Application of SAN DIEGO GAS & ELECTRIC COMPANY (U902-E) for Approval of SB 350 Transportation Electrification Proposals	Application No. _____ (Filed January 20, 2017)

PREPARED TESTIMONY OF

RANDY SCHIMKA (ERRATA - CLEAN)

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

CHAPTER 4

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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TABLE OF CONTENTS

I. RESIDENTIAL CHARGING PROGRAM DESCRIPTION AND FEATURES 1

A. Program Summary 1

B. Program Objectives 3

C. Program Description and Scope 3

1. Market Segment and Vehicles Targeted 3

2. Program Size 6

3. Charge Speed: Level 2 (L2) vs. Level 1 (L1) 8

4. Rate Design: Residential Grid Integrated Rate 10

5. Implementation Timeframe 11

D. Grid Impacts 12

E. Ratepayer and Societal Interest 14

1. Emission Benefits 14

2. Grid Utilization Benefits 15

3. High-Quality Job Creation 15

4. Disadvantaged Communities 16

F. Utility Ownership 17

1. Customer Experience 17

2. Installation Safety Standards 18

3. Dynamic Grid Conditions 18

4. Stranded Asset Mitigation 19

G. Monitoring and Evaluating Plan 20

1. Reporting Requirements 20

2. Metrics 20

3. Future Opportunities/Scalability 21
H. Regulation Supported by Program 21
1. California Agency Regulations Supported by Program 21
2. CPUC Regulation Supported by Program 21
I. Fair Competition: Balancing Test 22
1. Nature of the Program 23
2. Competitive Market Analysis 23
J. Education and Outreach 25
1. Education of Residential GIR 26
K. Estimated Program Costs (Capital and O&M) 27
II. STATEMENT OF QUALIFICATIONS 28

PREPARED TESTIMONY OF

RANDY SCHIMKA

CHAPTER 4

I. RESIDENTIAL CHARGING PROGRAM DESCRIPTION AND FEATURES

A. Program Summary

The purpose of this testimony is to discuss San Diego Gas & Electric Company's ("SDG&E") residential charging program. Upon approval from the Commission, SDG&E will own, install, maintain and operate Level 2 ("L2") electric vehicle supply equipment ("EVSE") at SDG&E customers' residences. In turn, the residential customer will be on a whole-house residential grid integrated rate ("Residential GIR"), which is described in Cynthia Fang's direct testimony (Chapter 5). This is a standard review project as defined in the Assigned Commissioner's Ruling ("ACR"), that will increase transportation electrification ("TE") by adding zero emission vehicles ("ZEVs") to the road.[1] This testimony will explain why a Level 1 ("L1") EVSE provided upon purchase using the domestic residential ("DR") rate would make a ZEV less cost-effective to buyers and why it is important for ZEV drivers to use a L2 EVSE and switch to the Residential GIR. The terms "managed" and "unmanaged" will be used in this testimony to illustrate the benefits of a L2 EVSE and a grid integrated rate. "Managed" refers to L2 customers who are using a grid integrated rate. "Unmanaged" refers to L1 customers who are using the standard domestic residential ("DR") rate. The chart below includes the project description identified in Appendix A to the ACR.[2]

[1] *2016 ZEV Action Plan* (October 2016), https://www.gov.ca.gov/docs/2016_ZEV_Action_Plan.pdf. According to the ZEV Action Plan, ZEVs include the following electric vehicle types: hydrogen fuel cell electric vehicles ("FCEVs") and plug-in electric vehicles ("PEVs"), which include pure battery electric vehicles ("BEVs"), and plug-in hybrid electric vehicles ("PHEVs"). Note, FCEVs are not included in SDG&E's proposals or in any analysis related to ZEVs included in this Application.

[2] Rulemaking ("R.") 13-11-007, ACR at Appendix A.

Program Components	SDG&E's Residential Charging Program
Commission Review Mechanism	Standard review
Objectives	Increase ZEVs in line with California's 2030 GHG reduction goals[3] while mitigating new infrastructure costs and providing overall benefits to ratepayers by SDG&E owning, installing, maintaining and operating L2 EVSEs for residential customers and establishing a Residential Grid-Integrated Rate (GIR).
Market Segment and Vehicles Targeted	Residential; L2 EVSE; light-duty passenger vehicles.
Vehicle Goals	Provide up to 90,000 SDG&E qualified residential customers, who drive ZEVs, with in-home L2 EVSEs.
Implementation Timeframe	One year to conduct a RFP for EVSPs and marketing campaign for SDG&E customers and five years to enroll up to 90,000 SDG&E residential customers.
Program Partners	EVSP: provides in-home EVSE. IBEW: installation and maintenance of L2 EVSE. "Smart Home" appliance companies: encourage energy efficiency and tools to utilize the Residential GIR.
Leveraged Funding	Participants could be required to pay portion of installation costs.
Stranded Asset Mitigation	SDG&E will remove unused devices as requested by participant to be refurbished and recommissioned.
Grid Impacts	Use grid integrated rate technology to incentivize drivers to optimize energy use throughout the house, including ZEV charging, by shifting usage to times of the day that minimize grid impact.
Emissions Benefits & Accounting Methodology	Estimated Annual 2025 GHG Reduction: 123,226 $MTCO_2$[4]
CA Regulation Supported by Program	SB 350 SB 32 2016 ZEV Action Plan Executive Order B-16-12 Executive Order B-30-15
CPUC Regulation Supported by Program	P.U. Code § 740.3(c) P.U. Code § 740.8 P.U. Code § 740.12
Monitoring and Evaluation Plan	Monitor household usage data to study charging patterns and the impact of a Residential GIR. Share program metrics with the Commission and other stakeholders.
Cost	Estimated Cost: $226M

[3] P.U. Code § 740.12(a)(1)(D) ("The Legislature finds and declares…Reducing emissions of greenhouse gases to 40 percent below 1990 levels by 2030 and to 80 percent below 1990 levels by 2050 will require widespread transportation electrification.").
[4] *See* Chapter 8, Prepared Testimony of J.C. Martin for further details.

B. Program Objectives

The purpose of my testimony is to describe SDG&E's residential charging program, explain why it is essential to TE efforts in San Diego and California, and show how it aligns with ratepayer interests, as defined by P.U. Code § 740.8, with program benefits including, but not limited to, reducing greenhouse gas ("GHG") emissions, creating opportunity for high-quality jobs, positively impacting disadvantaged communities ("DACs"),[5] and supporting grid optimization by efficiently adding load to the system while minimizing the system's peak. Overall, the program will assist SDG&E in integrating and managing the grid with ZEV load.

C. Program Description and Scope

1. Market Segment and Vehicles Targeted

This program targets light-duty passenger vehicles owned by residential customers. Vehicles can also be categorized by weight class, where Class 1 includes vehicles 6,000 lbs. or less, as defined by the U.S. Department of Energy's Alternative Fuels Data Center.[6] A vast majority of registered vehicles in SDG&E's service territory are Class 1 vehicles, as shown in the graph below.[7]

[5] DACs is defined consistent with D.16-01-045 and SDG&E Advice Letter 2876-E, as explained in more detail in Chapter 2, Prepared Testimony of Linda Brown.
[6] U.S. Department of Energy, *Types of Vehicles by Weight Class*, http://www.afdc.energy.gov/data/widgets/10381.
[7] Proprietary IHS/Polk Data (April 2016).

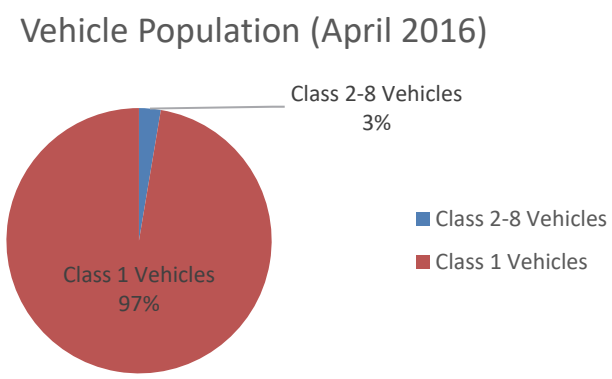

Figure 4-1: Vehicle Population by Class in SDG&E Service Territory in April 2016

The heavy penetration of Class 1, light-duty passenger vehicles in SDG&E's service territory demonstrates that this vehicle class can provide a significant opportunity to expand the EV market and result in greater GHG emission reductions. This also shows that SDG&E's residential charging program has potential to reach a large number of customers likely to purchase such vehicles.

Within this vehicle segment, the program specifically targets SDG&E residential customers. Residential customers constitute the majority of SDG&E's customer base at 89%, as illustrated in the graph below.[8]

[8] SDG&E Electric Revenue Report (based on September 2016 values).

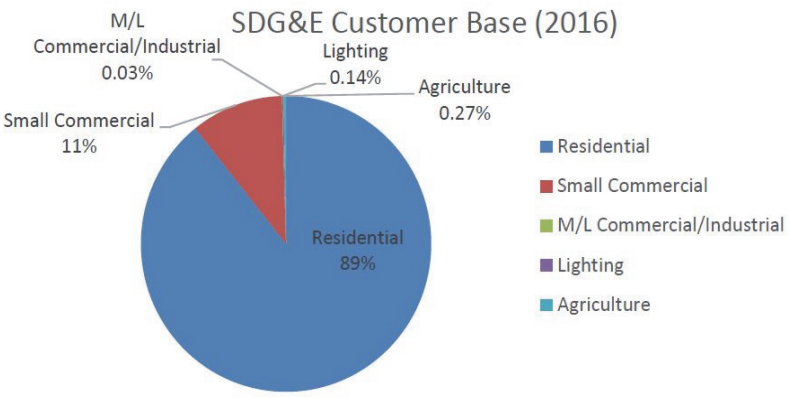

Figure 4-2: SDG&E 2016 Customer Segments

Residential customers can be broken down further into the following housing classifications: single family, multi-family and mobile home.[9] Residents of single family and a portion of multi-family (4 units or less) can participate in the residential charging program. The ACR states that proposed projects should not scale up or expand existing pilots that the CPUC has already approved.[10] This proposal does not overlap with the pre-existing TE efforts by SDG&E's "Power Your Drive" ("PYD") program,[11] which focuses on workplace locations and larger multi-unit dwellings ("MuDs"), such as the five plus units.[12]

The average cost of an EVSE installation, including materials and labor, is projected to be $1,425.[13] Costs associated with installations vary based on the age of the home, and the location, distance, proximity of the electric panel to the proposed EVSE location as well as the

[9] *SANDAG 2050 Regional Growth Forecast* (February 26, 2010), http://www.sandag.org/uploads/projectid/projectid_355_10794.pdf.
[10] R.13-11-007, ACR at 22, 32.
[11] Approved in D.16-01-045.
[12] PYD focuses on MuDs where it is cost effective to install. MuD sites with 4 or less charging stations are cost prohibitive due to the costs being too high per unit.
[13] *How do Residential Level 2 Charging Installation Costs Vary by Geographic Location?* at Appendix A (April 2015), https://avt.inl.gov/sites/default/files/pdf/EVProj/HowDoResidentialChargingInstallationCostsVaryByGeographicLocations.pdf.

size and load of the existing panel.[14] With those factors in mind, SDG&E will pay for EVSE installations up to a cap,[15] depending on the type of customer as follows:

- Customers residing in single family homes will have a cap of $1,000;
- Customers residing in two to four-unit MuDs will have a cap of $1,125;[16] and
- Customers residing in a DAC will have a cap of $1,500.[17]

2. Program Size

The residential charging program enrollments are proposed to take place over five years, with a goal of 90,000 L2 EVSEs installed. The goal of 90,000 participants was designed around Governor Brown's 2016 ZEV Action Plan. The 2016 ZEV Action Plan sets a goal for 1.5 million ZEVs on California roadways by 2025.[18] According to the California Transportation Electrification Assessment prepared by ICF International, SDG&E's share of the California EV market segment is assumed to be 9.43%.[19] Assuming that the service territory makes up approximately 10% of the State's 1.5 million vehicle goal, SDG&E's target narrows to 150,000 ZEVs. As of October 2016, SDG&E had 22,044 ZEVs in its service territory.[20] SDG&E

[14] *Id*. at 2.
[15] SDG&E created financial caps to ensure customers are held accountable for major infrastructure upgrades. The sliding scale was created to account for the factors that could increase cost and to help ensure the program is not cost prohibitive for MuDs and DACs.
[16] The variety of MuD property architectures, access to electrical service, parking models, and the associated EVSE installation approach can making installing an EVSE cost prohibitive in many cases. *See* California Plug-In Electric Vehicle Collaborative, *Plug-In Electric Vehicle Charging Infrastructure Guidelines for Multi-Unit Dwellings* (November 2013), http://www.pevcollaborative.org/sites/all/themes/pev/files/docs/MUD_Guidelines4web.pdf.
[17] DACs often face disproportionate exposure to the health and economic impacts of climate change, therefore making the installation of an EVSE less cost prohibitive for DACs is a policy priority. *See* Center for Sustainable Energy, *Quality of Life Dashboard* (2016), https://energycenter.org/sites/default/files/2016-equinox-regional-dashboard-report.pdf.
[18] *2016 ZEV Action Plan* (October 2016), https://www.gov.ca.gov/docs/2016_ZEV_Action_Plan.pdf.
[19] ICF International, *California Transportation Electrification Assessment Phase 1: Final Report* (August 2014) (based on SDG&E's 2014 customer population as a percentage of the state).
[20] Proprietary IHS/Polk Data (April 2016).

forecasts that this population will grow to 29,691 by January 2020.[21] Figure 4-3 illustrates both today's ZEV count and the forecasted total ZEVs by 2020.

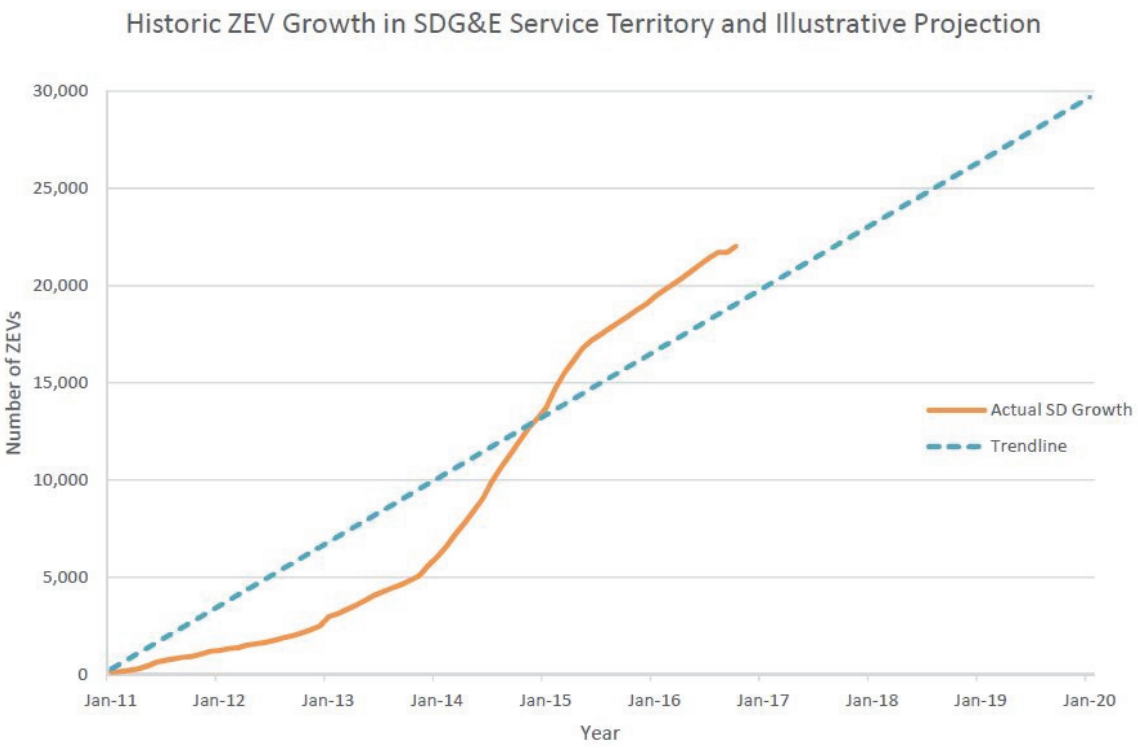

Figure 4-3: SDG&E Actual ZEV Trendline

To calculate program size, SDG&E subtracted the projected 2020 ZEV population from San Diego's share of the Governor's goal of 150,000 vehicles to get a remaining market of 120,309 additional ZEVs that need to be on the road by 2025. SDG&E has set the goal of obtaining a 75% participation rate through this program, which leads to the goal of 90,000 participants.

[21] Internal estimate based on a growth forecast using IHS/Polk Data reported ZEV adoption from January 2011 – October 2016.

3. Charge Speed: Level 2 (L2) vs. Level 1 (L1)

Upon purchasing a ZEV, the driver ordinarily receives a L1 EVSE that plugs into a standard 120-volt outlet. A full charge on a battery electric vehicle ("BEV") with a range of 84 miles could take up to 17 hours to fully charge on a L1 EVSE.[22] In comparison, a 240-volt L2 EVSE would take approximately 3.5-7 hours to charge depending on the current rating of the equipment: 40-amp vs. 20-amp, respectively. Unmanaged drivers on the domestic residential tiered rate would not likely see the fuel cost savings that are expected to come with obtaining an EV due to the fact that they will reach the higher cost tier. Managed drivers would take advantage of lower rates associated with times when the energy market prices are low using the Residential GIR.

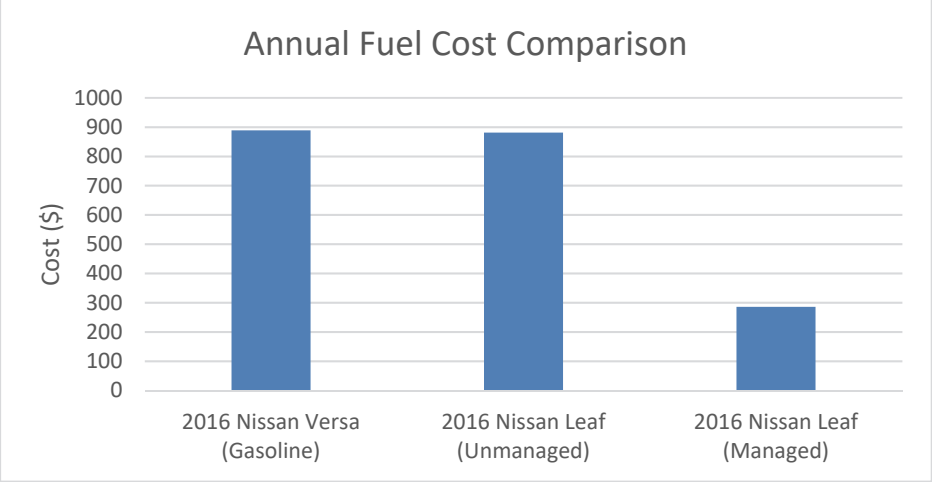

Figure 4-4: Annual Fuel Costs Comparison of Electricity and Gasoline

Figure 4-4 compares the annual fuel costs for an average 30-mile daily commute.[23] As illustrated, the annual fuel cost of gasoline for an internal combustion engine ("ICE") vehicle is

[22] Center for Sustainable Energy, *Electric Vehicle Charging Station Installation Guidelines: Residential and Commercial Locations* (April 2011), https://energycenter.org/sites/default/files/docs/nav/programs/pev-planning/san-diego/fact-sheets/ResComm%20EVSE%20Permit%20Guidelines%20v3_Final_attach.pdf.

[23] UC Davis Electric Vehicle Explorer, http://gis.its.ucdavis.edu/evexplorer/.

similar to the cost of electricity on an unmanaged ZEV.[24] In this example the managed ZEV driver has the lowest annual fuel costs.

Saving money on fuel costs is the most important reason people purchase a ZEV.[25] Accordingly, this program will help ensure that the cost of electricity to fuel ZEVs remains competitive relative to gasoline prices.

In addition to the average customer not knowing the benefits of a L2 EVSE, the cost of owning and installing a L2 EVSE can be prohibitive when it is added to the initial purchase of a new ZEV, especially due to the fact that ZEVs tend to be more expensive than their equivalent ICE vehicle.[26] The average total cost for purchasing and installing a L2 EVSE in San Diego is $2,025.[27] In a study that surveyed ZEV drivers, 3,881 respondents received a subsidized L2 EVSE, of which 60% were "very influenced" by the subsidy to move to a L2 EVSE.[28] Thus, subsidizing the cost of the L2 EVSE and its associated charging infrastructure reduces the barriers for new customers to invest in a ZEV.

The L2 EVSE has the ability to increase TE by tackling the barriers of a ZEV purchase, including cost and infrastructure, and at the same time fostering a more flexible load, benefiting the grid. Flexible load can be optimized and shifted to off-peak times on the grid. This program

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[24] Assumptions for the chart include: a 2016 Nissan Versa gas price of $3.37/gallon, rated 29MPG; A 2016 Nissan Leaf with two profiles (1) using L1with a DR Tier 2 Rate average between winter and summer of $0.378/kWh, and (2) using an L2 with an EV-TOU rate average super off-peak of $.183/kWh.
[25] Center for Sustainable Energy and California Air Resources Board, *Clean Vehicle Rebate Project: EV Consumer Survey Dashboard* (2016), http://cleanvehiclerebate.org/survey-dashboard/ev.
[26] Four out of the five Nissan sedans featured on its website (https://www.nissanusa.com/cars) are less expensive than the Nissan Leaf (accessed on 1/13/2016). For example: Maxima $32,610, Leaf $30,680, Altima $22,500, Sentra $16,990, Versa Note $15,480, and Versa Sedan $11,990.
[27] $600 for an EVSE and an average $1,425 for the installation (including $206 for permits), for a total of $2,025. *See* Installation and permitting costs based on: *How do Residential Level 2 Charging Installation Costs Vary by Geographic Location?* at Appendix A (April 2015), https://avt.inl.gov/sites/default/files/pdf/EVProj/HowDoResidentialChargingInstallationCostsVaryByGeographicLocations.pdf.
[28] Center for Sustainable Energy, *What Drives California's Plug-In Vehicle Owners?* (May 2013), https://cleanvehiclerebate.org/sites/default/files/docs/nav/transportation/cvrp/survey-results/California_PEV_Owner_Survey_3.pdf.

couples a L2 EVSE with a Residential GIR that provides the customer with the necessary tools, opportunity, and incentive to be a flexible load. See Cynthia Fang's direct testimony (Chapter 5) for discussion of the Residential GIR. Ultimately, it is the customer's choice whether or not to provide flexible load; however, providing flexible load will allow customers to save on their electric bills, which is a significant motivator.[29]

New technology advances including longer range vehicles (200+ miles) makes this program more important. A longer range just denotes that the car has a bigger battery. ZEV drivers will still want the flexibility associated with L2 EVSE and the low off-peak pricing associated with the Residential GIR. This longer range will be perceived as a benefit if participants will be able to top-off their range in the hours when day-ahead prices in the Residential GIR are low.

4. Rate Design: Residential Grid Integrated Rate

The rate structure that is being proposed for this program is the Residential GIR which uses day-ahead hourly rates communicated via a smart phone application, email or through the charger itself.[30] This dynamic grid integrated rate is described in detail in the direct testimony of Cynthia Fang (Chapter 5). The rate is designed to send pricing signals reflecting electricity wholesale market prices, and high prices in periods of high net loads when added loads may trigger the need for new generation or distribution infrastructure. The Residential GIR will be applied to the entire residence, not just the EVSE. Education will be an essential element, as later discussed in this testimony in Education and Outreach, to help customers understand their energy usage throughout the entire residence.

[29] Final Evaluation for San Diego Gas & Electric's Plug-in Electric Vehicle TOU: Pricing and Technology Study at 44-45 (February 2014), http://www.sdge.com/sites/default/files/documents/1681437983/SDGE%20EV%20%20Pricing%20%26%20Tech%20Study.pdf?nid=10666.

[30] SDG&E's proposed RFP process will evaluate the suitable technologies that meet program requirements.

SDG&E has proven through a multi-year Plug-In EV Pricing and Technology Study that customers can be incentivized to charge during off-peak hours.[31] This study verified that customers are more likely to charge during hours when prices are low using a time-varying rate in combination with a L2 EVSE. [32] The study also shed light on a ZEV customer's charging response to time-varying rates and how pricing and technology influences their decisions. During the study, the group with the highest rate variance between on-peak and super off-peak prices (6:1 ratio), charged their vehicles 84% of time (on average) during the period with the lowest rates.[33]

5. Implementation Timeframe

The Governor's ZEV Action Plan states a goal of 1.5 million ZEVs on the road in California by 2025. However, in order to have the best chance of influencing the EV market to reach this goal, this Application requests a decision from the CPUC in 2018. The first year of the program would be dedicated to fully establishing partnerships through a request for proposal ("RFP") process[34] and customer outreach.[35] The program enrollment will be limited to the five-year period: 2020-2025. SDG&E believes that program enrollment will gradually ramp up over the five-year period with increasing enrollments and installations in the later years of the program (see following chart).

[31] Final Evaluation for San Diego Gas & Electric's Plug-in Electric Vehicle TOU: Pricing and Technology Study at 17-22 (February 2014), http://www.sdge.com/sites/default/files/documents/1681437983/SDGE%20EV%20%20Pricing%20%26%20Tech%20Study.pdf?nid=10666.
[32] *Id.* at 1-6.
[33] *Id.* at 38.
[34] *See* Section I.I., Fair Competition: Balancing Test, *infra*, for additional detail on the RFP process.
[35] *See* Section I.J., Education and Outreach , in this testimony for additional detail on customer outreach.

Table 4-1: Estimated Program Enrollment Goal by Year

Year	Enrollment
2020-2021	10,000
2021-2022	15,000
2022-2023	19,000
2023-2024	22,000
2024-2025	24,000
5 Years	90,000

To mitigate time and labor constraints, installations have the flexibility to extend into 2026, with the goal of a completion date for all installations by December 31, 2026.

D. Grid Impacts

The residential charging program will also minimize new electrical infrastructure upgrades by encouraging the new load from EV adoption to shift to off-peak hours. Owning, installing, maintaining, and operating L2 EVSEs for residential customers and enrolling those customers on a Residential GIR for the entire residence are both key components to the program.

A load factor is the ratio of the average amount of load to the peak load. For an electric utility, peak load is when electricity prices are highest and increases in peak load can drive new investments in generation. Today, SDG&E's load factor is lower than the California Independent System Operator ("CAISO") system.[36] The historic load factors for 2015, as shown in the figures below, are 52% and 56% for SDG&E and CAISO, respectively.[37] For an electric utility, increasing the load factor will avoid adding new generating capacity and will increase system operating efficiency. The figures below show that CAISO's grid is operating more efficiently than SDG&E's.

[36] The CAISO system includes all the California investor-owned utilities ("IOUs"): Pacific Gas & Electric ("PG&E"), Southern California Edison ("SCE"), and San Diego Gas & Electric ("SDG&E") plus other smaller investor-owned and publicly-owned utilities.
[37] Calculated from SDG&E's 30 minute interval data collection system.

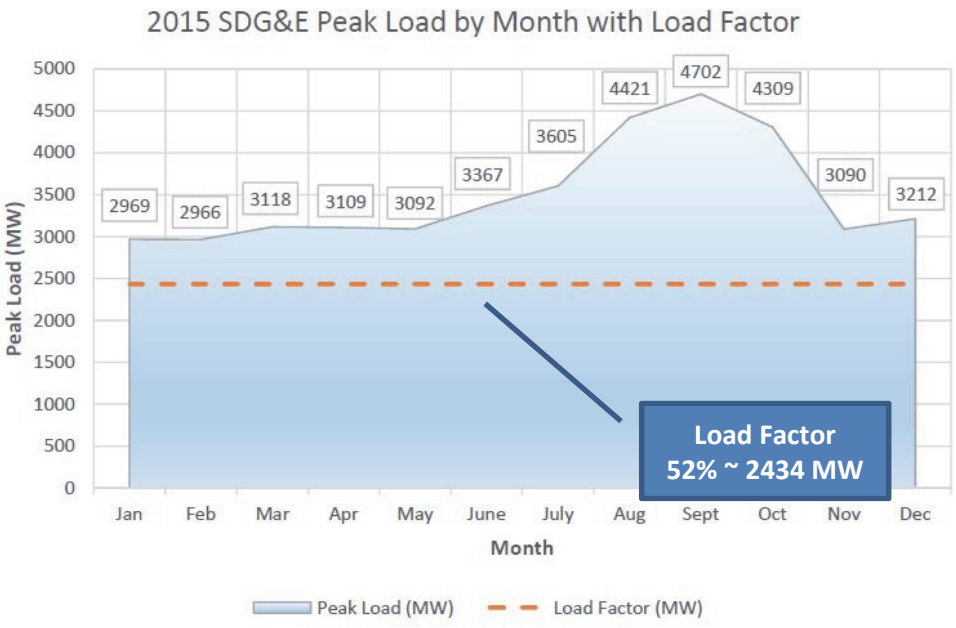

Figure 4-5: 2015 Historic Load Factor for SDG&E

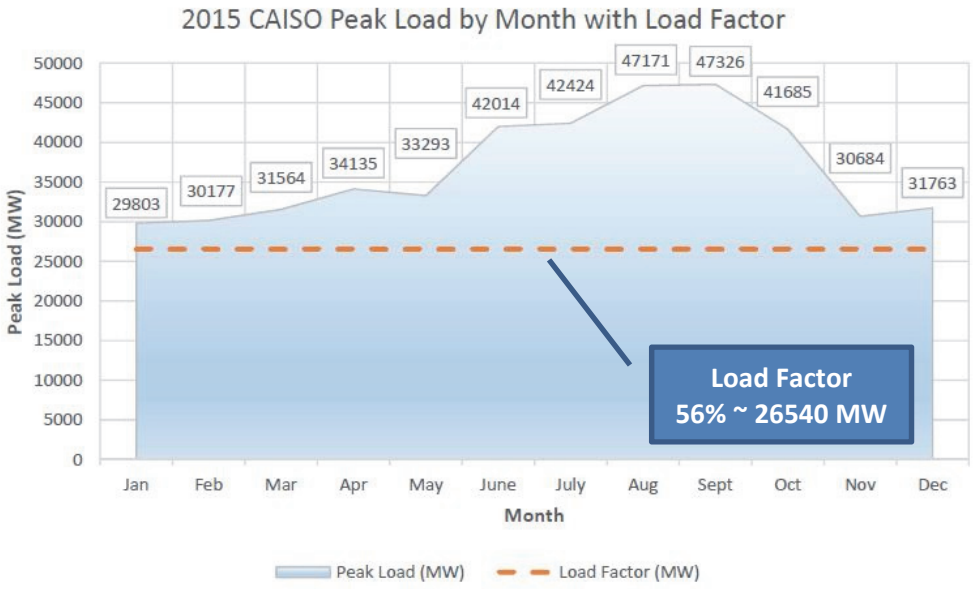

Figure 4-6: 2015 Historic Load Factor for CAISO

The residential charging program could improve the system load factor if the program is successful in shifting new load to the off-peak and not adding system load to the peak. A more

detailed description of residential charging program grid impacts are in J.C. Martin's direct testimony (Chapter 8).

E. Ratepayer and Societal Interest

SDG&E referred to Public Utilities Code § 740.8 to align this program with the ratepayers' interest. The following benefits are expected:

- Lower GHG emissions by the increase of ZEVs on local roads;
- Reduction in air pollution associated with the increasing amount of ZEVs in SDG&E's service territory;
- A L2 EVSE combined with the Residential GIR creates a more flexible load. This load can be moved to off-peak hours of the day, making the system more efficient. In turn, this creates a lower relative cost for electric service, which lowers rates for all ratepayers; and
- Installation services will increase the number of local high-quality jobs. SDG&E plans to use qualified International Brotherhood of Electrical Workers ("IBEW") affiliated contractors who will be trained using the "Electric Vehicle Infrastructure Training Program" ("EVITP").[38] This training program will equip these contractors with the skills of a new trade that can be utilized as ZEV penetration in California continues to expand.

1. Emission Benefits

GHG reductions from the residential charging program provide air quality benefits for all of California, of which SDG&E ratepayers are a subset. Annual reductions of 123,226 metric tons ("MT") of CO_2 are conservatively estimated, resulting in lifetime net CO_2 reductions of

[38] Electric Vehicle Infrastructure Training Program, http://www.evitp.org/.

1,341,609 MT for the vehicles included in the residential charging program.[39] Additional air quality benefit details, as well as, estimation methods are provided in J.C. Martin's direct testimony (Chapter 8).

2. Grid Utilization Benefits

Not only will this program increase the number of ZEV drivers, it will also convert Unmanaged ZEV drivers into Managed ZEV drivers, and will therefore better utilize SDG&E's current grid assets. SDG&E's load shape has changed as more renewables have been added in the State. Peak system load used to be in the mid-afternoon and has now shifted to later in the day when solar resources taper off. This program allows the ZEV charging load to be more flexible by providing faster L2 charging combined with a grid integrated rate. An improved net load, as described in Chapter 8, aligns with ratepayer interest because it will reduce the market's electricity costs and therefore benefit customers. J.C. Martin's direct testimony (Chapter 8) describes the details of SDG&E's net load factor and the benefits this program has on the net load factor and the distribution system.

3. High-Quality Job Creation

San Diego has been acknowledged as a leader in clean-tech employment for a city of its size.[40] This program will provide job opportunity via contracting for installation of the L2 EVSE. In order to keep up with the demand of the program, SDG&E will contract with multiple IBEW-affiliated contractors.

[39] *See* Chapter 8, Prepared Testimony of J.C. Martin, for further details.
[40] Center for Sustainable Energy, *Quality of Life Dashboard* (2016), https://energycenter.org/sites/default/files/2016-equinox-regional-dashboard-report.pdf.

4. Disadvantaged Communities

Senate Bill 535 requires 10% of the Greenhouse Gas Reduction Fund to support programs located in DACs, which include neighborhoods disproportionally impacted by climate change. SDG&E would like to drive beyond this 10% goal for its residential charging program. SDG&E is proposing to reserve 20% of the program's enrollment to customers living in DACs. The map of DACs in SDG&E's service territory is shown in Figure 4-7.

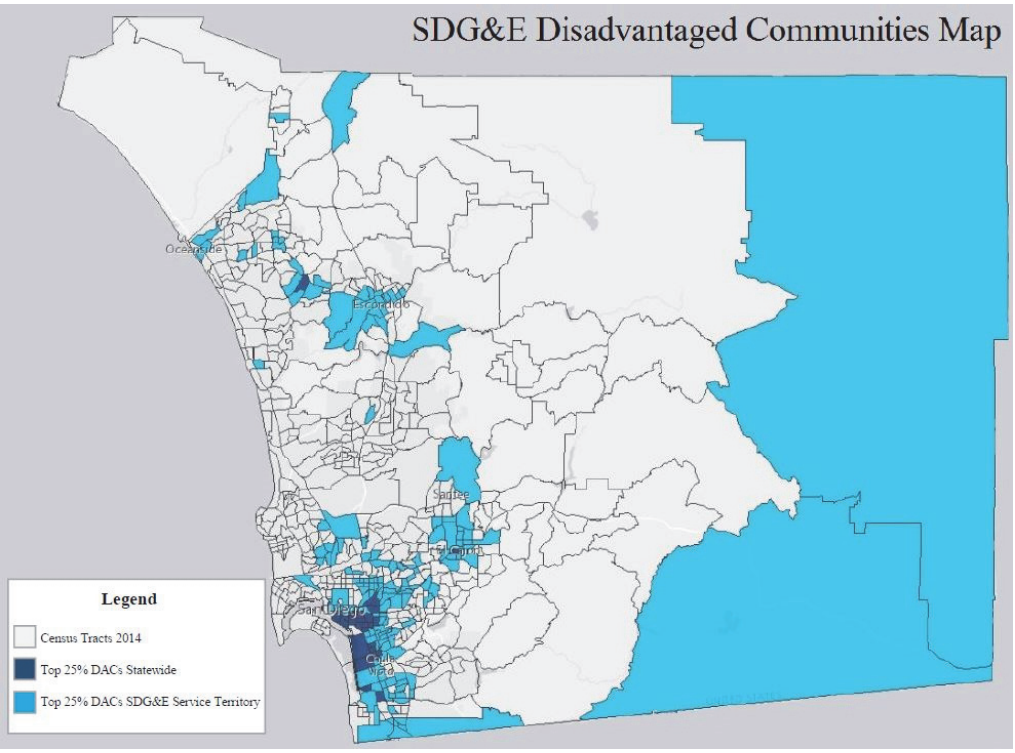

Figure 4-7: DACs in SDG&E's Service Territory

SDG&E's 20% set aside is intended to help eliminate barriers to TE and improve the local health standards associated with pollution in DACs.[41]

The residential charging program also aligns with the ZEV Action Plan and §740.12(E), by providing charging infrastructure that makes ZEVs more affordable and increases access to the ZEV market. As noted above, customers residing in a DAC will be allotted a higher

[41] *See* Chapter 8, Prepared Testimony of J.C. Martin.

installation cost cap: up to $1,500. With the ability to receive a safe and reliable installation of a L2 EVSE for a low cost, the total overall cost for the ZEV will be less. This will allow for greater ZEV adoption in the local DACs, as well as improve public health and quality of life in DACs in accordance with § 740.12(a)(1)(C).

F. Utility Ownership

SDG&E is proposing to own, install, maintain and operate the EVSEs in 90,000 SDG&E residences. By partnering with third-party electric vehicle service providers (EVSPs) and IBEW-affiliated installation contractors, SDG&E's residential charging program will help expand the ZEV market and opportunities for further private sector participation in the market. The following sections related to customer experience, safety, grid management and stranded asset mitigation further illustrate the benefits of utility ownership.

1. Customer Experience

For the tenth straight year, SDG&E has been recognized as a Customer Champion and in 2015 SDG&E was named 2nd best utility in the west.[42] This award illustrates the trust that customers have in SDG&E to provide them with all of their gas and electrical needs. To meet the need to install 90,000 EVSEs, SDG&E plans to work with multiple third-party EVSPs. The program will help provide accessibility to the in-home charging market for customers who want a L2 EVSE, but find the installation and procurement process overwhelming and economically challenging. SDG&E wants to provide a seamless customer experience for their vehicle charging, similar to what they receive in their current procurement of gas and electricity from the company.

[42] "SDG&E Named 2015 'Customer Champion'" (December 21, 2015), http://www.sdge.com/newsroom/press-releases/2015-12-21/sdge-named-2015-%E2%80%9Ccustomer-champion%E2%80%9D .

2. Installation Safety Standards

Safety is one of SDG&E's guiding principles. Nothing is more important to SDG&E and its associated companies than the safety of its customers and workers. SDG&E intends to partner with skilled labor and will require that installers are trained and educated on leading practices by EVITP.[43]

SDG&E wants to make sure that installations of the L2 EVSEs follow proper safety and procedural standards, as addressed in the EVITP.[44] SDG&E will require installers to procure proper permitting before construction begins to assure a high level of safety. Most, if not all, jurisdictions in SDG&E service territory require permits and inspections.[45]

SDG&E will also ensure that the equipment is safe. One of the specifications for the EVSE will be a safety-certification by a Nationally Recognized Testing Laboratory ("NRTL"). Overall, SDG&E will comply with all current safety laws, rules and procedures.

3. Dynamic Grid Conditions

Without the Residential GIR, L2 EVSEs will not promote grid efficiencies. SDG&E's residential charging program will pair a dynamic rate and provide customers with an enabling technology tool that allows this new ZEV load to be flexible. As mentioned before, creating a more flexible load is key to ratepayer interests, as it can help to reduce rates. The Residential GIR will educate ZEV drivers using pricing queues that align with grid demand. It is important

[43] National Electrical Contractors Association, *Electric Vehicle Infrastructure Training Program* (EVITP), http://www.necanet.org/professional-development/specialized-training/electric-vehicle-infrastructure-training-program-(evitp).
[44] Electric Vehicle Infrastructure Training Program, http://www.evitp.org/.
[45] City of San Diego, *How to Obtain a Permit for Electrical Vehicle Charging Systems* (November 2016), https://www.sandiego.gov/sites/default/files/dsdib187.pdf. *See also* Center for Sustainable Energy, *Electric Vehicle Charging Station Installation Guidelines: Residential and Commercial Locations* (April 2011), https://energycenter.org/sites/default/files/docs/nav/programs/pev-planning/san-diego/fact-sheets/ResComm%20EVSE%20Permit%20Guidelines%20v3_Final_attach.pdf.

for customers to learn beneficial charging behaviors early so that off-peak charging becomes standard practice.

SDG&E has tried to make ZEV-driving customers more conscious of load impacts by promoting the EV-TOU (separate meter) or the EV-TOU2 (whole house) EV rates, which are currently available to ZEV drivers. Unfortunately, these rates are only being used by 38% of SDG&E's ZEV customers.[46] In order to shift its ZEV customers to a Residential GIR, SDG&E wants to incentivize drivers with this program. Otherwise, the number of ZEV drivers will continue to grow, along with peak load. The shift from a time-of-use ("TOU") rate to a Residential GIR will integrate the customer with the grid's condition, transforming the residence into flexible load when possible, as discussed in Cynthia Fang's direct testimony (Chapter 5).

4. Stranded Asset Mitigation

SDG&E wants to make sure that L2 EVSEs are reliable, used, and useful for their expected life.[47] ZEV Customers are less likely to leave an asset stranded in their home. If there is a problem with the charger, the customer will be able to contact SDG&E to request maintenance. Studies show that once a person drives a ZEV, that person is roughly 92% likely

[46] Proprietary IHS/Polk Data (April 2016) and SDG&E TOU Rate Count.

[47] Reputation and branding can be significant in changing the public perception of EVs. The local utilities have the reputation to deliver safe and reliable service. Recent failures in an attempt to advance the TE market illustrate that a different approach is needed. Car2Go, a fleet of clean EV cars in San Diego, failed in just five years, claiming setbacks in electric charger stations as one of the reasons.(http://www.sandiegouniontribune.com/news/politics/sd-me-car2go-leaves-20161118-story.html) ECOtality, the original operator of the Blink charging network went bankrupt and the Blink network was taken over by Car Charging Group. The Blink residential and public chargers were initially provided as part of a DOE EV grant. ECOtality's public financial reports have revealed its inability to build a business beyond the DOE funded chargers which led to DOE freezing further grant payments. One survery conducted by Recargo indicated that only 48 percent considered the Blink brank "reliable" and only 18 percent felt "loyal" to the brand. (https://www.greentechmedia.com/articles/read/ECOtality-Bankruptcy-Blink-EV-Charging-Network-Changes-Hands-But-Not-Bad-R)

to buy another ZEV in the future.[48] If a participant is no longer using the L2 EVSE, SDG&E will remove the EVSE so that it can be refurbished and recommissioned in a timely manner.

G. Monitoring and Evaluating Plan

SDG&E's monitoring and evaluation plan aligns with the commitment to customer service by focusing on evaluating participants' energy usage to ensure their success on this new dynamic Residential GIR. Grid integration is of common interest to the CAISO, California Energy Commission ("CEC"), and the Commission. These governing groups together created the VGI Roadmap.[49] This program takes the Residential GIR and applies it to the entire residence. As discussed in Cynthia Fang's direct testimony (Chapter 5), with the Residential GIR for the residence, participants are able to track grid conditions through pricing incentives.

1. Reporting Requirements

SDG&E will align reporting pursuant to D.16-01-045 by engaging the Program Advisory Council (PAC).[50] SDG&E will communicate and work with PAC guidance throughout the program to ensure input based on diverse needs is addressed. The makeup and purpose of this PAC is described in Linda Brown's direct testimony (Chapter 2).

2. Metrics

The focus of the program is to create a more flexible household load using a grid integrated rate in combination with a L2 EVSE. SDG&E will provide metrics on the success of the program including, but not limited to, the following:

- Actual operating costs (i.e., the cost of running the program);

[48] "10,000 EV Drivers Can't Be Wrong… But They Can Be Different" (August 9, 2015), https://cleantechnica.com/2015/08/09/ct-exclusive-interview-10000-ev-drivers-cant-wrong-can-different/.
[49] 2016 ZEV Action Plan at 11 (October 2016), https://www.gov.ca.gov/docs/2016_ZEV_Action_Plan.pdf.
[50] *See* D.16-01-045 at 145 (Section 5.7.10 ("Program Advisory Council")); *see also id.* at Attachment 2, Appendix A at 13.

- Actual installation costs (total and average per site);
- Annual growth in ZEV by type (i.e., BEV, PHEV); and
- Annual growth of the program (by region, including DACs and non-disadvantaged communities).

These metrics along with any proposed program changes will be reported to the PAC on a semi-annual report, to highlight the program's progress.

3. Future Opportunities/Scalability

SDG&E will monitor opportunities and program execution to expand the program with new features to respond to customer needs. This may result in a future application and/or other consultation with the CPUC. If the program progresses at a slower rate than estimated, SDG&E can extend the program enrollment past 2025.

H. Regulation Supported by Program

1. California Agency Regulations Supported by Program

The residential charging program will support a variety of California regulations in addition to SB350, such as:

- 2016 ZEV Action Plan: 1.5 million ZEVs in California by 2025;[51]
- Executive Order B-30-15: Decrease GHG emissions to 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050; and
- California Executive Order B-16-2012: Orders and directs the rapid commercialization of zero-emission vehicles.

2. CPUC Regulation Supported by Program

The residential charging program supports the following CPUC regulation:

[51] *See* 2016 ZEV Action Plan (October 2016), https://www.gov.ca.gov/docs/2016_ZEV_Action_Plan.pdf.

- P.U. Code § 740.3(a) and (c): SDG&E, as an electrical corporation, will evaluate and implement policies to promote the development of equipment and infrastructure needed to facilitate the use of electric power and this program is in the ratepayers' interest and will not unfairly compete with nonutility enterprises.
- P.U. Code § 740.8: by creating high-quality job or other economic benefits, including in DACs, for the installation and maintenance of the proposed EV infrastructure.
- P.U. Code § 740.12: by stimulating innovation and competition by EV manufacturers and EVSPs, attracting more private capital investments in TE, and creating high-quality jobs for Californians.

I. Fair Competition: Balancing Test

The balancing test in D.16-01-045, provides the tools to weigh the impacts of utility ownership, making sure that ownership will not lead to competitive limitations as a result of that ownership.[52] This section of the testimony will provide examination of:

1. The nature of the residential charging program and its elements; and
2. The degree to which the market into which SDG&E would enter is competitive, and in what level of concentration.

Overall, the benefits provided by the residential charging program will be aligned with ratepayer "interests" as defined by § 740.8 and provide benefits as described in the direct testimony of J.C. Martin (Chapter 8).

[52] D.16-01-045 at 104.

1. Nature of the Program

The residential charging program proposes utility ownership of the EVSE infrastructure and will provide billing and metering services. Residential billing and metering services are core utility services and should not impact EVSPs. The benefits of utility ownership of the EVSE are detailed in Section F above and include customer experience, installation safety standards, rate alignment with dynamic grid conditions, and stranded asset mitigation. In summary, the program will make it easier for customers to choose and install a L2 EVSE with the provided comfort in knowing that the EVSE will be a useful tool for charging their ZEV during the lower-priced hours of the day.

Using the theory of diffusion of innovation, technology spreads across five customer segments in the following order: innovators, early adopters, early majority, late majority and laggards.[53] When looking at the current ZEV count in SDG&E's service territory, 22,044 in October 2016, ZEVs are still in the early adopter stage of the 150,000 goal.[54] In order to move ZEVs into the mainstream, they have to be adopted by the early and late majority. Unlike the innovators and early adopters, these categories have less financial resources and question adoption more before committing.[55] The residential charging program is designed to remove some of the boundaries and concerns these groups might have.

2. Competitive Market Analysis

The residential charging program will create opportunities for the EVSPs in SDG&E's service territory. Expanding the EVSE market can be achieved by enabling widespread

[53] On Digital Marketing, *The 5 Customer Segments of Technology Adoption*, http://www.ondigitalmarketing.com/learn/odm/foundations/5-customer-segments-technology-adoption/.
[54] According to the Diffusion Innovation Theory, innovators and early adopters make up 16% of adoption, 16% of 150,000 ZEVs is 24,000 ZEVs. *See* Rogers, Everett (August 2003), *Diffusion of Innovations*, 5th Ed. Simon and Schuster. ISBN 978-0-7432-5823-4.
[55] On Digital Marketing, *The 5 Customer Segments of Technology Adoption*, http://www.ondigitalmarketing.com/learn/odm/foundations/5-customer-segments-technology-adoption/.

accessibility to ZEV drivers that might need the guidance and education the program aims to provide.

Purchasing an L2 EVSE can be overwhelming due to the number of choices and differences in specifications of the equipment.[56] This program aims to give customers a choice of EVSEs, that have been approved and vetted through an RFP process. SDG&E's PYD program is currently in progress. The open RFP process for PYD is a fair and competitive solicitation process for qualifying third-party EVSPs. This approach offers further protection against the potential that the program could somehow stifle innovation, when in fact the RFP process has the potential to nurture competitive innovation and pricing among the EVSPs. SDG&E intends to keep the PYD RFP process open to allow the current qualifying third parties, as well as future third parties, the opportunity to provide similar services to meet the needs of the residential charging program.

a. Request for Proposal

SDG&E will follow its *Supply Management Procurement Policies and Guidelines* when developing and distributing the RFPs. The following summarizes the process that will be followed for both RFPs:

- SDG&E's subject matter experts ("SMEs") will develop a list of specifications and qualifications (e.g., the EVSE must be UL listed).
- SMEs will develop scoring criteria. SDG&E will score each of the bidders on the pre-selected scoring criteria that are determined before bids are received.
- SDG&E will distribute the RFP using its online procurement tool. All communication will be administered through the tool. Any questions received

[56] A search of "L2 EVSE" on Amazon.com retrieves 64 results that range from $200-$1,000 with varying capabilities.

will be answered on a question log and shared with all participants. The RFP is a "sealed bid" process, meaning that SDG&E will be unable to view any attachments or uploaded items from any bidder prior to the RFP closing.

- SDG&E will apply its strong and successful diverse business enterprises ("DBE") practices to all program-related contracts. In particular, each contract bidder will be required to submit all documentation in reference to their plan for utilizing DBEs with its proposal.

In addition, the overall proposal is subject to the Commission's jurisdiction and oversight.

J. Education and Outreach

Education and outreach is important to the success of the residential charging program. SDG&E intends to leverage SDG&E's Clean Transportation Department's customer engagement efforts to target current and future EV drivers, as well as partner with stakeholders to share information about the program.

SDG&E will create a comprehensive marketing campaign that will be used by both SDG&E and its program partners. SDG&E will leverage its own market research and existing customer communication channels to reach current and potential EV drivers. These channels include direct email, social media, advertising, non-paid media, and on the company website, as well as by partnering with car dealerships and other retailers that can market the program.

Education efforts also include training participating IBEW contractors on EVSE installation, and educating customers how to effectively use their new Residential GIR to their advantage.

1. Education of Residential GIR

Incentivizing customers to charge their ZEVs during off-peak times, and educating them about how easy it is to do so, is fundamental to the adoption of grid integrated ZEVs. Day-ahead pricing is new to residential customers and must be demonstrated in a way that is both easy to understand and easy to implement. Simplicity will be a key message of this customer engagement campaign. Another key message will be the reliability and the quality of EVSE that are owned, installed, maintained and operated by SDG&E.

The residential charging program customer engagement effort will direct customers to sign up online. Participants will switch to the a new Residential GIR once their chosen L2 EVSE is installed.

As an additional component to this online sign-up process, customers will have the option to visit the SDG&E Marketplace. The marketplace is a one-stop-shop for an array of smart appliances, including technology that can respond to price signals and incentivize customers to run the appliances during times of day when electricity is at its lowest price. The SDG&E Marketplace also provides customers information on rebates and energy efficiency scores for products listed throughout the site.[57]

Appliances that could significantly impact energy usage in the home on a Residential GIR are summarized in Table 4-2.[58] SDG&E believes that simple online educational tools that provide this information will help inform customers about high energy users and therefore motivate them to modify their behavior at home with the Residential GIR. If educated on appliance energy usage, as shown in Table 4-2, customers can identify changes that can easily impact their bill.

[57] SDG&E Marketplace, https://marketplace.sdge.com/.
[58] Silicon Valley Power, *Appliance Energy Use Chart*, http://www.siliconvalleypower.com/for-residents/save-energy/appliance-energy-use-chart.

Table 4-2: Appliance Energy Usage

Appliance	Estimated Energy Usage Per Hour
AC - Central Air	3 kWh
AC – Window/Wall (240V)	1.8 kWh
Oven	2.3 kWh
Swimming Pool – Filter Pump (2hp)	1.5 kWh
Spa/Hot Tub with electric heat	5.5 kWh
L1 EVSE	1.4 kWh
L2 EVSE (PHEV, 20amp)	3.3 kWh
L2 EVSE (BEV, 40amp)	6.6 kWh

K. Estimated Program Costs (Capital and O&M)

The following table provides details around the assumed capital direct costs, as well as operations and maintenance ("O&M") direct costs associated with the residential charging program.

Standard Review Project: Residential Charging Program
Table 3

	Total Costs		
	CapEx	O&M	Total
EVSE Costs	$ 193,374,750	$ -	
Purchased and SD Software	$ 7,600,000		
Customer Engagement		$ 300,000	
Advertising		$ 500,000	
Measurement & Evaluation		$ 250,000	
Billing Support		$ 400,000	
SDG&E Clean Transportation PM		$ 1,000,000	
Maintenance (service calls)		$ 22,500,000	
	$ 200,974,750	$ 24,950,000	$ 225,924,750

This concludes my testimony.

II. STATEMENT OF QUALIFICATIONS

My name is Randall L. Schimka. My business address is 8306 Century Park Court, San Diego, California 92123. I am employed by SDG&E as a Project Manager in Clean Transportation.

I have over 30 years of energy industry experience. My current duties involve project management to support SDG&E's electric transportation efforts, including electric vehicle charging in residential, workplace, and public locations, including utility interface with service providers wanting to install this equipment. I also contribute to our Clean Transportation education and outreach efforts for electric vehicle customers, and am the proud owner of two battery electric vehicles. In addition to driving an EV on a daily basis, I have driven over 15,000 miles on various EV road trips using public charging since 2011.

Prior duties at SDG&E focus on transmission grid control systems, transmission system cyber security, NERC and CIP reliability standards, distribution system reliability, substation engineering, and project management.

My education is in the general area of electrical engineering and business. I graduated from San Diego State University in 1985 (BS Electrical Engineering), 1990 (MS Electrical Engineering), and 1992 (Executive MBA). I am a registered Electrical Engineer in the State of California.

I have previously testified before the California Public Utilities Commission.