CPUC Docket: A.18-01-012

Exhibit Number: _____

Witness: Eric Borden

PREPARED TESTIMONY OF THE UTILITY REFORM NETWORK

ADDRESSING SAN DIEGO GAS AND ELECTRIC'S PROPOSAL FOR A MEDIUM-HEAVY DUTY CHARGING INFRASTRUCTURE PROGRAM

THE UTILITY REFORM NETWORK

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August 17, 2018

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PREPARED TESTIMONY OF THE UTILITY REFORM NETWORK

I. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

Pursuant to the March 30, 2018 Scoping Memo and Ruling of Assigned Commissioner and Joint Ruling of the Administrative Law Judges, TURN respectfully submits this testimony regarding San Diego Gas and Electric's (SDG&E's) medium-heavy duty (MD-HD) charging infrastructure application. TURN does not address the utility's accompanying vehicle to grid pilot proposal.

Despite requesting over $700 million[1] in ratepayer funds the utility has not adequately justified its program. SDG&E did not conduct a market study or analysis of the MD-HD electric vehicle (EV) market in its territory.[2] In addition, no cost-effectiveness analysis is presented. As a result, the utility does not know how many MD-HD EVs there are in its territory, how program benefits compare with costs, or how exactly the requested funds will be spent on behalf of ratepayers. While TURN's primary recommendation is for a full-scale program over five years consistent with the the Commission's MD-HD Decision for PG&E's and SCE's programs (D.18-05-040), this must be balanced with a sufficient level of accountability, oversight, and ratepayer protections.

Further, SDG&E, similar to the other investor owned utilities (IOUs), has once again proposed a program that primarily consists of capital expenditures. This is why SDG&E's proposed $150 million budget balloons to $700 million over time which represents the true cost of the program to ratepayers. While it is not a surprise that utilities are incentivized to create potential returns for shareholders through higher capital spending and increases in rate base, this should be balanced with more creative ways to leverage a greater amount of funds from participants, use rebates rather than capital spending as a cost-saving tool, and utilize proper planning assumptions that can reduce ratepayer risk and costs.

TURN supports reasonable utility MD-HD programs that can cost-effectively reduce criteria pollutant emissions, particularly focused on the communities most impacted by these

[1] SDG&E estimates the program revenue requirement to be $706 to $723 million, depending on the ownership scenario. Data request (DR) TURN-01, question 1, attachment "Rev Req Summary."
[2] Data request (DR) TURN-01, question 11c.

emissions, disadvantaged communities (DACs). Properly structured, such programs can spur greater adoption and potentially accelerate the market for electrified vehicles which can have beneficial environmental and financial consequences for ratepayers. We recommend the following for SDG&E's MD-HD program:

- The Commission should adopt SDG&E's requested number of vehicles to electrify, 3,085, but utilize the same budgeting assumptions adopted in D.18-05-040. This results in a full-scale budget of $68.3 million over five years.

- The Commission should reject SDG&E's "customer choice" model that would allow the utility to own MD-HD charging stations due to the increased cost and risk this proposal poses to ratepayers.

- The Commission should retain key ratepayer protections and accountability measures adopted in D.18-05-040, including: targeted rebates, minimum site and vehicle requirements (TURN recommends 125 sites and 2,500 vehicles, for SDG&E's program, respectively), and participant requirements, among others.

TURN provides the following three recommendations in addition to what was adopted in D.18-05-040:

  - Fortune 1000 companies that participate in SDG&E's program should pay for 50% of customer-side infrastructure costs (in addition to the charging station itself), the remaining customer-side infrastructure costs subsidized by ratepayers should be expensed rather than capitalized.

  - The Commission should adopt a similar measure as D.18-05-040 that allows for customer ownership of customer-side infrastructure, but revise the standard to be solely "least cost." While D. 18-05-040 states that this option must be lower cost *and* the customer's "preference,"[3] TURN does not believe the site host should be expected to choose against his own financial incentives. Customer-owned infrastructure is lower cost to ratepayers and helps accomplish a more financially sustainable program.

  - To protect ratepayers from long-term stranded costs, SDG&E should include with future general rate case applications testimony that addresses the ongoing utilization (or lack thereof) of utility-owned infrastructure associated with the costs authorized here. The Commission could then have the opportunity to remove from rate base unutilized and/or stranded infrastructure after a reasonable period of time (such as three years of unutilized assets).

[3] D.18-05-040, p. 109.

These recommendations are discussed in greater detail in Section VI. Appendix 1 provides TURN's detailed budget calculations, based on D. 18-05-040.

II. BACKGROUND ON POLLUTION DRIVERS IN THE SAN DIEGO AIR BASIN

The San Diego county air basin contributes around 5% of nitrogen oxide (NOx) and 8% of California's statewide carbon emissions.[4] While the light-duty vehicle and light-duty truck sectors are some of the largest contributors to carbon emissions in the air basin, NOx is primarily driven by heavy-heavy duty diesel trucks and off-road equipment (the largest contributor to which is transportation refrigeration units (TRU)). These two sectors comprise 32% of the air basin's NOx pollution.[5] Since SDG&E has not done any analysis of the MD-HD sector in its territory, TURN does not know where the majority of these TRU's are located. This is the type of information that would be helpful to design a more focused program.

[4] California Air Resources Board (CARB), 2012, statewide emissions from https://www.arb.ca.gov/app/emsinv/2017/emseic1_query.php?F_DIV=-4&F_YR=2012&F_SEASON=A&SP=SIP105ADJ&F_AREA=CA, San Diego air basin data from CARB, 2012, https://www.arb.ca.gov/app/emsinv/2017/emseic1_query.php?F_DIV=-4&F_YR=2012&F_SEASON=A&SP=SIP105ADJ&F_AREA=AB&F_AB=SD&F_DD=Y.

[5] Data from CARB, 2012, https://www.arb.ca.gov/app/emsinv/2017/emseic1_query.php?F_DIV=-4&F_YR=2012&F_SEASON=A&SP=SIP105ADJ&F_AREA=AB&F_AB=SD&F_DD=Y.

Figure 1. NOx Emission Drivers in the San Diego County Air Basin[6]

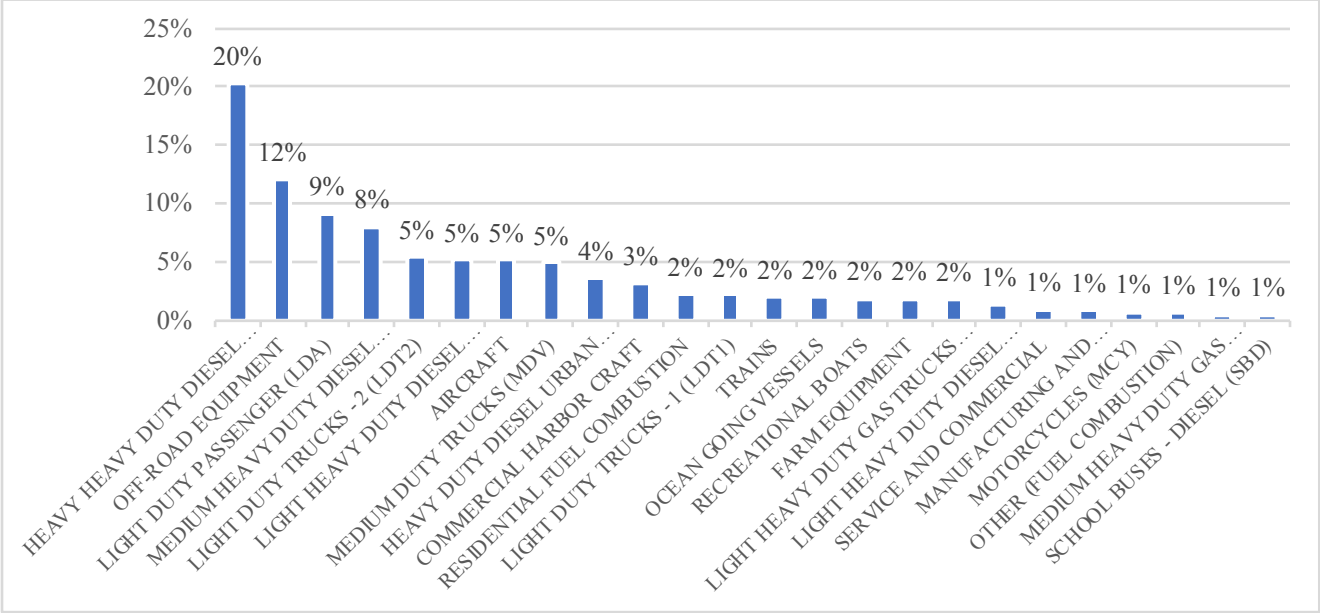
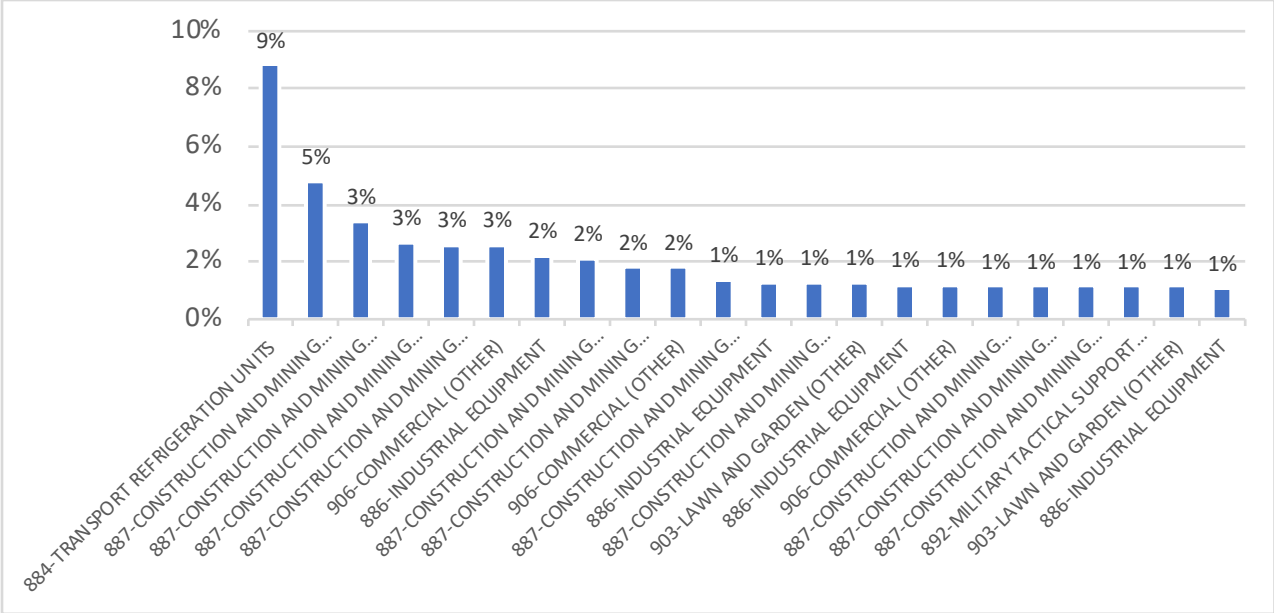


Figure 2. Off-Road Equipment NOx Drivers[7]



[6] Data from CARB, 2012, https://www.arb.ca.gov/app/emsinv/2017/emssumcat_query.php?F_YR=2012&F_DIV=-4&F_SEASON=A&SP=SIP105ADJ&F_AREA=AB&F_AB=SD#8.

[7] Data from CARB, 2012, https://www.arb.ca.gov/app/emsinv/2017/emseic_query.php?F_YR=2012&F_DIV=-4&F_SEASON=A&SP=SIP105ADJ&SPN=SIP105ADJ&F_AREA=AB&F_AB=SD&F_EICSUM=860.

Ideally, SDG&E's program would be carefully targeted to propel electrification in sectors that have the most impact on NOx and other criteria pollutant emissions in its territory and which can be cost-effectively targeted for EV adoption. TURN supports programs that provides the greatest amount of pollution reduction and air quality benefits per ratepayer dollar spent. In addition, these investments should strongly prioritize disadvantaged communities (DACs) where residents suffer the most harmful effects of criteria pollutant emissions. Instead, SDG&E's program is "customer driven" and "does not require any specific targets by customer class."[8] While setting a DAC "goal" of 40%, SDG&E proposes no program requirement.[9] This approach promotes random selection of technologies by the "market," regardless of impact on pollution or cost-effectiveness to ratepayers. Section VI describes TURN's recommendations to focus investment to a greater extent in disadvantaged communities and provide for sectoral targets based on D.18-05-040.

III. THE ELECTRIC MD-HD MARKET IS EVOLVING AND REPRESENTS A RANGE OF TECHNICAL MATURITY

SDG&E's program provides virtually the same subsidy to each type of vehicle regardless of market maturity. As of 2015, CARB categorized the various MD-HD segments as ranging from demonstration phase to commercially available (see Figure 3 below). TURN notes that while transportation electrification (TE) of the MD-HD sector has advanced since this report, particularly with regard to deployment in the transit bus space, the "technology readiness" categories described by CARB are still broadly applicable.

[8] "Customer class" in this instance refers to weight of the MD-HD vehicle (e.g. class 2-3). SDG&E Testimony Chapter 2, Hannon Rasool, ("SDG&E-2"), p. HJR-8, line 15.
[9] SDG&E-2, p. HJR-17.

Figure 3. CARB Categorization of Battery Electric Vehicle Technology

Vehicle Type	Technology Readiness	Number in Service	Notes
Transit Bus	Commercially Available	~40 in California > 2,500 worldwide	3 models are commercially available in US
School Bus	Limited Commercial Availability	4 in California	3 new buses ordered in SCAQMD 6 repowers underway with V2G
Medium-Duty (8,501 to 14,000 lbs. GVWR)	Limited Commercial Availability	300+	Focused on delivery service
Heavy-Duty (> 14,000 lbs. GVWR)	Demonstration Phase	2 Drayage 1 Refuse	13 Class-8 Trucks under construction

The heavy-heavy duty sector (class 7 & 8 freight trucks), which is the largest contributor to NOx in the territory, will have the first electric market alternative starting in 2019.[10] This is a nascent technology that is an alternative for relatively short trips rather than long-haul trucking. Given that many of the assets installed by the utility have over 40 years of useful life, the risk of stranded assets in such a nascent market is large. For example, hydrogen fuel cell technology or rail may compete with this technology and render ratepayer investment obsolete after the vehicle's useful life. Further, as noted below charging technology for these sectors are generally not standardized and are unique to particular vehicle manufacturers.

IV. COMMERCIAL SITE HOSTS RECEIVE SUBSTANTIAL BENEFITS FROM TRANSPORTATION ELECTRIFICATION AND ACCORDINGLY SHOULD BE REQUIRED TO PAY FOR A PORTION OF CUSTOMER SIDE COSTS

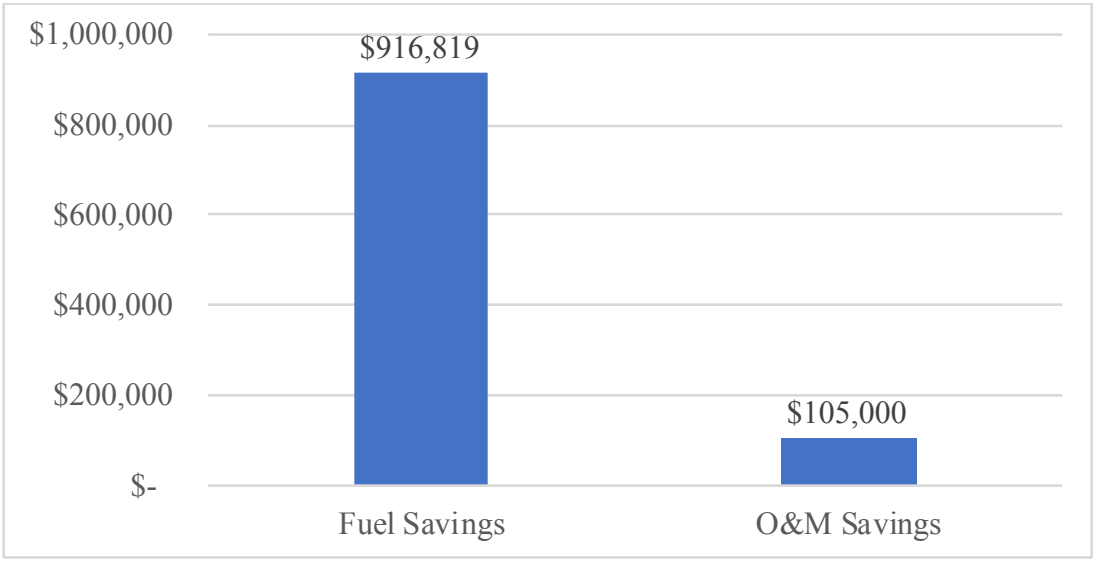
Adoption of MD-HD vehicles by site hosts result in significant financial and ancillary benefits to these entities. Additionally, the incremental vehicle cost premium between conventional and electric vehicles may be paid for in-part or entirely with state or federal funds. As explained by SGD&E:

[10] Forbes, August 2017, https://www.forbes.com/sites/joannmuller/2017/08/29/take-that-tesla-diesel-engine-giant-cummins-unveils-heavy-duty-truck-powered-by-electricity/#287a43c078f1/.

SDG&E will collaborate with program participants to leverage non-ratepayer funds including grants and incentive programs. This includes sources such as U.S. Department of Energy, Federal Transit Administration, VW Diesel Settlement, the California Energy Commission and CARB, including HVIP. The most recent HVIP funding (Fiscal Year 2017-18) saw an increase to $180 million from the previous annual funding of $36 million. Of the $180 million allocation, $35 million must be set aside to fund zero-emission buses.[11]

In addition to available incentives, EV adoption results in significant financial benefits for site hosts, primarily through fuel cost savings and reduced operation and maintenance (O&M) expenditures. TURN calculates that for a fleet of 10 medium-duty vehicles, reductions in fuel and O&M costs would result in over $1 million in savings over ten years for a program participant (site host).

Figure 4. Medium-Duty Electric Vehicle Savings Compared with Conventional Vehicle Fleet of Ten Electric Vehicles Over Ten Years[12]



Gasoline price increases and fleets that travel more miles than assumed in the calculation above would result in greater savings than shown in Figure 4.

[11] SDG&E-2, p. HJR-14, lines 14-19.

[12] Primary assumptions include diesel efficiency of 6.64 mpg, annual miles per vehicle of 20,000, $4/gallon diesel price, 5.25 cents/mile O&M savings,1.8kWh/mile battery efficiency, and 8 cents/kWh charging. See Department of Energy https://www.afdc.energy.gov/data/, Energy Information Administration, https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_w.htm, SDG&E, http://www2.sdge.com/tariff/com-elec/ALTOUSecondary.pdf, California Air Resources Board (CARB), https://www.arb.ca.gov/msprog/tech/presentation/electrictrucks.pdf.

These financial benefits for site hosts can be shared with ratepayers to increase the cost-effectiveness and decrease the equity issues inherent in the program. Even if site hosts are required to pay two-thirds of the *total* assumed infrastructure cost for medium-duty vehicles ($100,000)[13] as well as the incremental vehicle cost between a conventional and electric vehicle (around $60,000 per vehicle)[14] the site host would still realize a gain of over $320,000 over ten years.[15] Accordingly, even under scenarios where significant funds are leveraged directly from site hosts to reduce the costs of ratepayer-funded infrastructure, and assuming site hosts do not receive subsidies to purchase the vehicles, there is sufficient financial rationale for companies to invest in electric vehicle technology. Clearly, *including* the ratepayer subsidies recommended by TURN (even when leveraging greater participant contributions) in addition to funds available for the vehicle purchase, will significantly increase financial savings for site hosts.

Further, these financial incentives do not take into account other qualitative benefits of electric vehicles to the companies. As explained by the West Coast Collaborative, a public-private partnership for reducing diesel emissions:

> In addition to their short payback period, immediate operational savings, and significant emissions reductions, BEVs [battery electric vehicles] generate several ancillary benefits to the fleets that purchase them. The following is a list of some additional benefits associated with BEV ownership and operation:
>
> 1) **Fuel Cost Certainty** – Electricity prices are significantly less volatile than petroleum prices;
>
> 2) **Consumer Preference** – Modern consumers prefer vendors who operate BEVs;
>
> 3) **Business Exposure** – Additional media and public attention for operating BEVs;
>
> 4) **Driving Performance** – Greater acceleration and torque at low power bands;
>
> 5) **Driver Recruitment & Retention** – Drivers prefer working for companies using latest technology;
>
> 6) **Energy Security** – Domestic electricity generation versus imported petroleum; and,

[13] The CPUC assumes around $150,000 per site for medium-duty vehicles. See D.18-05-040, Appendix C, Table 6.

[14] CARB, *Medium and Heavy Duty Vehicle Assessment,* 2014, p. 40, see link above. CARB assumes around $60,000-$80,000 incremental vehicle costs but given rapidly falling battery costs and that the report was written in 2014, TURN believes this to be a reasonable if not conservative estimate.

[15] Savings of $1.02 million less assumed upfront cost of $700,000 (incremental $60,000 for 10 vehicles plus $100,000 in infrastructure costs).

7) **Corporate Social Responsibility (CSR)** – BEVs reduce air and noise pollution along fleet routes, as well as vehicle vibration and emissions exposure for fleet operators.[16]

In order to create a more cost-effective and equitable program, the Commission must ensure that it leverages the maximum amount of funds possible from the site hosts who will directly and substantially benefit from ratepayer subsidy under this program.

V. ANALYSIS OF SDG&E'S MEDIUM-HEAVY DUTY PROPOSAL

A. SDG&E's Application Lacks Basic Information that Would Normally be Required for Full-Scale Projects

SB 350 did not set a lower standard of review for utility spending, nor did it modify the "just and reasonable" rates standard for all utility costs recovered from ratepayers.[17] SDG&E's application and underlying testimony have little factual support due to the utility's lack of direct experience supporting these sectors. For example, the utility does not know how many MD-HD EVs are in its territory,[18] much less a sectoral breakdown, which would help guide program investment. The utility did not conduct a cost-effectiveness analysis because it "was not required by the Assigned Commissioner's Ruling."[19] The primary financial benefit of these programs to ratepayers is the increase in load pursuant to the program. Yet SDG&E could not provide an estimate of incremental revenues from the program because it does not know what types of vehicles will participate.[20] Additionally, because of the nascent state of many MD-HD markets, combined with the multiple decades depreciation life of electric infrastructure, there is a significant risk of long-term stranded costs. The best way to mitigate this risk is to limit utility ownership of assets (both electric infrastructure and charging stations) where possible, and to limit overall ratepayer funding to a reasonable level. The utilities' application does not sufficiently address this risk.

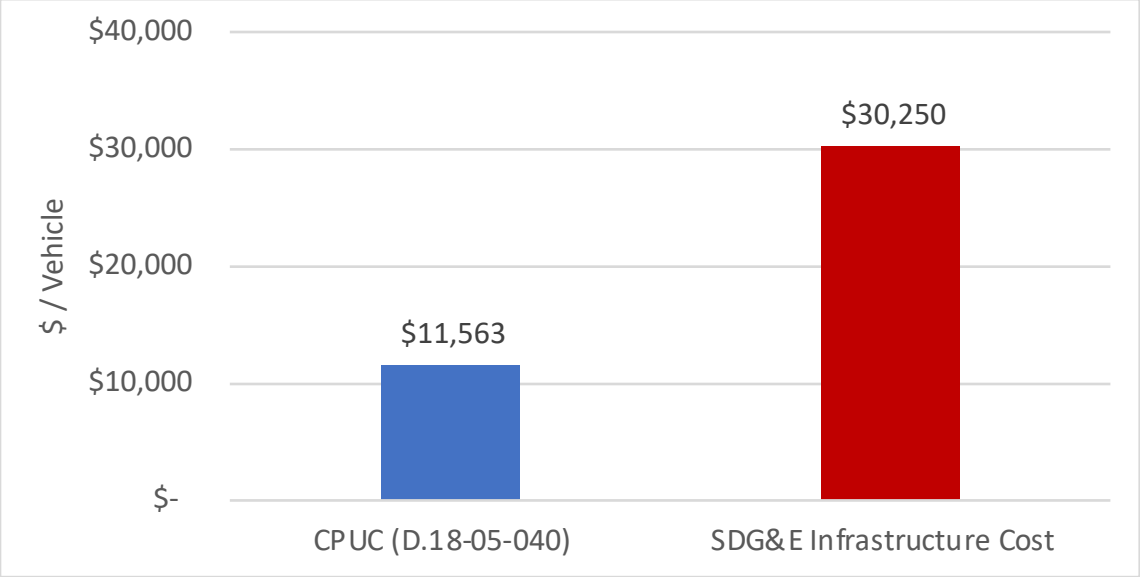
[16] West Coast Collaborative Fact Sheet, *Business Case for Battery-Electric Trucks in Fresno, California,* https://westcoastcollaborative.org/files/outreach/WCC-FresnoBEV-BusinessCase20110815.pdf.
[17] See Public Utilities Code Section 451.
[18] DR TURN-01, question 11c.
[19] DR TURN-01, question 8.
[20] DR TURN-01, question 9.

B. SDG&E's Program is not a Scalable Solution to Combat Pollution from the MD-HD Sector in its Territory

i. SDG&E's Costs are Significantly Higher than the Commission's Recent MD-HD Decision (D.18-05-040)

SDG&E's costs are significantly higher on a per vehicle basis than what the Commission approved in D. 18-05-040 (Decision) for PG&E's and SCE's MD-HD programs. TURN compared the infrastructure costs[21] for what was approved in the Decision with SDG&E's costs. SDG&E's request is 162% higher on a per vehicle basis than what was approved in D. 18-05-040, which were based upon PG&E's forecasted costs.

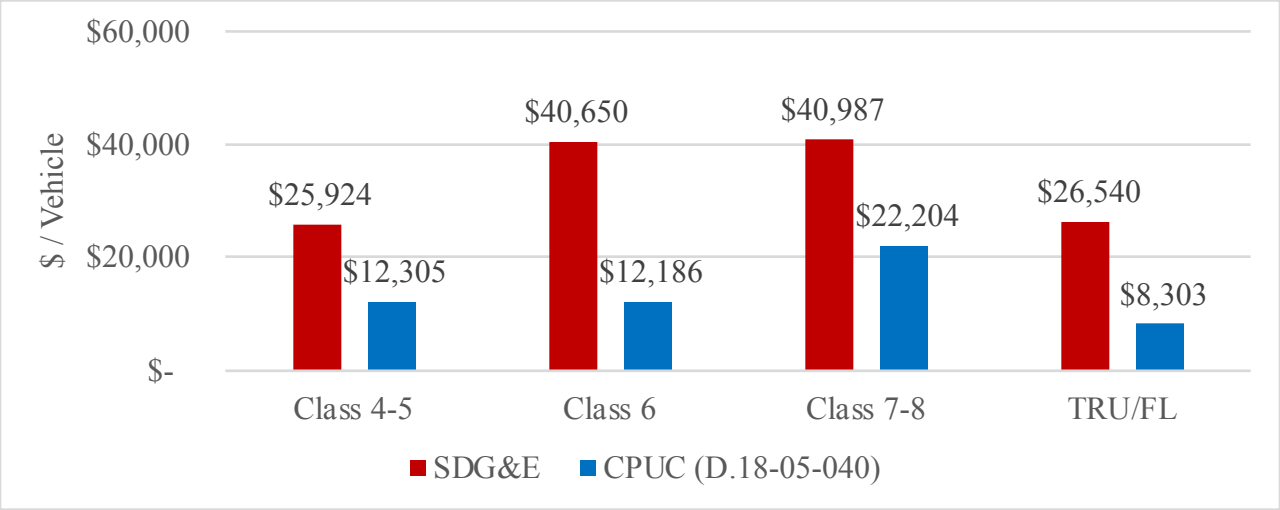
Figure 5. Capital Infrastructure Costs[22]
CPUC vs. SDG&E
(Dollars per Vehicle)



[21] This includes materials and labor related to the electrical infrastructure to serve EV load. This does not include contingency, O&M, rebates, and other costs that TURN addresses separately.
[22] D.18-05-040, Appendix C, page 2. CPUC figures derived from the capital infrastructure budget for PG&E infrastructure subtotal divided by number of vehicles. SDG&E cost from TURN-SDGE-01, attachment "MD HD Cost Estimate 50 Percent utility ownership." Removed contingency, allowance, charger, and miscellaneous costs from SDG&E's estimates to derive an infrastructure amount and divided by the number of assumed vehicles (3,085).

The disparity is even greater (more than 300% in some cases) when comparing the cost per vehicle by vehicle segment (weight class). Note that the Decision and SDG&E use slightly different nomenclature which TURN has attempted to reconcile for comparison.[23]

Figure 6. Capital Infrastructure Costs
CPUC vs. SDG&E by Vehicle Type
(Dollars per Vehicle)



This appears to be due primarily to the fact that SDG&E's costs support a significantly less number of vehicles at each site than assumed in the Decision. For example, while the Decision's cost estimates supported an average of 18 vehicles per site, SDG&E estimates its sites support around 6 vehicles per site.[24] The discrepancy is likely due to some engineering assumptions that

[23] Data from D.18-05-040, Appendix C, page 2, and TURN-SDGE-01, attachment "MD HD Cost Estimate 50 Percent utility ownership." Some of TURN's cost numbers for the CPUC differ slightly from the Decision because of rounding and the fact that decimal places were not shown in Appendix C. This does not materially affect the estimates. TURN removes the charging station costs from SDG&E's per site capital cost estimate to determine the capital infrastructure costs for each class range. The Decision classifies vehicle types according to descriptive nomenclature (e.g. "transit bus," "forklifts," "medium-duty," etc.) while SDG&E classifies vehicles according to weight/class as shown in the Figure. The Decision's numbers shown here are an average of the applicable weight categories– for example, port cargo trucks, transit bus, and heavy duty vehicles are all class 7-8. TURN was not able to easily identify a comparable class 2-3 category from the decision so these are not included. For instance, while some airport ground support equipment may be considered class 2-3, some may not. Regardless of what exact assumptions are made in this regard, SDG&E's cost per vehicle are substantially higher than the Decision.

[24] DR TURN-01, question 4, provides the number of vehicles assumed by SDG&E for each class range. Combined with the number of sites assumed for each class, found in DR TURN-01, question 3,

differ between the utilities. Nevertheless, there is no objective reason why SDG&E's cost estimates should be drastically higher than what was adopted by the Commission which were based on PG&E's estimates. In order to ensure SDG&E maintains budgeting discipline and for consistency across the programs, the Commission should apply the same budgeting assumptions as D.18-05-040 to SDG&E's MD-HD program.

ii. SDG&E's Program Cannot be Affordably Scaled

SDG&E's program seeks to electrify around 3,085 MD-HD vehicles in its territory, of a total 103,115 MD-HD vehicles in the utility's territory,[25] for a cost of about $150 million.[26] The revenue requirement for the program is over $700 million, the present value of which is around $210 million.[27] Assuming the same mix of vehicles as SDG&E's current application, the cost of the program to electrify all MD-HD vehicles in SDG&E's territory would be over $7 billion, or $3.5 billion for half the vehicles in the utility's territory.[28] By comparison, SDG&E's entire distribution revenue requirement was $1.3 billion in 2016.[29] SDG&E's program structure and budgeting assumptions are not sustainable.

iii. Emissions Benefits Can be Achieved Much More Cost Effectively

SDG&E's program does not even approach a cost-effective way to help combat climate change. The only way California will achieve its ambitious environmental goals is by intelligently investing in impactful programs that maximize the benefits of ratepayer and public expenditure. SDG&E's proposal represents a departure from this basic guiding principal.

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attachment "Confidential – Unredacted – MD HD Cost Estimate 50 Percent utility ownership" one can calculate the number of vehicles per site.

[25] DR TURN-01, questions 4 and 5.

[26] SDG&E-2, p. HJR-3.

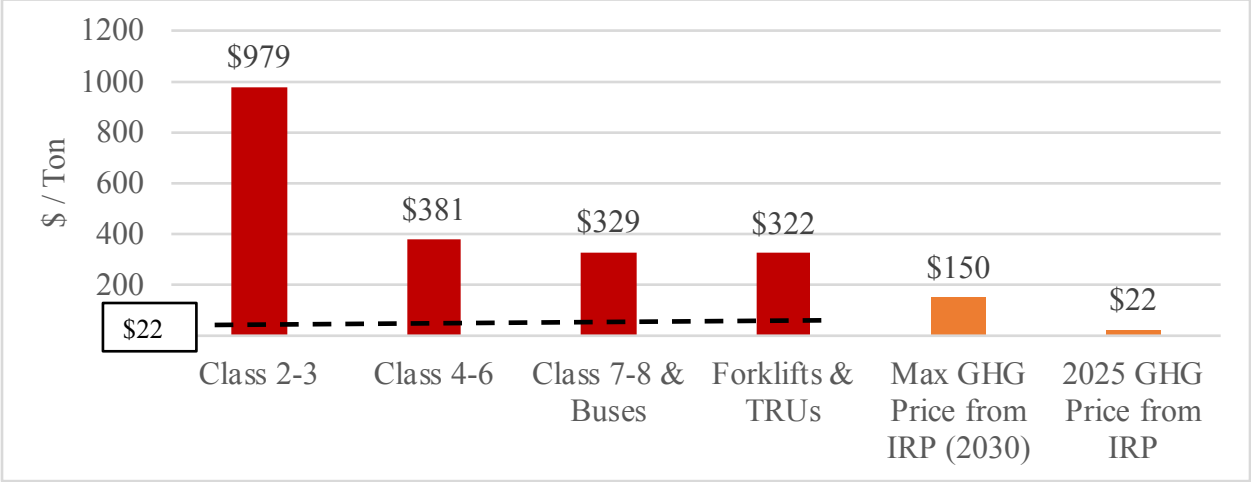
[27] Data from DR TURN -01, question 1. Conservatively assumes 50% ownership of charging stations rather than 100%. The discount rate used by SDG&E in this analysis is the utility's weighted average cost of capital (WACC), slightly less than 8%. However, TURN notes that a "consumer" discount rate would generally be lower with regard to cost increases because consumer wages do not grow at 8% (wage growth has been closer to 2% or 3% per year, at most). This increases the "real" costs paid by consumers. Put another way, the $210 million present value figure calculated by SDG&E is a conservative value from a consumer/ratepayer perspective.

[28] The cost per vehicle is around $68,000 ($210mm/3085 vehicles). The cost cited here is the per vehicle cost multiplied by 103,115 total vehicles.

[29] CPUC Energy Division Report, *Public Utilities Code Section 913 Annual Report to the Governor and Legislature*, p. 10.

Based on SDG&E's calculation regarding total cost (present value of the revenue requirement) and equivalent tons of CO2 avoided by the program, SDG&E's program costs are significantly more on a per ton basis than the GHG planning price recently adopted in the Integrated Resource Plan (IRP) proceeding. This planning price represents initial modeling results for the "marginal cost of GHG abatement associated with the 42 MMT [million metric ton] Scenario [target] in 2030."[30] In developing a portfolio of GHG-reducing resources, utilities "would add resources that reduce GHG emissions up to the point that the marginal cost of doing so equals the GHG Planning Price." This price thus represents the most *expensive* resource expected to be procured in a given year, based on initial modeling results in the IRP. Thus, it is clear from Figure 7 that other resources can be more cost-effectively procured to reduce carbon emissions in California through 2025 and even through 2030, the last year modeled.

Figure 7. Costs per Abated Metric Ton of Carbon Dioxide Equivalent (CO2e) SDG&E vs. IRP GHG Abatement Price[31]



TURN recognizes that SDG&E's program can help reduce local pollutants like NOx and particulate matter (PM) in addition to carbon, which is why TURN's proposal emphasizes greater deployment and hard requirements for disadvantaged communities where these emissions have the most harmful impacts on residents.

[30] D.18-02-018, pp. 53,105. The 42 MMT scenario "represents an approximately 50% reduction in GHG emissions from the electric sector from 2015 levels by 2030."

[31] Calculated using SDG&E's present value revenue requirement for each class provided in TURN-01, question 1, attachment Rev Req Summary MDHD Elect. 12-30-17-PET Tax Chng-01-09-18 and expected emissions reductions provided in DR TURN-01, question 7, attachment. IRP Prices from D.18-02-018, Table 5, p. 116.

iv. SDG&E's Program Does Not Adequately Leverage Funds from Participants

Leveraging the maximum amount of funds possible from site hosts helps to reduce total and per site costs, increases cost-effectiveness, stretches each ratepayer dollar further, and helps to match the primary financial benefits of the program (which flow to site hosts) with costs. SDG&E seems to interpret "leveraged" funding as primarily for the vehicle itself, where the utility points to governmental and third-party sources of funding[32] rather than the entities who will receive the primary financial benefit of the program, the site host. SDG&E's approach thus seeks to maximize ratepayer expenditure without due consideration of how to lower costs and better match costs of the programs with benefits.

Much of the subsidy for these programs will flow to large corporations with significant financial resources who will receive the primary financial benefit of EVs from fuel cost savings of electricity over diesel fuel and operations and maintenance savings (see Section XX). As SDG&E states, initial interest and discussion in the program has been with "Sysco Corporation, United Parcel Service ("UPS"), Ace Parking Management, Inc., [and] Amazon.com.[33] Sysco, UPS, and Amazon have revenues in the tens of billions of dollars and are among the wealthiest corporations in the world. Further, many of these corporations recently received a reduction in their corporate tax rate, which may provide additional cash flow for clean energy investment.[34]

The Commission must be cognizant of the fact that low and middle-income residential ratepayers, increasingly squeezed by cost of living and other affordability concerns in California, will be forced on a regressive basis to fund SDG&E's program, whereby the financial benefits of the program will not flow back to these customers but rather to these large corporations. It is not just good public policy to leverage the maximum amount of funds possible from these entities, it is also more fair and equitable.

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[32] See SDG&E-2, p. HJR-14, lines 14-18. "SDG&E will collaborate with program participants to leverage non-ratepayer funds including grants and incentive programs. This includes sources such as U.S. Department of Energy, Federal Transit Administration, VW Diesel Settlement, the California Energy Commission and CARB, including HVIP."

[33] Chapter 2, p. HJR-13, lines 8-10.

[34] H.R. 1, An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018, Section 13001. 21. Available at https://www.congress.gov/bill/115th-congress/house-bill/1/text.

TURN therefore recommends, at a minimum, the following be adopted to leverage adequate funds from participants in the program:

- Fortune 1000 companies located anywhere in SDG&E's territory (including DACs) should not receive any ratepayer-subsidized rebate for the charging station, consistent with D.18-05-040;
- Fortune 1000 companies should pay for 50% of customer-side infrastructure costs in addition to the charging station, and the other 50% should be expensed by the utility. This goes beyond what was required in D.18-05-040 but is reasonable as different models should be tested given the nascent state of utility programs, in light of these companies' financial resources, and the equity concern with low and middle-income residential ratepayers paying for unnecessary costs, the benefits of which flow to large corporations.
- Participants in non-DACs should not receive a rebate (or "allowance") for the charging station, consistent with D.18-05-040.
- Charging station rebates for sites located in a DAC should be set at 50% of the charging station cost, consistent with D.18-05-040.

With more data from program implementation and rapidly advancing battery technology and cost declines, TURN believes even greater amounts of funds can be leveraged from site hosts.

C. Utility Ownership of Charging Stations Unnecessarily Exacerbates Risks and Increases Costs

SDG&E proposes to give customers a "choice" regarding whether the utility or customer will own the charging station:

> The program participant will have the option to have SDG&E own and maintain the EVSE or elect to own and maintain the EVSE themselves.[35]

SDG&E provides a vague explanation for why this is an appropriate structure, stating simply "Customer choice is a vital component of the Program."[36] SDG&E therefore does not sufficiently explain why the proposal is in ratepayer's interest. Interestingly, SDG&E proposed the exact same structure in its *residential* charging station application, a program for a completely different sector with very different technologies and requirements. SDG&E's attempt to obfuscate the issue of charging station ownership with a vague mantra about "customer

[35] SDG&E-2, p. HJR-10, lines 4-6.
[36] SDG&E-2, p. HJR-11, line 15.

choice" should be rejected by the Commission due to the increased risk and cost of the proposal for the MD-HD sector.

In addition to the increased cost (revenue requirement) inherent in unnecessary utility ownership of customer-side assets to ratepayers, the MD-HD sector does not have standardized connection standards. In fact, standards differ among the various manufacturers, such that if one vehicle manufacturer goes out of business, another may use an entirely different charging station technology. As explained by UC Davis and CARB:

> At the present time, high voltage, high power charging stations are expensive primarily because the products have not been standardized both because sales volumes are low and standards for both connectors/docking units and interface protocols have not yet been established. Meetings are currently underway world-wide to establish the needed standards. Development of high power wireless charging technology is presently underway for HD electric vehicles. Deployment/demonstration of the wireless technology has only begun.[37]

> […] As initially seen in the light-duty fleet, charging approaches have not been standardized. A standardized charging infrastructure would reduce costs through increasing volumes, and increase opportunities to charge away from the home base. Standardization will likely be achieved through cooperative agreements between manufacturers of components and vehicles, with the assistance of the Society of Automotive Engineers (SAE).[38]

The claimed benefits of utility charging station ownership are outweighed by the additional cost and risk to ratepayers.

VI. TURN RECOMMENDATIONS

TURN's primary recommendations to modify SDG&E's MD-HD program are listed below and are primarily based on the recent MD-HD Commission Decision (D.18-05-040). TURN also supports additional ratepayer protections that may not be summarized here but were

[37] National Center For Sustainable Transportation and UC Davis, *Assessment of Critical Barriers to Alternative and Renewable Fuel and Vehicle Deployment – Workshop Series,* June 2016, p. 7.
[38] California Air Resources Board (CARB), *Draft Technology Assessment: Medium-and-Heavy Duty Battery Electric Trucks and Buses*, p. ES-11.

adopted in the D.18-05-040. In addition, included here are three ratepayer protection measures beyond what was adopted in D.18-05-040, see Section VI(B) for further discussion.

- The approved budget should not exceed $68.3 million, which supports 3,085 vehicles as requested by SDG&E but adopts the budgeting assumptions of D.18-05-040. This is discussed further below and Appendix 1.
- Rebates for charging stations should be targeted to electric transit, school busses, and disadvantaged communities, not to exceed 50% of the charging station cost. Charging station rebates should not be available to Fortune 1000 companies, consistent with D.18-05-040.[39]
- Fortune 1000 companies should pay 50% of the customer-side infrastructure costs in addition to the charging station cost; remaining ratepayer-funded customer-side costs should be expensed. This is discussed further below.
- Forty percent of the infrastructure budget should fund sites that are located in DACs, consistent with the requirement in D.18-05-040 for SCE.[40]
- A minimum site and vehicle requirement of 125 and 2,500, respectively, should be established for program costs to be deemed reasonable. TURN elects to establish a more stringent vehicle requirement than site in order to incentivize the utility to maximize the number of vehicles adopted pursuant to the program.
- Sites should have a minimum purchase of 2 incremental EVs and sites which adopt more EVs should be prioritized for investment, consistent with D.18-05-040.[41]
- If using a customer's existing service connection is the lowest-cost option for a specific site, SDG&E should support customer-side costs with a rebate up to 80 percent of total costs. These should be expensed by the utility and owned by the customer. This recommendation goes slightly beyond the language in D.18-05-040[42] by ensuring the lowest cost option to ratepayers is adopted rather than "customer preference" (see discussion below).[43]
- Site hosts should maintain EVSE installations for at least 10 years.
- The data gathering requirements from D.18-05-040 should be extended to SDG&E's program.[44]

[39] D.18-05-040, Ordering Paragraph (OP) #35, p. 159.
[40] *Ibid,* OP #32, p. 158.
[41] *Ibid,* OP #37, OP #31, pp. 157, 158.
[42] *Ibid,* p. 109.
[43] *Ibid.* Conclusion of Law # 42, p. 149.
[44] *Ibid,* pp. 127-128.

A. TURN's Recommended Size for SDG&E's MD-HD Program

TURN accepts the Commission's direction in D.18-05-040 for a five-year "full scale" program provided sufficient performance accountability and ratepayer protection measures are adopted. Nevertheless, SDG&E's program should be scaled appropriately to its territory from the budget and vehicle levels adopted in the Decision for PG&E's and SCE's MD-HD program.

There are at least a few ways to consider how to properly scale the size and scope of the programs adopted in D.18-05-040 to SDG&E's territory. First, while PG&E and SCE represent at least 80% of MD-HD emissions in the state (likely more),[45] SDG&E's territory is around 8%, (see Section II above) indicating SDG&E's program should be around 10% the size of that adopted for PG&E and SCE combined, or $58 million.[46] Another metric is to compare the number of commercial customers as a proxy for the number of potential MD-HD sites in the respective utility territories. On this metric, SDG&E has around 25% of the commercial customers in PG&E's territory,[47] which would indicate a total budget of about $59 million. Alternatively, SDG&E has around 10% of the state's MD-HD vehicles,[48] and PG&E/SCE have at least 80% (likely more).[49] Using these figures to scale SDG&E's program in relation to PG&E & SCE's would result in a budget of $72 million for SDG&E.[50]

This demonstrates a reasonable budget based on the Commission's recent MD-HD Decision to be in the range of $58 to $72 million for SDG&E's territory. Perhaps coincidentally, SDG&E's requested number of vehicles to electrify, 3,085, represents around 25% of the number of vehicles assumed for budgeting purposes for PG&E's program.[51] This is in line with the

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[45] PG&E and SCE apportion a combined 81% of the statewide vehicles to their territory in their MD-HD applications. See TURN Witness Borden Opening Testimony on Medium-Heavy Duty Applications for PG&E and SCE, p. 5.

[46] D.18-05-040, pp. 103-104 show a combined budget of $57,898,088. 10% of this is $57.8 million.

[47] See A.17-10-007, SDG&E-38, p. KES-1 and A.16-06-013, PG&E-6, pp. 5-2 and 6-2. Counts do not include agriculture or lighting. PG&E figures for 2015 and SDG&E for 2016.

[48] DR TURN-01, question 5, states there are 103,115 MD-HD vehicles in SDG&E's territory, compared with 987,817 medium-heavy duty vehicles. The latter from California Energy Commission, Almanac, http://www.energy.ca.gov/almanac/transportation_data/summary.html.

[49] In their applications PG&E and SCE applied proportions of the statewide total vehicles of 43% and 38%, respectively, or 81% in total.

[50] 10% is 12.5% of 80%. TURN applied the 12.5% figure to the combined utility budget of $578,980,882, about $72.4 million.

[51] D.18-05-040, Appendix C, p. 2. The total number of vehicles estimated for PG&E's program is 12,812, compared with 3,085 for SDG&E.

commercial customer metric discussed above and likely represents a reasonable scale for the program, though not for the costs proposed by SDG&E (despite proposing to electrify 25% of the number of vehicles as PG&E, SDG&E's costs are just 64% of PG&E's adopted budget).[52] TURN thus recommends the Commission scale the budgeting assumptions in D.18-05-040 to the number of vehicles proposed by SDG&E, which results in a total budget of $68.3 million over five years, including infrastructure, program management, contingency, education, and rebates. See Appendix 1 for the calculations and assumptions supporting this recommendation, based primarily on the planning assumptions adopted in the Commission's MD-HD Decision.

B. TURN Recommendations for Ratepayer Protections Beyond those Adopted in D.18-05-040

In addition to the ratepayer protections adopted in the Commission's MD-HD Decision, TURN recommends three measures that are fully aligned with the spirit of D.18-05-040 but provide a modest improvement to the ratepayer protections adopted therein. First, the Commission should leverage additional funds from Fortune 1000 companies that participate in the program. Specifically, these companies should pay at least 50% of customer-side infrastructure costs (in addition to the charging station) the remainder of which should be expensed by the utility. This recommendation still provides significantly greater funding for electric infrastructure costs than has been available to-date and thus is a compelling incentive. At the same time, it strikes a balance between leveraging more funds from site hosts and still allowing for a compelling business case due to reduced fuel and maintenance costs (see Section **Error! Reference source not found.**). This minimizes costs to ratepayers and helps reduces the significant equity problems inherent in a program which will predominately subsidize wealthy corporations.

Second, TURN recommends the Commission modestly adjust the language from D.18-05-040 for the SDG&E program, to allow for reduced capital expenditures on the customer side in some instances:

> We agree with Tesla and TURN that if using a customer's existing service connection is the lowest-cost option for a specific site, ~~and the customer would prefer to use its existing service connection,~~ that is the option ~~PG&E and SCE~~ **SDG&E** should

[52] $150 million / $236 million.

> support. There should not be a cap limiting the amount of the two utilities' budgets that would support a rebate of up to 80 percent of the customer side infrastructure installation cost to support the EVSE. Any rebates provided to customers for make-ready installation on their existing service connections should be treated as expenses.[53]

The issue with the stricken portion of the language is that the customer is financially disadvantaged in picking the "customer-owned" option (which it should be noted would be the normal state of affairs absent this program). First, the customer will choose between paying 0% or 20% of these costs, and second, the customer will have to choose between paying ongoing maintenance costs, or not. Despite the fact that the customer ownership option is far less costly for ratepayers, the participants' financial incentive will be to choose that the utility own and maintain the infrastructure, at greater cost and risk to ratepayers.

This issue can be easily rectified here. Simply by instituting a requirement that if using existing service connection is the lowest-cost option the utility must implement that option and require the participant to pay for a portion of the customer side infrastructure costs (20%) with the remainder expensed by the utility and paid for by ratepayers. This modification is fully aligned with the spirit of D.18-05-040 and is, in the end, a minor adjustment that could result in significant long-term ratepayer savings and reduced risk of stranded customer-side assets.

Third, TURN is extremely concerned with long-term stranded costs pursuant to utility subsidization targeted to the MD-HD sector. While the Decision attempts to address the initial 10 years of investment, utility-owned assets are owned and depreciated for several decades – for SDG&E new electric service over 55 years and transformer/installation over 34 years.[54] To that end, SDG&E should be directed to include testimony with future general rate case applications that addresses the ongoing usage of utility-owned infrastructure associated with the make-ready costs authorized here. The testimony should identify all sites for which the program-funded infrastructure has not been in use for a specified period (such as three years), and the undepreciated amount remaining from the program-funded investment at that site. The expectation is that the Commission would then have an opportunity to determine whether the remaining investment should be removed from rate base or afforded other treatment as plant that is no longer used and useful.

[53] D.18-05-040, p. 109.
[54] SDG&E Testimony Chapter 5 (Shimansky), p. GDS-11.

VII. CONCLUSION

The Commission should adopt the aforementioned recommendations to leverage greater funds from participants, reduce inequities, lower ratepayer risk and cost, and target SDG&E'S MD-HD program to disadvantaged communities where local pollutants have the most deleterious impacts.

VIII. APPENDIX 1 – DETAILED BUDGET CALCULATION

To develop SDG&E's budget recommendation TURN applies a discount factor of about 24% based on SDG&E's proposed number of vehicles (3,085) divided by the total number of vehicles assumed for PG&E's program (12,812) to each sector's assumed budget.[55] TURN assumes the same number of vehicles per site, cost per site and dollars per vehicle as the Decision to derive the number of vehicles supported by each sectoral budget.

Table 1. TURN Recommended Infrastructure Budget for SDG&E's MD-HD Program

Sector	Budget	Vehicles/Site	Sites	Vehicles
Forklifts	$ 3,193,187	19	24	462
TSE	$ 119,237	20	1	24
TRU	$ 3,976,156	19	21	407
Port Cargo Trucks	$ 483,359	11	1	16
Transit Bus	$ 6,570,096	12	19	231
School Bus	$ 1,589,889	12	11	130
Airport GSE	$ 644,903	20	5	96
M-D	$ 14,264,007	12	96	1156
H-D	$ 4,927,572	39	14	562
Total	$ 35,768,407		194	3,085

For program management, contingency, and education, TURN applies the same percentage of the infrastructure budget as provided in the Decision - 10% of capital costs for program management/contingency and 4% of the infrastructure budget for education. For DAC charging station rebates TURN assumed a per rebate amount of $15,000 (which is likely high but we were unsure exactly what was assumed in the Decision) and applied this to 40% of the total number of vehicles, assuming a 1 to 1 charger per vehicle ratio. Similarly, transit and school bus rebates were calculated using a 1 to 1 ratio of vehicles to chargers and $15,000 per rebate. This results in the following recommendation for SDG&E's total budget.

[55] D.18-05-040, Appendix C, p. 2. Some of TURN's cost numbers differ slightly from the Decision because of rounding and the fact that decimal places were not shown in Appendix C. This does not materially affect the estimates.

Table 2. TURN Recommended Budget for SDG&E's MD-HD Program

Infrastructure Budget	$	35,768,407
Program Management	$	3,567,313
Contingency	$	3,567,313
Education	$	1,430,736
DAC Rebates	$	18,510,000
Transit and School Bus Rebates	$	5,417,772
Total	$	68,261,542

IX. APPENDIX 2 – STATEMENT OF QUALIFICATIONS FOR ERIC BORDEN

I am presently an Energy Policy Analyst with The Utility Reform Network (TURN). I have submitted testimony and comments to the California Public Utilities Commission with regard to utility proposals related to electric vehicle infrastructure, rate design, general rate cases, distributed energy resources, and energy storage. Prior to my position at TURN, I consulted for utilities, an inter-governmental energy agency, and an energy services company. I have also conducted research and published reports on energy sector topics.

My areas of experience include financial modeling and public policy research. I have authored several academic papers on topics in the energy sector and was awarded a German Chancellor Fellowship, which facilitated energy research in Germany and extended to aspects of US energy policy. I hold a Masters in Public Affairs with a concentration in natural resources and the environment from the University of Texas at Austin, and a Bachelor's degree in finance and entrepreneurship from Washington University in St. Louis.

Attachment 1

Data Request Responses

TURN DATA REQUEST
TURN-SDG&E-DR-01
SDG&E TRANSPORTATION ELECTRIFICATION MD/HD and V2G PROPOSALS (A.18-01-012)
SDG&E RESPONSE
DATE RECEIVED: January 30, 2018
DATE RESPONDED: 2/13/2018

Question 1: Please provide the total revenue requirement in Excel on annual basis through 2030 for the MD/HD charging infrastructure program. Please sum the remaining revenue requirement after 2030 in a column to the right. Please provide two separate files or tabs (clearly marked) for "100% utility ownership of EVSE" and "50% utility of ownership of EVSE" options. Please provide all workpapers and calculations related to this response in Excel format, which should include all items impacting the revenue requirement.

SDG&E Response:
For the response to this question and the calculation is seeks, please refer to SDG&E excel attachments:

Turn DR-01 Q-1 MDHD Buses-100percent-REV REQ Input-12-30-17
Turn DR-01 Q-1 MDHD Buses-50percent-REV REQ Input-12-30-17
Turn DR-01 Q-1 Rev Req Summary MDHD Elect. 12-30-17-PET Tax Chng-01-08-18
Turn DR-01 Q-1-Rev Req-2 cases-01-31-18

In addition to the attached workpapers submitted as part of this response, it is important to note that SDG&E is asking that the Commission approve the revenue requirement for years 2019-2025 only and not beyond 2025. Please refer to the Chapter 5 direct testimony of Gregory Shimansky Section I Purpose & Summary GDS-2 lines 1-7. Revenue requirements shown beyond 2025 (workpapers etc.) are for illustrative purposes only.

Question 2: Please provide a Table summarizing the annual bill impacts for the MD/HD charging infrastructure program for the residential and small commercial classes through 2040 or the latest date available.

SDG&E Response:
Please refer to SDG&E excel attachment titled: "TURN DR 1 Q-2 Annual Bill Impacts through 2040". The referenced file provides the average rate impact by class, which reflects the impact on the average bill, by customer class. This percentage change is expected to be the same for all customers within that class, assuming no change in usage. This file also provides the annual bill impacts for the MD/HD charging infrastructure program for a typical residential customer through 2040. SDG&E does not have a "typical" small commercial customer and therefore cannot provide the same data for this customer class.

Question 3: Please provide all cost estimate workpapers related to the proposal, segregated at a minimum by class of vehicle and type of equipment (e.g. such as the categorization provided in Chapter 5 testimony, Table GDS-17, p. GDS-15). Please indicate what costs are "utility-side" (front of the meter) versus "customer-side" costs (behind the meter).

SDG&E Response:

Direct cost estimate workpapers have been provided in response to this question. Attachments include:

- Final – Confidential – Unredacted – MD HD Cost Estimate 100 Percent utility ownership
- Final – Confidential – Unredacted – MD HD Cost Estimate 50 Percent utility ownership
- Allowance Amounts – Confidential

SDG&E did not calculate the "utility-side" versus "customer-side" costs because SDG&E's cost estimate was not structured based on that distinction. Creation of this type of cost breakdown involves a series of assumptions on key data points, such as length of trenching required on the "customer-side". These data points can vary significantly between sites.

It should be noted that while compiling the data responsive to this data request, SDG&E discovered an error in its prior calculations. Specifically, the error relates to an overstatement of forecasted costs of $515,088 (found at the tab titled "Estimate Class 2-3", line 21, column C of the direct cost spreadsheets). The correction results in a cost reduction on the order of 0.3%. Accordingly, SDG&E intends to correct its testimony at a future appropriate time, most likely at the time of hearings. In the meantime, the data provided in this response is corrected.

Question 4: If not previously provided, please provide an estimate of the number of vehicles supported by SDG&E's proposal, segregated by class (2-8).

SDG&E Response:
For cost estimate purposes, SDG&E assumed the following electric vehicle supply equipment (EVSE) counts. Generally, a one for one ratio, EVSE to electric vehicle, is assumed. Note that actual uptake by vehicle class will be customer driven.

- 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

Question 5: Please provide the "Proprietary IHS/Polk Data" referenced in Chapter 2 Testimony, p. HJR-9, footnote 10, in Excel. Please provide the most recent version of the data in addition to the file used by SDG&E for its testimony.

SDG&E Response:

SDG&E's annual license for the IHS/Polk Data has expired. Under the license agreement, SDG&E was required to dispose of the source data at the expiration of the license. However, we were allowed to retain information derived from the source data.

IHS/Polk Data - Derived from Source Data

Commercial Vehicles in SDG&E Service Territory
June 2016 Registrations

Class	
1	49096
2	68068
3	6837
4	4825
5	4168
6	5176
7	2899
8	11142
TOTAL	152211

Class 2 - 8 **103115**

Question 6: Please provide all workpapers that support Chapter 7 testimony, "GHG and Air Quality Benefits."

SDG&E Response:
Please see workpapers files "MD-HD-OffRd AQ Impacts (Final).xlsx" and "MD-HD AQ Impacts (Final).accdb".

Question 7: Please provide the *total* annual CO2e, NOx, and PM2.5 emissions from the various vehicle classes in the same format as presented in Table 7-1 (and 7- 2) in Chapter 7 testimony, p. JCM-4. Please provide this in Excel.

SDG&E Response:
The model used for Table 7-1 and 7-2 calculates only first-year and lifetime emission impacts. To be responsive to TURN DR-01 Question 7 SDG&E estimated annual emission impacts by incrementing the first-year calculations for each year over the life of the vehicles, please see the attached workbook "TURN DR-01 Q7.xlsx" for the total annual emission impacts estimated with this method.

Question 8: Has SDG&E conducted a cost-benefit analysis for its proposal? If yes, please provide the analysis and supporting workpapers. If no, please explain why not.

SDG&E Response:
No, SDG&E did not conduct a cost-benefit analysis for its proposal. A cost-benefit analysis was not required by the Assigned Commissioner's Ruling Regarding the Filing of the Transportation Electrification Applications Pursuant to Senate Bill 350 (September 2016). The Program is designed to support the goals of Senate Bill 350, encourage greenhouse gas reductions and accelerate transportation electrification.

Question 9: Please provide the expected incremental charging revenue for each class of vehicle (or like vehicles grouped together) for a ten-year period. Please provide a per vehicle estimate and total class estimate. Please provide all workpapers, calculations, assumptions, and sources.

SDG&E Response:
SDG&E did not conduct this analysis in preparing the application and testimony. Incremental charging revenue will depend on vehicles adopted, size of battery, miles traveled per day and other factors.

Question 10: Please provide the annual cost reduction savings to the operator (host) due to reduced fuel, maintenance, and any other meaningful cost reductions by class of vehicle (or like vehicles grouped together). Please provide all workpapers, sources, and assumptions related to this response.

SDG&E Response:
SDG&E has not calculated the annual cost reduction savings to the operator due to reduced fuel or maintenance costs.

Question 11: Chapter 2 testimony, page HJR-9, lines 5-6, state, "SDG&E's program targets a small fraction of the population – approximately 3% of SDG&E service territory population."

a. Please provide all workpapers, sources, and an explanation of how this 3% target was arrived at.

b. Please explain whether 3% of each class of vehicle was assumed or if it is of the total number of vehicles. Please provide all workpapers/calculations that support this response.

c. Please provide the number of EVs by class currently in SDG&E's territory, and/or whatever information is known to SDG&E regarding MD/HD and off-road EV adoption through 2017.

SDG&E Response:

a. 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.

b. 3% reflects the total number of vehicles targeted as part of the Program. It is not broken up by each class of vehicles.

c. SDG&E does not have this information.

Question 12: Chapter 1 Testimony, page LPB-16, lines 9-10 state, "Additionally, SDG&E has vast knowledge and experience in administering programs and providing a positive customer experience." Please explain and provide examples of the SDG&E programs referenced in this statement and provide any evidence demonstrating that they have resulted in a positive customer experience. Please share any other relevant documentation to support this response.

SDG&E Response:

One of the main areas where SDG&E provides a positive customer experience is through its Energy Efficiency programs. SDG&E is committed to energy efficiency and helping our customers manage their energy costs as their trusted energy advisor. Using the guiding principles of innovation, integration and comprehensiveness that SDG&E used in designing its program portfolio, SDG&E's energy efficiency program portfolio achieved substantial annual energy savings. As stated in SDG&E's Energy Efficiency Programs Annual Report 2016 Results, in 2016, SDG&E's efforts resulted in savings of over 346 million kilowatt-hours (kWh) and reduced energy demand by approximately 93 MW. In addition to helping customers save money and save energy, the energy efficiency programs helped reduce CO2 in support of the State's goal of reducing greenhouse gas emissions.

SDG&E also continues to provide innovative and user-friendly solutions to enable customers to take control of their energy use and reduce their bills. By signing up for My Account through SDG&E's website, customers can access the Energy Management Tool, which helps them manage their energy use by providing updates on how and where they use energy the most. Customers can conveniently access their consumption history via the Green Button process, and have the option to authorize a third party to review and analyze their energy use data through Green Button Connect My Data. In addition, SDG&E customers can borrow an in-home display device from SDG&E at no cost to understand their home's energy use and identify high energy use appliances with near-real time information and estimated energy costs. SDG&E's Marketplace offers customers an easy way to review and purchase energy efficiency products. In 2016, SDG&E launched a new Marketplace feature that provides efficiency ratings to help customers make informed decisions.

Question 13: Chapter 1 Testimony, page LPB-18, lines 6-8 state, "SDG&E has seen evidence in its Power Your Drive ("PYD") Program that the RFP process has driven competition and innovation in the market as vendors develop new products and capabilities in order to serve PYD customers." Please explain and provide the "evidence" referenced in this statement.

SDG&E Response:
In the Power Your Drive Request for Proposal (RFP) process, SDG&E solicited input from nearly 90 vendors and providers that had shown interest and responded to SDG&E's earlier Request for Information solicitation. From the RFP solicitation, SDG&E received 34 responses from interested vendors and providers that wanted to participate. The RFP process drove innovation because no responding vendor had off-the-shelf products and software ready to deliver that could fulfill all of SDG&E's PYD requirements for the hourly VGI rate to drivers and the billing data specifications (some vendors were closer than others). All vendors needed some time to modify their software and processes in order to give a demonstration of their capabilities and move forward. SDG&E allowed any vendor or partnering vendors to show interest, but they needed PYD compliant products and services to move forward with the qualification process.

SDG&E believes that the idea of participating in one of the first historic utility pilot EV charging projects with managed charging features is what drove many of the RFP bidders to take the necessary steps to add and refine the required PYD features to their products and software. After doing that work, these features and products will be available to all customers in the future who want to implement a managed charging solution. SDG&E believes without the PYD program driving innovation and, it is doubtful that this managed charging innovation would have occurred in the industry as early as it has.

TURN-01, question 7.

Tables as filed, from Chapter 7 (p. JCM-4)

Table 7-1

Net Emission Reduction Estimates
First-Year Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,512	0.6	0.2
Class 4-6	1,200	Diesel	18,793	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,177	16.8	3.9
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		42,709	25.6	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

Table 7-2

Net Emission Reduction Estimates
Lifetime Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Lifetime Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	59,205	13.2	3.4
Class 4-6	1,200	Diesel	191,687	52.4	2.3
Class 7-8 & Buses	450	DSL & CNG	186,936	218.7	44.9
Forklifts & TRUs	225	Diesel	38,725	43.6	
Grand Total	3,075		476,552	327.9	50.5

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

Annual Emission Estimates for Twelve Years ==>
2029

Net Emission Reduction Estimates
Year 1 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,512	0.6	0.2
Class 4-6	1,200	Diesel	18,793	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,177	16.8	3.9
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		42,709	25.6	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

Sum of Annual Estimates for Twelve Years

Net Emission Reduction Estimates
Sum of Annual Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Lifetime Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	59,851	11.9	3.1
Class 4-6	1,200	Diesel	200,058	53.1	2.4
Class 7-8 & Buses	450	DSL & CNG	187,261	215.0	45.5
Forklifts & TRUs	225	Diesel	35,497	43.6	
Grand Total	3,075		482,667	323.6	50.9
Grand Total (as a % of Table 7-2)			101%	99%	101%

2030

Net Emission Reduction Estimates
Year 2 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions		
			CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,356	0.7	0.2
Class 4-6	1,200	Diesel	18,505	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,824	17.1	3.9
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		42,913	25.9	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2031

Net Emission Reduction Estimates
Year 3 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions		
			CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,379	0.9	0.2
Class 4-6	1,200	Diesel	18,170	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,820	17.3	3.9
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		42,595	26.4	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2032

Net Emission Reduction Estimates
Year 4 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,292	1.0	0.3
Class 4-6	1,200	Diesel	17,739	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,801	17.5	3.9
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		42,058	26.7	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2033

Net Emission Reduction Estimates
Year 5 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,174	1.1	0.3
Class 4-6	1,200	Diesel	17,280	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,764	17.7	3.8
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		41,445	26.9	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2034

Net Emission Reduction Estimates
Year 6 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	5,049	1.1	0.3
Class 4-6	1,200	Diesel	16,840	4.5	0.2
Class 7-8 & Buses	450	DSL & CNG	15,718	17.9	3.8
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		40,835	27.0	4.3

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2035

Net Emission Reduction Estimates
Year 7 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	4,931	1.1	0.3
Class 4-6	1,200	Diesel	16,415	4.4	0.2
Class 7-8 & Buses	450	DSL & CNG	15,664	18.0	3.8
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		40,237	27.2	4.2

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2036

Net Emission Reduction Estimates
Year 8 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	4,820	1.1	0.3
Class 4-6	1,200	Diesel	16,010	4.4	0.2
Class 7-8 & Buses	450	DSL & CNG	15,617	18.2	3.7
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		39,673	27.3	4.2

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2037

Net Emission Reduction Estimates
Year 9 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	4,718	1.1	0.3
Class 4-6	1,200	Diesel	15,626	4.4	0.2
Class 7-8 & Buses	450	DSL & CNG	15,560	18.4	3.7
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		39,131	27.5	4.2

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2038

Net Emission Reduction Estimates
Year 10 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	4,624	1.1	0.3
Class 4-6	1,200	Diesel	15,257	4.3	0.2
Class 7-8 & Buses	450	DSL & CNG	15,499	18.6	3.7
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		38,607	27.6	4.2

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2039

Net Emission Reduction Estimates
Year 11 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	4,538	1.1	0.3
Class 4-6	1,200	Diesel	14,894	4.3	0.2
Class 7-8 & Buses	450	DSL & CNG	15,439	18.7	3.7
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		38,098	27.7	4.1

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units

2040

Net Emission Reduction Estimates
Year 12 Well-to-Wheels Impacts

MD/HD Vehicle Group:	Vehicles (Count)	Displaced Fuel	Annual Net Emission Reductions		
			CO2e (MT)	NOx (MT)	PM2.5 (MT)
Class 2-3	1,200	Diesel	4,459	1.1	0.3
Class 4-6	1,200	Diesel	14,527	4.2	0.2
Class 7-8 & Buses	450	DSL & CNG	15,379	18.9	3.7
Forklifts & TRUs	225	Diesel	3,227	3.6	
Grand Total	3,075		37,593	27.8	4.1

DSL = Diesel and CNG = Compressed Natural Gas
TRU = Transport Refrigeration Units