**Subject: SDG&E Transportation Electrification Application**

1. Please explain how SDG&E determined that its program should electrify 3% of all MD/HD vehicles within its service territory.
   1. Provide all workpapers used to calculate this 3% value.
   2. Provide all spreadsheets unaltered in Excel spreadsheet format.
   3. For any data utilized in these workpapers, please cite the source of the data.
   4. For any assumptions, please provide a description of the reasoning behind the assumption.

**Response:**

Adoption curves show that the first 2.5% of technology adopters are “innovators.” They are followed by the next 13.5%, known as “early adopters.” SDG&E’s program size of 3% helps move the San Diego region market out of the innovators group into the early adopters group.

1. In SDG&E’s Chapter 5 testimony, SDG&E calculates its base case scenario utilizing costs assumed for a 100% utility ownership scenario.
   1. Please explain why 100% utility ownership was the base case scenario, when “customer choice is a vital component of the program”.[[1]](#footnote-1)
   2. Does SDG&E have a comparison of the difference in revenue requirement for different percentage of utility ownership scenarios, for instance 0%, 50%, or 100%? If so, please provide these differences and the work papers showing how these differences were calculated.

**Response:**

a. Chapter 5 describes the 100% case as well as the 50% case. The percentage of customers who will elect to own the charging station is unknown. Therefore, SDG&E requested authority up to 100% utility ownership in the event that more customers seek utility ownership and maintenance of the charging infrastructure.

b. A comparison of the three scenarios can be found in the following attachments:

* ORA DR-02 Q2b-MDHD Buses-0percent-REV REQ Input-12-30-17
* ORA DR-02 Q2b-MDHD Buses-50percent-REV REQ Input-12-30-17
* ORA DR-02 Q2b-MDHD Buses-100percent-REV REQ Input-12-30-17
* ORA DR-02 Q2b-Rev Req Summary MDHD Elect. Summaries 06-18-18-PET
* ORA DR-02 Q-2b-Rev Req-3 cases-06-18-18

1. Please provide detail of all performance metrics SDG&E plans to incorporate into its MD/HD EV Charging Infrastructure and V2G pilot programs.

**Response:**

As stated in Chapter 2 on page HJR-19, SDG&E will collect data to determine best practices and procedures to support medium-duty and heavy-duty EVs. Additionally, a total cost of ownership calculation will be conducted to examine the costs of EVs as compared to the incumbent vehicles.

As a pilot, the V2G proposal is a learning opportunity. As stated in Chapter 3 on page DMG-12, SDG&E will provide a report to the CPUC that will include data such as energy consumption and energy exports relative to time and demand. It will also examine the costs and benefits of V2G. The report will describe lessons learned.

1. In SDG&E’s response to ORA Data Request 1 (ORA-SDG&E-DR-01) Question 3, SDG&E provided the following assumed electric vehicle supply equipment (EVSE) counts.
   1. Provide all workpapers used to calculate these assumptions.
   2. Provide all spreadsheets unaltered in Excel spreadsheet format.
   3. For any data utilized in these workpapers, please cite the source of the data.
   4. For any assumptions, please provide a description of the reasoning behind the assumption.

* Class 2 – 3: 1200
* Class 4 – 5: 900
* Class 6: 300
* Class 7 – 8: 450
* On-route transit chargers: 10
* Forklifts and TRUs: 225 (capped)
* 3,085 EVSEs total for Program

**Response:**

Formal spreadsheets and workpapers were not used to calculate these assumptions. Vehicle classes were weighted based on a number of factors. More mature vehicle classes such as delivery trucks and transit buses were weighted more heavily because it was assumed that those vehicles would be adopted sooner. Transit buses and school buses are also considered “beachheads” which have the ability to accelerate adoption of HD EVs.

Weighting different segments is similar to the approach taken in the CPUC’s May 31, 2018 decision on SCE’s and PG&E’s medium-duty / heavy-duty applications, where they chose to weigh the transit bus, school bus and heavy-duty vehicle sectors higher.

1. Please explain SDG&E’s rationale and calculations in coming up with a cap of 225 EVSEs for forklifts and TRUs.

**Response:**

The intent of the program is to support electrification of a range of non-light-duty passenger EVs. SDG&E decided to include forklifts and TRUs based on discussions with customers who have shown an interest in electrifying these vehicles. However, the number was capped because SDG&E did not want the program to primarily become a forklift and TRU program. Chapter 2, HJR-7 discusses the requirements for forklift eligibility in the program.

1. Please provide a list of all non-ratepayer funds SDG&E intends to pursue and leverage in regards to the programs contained in this proceeding. If available, please also provide the anticipated funding amount from each source, and, if different, the subsequent anticipated reduction in needed funding from ratepayers for these programs.

**Response:**

Please see HJR-14 for SDG&E’s discussion on leveraged funding. In addition, SDG&E will work with customers and state agencies to leverage additional funding as it becomes available.

1. In Chapter 2 p. 14 of SDG&E’s prepared testimony, SDG&E lists the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP) as a potential source of leveraged non-ratepayer funds for the MD/HD EV Charging Infrastructure Program. However, HVIP vouchers discount the cost of the electric vehicle (EV), rather than the cost of the electric vehicle supply equipment (EVSE) and related grid infrastructure.[[2]](#footnote-2)

**Response:**

HVIP reduces the upfront cost of the EV. For widespread transportation electrification to occur and to accelerate the adoption of EVs, electric vehicles and electric vehicle charging infrastructure must grow simultaneously. If they do not, you will continue to have “the chicken and the egg” problem which is often opined upon with regards to EV adoption. Electric vehicles and the infrastructure to support those vehicles are part and parcel of the same end goal of greenhouse gas reduction.

1. Please explain how incentive programs and funding sources targeting the EV rather than the EVSE and related grid infrastructure will have a beneficial impact on the MD/HD EV Charging Infrastructure Program. In your explanation, please focus on explaining how EV-targeting incentive programs and funding sources in general have beneficial impacts, rather than the beneficial impacts of HVIP in particular.

**Response:**

Please see response to Q7.

1. The US Department of Energy has the following vehicle classifications:[[3]](#footnote-3)

|  |  |  |
| --- | --- | --- |
| **Gross Vehicle Weight Rating (GVWR) (lbs)** | **Vehicle Class** | **GVWR Category** |
| <6,000 | 1 | Light Duty |
| 6,001-10,000 | 2 |
| 10,001-14,000 | 3 | Medium Duty |
| 14,000-16,000 | 4 |
| 16,001-19,500 | 5 |
| 19,501-26,000 | 6 |
| 26,001-33,000 | 7 | Heavy Duty |
| >33,000 | 8 |

Based on the above classifications, it appears that Class 2 vehicles are classified as light duty. However, SDG&E’s MD/HD EV Charging Infrastructure Program appears to target vehicles of all classes from 2-8. Please explain how SDG&E’s vehicle class categorization differs from the US Department of Energy. If SDG&E’s definition of Class 2 vehicles includes vehicles with a GVWR of 10,000 lbs or below, please explain SDG&E’s rationale for including such vehicles in its MD/HD program. Please provide the vehicle weights and axle numbers by which SDG&E defines Class 1, 2, 3, 4, 5, 6, 7, and 8 vehicles.

**Response:**

SDG&E uses the same weight thresholds as the US DOE to identify Class 1 – 8.

The application focuses on Class 2 – 8 vehicles as described in Chapter 2 on page HJR-2. However, MD/HD was used generally to describe these vehicle classes. The intent is to support vehicles that are not generally driven by residential passenger vehicles such as Class 2 through Class 8 vehicles used to support a wide range of commercial and fleet purposes. For example, a light truck used by landscapers or maintenance vehicles can be Class 2. SDG&E’s MD/HD program would support those commercial applications by Class 2 vehicles. SDG&E used a definition that allows for broader participation by customers thus resulting in greater greenhouse gas reduction and reduction in tailpipe emissions.

1. In SDG&E’s testimony, Ch. 2 HJR – 16, SDG&E states that the program’s load management plans will efficiently integrate new load to the grid and generate “benefits to all ratepayers through grid optimization.” SDG&E further describes its load management plans in its response to Question 7 of ORA-SDG&E-DR-01, suggesting it could include “price signals through the electric rate selected, automation, physical acts such as unplugging vehicles and other strategies.”
   1. What electric rates is SDG&E including or considering for customers of this program?
   2. How will SDG&E leverage the networked capability of the EVSEs?
   3. In SDG&E’s testimony, Ch. 2 HJR – 20, SDG&E includes $15 million for transformer upgrades. What upgrades are eliminated by grid optimization and how does this compare to the $15 million in additional infrastructure needed to support the EVs?

**Response:**

a. At this time, customers will participate using SDG&E’s existing tariffed rates. This includes rates such as AL-TOU and AL-TOU2. SDG&E participated in the CPUC’s June 7 and 8, 2018 ZEV Rate Design Forum where various ideas were presented regarding rate design suitable for MD/HD electrification. In addition, SDG&E is examining additional rate options for commercial EV operators and intends to hold a workshop to garner stakeholder input.

b. Networked capability will allow for communication, managed charging and the ability to send new rate signals to the customer. As the market continues to evolve new functionality is expected to be available. A networked EVSE will allow for the customer to tap into more of these innovations.

c. The $15M budget will cover new transformers to feed the new charging stations. The type of grid upgrades that could be reduced by managed charging and grid optimization are related to the upstream distribution circuit and substation that feeds the transformers and charging stations.

Different customers with different vehicle operation needs will have varying abilities to help optimize the grid. Rate signals and managed charging can give customers the ability to charge at times that are less impactful to the grid and cheaper for the customer. This type of optimization will reduce the need for as many upgrades. However, upgrades will still be needed as vehicle fleets transition from gas to electric.

1. In SDG&E’s Testimony, Ch. 3 DMG-5, SDG&E states the V2G Pilot will use both an alternating current (“AC”) to direct current (“DC”) on-board converter to charge the buses as well as a DC to AC off-board inverter to discharge the buses to the grid.
   1. List and describe the interconnection process (ie Rule 21) for how these resources will be studied and interconnected into SDG&E’s distribution grid.
   2. How does this hardware configuration work to solve interconnection issues for future V2G projects?

**Response:**

a. These resources will be interconnected consistent with SDG&E’s Rule 21, found here: <http://regarchive.sdge.com/tm2/pdf/ELEC_ELEC-RULES_ERULE21.pdf>. SDG&E’s current application is not proposing modifications to Rule 21.

b. The proposed hardware configuration is intended to conform with Rule 21. If the charging station has an approved inverter under UL certification as opposed to SAE certification it may help streamline future V2G projects. The pilot will help test and pilot configurations and functionality.

1. In SDG&E’s Testimony, Ch. 3 DMG-9, SDG&E describes a request for information (RFI) and request for proposal (RFP) process for its V2G Pilot. SDG&E selected FP GreenFleet’s pilot concept, revealing "FP GreenFleet’s pilot concept was well thought out and is scalable from a technology and standardization perspective.”
   1. What was the rationale for conducting an RFP before the application was submitted?
   2. Provide all factors that lead to SDG&E’s decision to select the hardware and software configuration submitted by FP GreenFleet.
   3. Who will own the intellectual property (IP) of the software engineering modifications to the EV buses?
   4. Does EV Connect, the chosen bi-directional charger vendor, have a bi-directional charger that is UL-certified?

**Response:**

a. V2G is relatively new, particularly with regards to MD/HD vehicles and school buses. It was prudent to conduct an RFP to evaluate the solutions that market participants were able to provide and the cost to do so prior to making a request to the CPUC.

b. An RFP was conducted requesting that interested parties provide a turnkey solution for a V2G pilot. FP GreenFleet provided a proposal that included the constituent groups needed to execute the pilot. FP GreenFleet will be responsible for project management and coordination of the Pilot.

Both FP Green Fleet and Kisensum participated in the LA Air Force Base Pilot, an early stage pilot using EVs. Based on the responses to the RFP, the determination was made that FP GreenFleet and its selected partners had the most expertise to deploy a V2G pilot utilizing electric school buses. Please see Chapter 3 on page DMG-9 regarding the partners and further details on why they were selected.

c. The IP for the software engineering modifications to the bus will not be SDG&E’s. According to FP GreenFleet, the software was contemplated and designed prior to SDG&E’s RFP and offered as part of the proposed pilot.

d. BTC Power is the EVSE manufacturer. FP GreenFleet has proposed the EVSE for this project stating that it meets UL 2594 for charging and UL 1741 certification for the inverter for dispatching power back to the grid. The bid includes additional UL certifications met by the selected EVSE.

1. List what is specifically included in the $452,461 of V2G Pilot licensing and analysis costs shown in Figure 4 in Ch. 3 DMG-14.

**Response:**

FP GreenFleet has stated that they will conduct analysis pre-deployment, during deployment and post-deployment. In order to schedule the buses, they will review historical routes and load at the location. They will also factor in the expected new load requirements for the EV operation and the V2G discharge. During the pilot, they will collect interval data, functioning of the EVSE and scheduling of use in the V2G configuration to determine effective vehicle operations and maintaining of battery integrity. Finally, they will create a report on the V2G pilot, including lessons learned for future expansion and V2G deployment.

The analysis and licensing cost also includes licensing Kisensum’s energy management software.

1. In SDG&E’s testimony, Ch.2 HJR-6, SDG&E states that it will supply an allowance percentage of 100% to all customers during the first year of the program (which decreases 10% per year); and to DACs, transit, and school buses for the entirety of the program.
   1. Please provide all work papers for any analysis that SDG&E has done to justify this high percentage against its cost to ratepayers.
   2. Additionally, please provide SDG&E’s justification for providing this level of an allowance.

**Response:**

A 100% allowance in the first year is intended to encourage early adoption of MD/HD EVs. It will decrease in subsequent years. Workpapers were not created in determining this element of program design.

Due to the GHG and health impacts of internal combustion engine MD/HD vehicles an allowance is prudent to help accelerate this nascent market. A declining allowance rewards early adopters and then phases out the allowance in order to reduce ratepayer impacts. SDG&E made a programmatic decision to encourage early adopters through a higher allowance. As the allowance phases out the customer will contribute to a greater cost of the EVSE.

1. In SDG&E’s testimony, Ch.2 HJR-19, SDG&E states that it will share its analysis and results on an on-going basis through annual reports and through the existing PAC. Please: specify the analysis and results SDG&E plans to supply in its annual reports, provide detail into how SDG&E plans to monitor pending vehicle electrification targets, and how SDG&E plans to report its progress.

**Response:**

In addition to conducting a total cost of ownership analysis for MD/HD vehicles, the program will help define best practices for utility deployment of EV charging infrastructure for MD/HD vehicles. SDG&E has not finalized reporting metrics and intends to collaborate with stakeholders through the PAC process to develop reporting metrics. This process will begin after a final decision in this proceeding, and will leverage existing reports such as the semi-annual Power Your Drive report.

1. In SDG&E’s testimony, Ch.7 JCM-4, SDG&E states that it estimates an emissions reduction of 476,552 MT CO2e, 327.9 MT NOx, and 50.5 MT PM2.5 over the lifetime of the vehicles. Please provide an explanation of actions SDG&E will take to: track ongoing emission reductions attributable to the project, encourage program participants to reduce the carbon intensity of the electricity they use to charge (e.g. charge their vehicles during times the times of highest renewable penetration of the electricity mix), and optimize costs for the estimated emissions reductions.

**Response:**

SDG&E will track ongoing emission reductions attributable to the project as described in Prepared Direct Testimony of Hannon J. Rasool Chapter 2 Section C, Monitoring and Evaluation Plan and will leverage existing reports such as the semi-annual Power Your Drive report. Participants will be encouraged to reduce their carbon intensity of electricity used for charging through the education program and Load Management plan described in Chapter 2 (pages HJR-15 to HJR-16). Customer will optimize their fuel costs through price signals provided in existing applicable commercial rates selected by the customer.

1. In SDG&E’s testimony, Ch.7 JCM-6, SDG&E states that it utilized the Argonne National Lab GREET model to derive Well-to-Tank emission estimates.
   1. Please indicate whether or not the California-specific CA-GREET model was considered.
   2. If CA-GREET was considered, please provide any workpapers used to determine the benefits of utilizing one model versus the other.
   3. If CA-GREET was not considered, please provide an explanation as to why.
   4. Additionally, please provide a list of any other models considered for the purposes of determining emission estimates.

**Response:**

The California-specific CA-GREET model (2015 CA-GREET, version 2.0) was considered for estimating Well-to-Tank emission estimates. However, the 2016 Argonne National Lab GREET model was used due to its more recent vintage and since SDG&E specific power mix was used. No other models were considered for the purposes of determining Well-to-Tank emission estimates.

1. How many vehicles is SDG&E assuming it can electrify per charger in developing its cost and emission estimates? Please provide an explanation as to why SDG&E makes these assumptions.

**Response:**

A conservative ratio of one charger per vehicle was taken. This is due to the fact that many of the commercial vehicles will be in operation during the day and only be able to charge at night. Therefore, they will each need their own charging port.

The on-route fast chargers are expected to support more than one vehicle per charger.

1. Please provide the workpapers or data sources used to develop SCE’s cost estimates in A18-01-012 ORA\_SDGE\_DR1, worksheet: “Final - Confidential - Unredacted - MD HD Cost Estimate 50 Percent utility ownership.” If data from SDG&E’s Power Your Drive program were used, provide all installation cost data and assumptions used from SDG&E’s Power Your Drive program to date.

**Response:**

The workpapers were provided in the tabs of the Excel document “Final - Confidential - Unredacted - MD HD Cost Estimate 50 Percent utility ownership.” Please provide clarification on what other information is sought in response to the cost estimate.

Power Your Drive, which focused on light-duty vehicles in workplaces and multi-unit dwellings, and medium-duty / heavy-duty EV infrastructure have many differences. However, permitting costs for PYD were used as a data source for the MD/HD application. The majority of costs used to estimate the budget were derived from construction costs and estimates such as the cost of a general foreman, saw cutting, etc.

1. SDG&E Testimony Chapter 2 p. 11. [↑](#footnote-ref-1)
2. <https://www.californiahvip.org/about/> [↑](#footnote-ref-2)
3. From <https://www.afdc.energy.gov/data/10380> [↑](#footnote-ref-3)