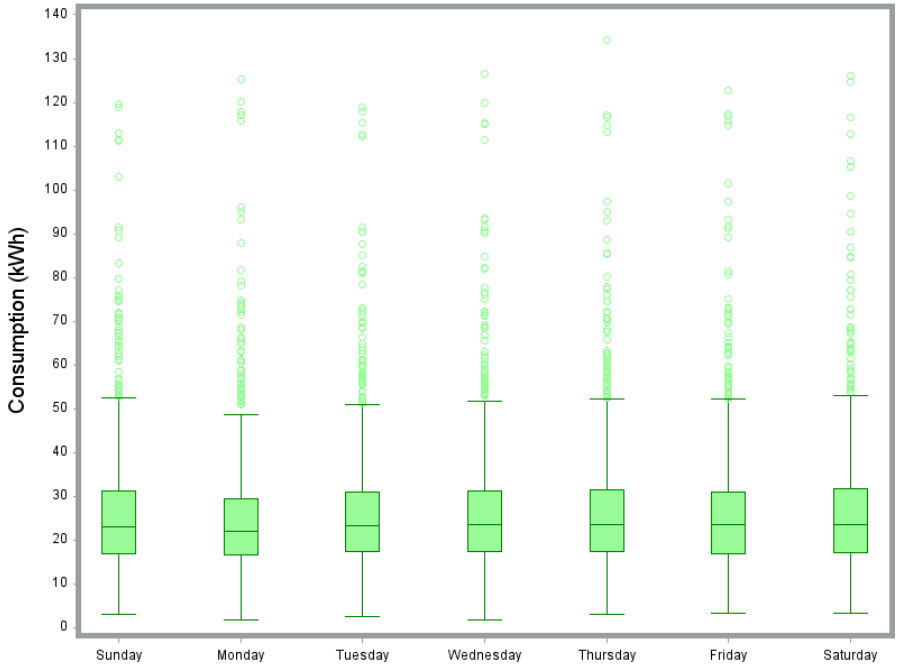
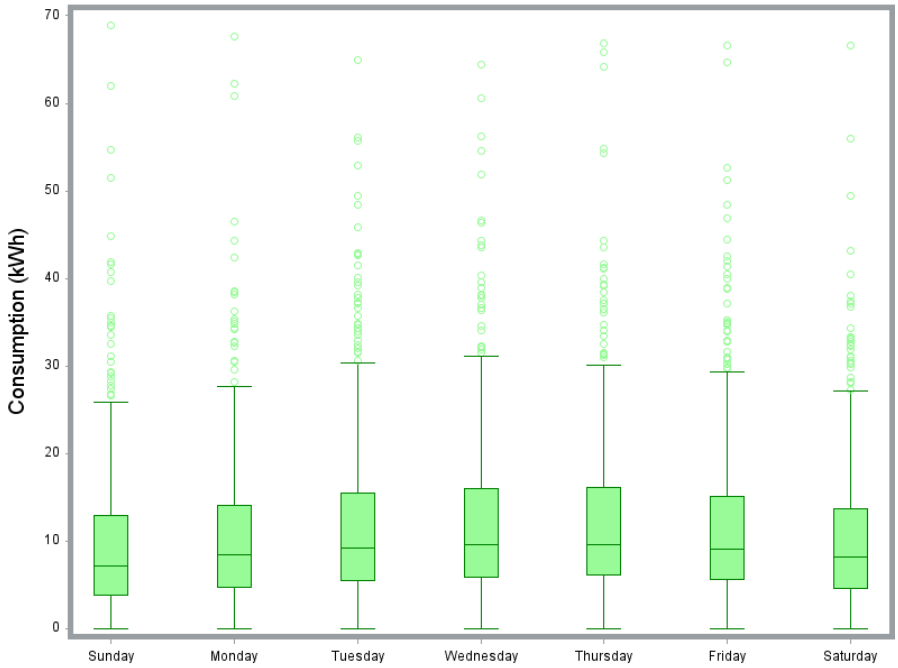


Chart SCE – 6c: Separate Meter (TOU-EV-1), SF –
Box-and-Whisker Plot of Individual Average Daily Consumption(kWh) by Day of the Week



Average Load Profiles

Average hourly load profiles provide a clear visual depiction of the daily usage patterns. As with the boxplots, the average hourly profile is computed for each day of the week for both single-metered and separately metetered accounts. Because it is expected that the tariff structure would impact usage behavior, the load profiles are shown for the single-metered TOU-D-TEV and TOU-D-A/B tariffs separately. Under each tariff load profiles further distinguished by single and multi-family dwellings. Additionally, average hourly load profiles are shown for each week of the day for a subset of PEV owners who chose to remain on the regular domestic, Schedule D, tariff and are known to SCE through self-identification.

The load profiles for single-family households with a PEV are shown in Chart SCE – 7a. As is typical with residential annual average hourly usage, usage peaks in the evening around 8:00 p.m. Midday usage is lower but slightly higher on weekend days. Rather than taper into the morning hours however these profiles exhibt a large spike occuring at midnight and then tapering until 6:00 a.m. This spike peaks at 2.6 kWh, 37% greater than the 1.9 average usage at 8:00 p.m. This corresponds directly with the off-peak time period of the TOU-D-TEV tariff. It appears that the PEV owners who choose a TOU rate for their household and PEV electricity needs are very responsive to the TOU period prices. All the usage in these load profiles occurs under the TOU-D-A/B tariff however most of the customers comprsing this group were migrated from the TOU-D-TEV and likely have their technology preset to commence charging at midnight. A small secondary spike is seen forming beginning at 10:00 p.m., the beginning of the off-peak periord of the new TOU-D-A/B tariff.

Very similar behavior is observed with MDU customers in Chart SCE – 7b but with with slightly lower avergage hourly usage.

Chart SCE – 7a: Single Meter (TOU-D-A/B), SF – Average Hourly Load Profile for Each Day of the Week

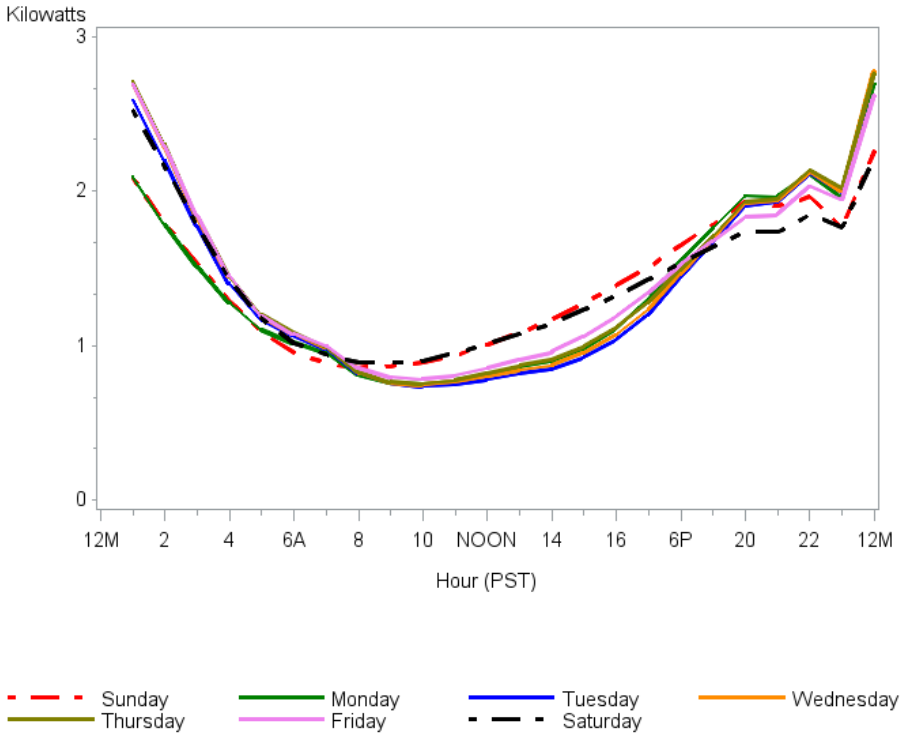
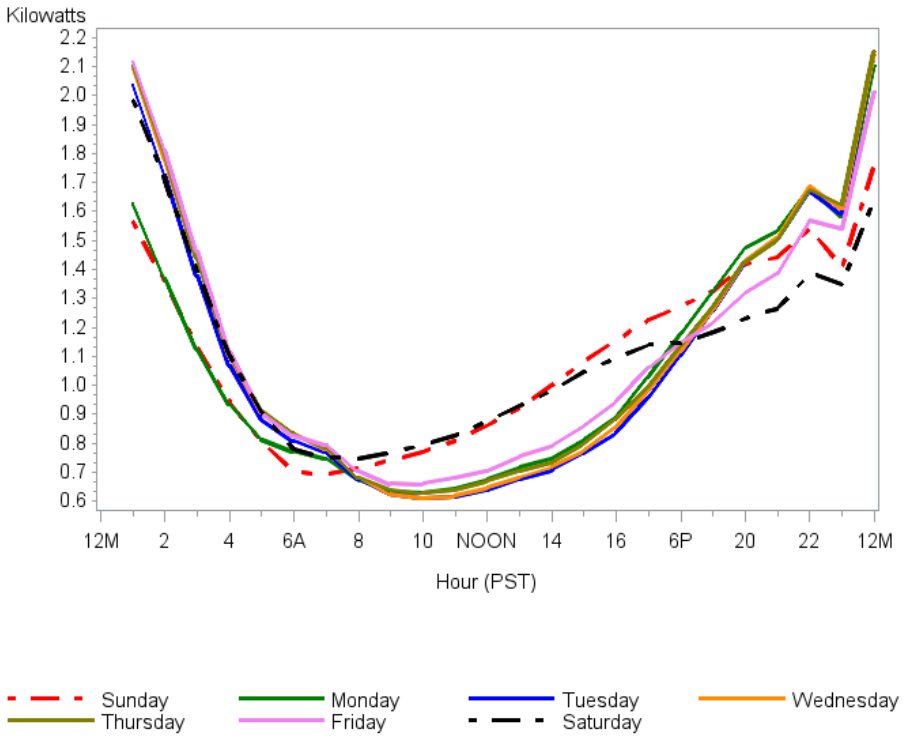


Chart SCE – 7b: Single Meter (TOU-D-A/B), MDU –
Average Hourly Load Profile for Each Day of the Week



Very similar profiles to the TOU-D-A/B are observed in Chart SCE – 7c and Chart SCE – 7d for SF and MDU households respectively under the TOU-D-TEV tariffs. The notable exception is the aforementioned third spike developing at 10:00 p.m. As noted in Table SCE – 8b the usage occuring between midnight and 6:00 a.m. is 34% of the daily usage.

Chart SCE – 7c: Single Meter (TOU-D-TEV), SF – Average Hourly Load Profile for Each Day of the Week

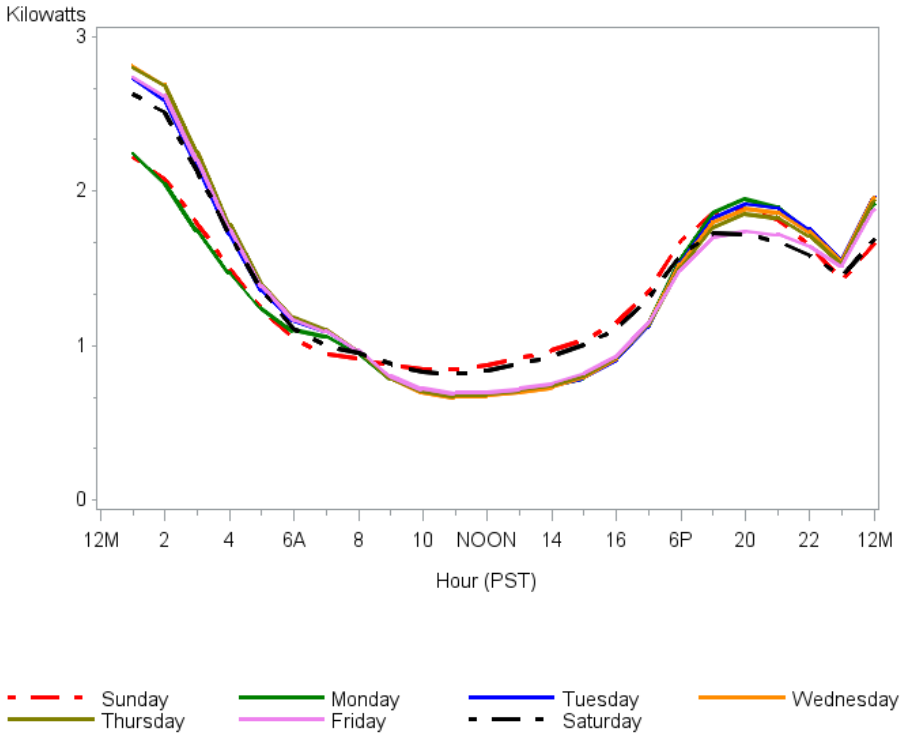
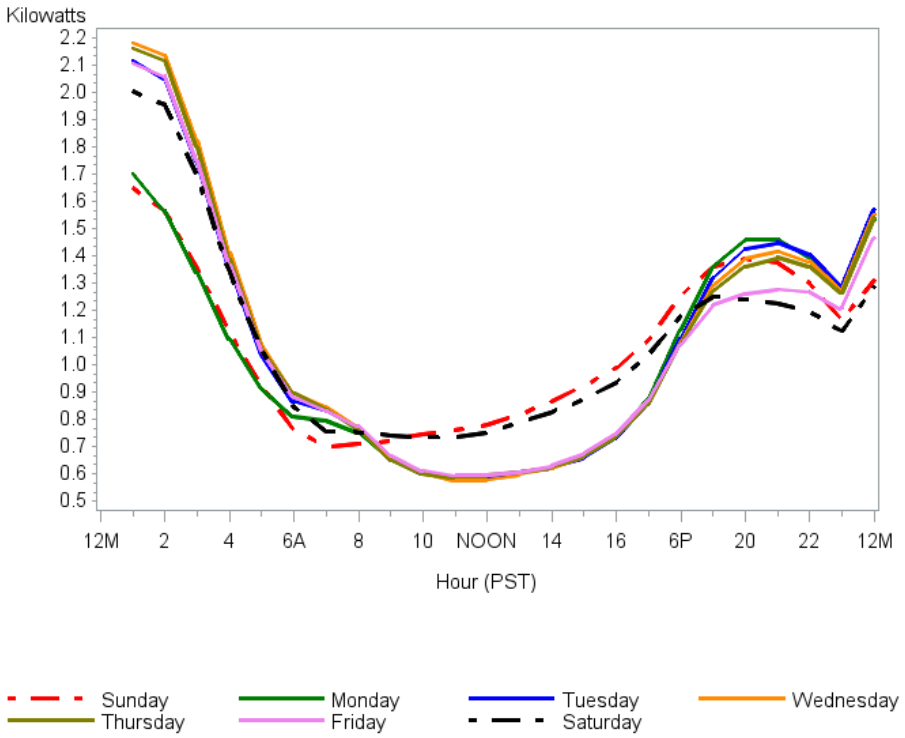


Chart SCE – 7d: Single Meter (TOU-D-TEV), MDU –
Average Hourly Load Profile for Each Day of the Week



Separately meterered PEVs commence charging promptly at the begin of the off-peak interval at 10:00 p.m. After 12:00 a.m. demands begin to taper off as vehicles reach full charges. The highest demand occurs Monday through Thursday and has an average hourly demand of 1.7 kW. Charging during the day between 7:00 a.m. and 8:00 p.m. is very low

Chart SCE – 8: Separate Meter (TOU-EV-1) - Average Hourly Load Profile for Each Day of the Week

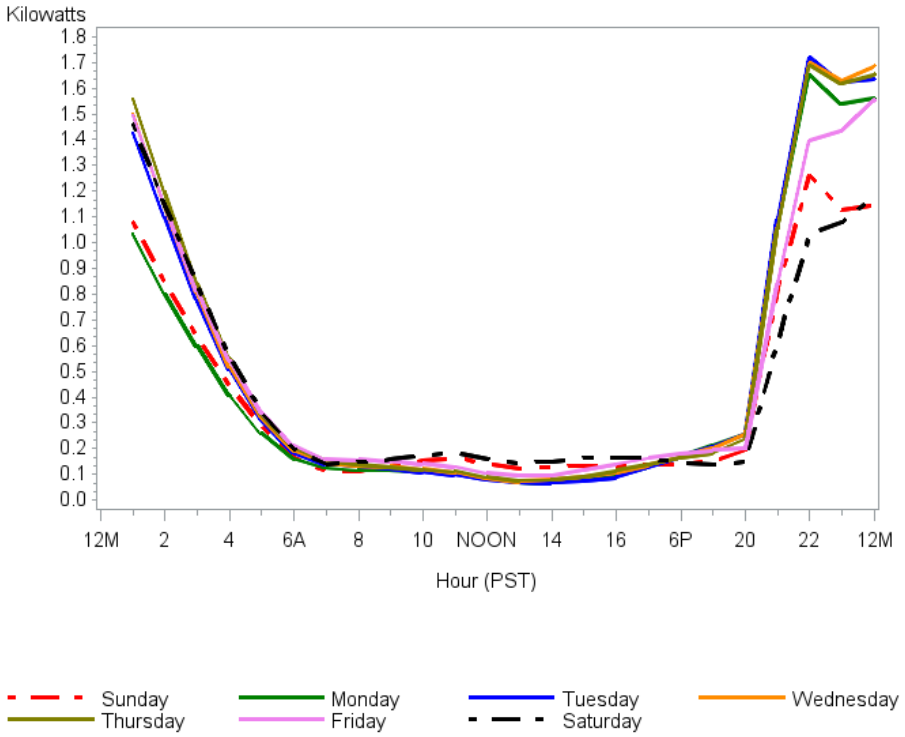
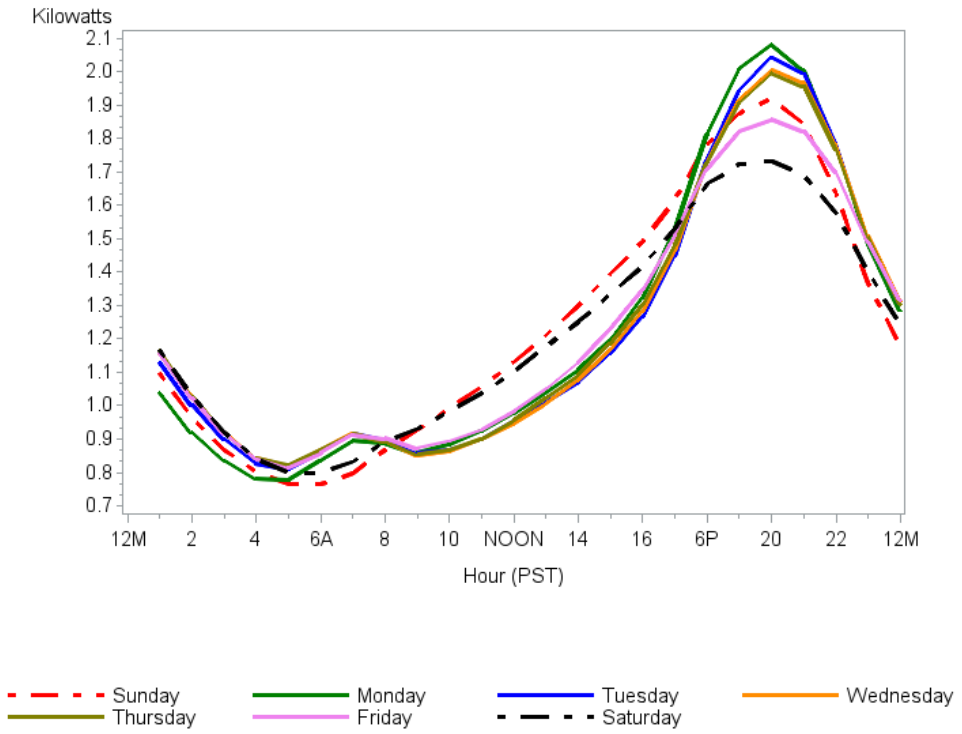


Chart SCE – 9 shows the load profile for a portion of the SF customers who are known to SCE to own a PEV but choose to remain on the regular tiered, domestic rate. Their daytime demand begins to rise around 9:00 a.m., and continues until it peaks in the evening at 8:00 p.m. As compared to the single-family, single-metered TOU customers in Chart SCE – 7a and Chart SCE – 7c they lack the second peak occurring at midnight, or 10:00 p.m. for some customers under the TOU-D-A/B tariff. They also have slightly higher afternoon levels of demand which may be a factor in their decision to remain on the regular residential rate as opposed to the TOU rate. Their evening peak, however, is very similar in magnitude to those customers on a single-meter, TOU tariff.

Chart SCE – 9[48]: Single Meter, SF PEV Owners[49] on a Non-TOU Rate – Average Hourly Load Profile for Each Day of the Week



[48] Identification of regular domestic accounts that belong to PEV owners relies on self-identification and therefore is subject to large selection bias. Furthermore, the duration of PEV load as a component of the metered household load cannot be determined. The reliability of this information therefore cannot be guaranteed.

[49] 3,032 accounts on the regular Domestic rate schedule (including NEM customers) with load data between September 1, 2014, and August 31, 2015, and a known purchase date of the PEV.

Average Non-Coincident Peak Load

The average monthly non-coincident peak for all single metered PEV households of 7.3 kW in Table SCE – 9a is on average 3.1 kW higher than the residential population as a whole. Chart SCE – 10a shows the same seasonal behaviour in non-coincident demand that was seen in usage in Chart SCE – 3 and Chart SCE – 4.

Table SCE – 9a: Single Meter (TOU-D-TEV and TOU-D-A/B) – Monthly Average Non-Coincident Peak Load (kW)

Month	Residential Pop.	SF Pop.	MDU Pop.	All Single Metering	SF Single Metering	MDU Single Metering
Sep. 2014	4.91	5.73	3.71	8.46	8.77	6.87
Oct. 2014	4.39	5.04	3.44	7.46	7.72	6.11
Nov. 2014	3.70	4.08	3.13	6.71	6.94	5.56
Dec. 2014	3.83	4.18	3.31	6.91	7.14	5.77
Jan. 2015	3.57	3.86	3.15	6.67	6.88	5.60
Feb. 2015	3.52	3.77	3.15	6.52	6.73	5.42
Mar. 2015	3.54	3.82	3.12	6.45	6.66	5.33
Apr. 2015	3.85	4.24	3.28	6.60	6.79	5.60
May 2015	4.52	5.18	3.54	6.81	7.04	5.63
Jun. 2015	4.39	5.04	3.43	7.65	7.92	6.26
Jul. 2015	4.87	5.67	3.70	7.93	8.21	6.47
Aug. 2015	4.81	5.58	3.66	8.50	8.82	6.84

Chart SCE – 10a: Single Meter (TOU-D-TEV and TOU-D-A/B) – Monthly Average Non-Coincident Peak Load (kW)

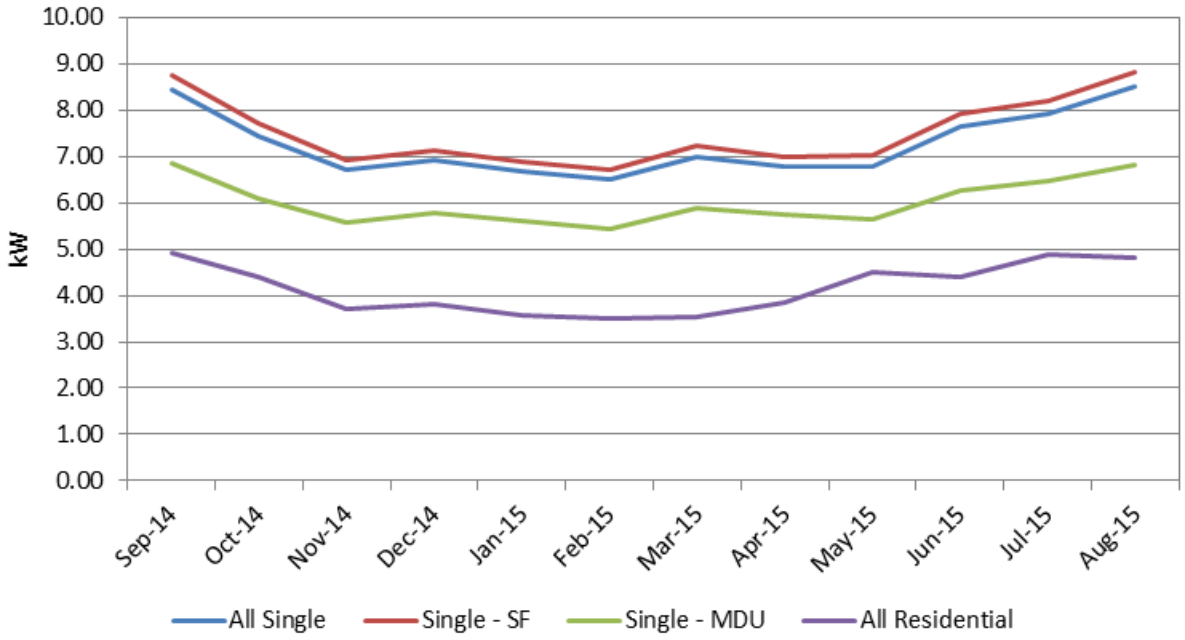


Table SCE – 9b and Chart SCE – 10b show a very stable monthly non-coincident demand averaging 7.5 kW. It would appear that the PEV charging of separately metered PEVs results in higher monthly average non-coincident demand than single-metered households.

Table SCE – 9b: Separate Meter (TOU-EV-1) – Monthly Average Non-Coincident Peak Load (kW)

Month	Separate Metering
Sep. 2014	7.47
Oct. 2014	7.42
Nov. 2014	7.39
Dec. 2014	7.41
Jan. 2015	7.41
Feb. 2015	7.42
Mar. 2015	7.60
Apr. 2015	7.63
May 2015	7.60
Jun. 2015	7.70
Jul. 2015	7.61
Aug. 2015	7.51

Chart SCE – 10b: Separate Meter (TOU-EV-1) – Monthly Average Non-Coincident Peak Load (kW)

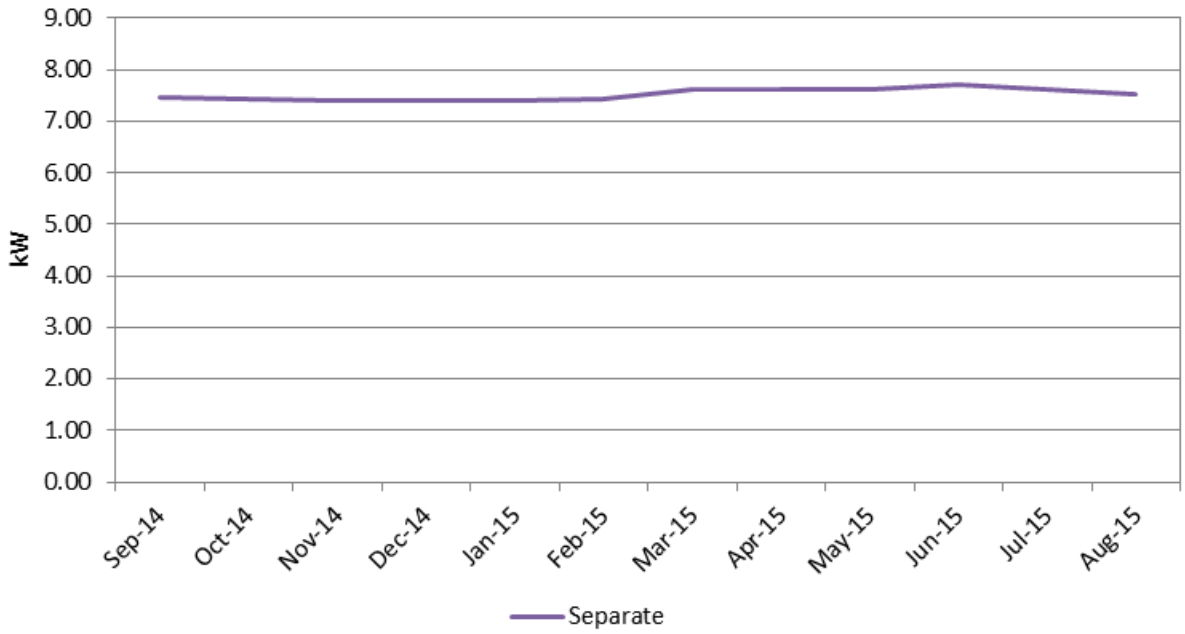
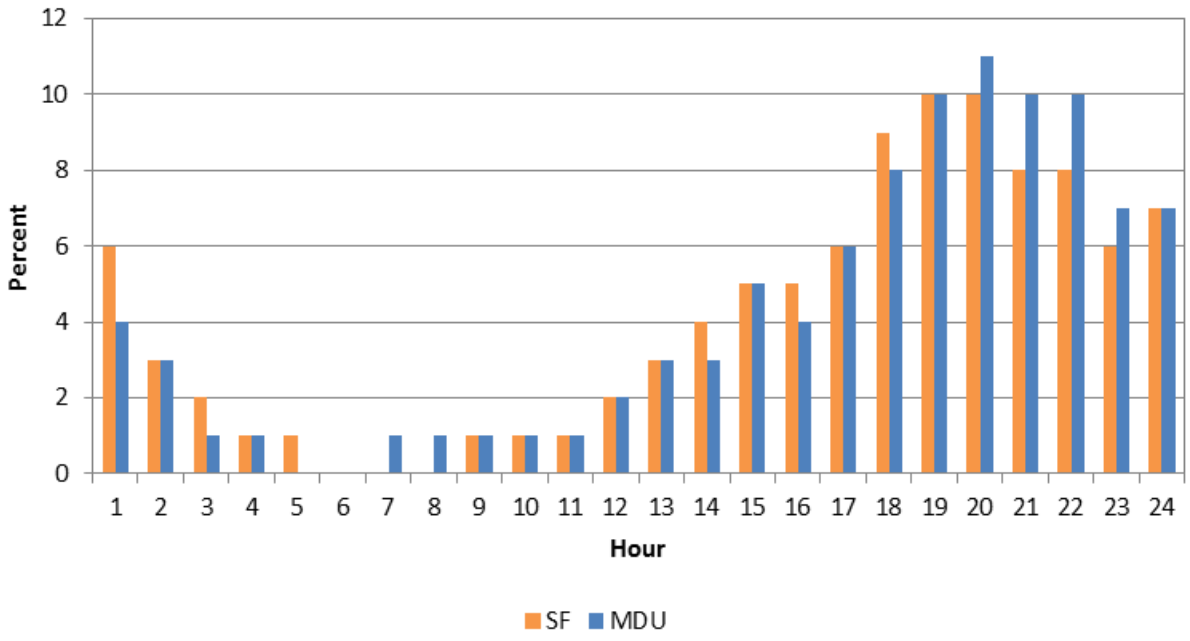


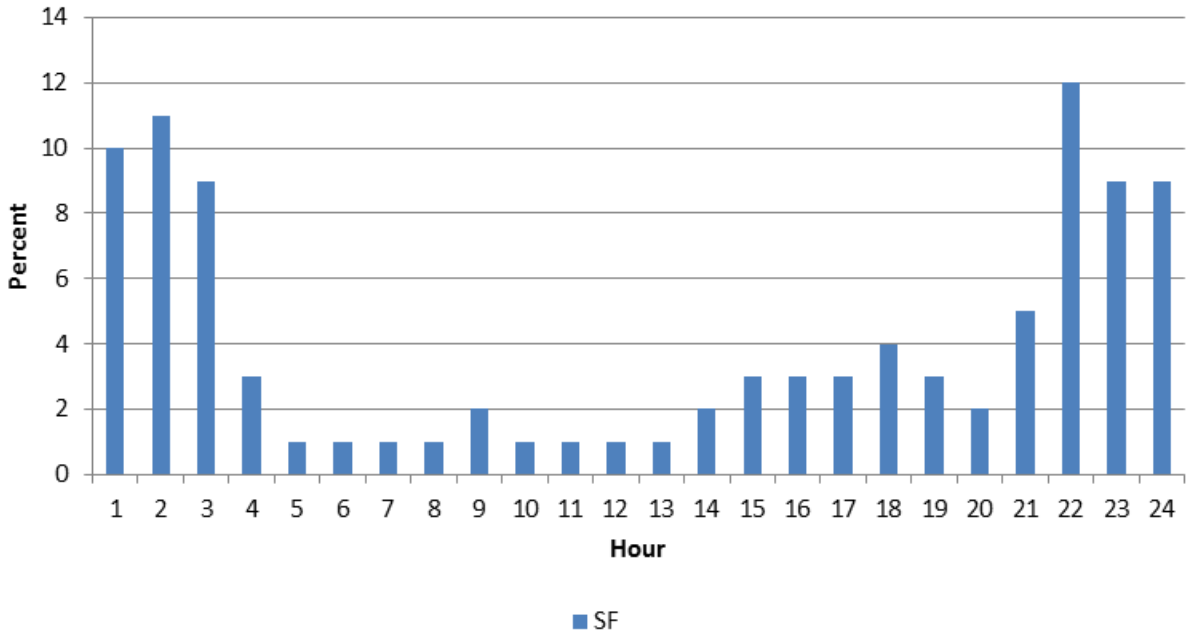
Chart SCE – 11a provides a contrast to the average hourly demands seen in the load profiles previously. For single-metered households, while the average demand is highest during the off-peak hours in the early morning, the hour of the annual non-coincident peak most frequently occurs in the evening. MDUs peak most often between 8 and 10 p.m. while SF households have the most annual hourly peaks between 6 and 8 p.m. This is similar to the residential population as a whole as shown in the subsequent table.

Chart SCE – 11a: Single Meter (TOU-D-TEV and TOU-D-A/B) –
Histogram of Hour of Non-Coincident Peak Load Occurrence for Each Account by Customer Type



Separately metered PEVs have annual non-coincident peaks which occur overwhelmingly more frequently during their off-peak period. Unlike the single-metered households there are no other loads which coincide with PEV charging causing the peak to shift.

Chart SCE – 11b: Separate Meter (TOU-EV-1) –
Histogram of Hour of Non-Coincident Peak Load Occurrence for Each Account by Customer Type



Data Accompanying Chart SCE – 11a, b

Hour	Residential Pop.	SF Pop.	MDU Pop.	All Single Metering	SF Single Metering	MDU Single Metering	Separate Metering
1	1%	1%	1%	6%	6%	4%	10%
2	0%	0%	1%	3%	3%	3%	11%
3	0%	0%	0%	2%	2%	1%	9%
4	0%	0%	0%	1%	1%	1%	3%
5	0%	0%	1%	1%	1%	0%	1%
6	0%	0%	1%	0%	0%	0%	1%
7	1%	1%	1%	0%	0%	1%	1%
8	1%	1%	2%	1%	0%	1%	1%
9	2%	1%	3%	1%	1%	1%	2%
10	2%	1%	3%	1%	1%	1%	1%
11	3%	2%	3%	1%	1%	1%	1%
12	4%	4%	4%	2%	2%	2%	1%
13	5%	6%	5%	3%	3%	3%	1%
14	8%	9%	6%	4%	4%	3%	2%
15	10%	11%	8%	5%	5%	5%	3%
16	9%	9%	8%	5%	5%	4%	3%
17	10%	11%	9%	6%	6%	6%	3%
18	10%	10%	9%	9%	9%	8%	4%
19	10%	10%	10%	10%	10%	10%	3%
20	10%	9%	11%	11%	10%	11%	2%
21	7%	7%	7%	8%	8%	10%	5%
22	4%	4%	5%	8%	8%	10%	12%
23	2%	2%	3%	6%	6%	7%	9%
24	1%	1%	1%	7%	7%	7%	9%

Time and Average Diversified Peak Load

The time of residential peak loads vary throughout the year ranging from 4:00 p.m. in the summer to 8:00 p.m. in the winter. The magnitude of these peaks also varies presumably due to different uses. The peak load for the single metered PEV owners is much more consistent month-to-month averaging 2.5 kW and occurs 1:00 a.m. to 2:00 a.m. (or midnight during daylight savings). The larger demands occuring on the accounts of PEV owners, presumably due to PEV charging, supplants the lower household demands occurring at other hours of the day.

Table SCE – 10a: Single Meter (TOU-D-TEV and TOU-D-A/B) – Time and Average Diversified Peak Load

Month	Residential Demand (kW)	Hour of Residential Demand	SF Population Demand (kW)	Hour of SF Population Demand	MDU Population Demand (kW)	Hour of MDU Population Demand
Sep. 2014	2.36	16	2.89	16	1.45	16
Oct. 2014	1.70	16	2.06	16	1.08	16
Nov. 2014	1.01	19	1.21	19	0.69	19
Dec. 2014	1.33	19	1.55	19	0.93	19
Jan. 2015	1.03	20	1.19	20	0.74	20
Feb. 2015	1.03	20	1.18	20	0.77	20
Mar. 2015	0.99	20	1.14	20	0.72	20
Apr. 2015	1.17	20	1.37	20	0.83	20
May 2015	1.85	18	2.25	18	1.18	18
Jun. 2015	1.55	17	1.87	17	1.00	17
Jul. 2015	2.02	18	2.46	18	1.27	18
Aug. 2015	1.95	17	2.40	17	1.19	16

Table SCE – 10a cont'd: Single Meter (TOU-D-TEV and TOU-D-A/B) – Time and Average Diversified Peak Load

Month	Single Metering Demand (kW)	Hour of Single Metering Demand	SF Single Metering Demand (kW)	Hour of SF Single Metering Demand	MDU Single Metering Demand (kW)	Hour of MDU Single Metering Demand
Sep. 2014	2.90	24	3.01	24	2.30	1
Oct. 2014	2.64	1	2.74	1	2.14	1
Nov. 2014	2.39	1	2.49	1	1.92	2
Dec. 2014	2.41	2	2.50	2	1.93	2
Jan. 2015	2.43	2	2.52	2	1.96	2
Feb. 2015	2.44	2	2.53	2	1.97	2
Mar. 2015	2.48	1	2.57	1	1.95	1
Apr. 2015	2.33	24	2.42	24	1.90	24
May 2015	2.32	24	2.41	24	1.84	24
Jun. 2015	2.53	24	2.63	24	2.01	24
Jul. 2015	2.55	24	2.65	24	2.06	24
Aug. 2015	2.75	24	2.86	24	2.18	24

Average monthly peak loads for separately metered PEVs 1.6 kW with the peaks occuring between 10:00 p.m. and 1:00 a.m.

Table SCE – 10b: Separate Meter (TOU-EV-1) – Time and Average Diversified Peak Load

Month	Separate Metering Demand (kW)	Hour of Separate Metering Demand
Sep. 2014	1.72	24
Oct. 2014	1.71	24
Nov. 2014	1.56	1
Dec. 2014	1.53	1
Jan. 2015	1.58	23
Feb. 2015	1.64	23
Mar. 2015	1.64	22
Apr. 2015	1.68	22
May 2015	1.61	24
Jun. 2015	1.61	22
Jul. 2015	1.52	24
Aug. 2015	1.58	22

Average Load Coincident With System Peak

The average load coincident with system peak is the average load occcurring at the same time that the system peak occurs. The system peak days and times were used to extract the appropriate hourly load at the time of system peak. The average group load coincident with system peak was calculated taking the total group load and dividing by the number of customers.

The coincident load of the single-metered PEV owners varies from month-to-month and seems to lack a consistent correspondence with the system peaks. Comparing to the residential population is not very meaningful as the load from one hour of each month is selected and the underlying residential data for January – August is from 2014.

Table SCE –11a: Single Meter (TOU-D-TEV and TOU-D-A/B) – Average Load Coincident With System Peak (kW/Customer)

Month	Residential Population	SF Population	MDU Population	All Single Metering	SF Single Metering	MDU Single Metering
Sep. 2014	1.94	2.35	1.22	1.92	2.02	1.43
Oct. 2014	1.44	1.75	0.91	1.50	1.56	1.16
Nov. 2014	0.92	1.08	0.63	1.36	1.43	1.02
Dec. 2014	1.09	1.31	0.71	1.86	1.95	1.36
Jan. 2015	0.82	0.96	0.57	1.30	1.37	0.96
Feb. 2015	0.90	1.06	0.63	1.47	1.54	1.11
Mar. 2015	0.91	1.06	0.64	0.52	0.52	0.57
Apr. 2015	0.98	1.13	0.71	1.20	1.26	0.95
May 2015	1.75	2.11	1.12	0.96	0.98	0.86
Jun. 2015	1.39	1.66	0.91	1.34	1.38	1.13
Jul. 2015	1.92	2.34	1.20	1.72	1.80	1.35
Aug. 2015	1.77	2.17	1.09	2.19	2.29	1.70

Table SCE –11a- cont'd: Single Meter (TOU-D-TEV and TOU-D-A/B) – Average Load Coincident With System Peak (kW/Customer)

Month	NEM	DR
Sep. 2014	1.41	1.86
Oct. 2014	1.39	1.40
Nov. 2014	1.65	1.20
Dec. 2014	2.22	1.77
Jan. 2015	1.56	1.21
Feb. 2015	1.73	1.35
Mar. 2015	0.32	0.40
Apr. 2015	0.75	1.16
May 2015	0.42	0.91
Jun. 2015	0.76	1.30
Jul. 2015	1.25	1.77
Aug. 2015	1.43	2.28

Table SCE – 11b corroborates with the load profiles in Chart SCE – 8 showing very low levels of demand from separately metered PEVs coincident with system peaks.

Table SCE –11b: Separate Meter (TOU-EV-1) -
Average Load Coincident With System Peak (kW/Customer)

Month	Separate Metering
Sep. 2014	0.05
Oct. 2014	0.13
Nov. 2014	0.16
Dec. 2014	0.18
Jan. 2015	0.20
Feb. 2015	0.11
Mar. 2015	0.11
Apr. 2015	0.13
May 2015	0.13
Jun. 2015	0.10
Jul. 2015	0.11
Aug. 2015	0.12

The geographic distribution of identified PEV owners within SCE's service territory is shown in Table SCE – 12a. These results are nearly unchanged from the previous year and show that these PEV owners remain disproportionately located in milder, coastal zones. The majority of PEV owners, 64% of single-metered and 58% or separately metered, are in the mild climate. By contrast only 42% of residential accounts are in these zones.

Table SCE –12a: Percentage of PEV Customers on
TOU Rates by Zone[50] as Compared to Residential Population

Climate	Zone(s)	Residential Population*	Single Meter	Separate Meter
mild	5, 6, 8, 16	42%	64%	58%
moderate/hot	9, 10, 13, 14, 15	58%	36%	42%

*Percentages are based on residential customers at the end of October 2015.

The following observations of this sub-population have been made previously and continue to be relevant:

- Their socio-demographic attributes such as income, education, and housing type correlate with those of coastal dwellers.
- Coastal dwellers have less air conditioning load, which may make them less resistant to TOU rates and their higher on-peak prices.
- Residents in the more densely populated zones such as Zones 6, 8, and 9 may have shorter commutes that are within the range of PEVs, allowing easier adoption.

[50] SCE's baseline information can be found at: http://www.sce.com/NR/sc3/tm2/pdf/ce63map.pdf.

Nearly the same zip codes maintain the greatest prevelance of PEVs as in the previous report. Table SCE 12 – b shows Manhattan Beach, Rancho Palos Verdes, Palos Verde Peninsula, Huntington Beach and Redondo Beach all in the top five zip codes by single-metered households as last year. Santa Monica, Manhattan Beach, Valencia and Los Alamitos all remain in the top five for the seperartly metered accounts.

Table SCE –12b: Top Five Most Populous Zip Codes With PEVs by Tariff

Rate Type	Zip Code(s)*	City of Zip Code	Total Number of Accounts with PEV
Single Meter	90266	Manhattan Beach	137
	90274	**Palos Verde Peninsula**	**117**
	90275	Rancho Palos Verde	103
	92648	**Huntington Beach**	**91**
	90278, 92620, 92886	Redondo Beach, Irvine, Yorba Linda	88
Separate Meter	**90402**	**Santa Monica**	**23**
	91302, 90266	Calabasas, Manahattan Beach	26
	91354, 90720	**Valencia, Los Alamitos**	**22**

The persistence of these geographic findings would indicate that the group of PEV owners which are available to report on have not transcended the broader population.

Figure SCE – 3: Geographic Location PEV TOU Accounts by Tariff Type

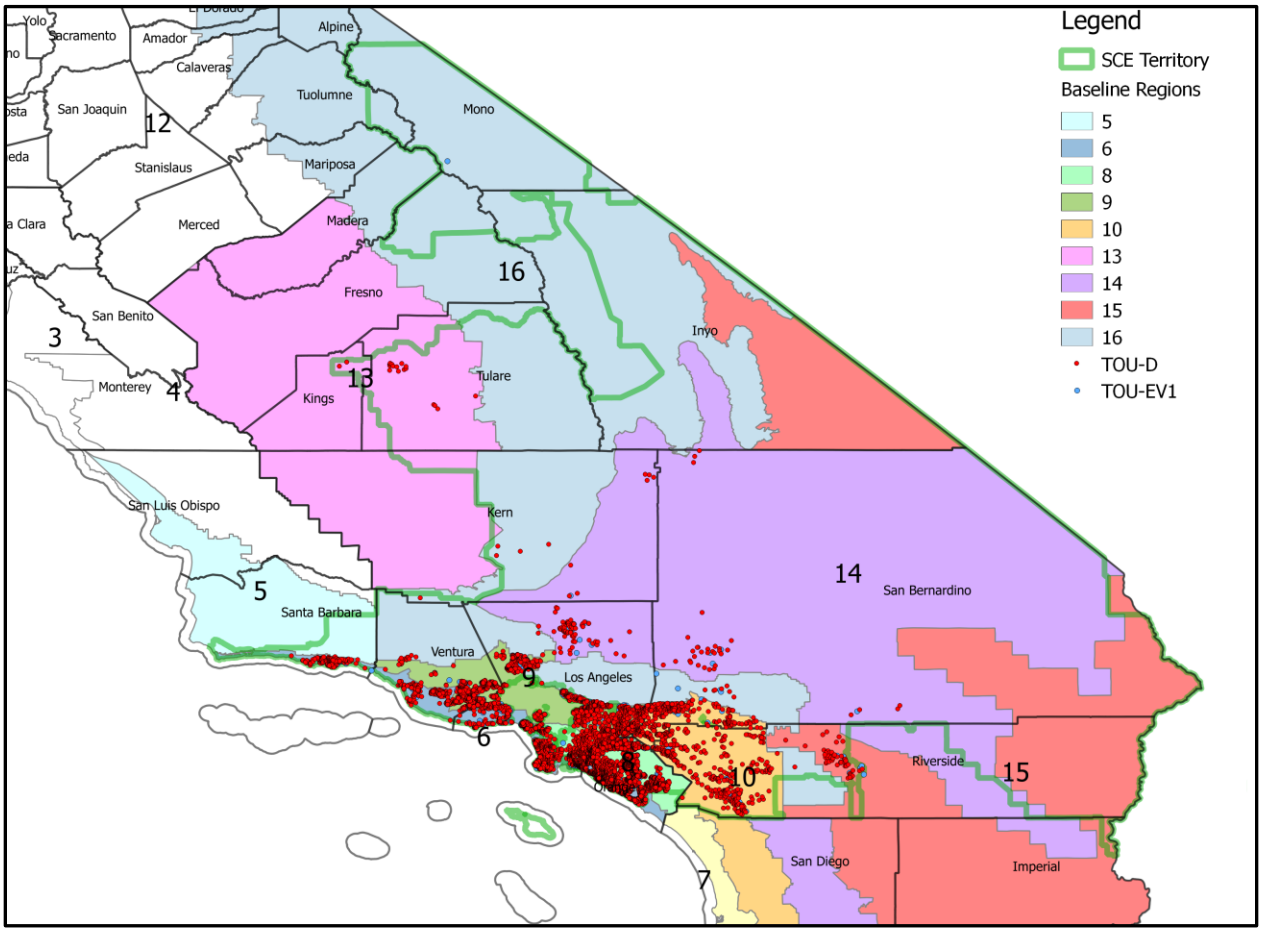
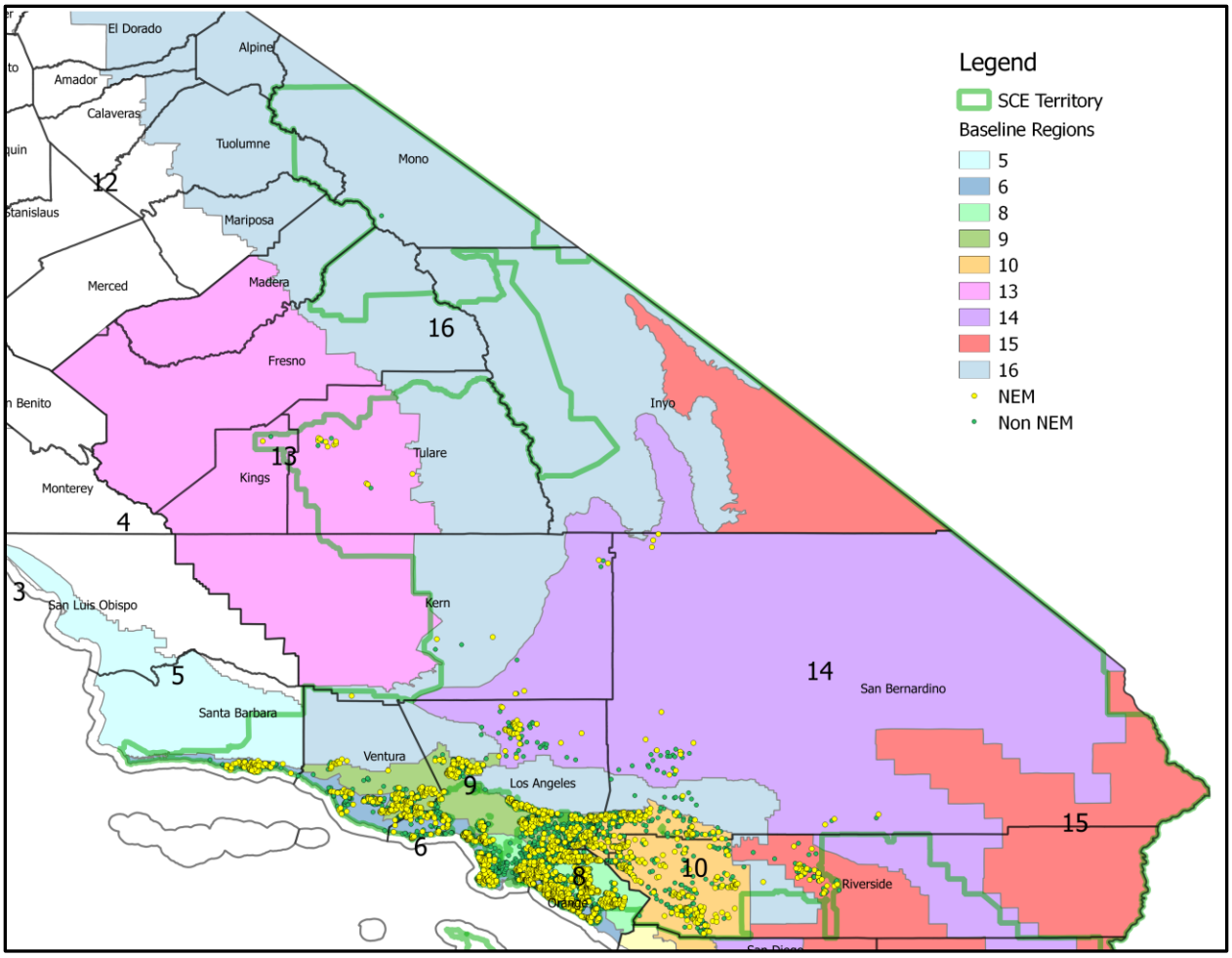


Figure SCE – 4: Geographic Location PEV TOU Accounts by NEM Designation



San Diego Gas and Electric

SDG&E offers residential customers five rates within two different meter configurations for PEV owners. First, a single-meter rate (EVTOU-2) captures load associated with both the PEV and the whole house. Second, there are four separately-metered rates (EVTOU, EPEV-X, EPEV-Y, and EPEV-Z) which capture load associated with EV charging only. The rates provided below were effective August 1, 2014 through September 30, 2015 and were effective for the majority of the period for which the data was collected. An exception to these effective dates is the experimental EPEV rates. These rates were closed December 31st, 2014 and customers on those rates were transitioned to out of them. SDG&E does not currently offer a commercial EV rate option. Table 1a provides the TOU periods for each rate and their respective seasonal prices per kWh.

SDG&E Table 1a: Tariff (¢/kWh)

Tariff	TOU	Hour Beginning	Winter Weekday	Winter Weekend	Summer Weekday	Summer Weekend
EVTOU	Super Off Peak	Midnight to 5 am	19.3	19.3	18.0	18.0
	On Peak	Noon to 8 pm	22.8	22.8	50.6	50.6
	Off Peak	All Other Hours	21.6	21.6	23.0	23.0
EVTOU-2	Super Off Peak	Midnight to 5 am	19.3	19.3	18.0	18.0
	On Peak	Noon to 6 pm	22.4	22.4	50.7	50.7
	Off Peak	All Other Hours	22.0	22.0	23.3	23.3
EPEV-X	Super Off Peak	Midnight to 5 am	17.7	17.7	17.6	17.6
	On Peak	Noon to 8PM	21.9	21.9	35.3	35.3
	Off Peak	All Other Hours	21.1	21.1	21.5	21.5
EPEV-Y	Super Off Peak	Midnight to 5 am	14.4	14.4	14.0	14.0
	On Peak	Noon to 8PM	43.7	43.7	53.6	53.6
	Off Peak	All Other Hours	29.2	29.2	33.7	33.7
EPEV-Z	Super Off Peak	Midnight to 5 am	13.2	13.2	12.9	12.9
	On Peak	Noon to 8PM	63.9	63.9	73.8	73.8
	Off Peak	All Other Hours	25.6	25.6	29.5	29.5

Table 1b provides the price ratios between the different TOU periods for each rate. The separate-metered rate, EPEV-Z, has the largest difference between on-peak and super off-peak prices. The on-peak price to super off-peak price ratio per kWh for EPEV-Z was 5 to 1 and 6 to 1 during the winter and summer respectively.

SDG&E Table 1b: Price Ratios

Tariff	Winter		Summer	
	Off-Peak and Super Off-Peak	On-Peak and Super Off-Peak	Off-Peak and Super Off-Peak	On-Peak and Super Off-Peak
EVTOU	1:1	1:1	1:1	3:1
EVTOU-2	1:1	1:1	1:1	3:1
EPEV-X	1:1	1:1	1:1	2:1
EPEV-Y	2:1	3:1	2:1	4:1
EPEV-Z	2:1	5:1	2:1	6:1

SDG&E Single-Meter PEV Rate (EVTOU-2):

The EVTOU-2 rate option is designed for residential customers that have both their household load and PEV load on the same meter. Service under this optional rate is specifically limited to residential customers who require service for charging of a currently registered motor vehicle which is: (1) a battery electric vehicle (BEV) or plug-in hybrid vehicle (PHEV) recharged via a recharging outlet at the customer's premise; or, (2) a natural gas vehicle (NGV) refueled via a home refueling appliance (HRA) at the customer's premise. The on-peak period is 12:00 – 18:00 daily (excluding holidays), the off-peak period is 05:00 – 12:00 and 18:00 – 24:00 daily, and the super off-peak period is 24:00 – 05:00 daily.

Please note that the current information drawn from this subgroup is preliminary and any judgments and/or policy decisions made from this information would be premature. Additionally, SDG&E cautions readers from drawing any major conclusions from any of the PEV rate information that has been provided over this past year. As can be seen form the information presented in this document, the number of customers taking service under a PEV rate is continuing rapid growth and the demand/energy data may not be stable enough to draw any major conclusions. Since September 2014, the number of customers taking service under EVTOU-2 has grown 52%.

SDG&E Table 2: NEM and DR Program Enrollment for Single-Meter Rate

Month	Total Customers on Single-Metering	Total Customers On NEM	NEM as a % of Single-Metering	Total Customers on DR	DR as a % of Single-Metering
Sep 14	3944	724	18.36%	852	21.60%
Oct 14	4145	772	18.62%	985	23.76%
Nov 14	4354	829	19.04%	1129	25.93%
Dec 14	4448	873	19.63%	1195	26.87%
Jan 15	4650	954	20.52%	1258	27.05%
Feb 15	4845	1023	21.11%	1299	26.81%
Mar 15	4988	1079	21.63%	1328	26.62%
Apr 15	5118	1128	22.04%	1350	26.38%
May 15	5237	1178	22.49%	1378	26.31%
Jun 15	5396	1236	22.91%	1420	26.32%
Jul 15	5542	1305	23.55%	1462	26.38%
Aug 15	5703	1350	23.67%	1516	26.58%

The preliminary research presented herein analyzes usage patterns of early adopter customers whose characteristics (including consumption patterns) are often markedly different from the general population. One characteristic in particular is the penetration of PV systems. Currently PV owners are over represented in the PEV rates class. The residential population in SDG&E's service territory consists of approximately 3% NEM customers while NEM customers represent 18%-24% of the single-meter PEV rate class as seen in Table 2. SDG&E believes that customers with PV systems tend to be more affluent with higher monthly consumption and greater awareness/desire to modify usage behavior when compared to the general residential population. We cannot conjecture what the penetration of NEM will be in the future as the adoption of PEVs continues to grow. DR enrollment has continued its rapid growth, which can be attributed to more aggressive recruitment strategies.

SDG&E Separate-Meter PEV Rate (EVTOU, EPEV-X, EPEV-Y, and EPEV-Z):

EVTOU:

The EVTOU rate option is designed for residential customers that have their PEV load on a dedicated meter. This is an optional rate to domestic service for charging of a currently registers motor vehicle which is one of the following: (1) a BEV) or plug-in hybrid electric vehicle (PHEV) recharged via a recharging outlet at the customer's premise; or, (2) an NGV refueled via an HRA at the customer's premise. The point of service must contain facilities to separately meter PEV or Compressed Natural Gas (CNG) charging. The on-peak period for this rate is 12:00 – 20:00 daily.

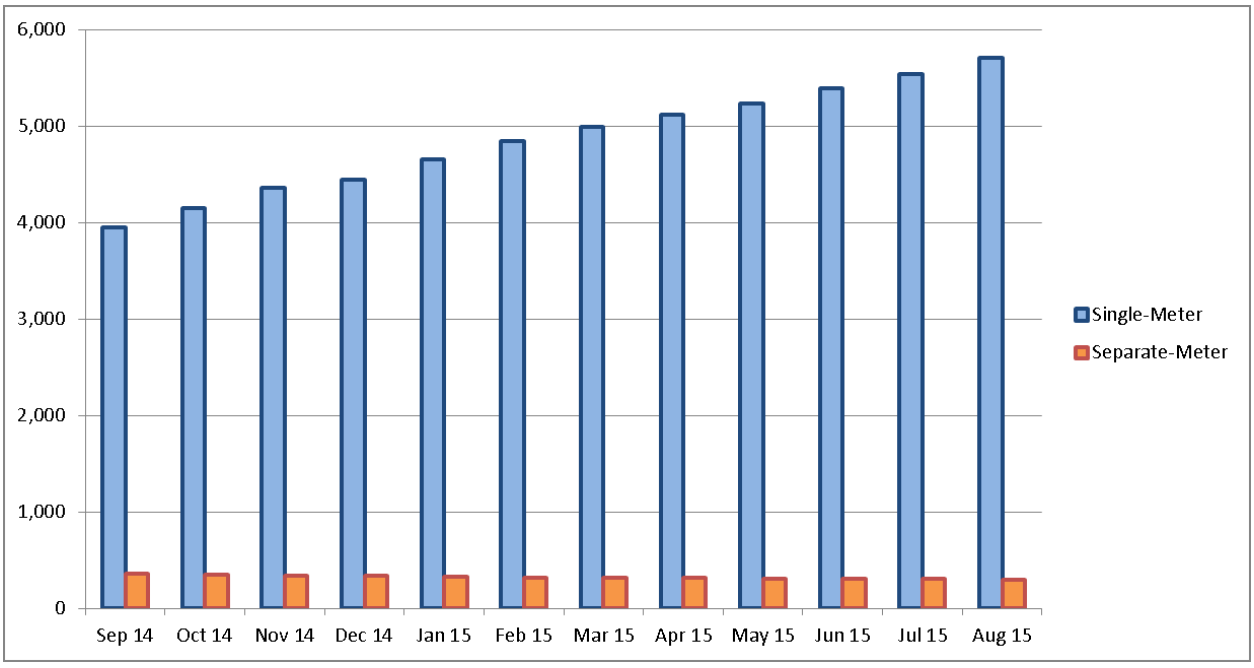
EPEV-X, -Y, and –Z:

These rates are experimental bundled services schedules available to selected residential customers exclusively for charging a PEV. These rates were temporary and were closed December 31st, 2014, and customers were transitioned to other rates. The PEV must be a currently registered motor vehicle, as defined by the California Motor Vehicle code. This schedule was not available to customers with a conventional charge sustaining (battery recharged solely from the vehicle's on-board generator) hybrid electric vehicle (HEV). These rates were designed with an on-peak period of 12:00 – 20:00 daily and an off-peak period of 05:00 – 12:00 and 20:00 – 24:00. The ratios from on-peak to super off-peak are 2:1, 4:1, and 6:1 for EPEV-X, EPEV-Y, and EPEV-Z respectively. These rate options were developed with different on-peak ratios specifically for an electric vehicle pricing study. The study recruited Nissan Leaf and Chevy Volt owners and randomly assigned one of the three experimental rates. Each customer participating in the study received an EVSE (charger) with a timer which was funded by the Department of Energy (DOE) and CEC. This technology enables customers to plug in the PEV at their convenience but utilize the timer to schedule the majority of their charging during the super-off peak time period. Most of the charging was conducted this way and therefore there is little variation in consumption patterns and charging behaviors. The average monthly consumption was between 200 and 250 kWh with approximately 75% of the consumption occurring during the super off-peak time period.

SDG&E Table 3: NEM and DR Program Enrollment for Separate-Meter Rates

Month	Total Customers on Separate-Metering	Total Customers on NEM	NEW as a % of Separate-Metering	Total Customers on DR	DR as a % of Separate-Metering
Sep 14	356	111	31.18%	52	14.61%
Oct 14	350	112	32.00%	51	14.57%
Nov 14	339	107	31.56%	48	14.16%
Dec 14	335	105	31.34%	50	14.93%
Jan 15	323	103	31.89%	47	14.55%
Feb 15	319	100	31.35%	47	14.73%
Mar 15	317	99	31.23%	45	14.20%
Apr 15	313	97	30.99%	45	14.38%
May 15	307	96	31.27%	44	14.33%
Jun 15	305	97	31.80%	44	14.43%
Jul 15	305	98	32.13%	46	15.08%
Aug 15	298	96	32.21%	45	15.10%

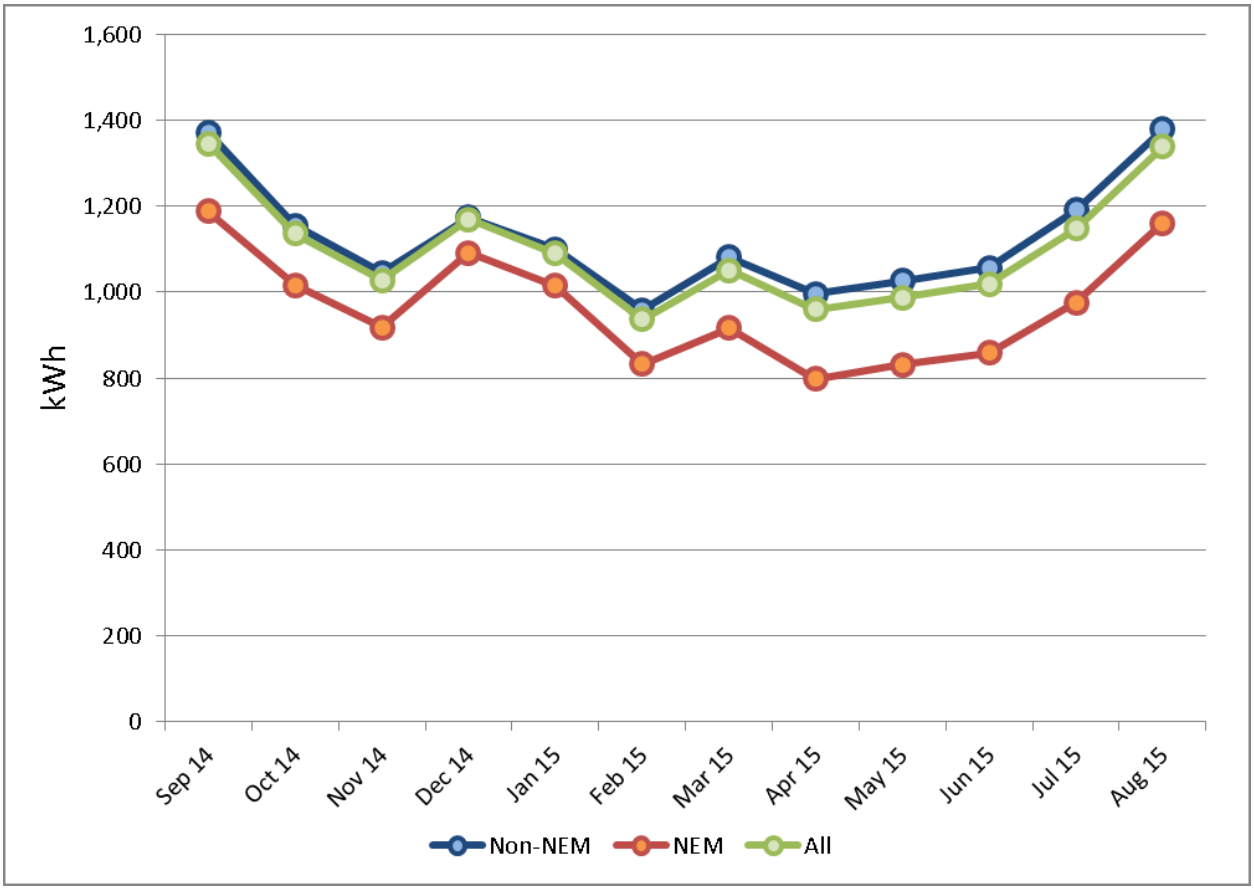
SDG&E Chart 1: Number of PEV Customers over Time by Meter Configuration



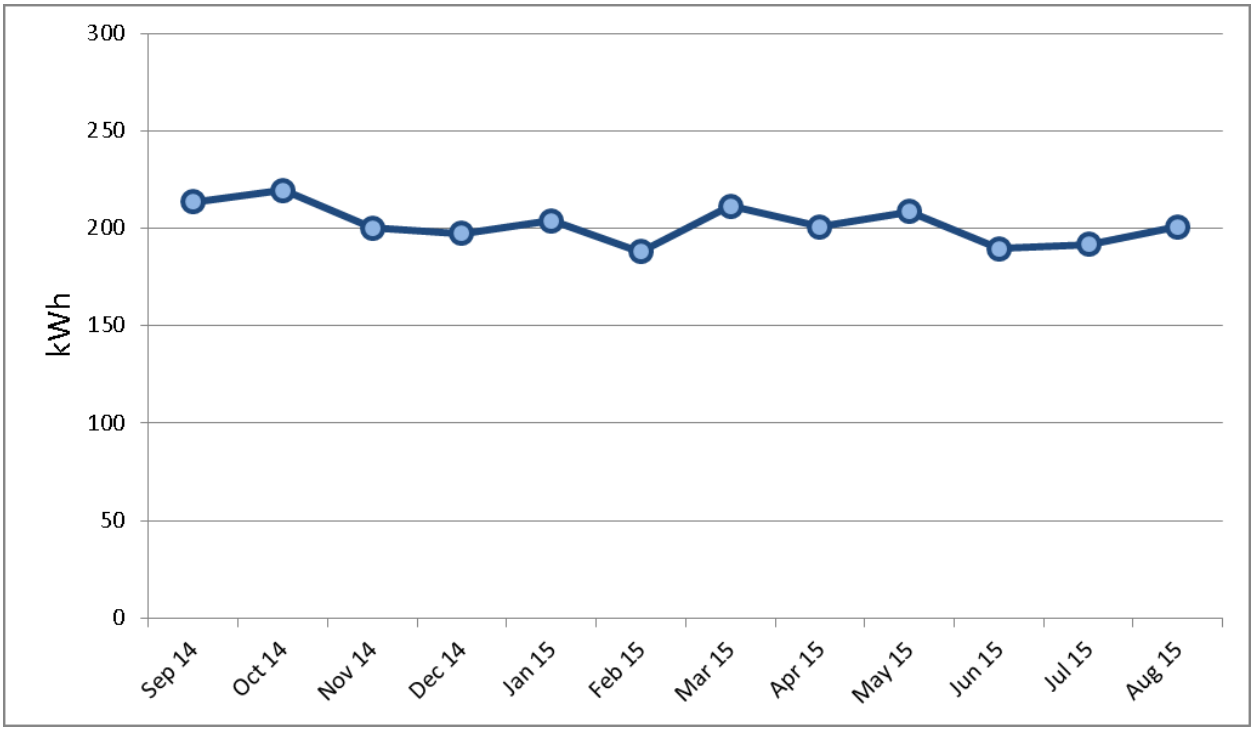
Looking at Table 3 and Chart 1, we can see that the number of customers taking service under these separate-metered rates have remained relatively constant over the past 12 months. The disparity in growth rates between single- and separate-meter customers can be attributed to three factors: (1) only customers who purchased Nissan Leafs or Chevy Volts were eligible for the EPEV rates, (2) the EPEV rates were originally scheduled to close at the end of 2013, and (3) the EPEV rates were closed to new customers in the 2nd quarter of 2013.

NEM penetration is higher in the separately-metered rates compared to single-meter customers. Roughly 30% of separate-meter EV customers had solar generation on their house meter compared to 23% for single-meter customers. The average monthly usage follows similar seasonal patterns when comparing NEM and non-NEM single-meter PEV customers. Assuming the car load is approximately 220-260 kWh, the household load for customers on EVTOU-2 is a little less than double the average residential customer load of 485 kWh per month. For comparison purposes, Chart 4 is included in Chart 5.

SDG&E Chart 3: Average Monthly Usage for Single-Meter Customers



SDG&E Chart 5: Average Monthly Usage for Separate-Meter Customers



Time of Use Analysis of Single- and Separate-Meter Customers

SDG&E Table 6: Percentage of On-Peak Usage by Meter Configuration

Year	Month	Single-Metering Non-NEM	Single-Metering NEM	Single-Metering	Separate-Metering
2014	9	23.81%	12.41%	21.94%	8.40%
2014	10	20.88%	9.74%	18.99%	8.55%
2014	11	19.23%	12.83%	18.11%	9.16%
2014	12	20.95%	15.73%	19.95%	9.79%
2015	1	19.22%	12.86%	17.97%	9.66%
2015	2	19.51%	10.19%	17.72%	9.59%
2015	3	20.87%	7.02%	18.23%	10.29%
2015	4	20.64%	5.37%	17.79%	9.84%
2015	5	19.86%	5.49%	17.11%	11.26%
2015	6	22.07%	7.89%	19.28%	10.82%
2015	7	21.95%	8.73%	19.30%	11.40%
2015	8	25.36%	12.02%	22.58%	12.08%

One of the questions attempted to be answered by the PEV Pricing Experiment relates to whether the EV rates act as an effective signal to deter on-peak charging. The load shapes provided in Charts 7 and 8 suggest that customers respond to differences in prices and charge their vehicles when electricity is the cheapest. Tables 6, 7, and 8 below provide the percentage share of monthly kWh for single- and separate-meter rates. Single-Meter customers as a class consume about 50% of their energy during the off-peak TOU period and split the rest evenly between on-peak and super-off peak at 25% each; however, single-meter customers with NEM consume between 5% and 15% of their monthly energy during the on-peak TOU period reflecting usage that is offset by generation. Separate-Meter customers respond well to the signal created by the TOU price differential and consume 78% of their energy during the super-off peak TOU period.

SDG&E Table 7: Percentage of Off-Peak Usage by Meter Configuration

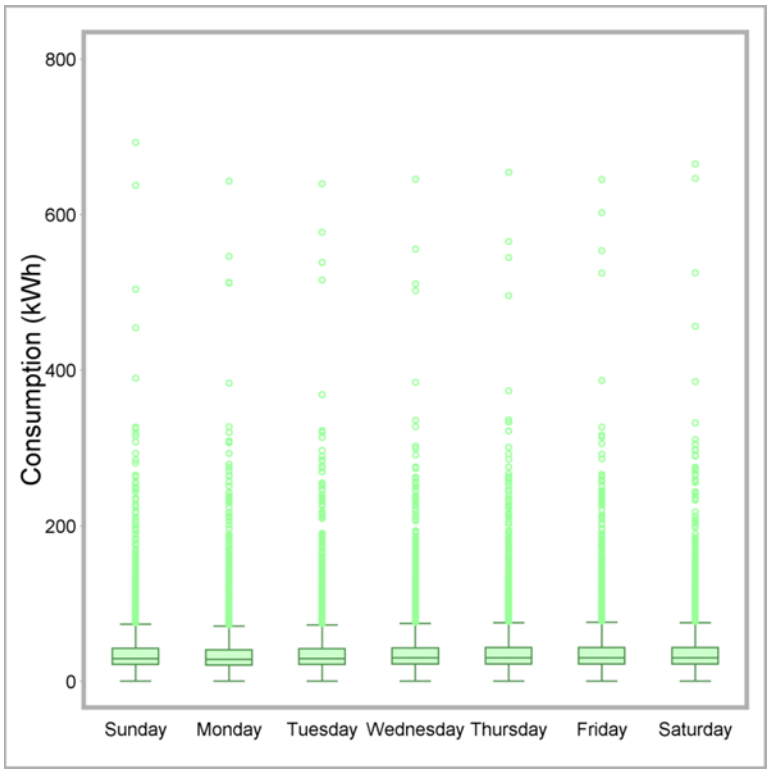
Year	Month	Single-Metering Non-NEM	Single-Metering Non-NEM	Single-Metering	Separate-Metering
2014	9	52.43%	53.05%	52.53%	11.02%
2014	10	52.79%	52.50%	52.74%	11.58%
2014	11	55.06%	50.46%	54.25%	11.82%
2014	12	55.11%	52.13%	54.54%	11.56%
2015	1	55.20%	52.40%	54.65%	12.36%
2015	2	54.17%	51.61%	53.68%	11.81%
2015	3	52.95%	53.27%	53.01%	12.20%
2015	4	52.45%	52.25%	52.41%	12.22%
2015	5	52.83%	52.55%	52.77%	12.08%
2015	6	51.79%	51.96%	51.83%	12.30%
2015	7	53.00%	53.98%	53.19%	15.06%
2015	8	51.27%	54.15%	51.87%	14.61%

SDG&E Table 8: Percentage of Super Off-Peak Usage by Meter Configuration

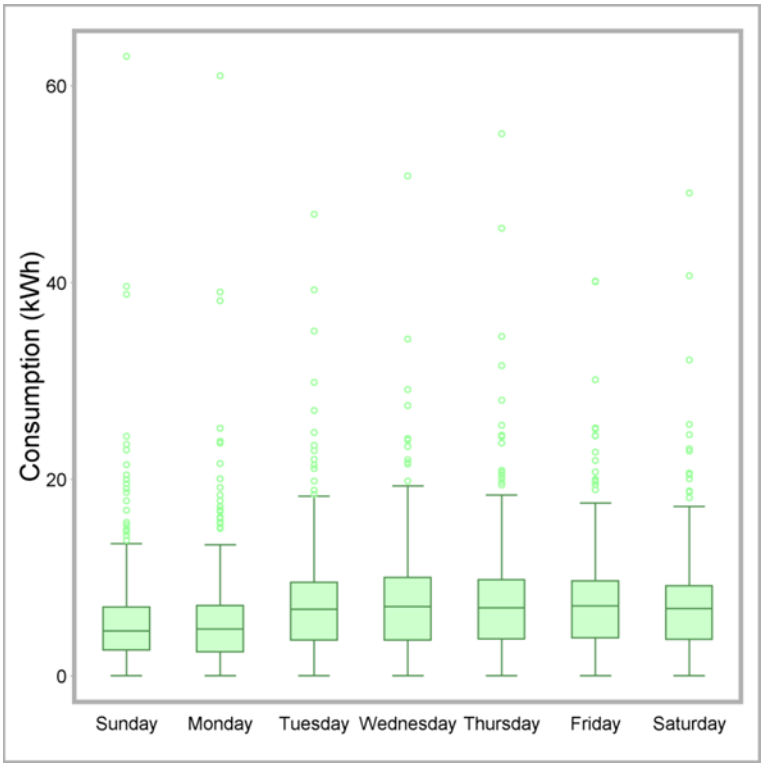
Year	Month	Single-Metering Non-NEM	Single-Metering NEM	Single-Metering	Separate-Metering
2014	9	23.76%	34.54%	25.53%	80.58%
2014	10	26.33%	37.76%	28.27%	79.87%
2014	11	25.71%	36.70%	27.64%	79.02%
2014	12	23.94%	32.14%	25.51%	78.65%
2015	1	25.58%	34.73%	27.38%	77.98%
2015	2	26.32%	38.20%	28.60%	78.60%
2015	3	26.18%	39.70%	28.76%	77.51%
2015	4	26.91%	42.38%	29.80%	77.94%
2015	5	27.31%	41.97%	30.12%	76.66%
2015	6	26.14%	40.15%	28.89%	76.88%
2015	7	25.05%	37.29%	27.50%	73.54%
2015	8	23.37%	33.82%	25.55%	73.32%

The box and whisker plots in Charts 6a and 6b show the distribution of customers' average daily usage by day of the week. As you can see, there is a lot of variation in the single-meter rate but not in the separate-meter rates. We would expect this since there are fewer factors that can affect consumption on a meter solely designated for PEV charging compared to consumption for a whole house. It is clear to see in Chart 6b, that Sunday and Monday have lower kWh on average than the rest of the week. We further explore this finding in the load profiles for each meter type in Chart 7 and 8 below.

SDG&E Chart 6a: Box and Whisker Plot for Single-Meter Energy Consumption by Day of the Week



SDG&E Chart 6b: Box and Whisker Plot for Separate-Meter Energy Consumption by Day of the Week



Average Load Profiles

Chart 7 looks at the average load profile for each day of the week for single-meter PEV customers. The load shapes remain relatively flat during the day with an increase in evening consumption. This behavior is similar to a typical residential load profile except that we see a large spike in the early morning (super off-peak) hours. This is the effect of customers taking advantage of the super off-peak pricing to charge their vehicles. You'll notice that Sundays and Mondays exhibit similar charging patterns. Since customers change their behavior to take advantage of super off-peak pricing, charging occurs in the early morning on the day after the vehicle was used (presumable driving to work Monday – Friday). If the electric vehicle sits idle during the weekend (Saturday and Sunday) significant charging is not conducted on Sunday and Monday.

SDG&E Chart 7: Average Load Profile for Single-Meter Customers by Day of the Week

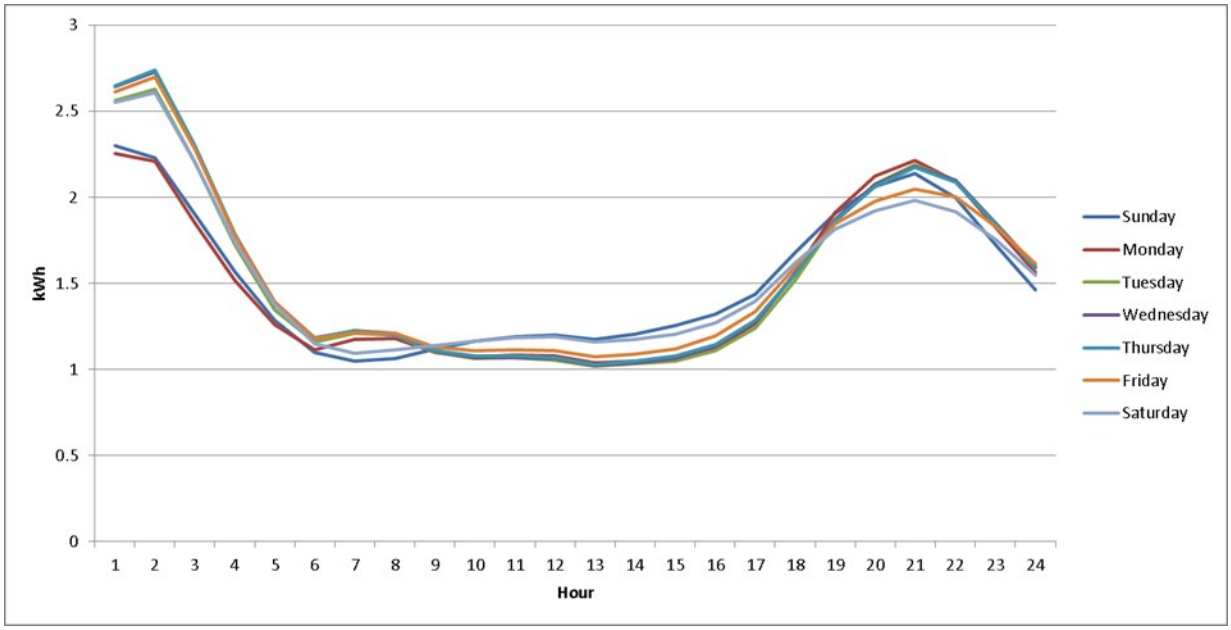
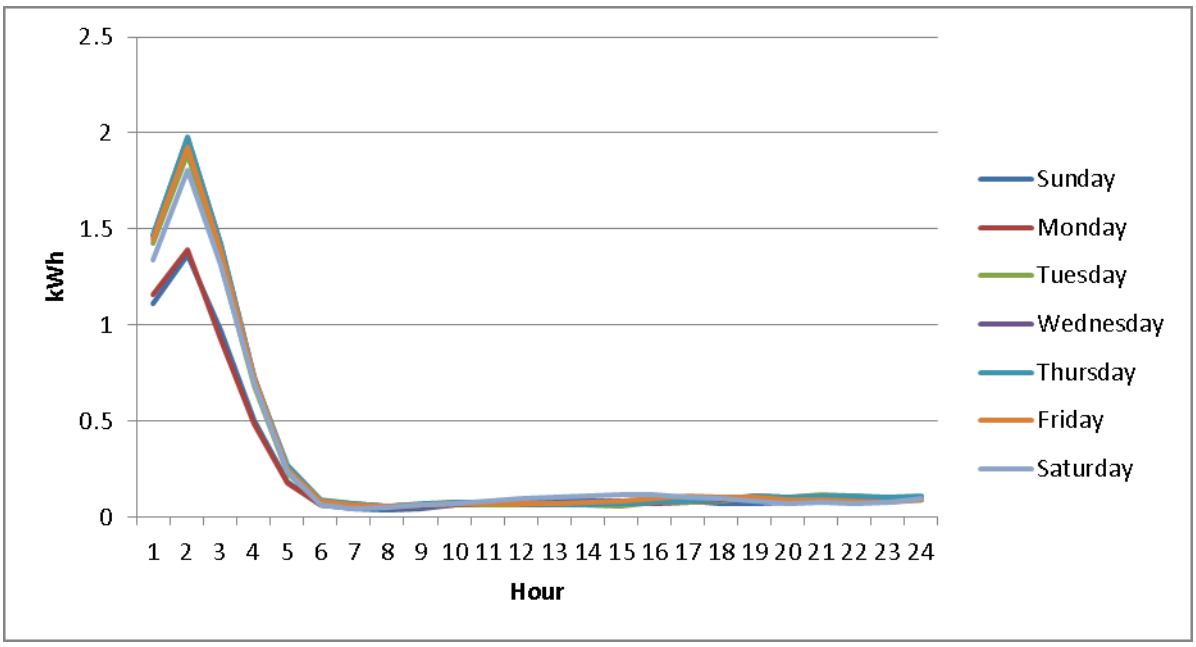


Chart 8 takes the same approach except for separate-meter PEV customers. These accounts peak in the 01:00 – 02:00 hours and have virtually zero consumption during the rest of the day. This would indicate that the rates and enabling technology are extremely successful in encouraging charging during super off-peak hours. This chart also shows that consumption on Sundays and Mondays is substantially lower than the rest of the week. Again, Sunday and Monday exhibit similar charging patterns that are consistent with the single-meter customers.

SDG&E Chart 8: Average Load Profile for Separate-Meter Customers by Day of the Week



SDG&E Chart 9: Average Load Profile for PEV Owners on a Non-PEV Rate by Day of the Week

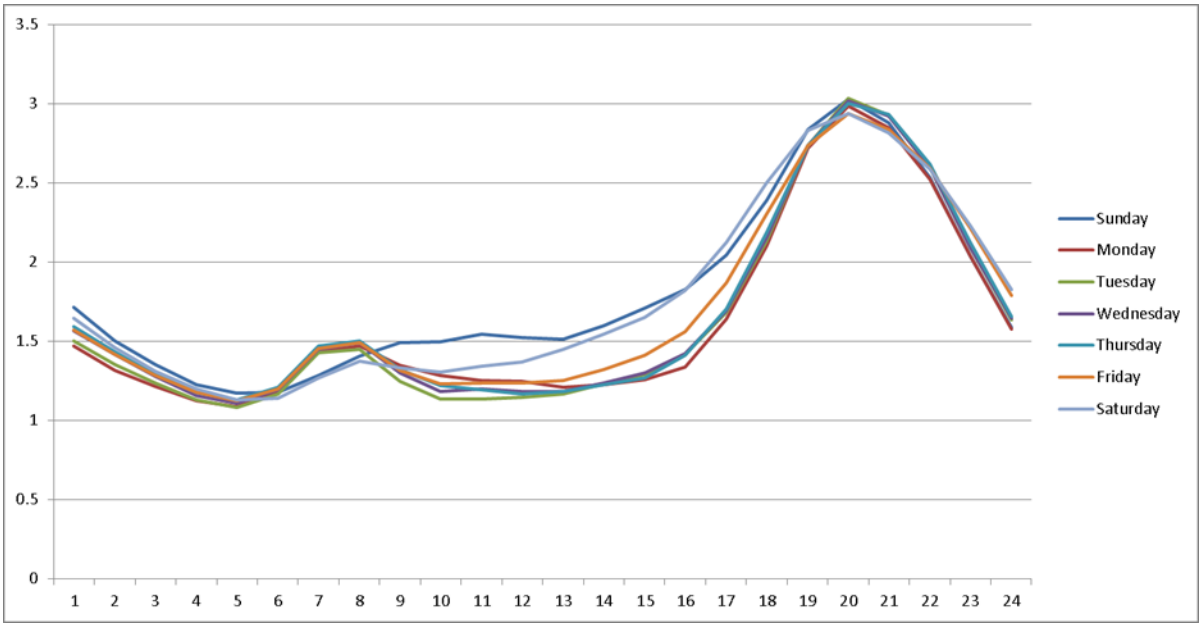


Chart 9 shows the same daily load profiles for customers who we believe to own a PEV, but are not currently taking service under one of the aforementioned PEV rates. We do not have a way to verify whether or not these customers actually own a PEV, but SDG&E has developed an algorithm to attempt to identify PEV owners. Since we cannot definitively say that all of these customers own a PEV, we should use caution when making inferences about the data presented in Chart 9.

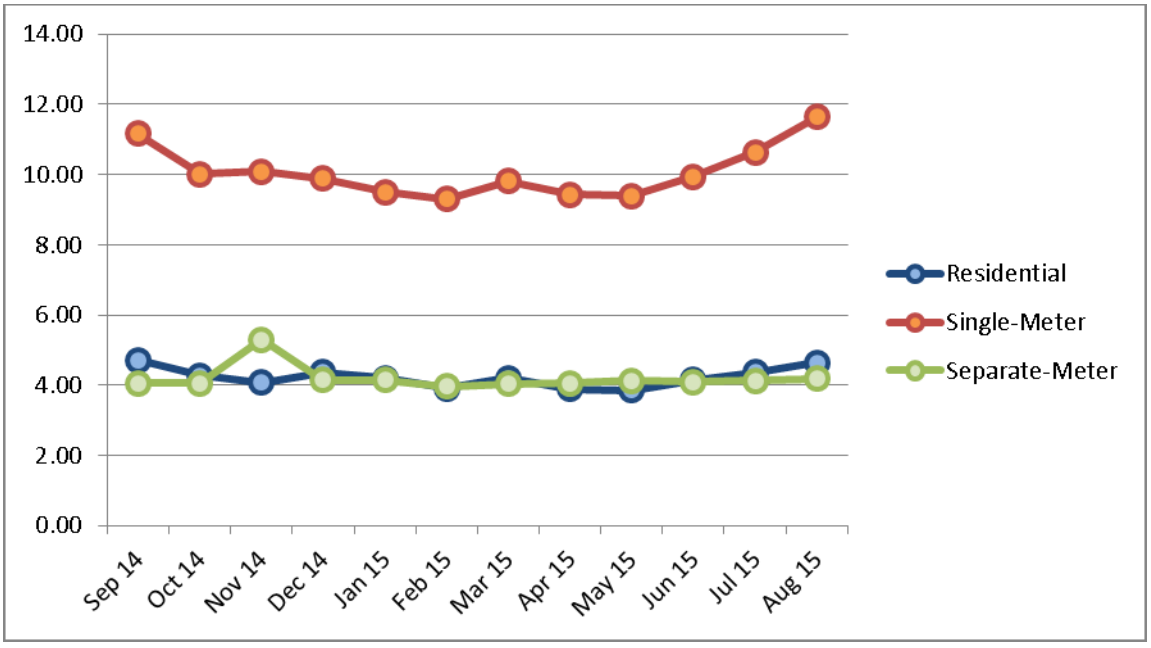
Average Non-Coincident Peak Load

Table 9 shows that the average non-coincident peak load for separate-meter customers is nearly constant at 4.20 kW as this is roughly the max setting on the Leaf EVSEs. Single-Meter customers have a non-coincident demand more than twice that of the average residential customer.

SDG&E Table 9: Monthly Average Non-Coincident Peak Load (kW)

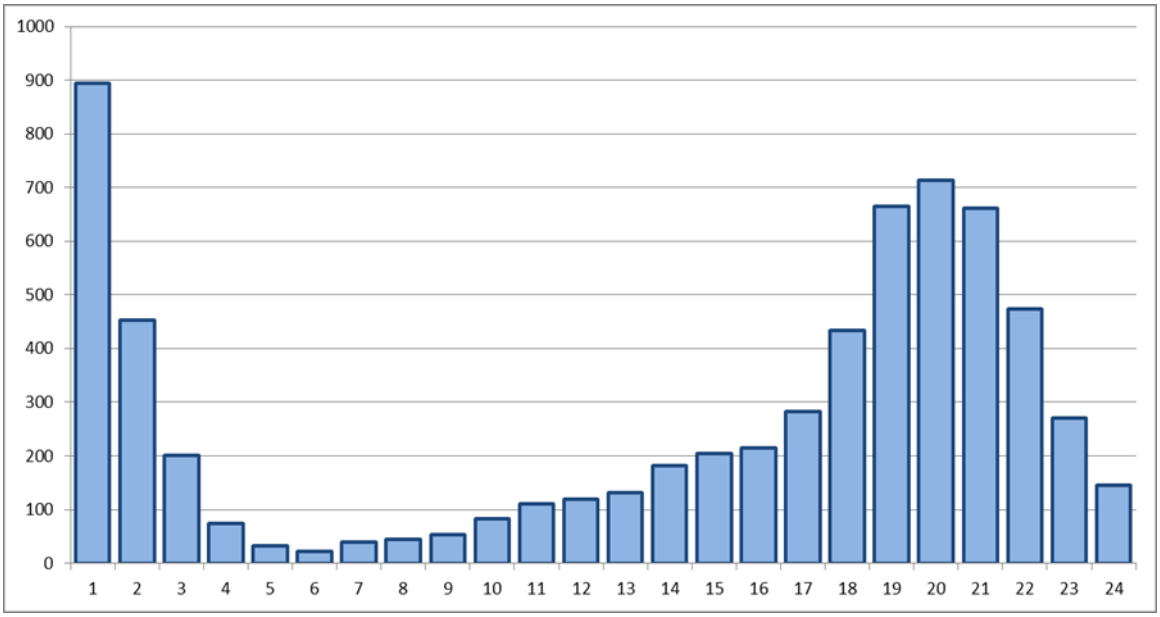
Month	Residential Pop.	Single-Meter	Separate-Meter
Sep 14	4.71	11.16	4.06
Oct 14	4.27	10.01	4.06
Nov 14	4.08	10.09	5.29
Dec 14	4.37	9.88	4.16
Jan 15	4.20	9.51	4.16
Feb 15	3.92	9.29	3.97
Mar 15	4.20	9.82	4.03
Apr 15	3.89	9.43	4.06
May 15	3.87	9.38	4.13
Jun 15	4.15	9.93	4.09
Jul 15	4.36	10.64	4.14
Aug 15	4.64	11.64	4.19

SDG&E Chart 10: Average Non-Coincident Peak Load (kW) by Customer Type and Month



The histogram in Chart 11 provides a distribution of the hours in which single-meter customers' non-coincident peak demand occurs. As you can see, the majority of peaks for single-meter customers occur in the super off-peak TOU period, but 33% of the peaks still occur between 19:00 and 21:00.

SDG&E Chart 11: Hourly Occurrence of Non-Coincident Peak Load for Single-Meter Customers



Time and Average Diversified Peak Load

SDG&E Table 10: Time and Associated Demand of Diversified Peak Load

Month	Resdiential		Single-Meter		Separate-Meter	
	Time	kW	Time	kW	Time	kW
Sep 14	7:45PM	1.78	8:00 PM	4.75	1:30 AM	2.41
Oct 14	7:30 PM	1.19	1:30 AM	3.47	1:30 AM	2.39
Nov 14	6:45PM	0.97	12:30 AM	4.81	12:45 AM	2.97
Dec 14	6:15 PM	1.26	1:15 AM	3.36	1:30 AM	2.35
Jan 15	7:00PM	1.12	1:15 AM	3.32	1:30 AM	2.33
Feb 15	6:30PM	0.93	1:15 AM	3.23	1:30 AM	2.34
Mar 15	8:00PM	1.07	1:15 AM	3.32	1:30 AM	2.30
Apr 15	8:30 PM	0.93	1:15 AM	3.30	1:30 AM	2.34
May 15	6:15 PM	0.86	1:15 AM	3.34	1:30 AM	2.28
Jun 15	8:30PM	1.08	1:15 AM	3.34	1:30 AM	2.19
Jul 15	8:15 PM	1.08	1:15 AM	3.55	1:30 AM	1.91
Aug 15	6:00 PM	1.52	8:00 PM	4.08	1:30 AM	2.15

With the exception of single-meter customers in August and September, both single-meter and separate-meter customers peak as a class around 01:15 and 01:45 driven by PEV charging behavior. The residential class peaks in the early evening hours.

Table Accompanying Chart 11

Hour	Count	%
1	895	14%
2	453	7%
3	200	3%
4	74	1%
5	32	0%
6	22	0%
7	40	1%
8	44	1%
9	53	1%
10	83	1%
11	110	2%
12	119	2%
13	132	2%
14	181	3%
15	205	3%
16	214	3%
17	283	4%
18	434	7%
19	664	10%
20	714	11%
21	662	10%
22	474	7%
23	270	4%
24	145	2%

Average Load Coincident With System Peak

SDG&E Table 11: Average Load Coincident With System Peak

Month	Residential	Single-Meter	Separate-Meter
Sep 14	1.54	3.11	0.07
Oct 14	1.12	2.72	0.08
Nov 14	0.82	2.00	0.03
Dec 14	1.23	2.91	0.14
Jan 15	1.07	2.50	0.12
Feb 15	0.79	2.01	0.06
Mar 15	0.77	1.58	0.09
Apr 15	0.55	1.02	0.14
May 15	0.78	1.47	0.12
Jun 15	0.79	1.53	0.06
Jul 15	0.99	1.99	0.08
Aug 15	1.43	3.04	0.15

Separate-Meter customers have extremely low demand coincident with system peak because this is when their cost per kWh is the highest. Single-Meter customers on the other hand more than double the coincident demand of the average residential customers.

Geographic Concentration of PEV Owners

SDG&E Table 12a: Geographic Concentration of PEVs (Top Five Zip Codes by Meter Configuration)

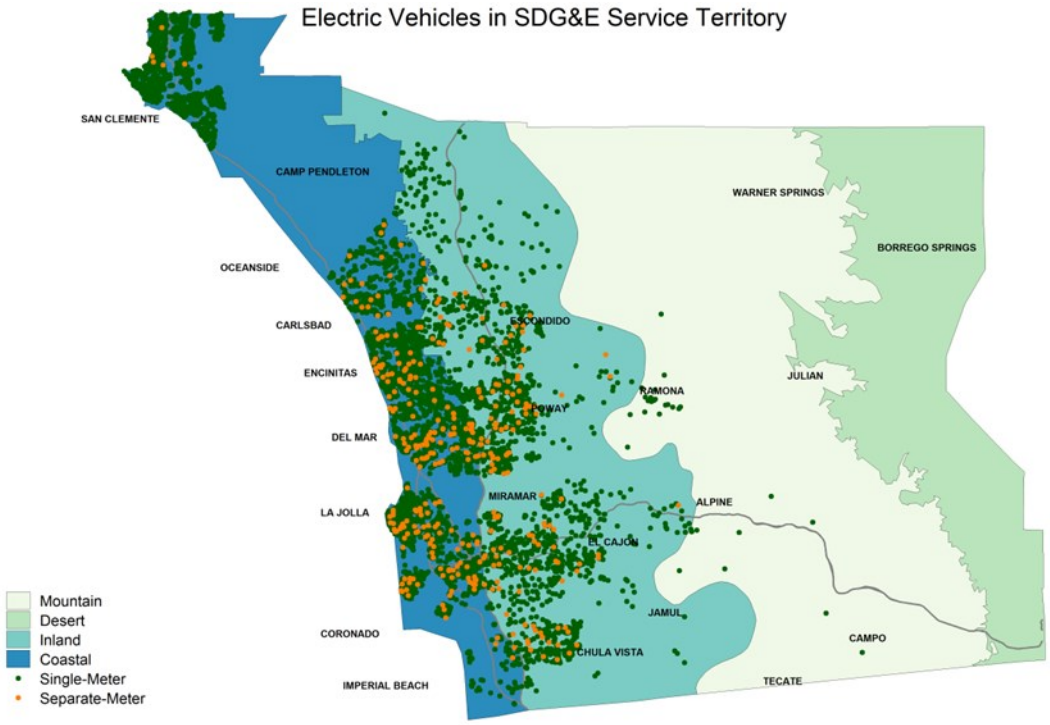
Rate	Zip Code	Area	Number of Customers	Percent of Total
Single-Meter	92130	Carmel Valley	327	5%
	92037	La Jolla	303	5%
	92067	Rancho Santa Fe	258	4%
	92127	Rancho Bernardo	254	4%
	92024	Encinitas	251	4%
Separate-Meter	92130	Carmel Valley	30	8%
	92129	Rancho Penasquitos	23	6%
	92024	Encinitas	22	6%
	92037	La Jolla	17	4%
	92064	Poway	15	4%

SDG&E Table 12b: Geographic Concentration of PEVs by Climate Zone and Meter Configuration

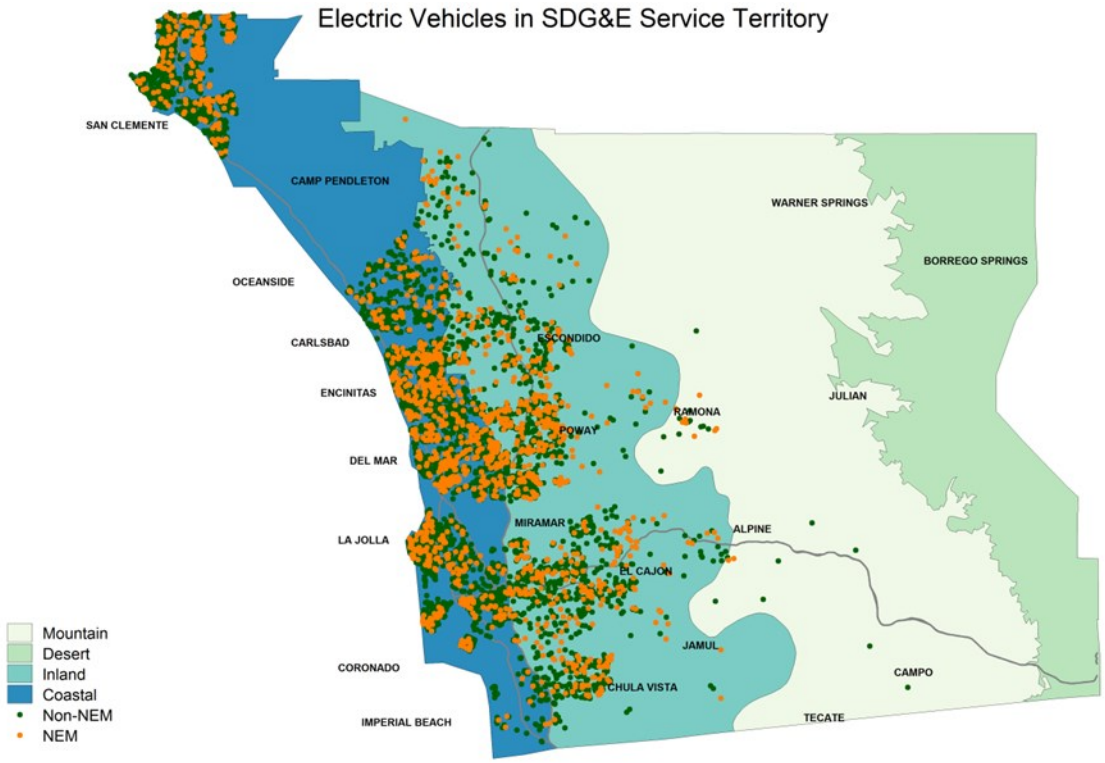
Climate Zone	Single-Meter	Separate-Meter	Total	Percent of Total
Coastal	4,580	237	4,817	70%
Mountain/Desert	33		33	0%
Inland	1,892	148	2,040	30%

70% of PEV owners are located in the coastal climate zone with the remaining 30% located in the inland zone. The results presented in Table 12a, Chart 12a, and Chart 12b show that PEV ownership is heavily concentrated in more affluent areas in the service territory (La Jolla, Rancho Santa Fe, etc.)

SDG&E Figure 1: Geographic Concentration of PEVs by Meter Configuration



SDG&E Figure 2: Geographic Concentration of PEVs by NEM



Conclusions and Observations

PG&E

- While the data collected are illustrative of the behaviors of early PEV adopters, one cannot conclude that these behavior patterns will hold as PEV technology matures, charging technology and charging behaviors evolve, and PEVs achieve greater market adoption beyond the early adopter phase. Consequently, data that is sufficiently reliable for policymaking can only be obtained via an appropriately funded and carefully designed study that controls for the above issues.
- There is evidence that, amongst this group of early adopters and for this current composition of vehicles, customers on TOU PEV rates are charging during off-peak periods: all EV-A customers use a lower percentage of energy in the on-peak period and a higher percentage in the off-peak period as compared to the residential population; and the diversified peak for customers on EV-A or EV-B occurs between 12am – 2am.
- On average, the PEV early adopters have a higher maximum demand that must be accommodated by the electric distribution system as compared to the average household without a PEV.
- Although the early adopter PEV customers may have a higher average maximum demand, those customers on the PEV rates tend to hit their maximum demand while non-PEV customers are at their lowest usage. Thus, there appears to be a diversity benefit created by the TOU rates. However, from the most local service assessment level perspective (i.e., a single household or set of households serviced by a single transformer), the value of this diversity is limited by the fact that the distribution system must still be prepared to accommodate PEV charging during the peak period since these customers can, and occasionally do, charge during those times.
- All of the above conclusions are subject to change as the mix of customers and vehicles changes over time. During the study timeframe, the rapidly changing nature of PEV ownership was clearly evident in the changes that occurred in the mix of customers who own PEVs and types of PEVs available. These changes will need to be considered in ratemaking and cost allocation policymaking. Therefore, California will need to continue to be flexible and adaptable with respect to PEV policies.

SCE

- As a result of D.14-12-048 the single-metered TOU-D-TEV time-of-use rate was superseded by TOU-D-A/B offering a ten hour off-peak window and removing tiers from the structure. Options A and B respectively offer the choice between a Baseline Credit and higher on- and mid-peak rates or a Basic Charge coupled with lower on and mid-peak rates. Though the rate is designed to accommodate the charging of PEVs it is open to any residential customer.
- The number of accounts on the single-meter TOU-D-A/B identified as belonging to PEV owners grew to 6,474 as of the beginning of August 2015. However as this rate is open to all residential customers, it is a challenge to positively identify those who also may own a PEV and therefore account growth is not comparable to previous reports.
- On average, as the number of residential PEV owners who are on a TOU rate continues to grow they continue to charge predominantly during the off-peak period.

- Separately metered PEV owners maintained a monthly average usage of 356 kWh which is unchanged from the 350 kWh/month during the previous reporting period.
- Non-coincident peak demand for the separately metered PEVs on average remained unchanged from the prior reported year at 7.51 kW. Sixty percent of the annual non-coincident peak demands during the current reporting period occurred in the six hours from 10 p.m. to 3 a.m.
- Charging continues to appear concentrated in the off-peak TOU period for single-metered PEV customers. For the separately metered PEVs, off-peak charging remained just under 90% as in the previous report and occurs between 9 p.m. and noon.
- PEV owners identified for this report reside disproportionately to the SCE's general residential population in milder coastal areas which tend to be more densely populated and likely require shorter commutes with greater access to charging infrastructure.
- The statistics and metrics found in this report are based on a relatively small population of identified early adopters in a potentially very dynamic environment. As fuel and materials costs fluctuate, vehicle options expand, and technology continues to adapt to customer needs, the observed behavior is expected to change. If broader swaths of the population acquire PEVs, the future population of owners may have different characteristics than the current group. Therefore, it may be difficult to assess longer term trends from the current data.

SDG&E

- Current TOU rates coupled with charging timers result in super off-peak PEV charging.
- Customers with PEVs that stay on SDG&E's typical residential non-TOU rate tend to show less usage during the super off peak period and increased usage during the afternoon-evening hours relative to those on PEV rates.
- NEM customers with PEVs respond to TOU rates.
- Demand and usage levels for these early PEV adopters are nearly double that of the average residential customer.
- Peak times for PEV Demands are typically in the early morning hours compared to evenings for typical residential customers.
- Sundays & Mondays have the lowest daily kWh consumed, for PEV customers on TOU rates.
- EV-TOU-2 (SDG&E's whole-house TOU rate) customer growth has increased 52% from September 2014 to August 2015, which may cause instability in current Load Research results.

Next Steps

In November 2013, the Commission opened a new Rulemaking (New AFV OIR), R.13-11-007, to consider Alternative-Fueled Vehicle Programs, Tariffs, and Policies. The new AFV OIR contemplates a track to address AFV rate design policy.

Appendix A: Additional Rates for the Tariffs Offered by Southern California Edison From September 2014 to August 2015

Table A – 1a: Single Meter (TOU-D-A/B) Tariff ($/kWh) – Effective 1/1/2015

	Option A				Option B			
Clock Hour Ending	Winter		Summer		Winter		Summer	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
1	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
2	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
3	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
4	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
5	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
6	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
7	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
9	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
10	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
11	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
12	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
13	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
14	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
15	0.37	0.26	0.47	0.30	0.25	0.14	0.36	0.18
16	0.37	0.26	0.47	0.30	0.25	0.14	0.36	0.18
17	0.37	0.26	0.47	0.30	0.25	0.14	0.36	0.18
18	0.37	0.26	0.47	0.30	0.25	0.14	0.36	0.18
19	0.37	0.26	0.47	0.30	0.25	0.14	0.36	0.18
20	0.37	0.26	0.47	0.30	0.25	0.14	0.36	0.18
21	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
22	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
23	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
24	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11

Option A: 0.10 Baseline Credit, 0.03 SF or 0.02 MDU meter/day Basic Charge

Option B: 0.54 meter/day Basic Charge

Table A – 1b: Single Meter (TOU-D-A/B) Tariff ($/kWh) – Effective 3/2/2015

	Option A				Option B			
Clock Hour Ending	Winter		Summer		Winter		Summer	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
1	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
2	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
3	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
4	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
5	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
6	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
7	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
9	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
10	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
11	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
12	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
13	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
14	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
15	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
16	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
17	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
18	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
19	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
20	0.36	0.26	0.46	0.30	0.25	0.14	0.35	0.18
21	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
22	0.26	0.26	0.30	0.30	0.14	0.14	0.18	0.18
23	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
24	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11

Option A: 0.10 Baseline Credit, 0.03 SF or 0.02 MDU meter/day Basic Charge

Option B: 0.54 meter/day Basic Charge

Table B – 1a: Single Meter (TOU-D-TEV) Tariff ($/kWh) – Effective 8/11/2014

Clock Hour Ending	Winter				Summer			
	Weekday		Weekend		Weekday		Weekend	
	Level I	Level II	Level I	Level II	Level I	Level II	Level I	Level II
1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
2	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
3	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
4	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
6	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
7	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
8	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
9	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
10	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
11	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
12	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
13	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
14	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
15	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
16	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
17	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
18	0.20	0.37	0.13	0.29	0.32	0.49	0.15	0.31
19	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
20	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
21	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
22	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
23	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31
24	0.13	0.29	0.13	0.29	0.15	0.31	0.15	0.31

Table B – 1b: Single Meter (TOU-D-TEV) Tariff ($/kWh) – Effective 1/1/2015

Clock Hour Ending	Winter				Summer			
	Weekday		Weekend		Weekday		Weekend	
	Level I	Level II	Level I	Level II	Level I	Level II	Level I	Level II
1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
2	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
3	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
4	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
6	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
7	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
8	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
9	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
10	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
11	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
12	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
13	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
14	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
15	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
16	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
17	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
18	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
19	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
20	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
21	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
22	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
23	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
24	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30

Table B – 1c: Single Meter (TOU-D-TEV) Tariff ($/kWh) – Effective 3/2/2015

Clock Hour Ending	Winter				Summer			
	Weekday		Weekend		Weekday		Weekend	
	Level I	Level II	Level I	Level II	Level I	Level II	Level I	Level II
1	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09
2	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09
3	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09
4	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09
5	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09
6	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09
7	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
8	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
9	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
10	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
11	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
12	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
13	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
14	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
15	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
16	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
17	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
18	0.19	0.35	0.13	0.28	0.25	0.47	0.15	0.30
19	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
20	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
21	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
22	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
23	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
24	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30

Table B – 1d: Single Meter (TOU-D-TEV) Tariff ($/kWh) – Effective 6/1/2015

Clock Hour Ending	Winter				Summer			
	Weekday		Weekend		Weekday		Weekend	
	Level I	Level II	Level I	Level II	Level I	Level II	Level I	Level II
1	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
2	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
3	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
4	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
5	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
6	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
7	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
8	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
9	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
10	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
11	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
12	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
13	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
14	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
15	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
16	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
17	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
18	0.19	0.35	0.13	0.28	0.31	0.47	0.15	0.30
19	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
20	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
21	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
22	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
23	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30
24	0.13	0.28	0.13	0.28	0.15	0.30	0.15	0.30

Table C – 1a: Separate Meter (TOU-EV-1) Tariff ($/kWh) – Effective 11/23/2014

Clock Hour Ending	Winter Weekday	Winter Weekend	Summer Weekday	Summer Weekend
1	0.11	0.11	0.11	0.11
2	0.11	0.11	0.11	0.11
3	0.11	0.11	0.11	0.11
4	0.11	0.11	0.11	0.11
5	0.11	0.11	0.11	0.11
6	0.11	0.11	0.11	0.11
7	0.11	0.11	0.11	0.11
8	0.11	0.11	0.11	0.11
9	0.11	0.11	0.11	0.11
10	0.11	0.11	0.11	0.11
11	0.11	0.11	0.11	0.11
12	0.11	0.11	0.11	0.11
13	0.25	0.11	0.37	0.11
14	0.25	0.11	0.37	0.11
15	0.25	0.11	0.37	0.11
16	0.25	0.11	0.37	0.11
17	0.25	0.11	0.37	0.11
18	0.25	0.11	0.37	0.11
19	0.25	0.11	0.37	0.11
20	0.25	0.11	0.37	0.11
21	0.25	0.11	0.37	0.11
22	0.11	0.11	0.11	0.11
23	0.11	0.11	0.11	0.11
24	0.11	0.11	0.11	0.11

Table C – 1b: Separate Meter (TOU-EV-1) Tariff ($/kWh) – Effective 1/1/2015

Clock Hour Ending	Winter Weekday	Winter Weekend	Summer Weekday	Summer Weekend
1	0.12	0.12	0.12	0.12
2	0.12	0.12	0.12	0.12
3	0.12	0.12	0.12	0.12
4	0.12	0.12	0.12	0.12
5	0.12	0.12	0.12	0.12
6	0.12	0.12	0.12	0.12
7	0.12	0.12	0.12	0.12
8	0.12	0.12	0.12	0.12
9	0.12	0.12	0.12	0.12
10	0.12	0.12	0.12	0.12
11	0.12	0.12	0.12	0.12
12	0.12	0.12	0.12	0.12
13	0.23	0.12	0.36	0.12
14	0.23	0.12	0.36	0.12
15	0.23	0.12	0.36	0.12
16	0.23	0.12	0.36	0.12
17	0.23	0.12	0.36	0.12
18	0.23	0.12	0.36	0.12
19	0.23	0.12	0.36	0.12
20	0.23	0.12	0.36	0.12
21	0.23	0.12	0.36	0.12
22	0.12	0.12	0.12	0.12
23	0.12	0.12	0.12	0.12
24	0.12	0.12	0.12	0.12

Table C – 1c: Separate Meter (TOU-EV-1) Tariff ($/kWh) – Effective 6/1/2015

Clock Hour Ending	Winter Weekday	Winter Weekend	Summer Weekday	Summer Weekend
1	0.11	0.11	0.12	0.12
2	0.11	0.11	0.12	0.12
3	0.11	0.11	0.12	0.12
4	0.11	0.11	0.12	0.12
5	0.11	0.11	0.12	0.12
6	0.11	0.11	0.12	0.12
7	0.11	0.11	0.12	0.12
8	0.11	0.11	0.12	0.12
9	0.11	0.11	0.12	0.12
10	0.11	0.11	0.12	0.12
11	0.11	0.11	0.12	0.12
12	0.11	0.11	0.12	0.12
13	0.23	0.11	0.36	0.12
14	0.23	0.11	0.36	0.12
15	0.23	0.11	0.36	0.12
16	0.23	0.11	0.36	0.12
17	0.23	0.11	0.36	0.12
18	0.23	0.11	0.36	0.12
19	0.23	0.11	0.36	0.12
20	0.23	0.11	0.36	0.12
21	0.23	0.11	0.36	0.12
22	0.11	0.11	0.12	0.12
23	0.11	0.11	0.12	0.12
24	0.11	0.11	0.12	0.12