

DOCKETED

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SCE January 2017 Transportation Electrification Filing

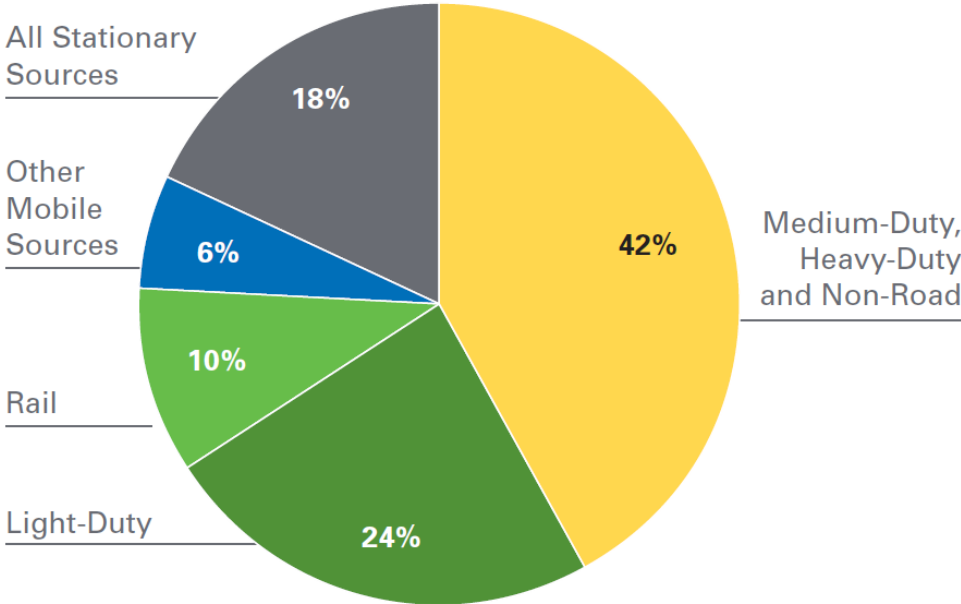
Eric Seilo

April 27, 2017

SCE serves the only two air basins in the nation that are in extreme non-attainment for ozone: San Joaquin and South Coast

- Transportation has an even greater impact on air quality than on GHG emissions in California – accounts for 80 percent of NOx and 95 percent of particulate emissions in the state
- Meeting 2032 attainment deadlines is more difficult than meeting the state’s 2050 GHG goal as far as pace of commercialization of TE and other technologies according to CARB
- Heavy-duty EVs reduce NOx up to 60 times more per kWh than renewables or energy efficiency
- Light-duty EVs reduce NOx about 8 times more per kWh

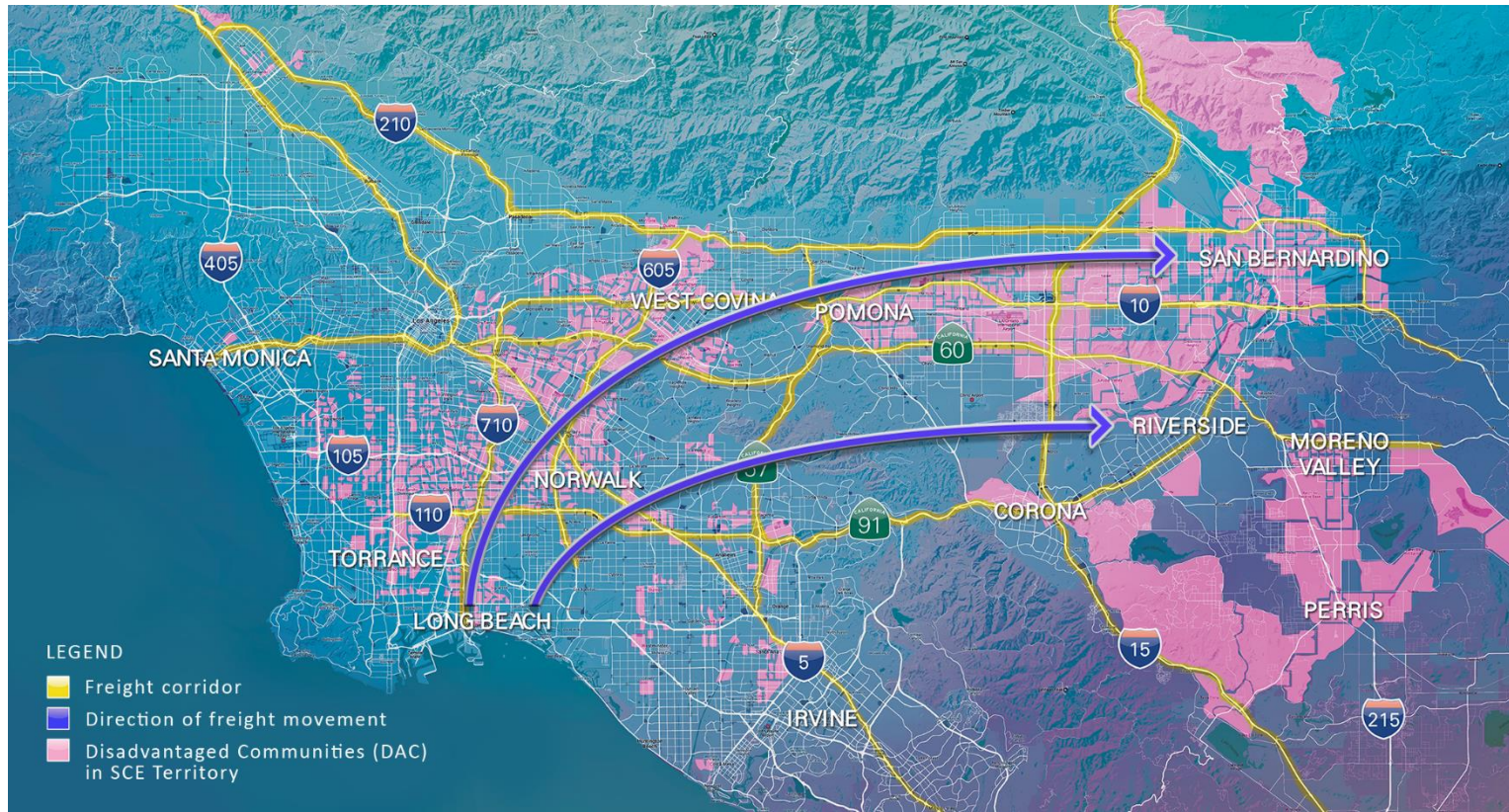
Medium-Duty, Heavy-Duty and Non-Road Vehicles Contribute Significantly to NOx Emissions in Southern California



Note: EPA National Emissions Inventory 2014 for counties in SCE area and Los Angeles County. US DOT 2016 Non-Road & Ports category includes forklifts, yard tractors, cranes, and transport refrigeration units

Disadvantaged Communities are Heavily Impacted by Air Pollution from Freight Corridors – SCE has 45% of CA's DACs

- In SCE's service area, the communities most heavily impacted by the associated air pollution from transportation are disadvantaged communities
- These communities are disproportionately impacted by the pollution caused by transportation both to and from warehouses and factories and along major freight corridors





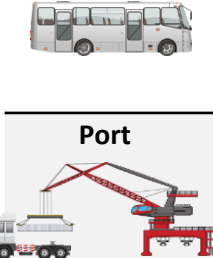
Note: Communities are considered DACs if they are in the worst quartile of environmental & economic burden, as evaluated by the California EPA using CES 3.0. Freight corridors are consistent with those identified by the Southern California Association of Governments in its 2016-2040 Regional Transportation Plan/ Sustainable Communities Strategy. A map of freight corridors, warehouses, and rail lines is available in the RTP/SCS Goods Movement appendix, available at http://scagrtpscscs.net/Documents/2016/final/f2016RTPSCS_GoodsMovement.pdf

SCE's TE vision centers around availability, affordability and awareness of fueling

Barrier Addressed			
SCE Role	Availability: Infrastructure necessary to fuel EVs	Affordability: Low cost in comparison to traditional vehicles	Awareness: Customer understanding of benefits of EVs
Infrastructure	<ul style="list-style-type: none"> • Charge Ready program to fund passenger vehicle charging infrastructure • Funding for medium- and heavy-duty truck charging infrastructure • Building vehicle charging infrastructure for electric transit buses • Building urban DC Fast Charger (DCFC) Clusters 	<ul style="list-style-type: none"> • Charge Ready rebate for away from home charging stations • Rebate for at home "make-ready" for residential customers • Rebate for charging stations for medium- & heavy-duty truck customers 	<ul style="list-style-type: none"> • Market education and outreach program to target potential car buyers in SCE's service territory to expand awareness about EVs and the benefits of fueling from the electric grid
Rate design		Rates designed to encourage EV adoption	
Innovative Collaborations	Port electrification projects, such as cargo-handling equipment		Bonus reward to rideshare and taxi drivers who use EVs

Existing Programs | Proposed Programs

Proposed programs in the Jan application span transportation sub-sectors, targeting both GHG and air-quality abatement opportunities

	Description	Cost	Duration	Key Partners ¹	
 Light duty	Customer rebate for residential charging station installation - Offer rebates to expand make-ready program to residences (not covered by Charge Ready)	\$4M	1 Yr	EV Owners, Site Hosts, Charging Station Provider/Operator, ED, CARB, Environmental Orgs, Environmental Justice Groups SCAG, COGs, Advisory Board Participants (where applicable)	Electricians,
	Building urban DC Fast Charger (DCFC) clusters - Deploy cluster of five DC fast charge stations to test if those who don't have access to nighttime charging can use this instead (also ridesharing drivers and others)	\$4M	1 Yr		Community leaders, MUDs, Rideshare and Taxi Companies
	Bonus reward to rideshare/taxi drivers who use EVs - Offer driver bonus to incentivize ridesharing (with focus on low-income)	\$4M	1 Yr		Rideshare & Taxi companies
 Trucks, Buses, Forklifts	Rates designed to incentivize EV adoption - Propose a new rate ² to mitigate demand charge barriers to stand-alone DC fast charge stations, fleets and other commercial	N/A	10 Yr	Environmental Orgs, Environmental Justice Groups SCAG, COGs, Advisory Board Participants (where applicable)	C&I customers, Transit Agencies AQMD
	Funding for medium- and heavy-duty vehicle charging infrastructure ³ - Build make readies and charging station rebates ³ for electric trucks, buses, shuttles, port and material handling equipment	\$553M	5 Yr		
 Port	Building vehicle charging infrastructure for electric transit buses ³ - Provide infrastructure and charging station rebates ³ for early-adopter transit agencies	\$4M	1 Yr	POLB, Terminal Operators	
	Two Port of Long Beach electrification projects - Make readies for Port of Long Beach gantry crane and yard tractor electrification	\$3.5M (total)	1 Yr (each)		

¹ Program also supports public funding programs: IRS (tax credits), ARB (CVRP, LCT, HVIP), SCAQMD (Carl Moyer)

² New rate design proposal contains new tariffs for three customer classes based upon demand size

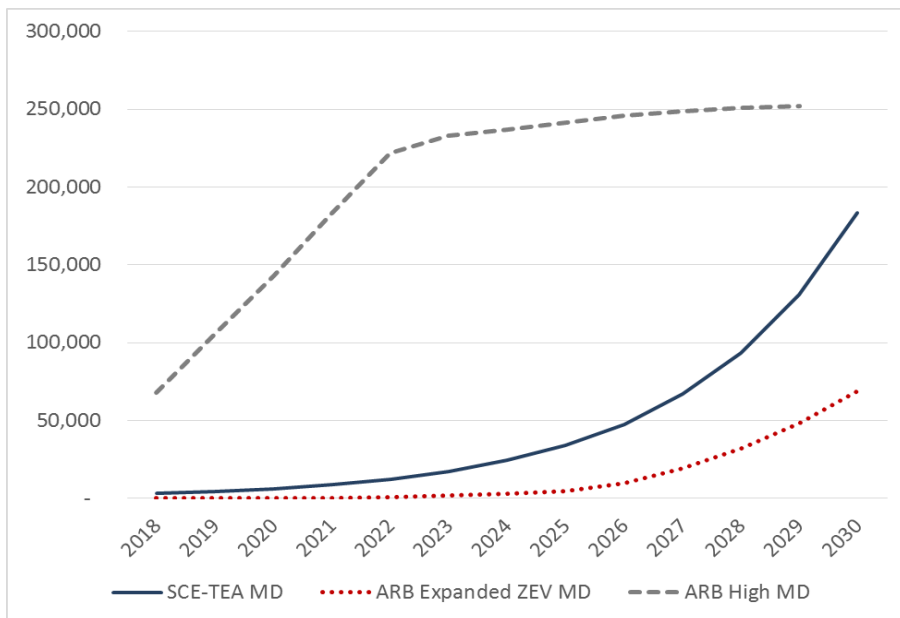
³ Rebates will only be available in sectors with technology that meets applicable standards

Goals of the MD/HD program

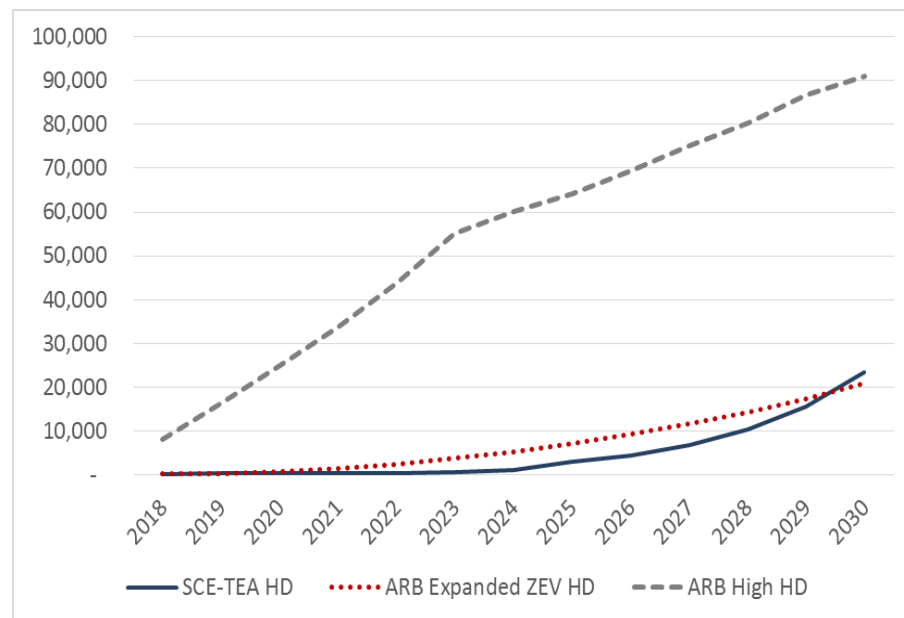
- Satisfy the goals and guidance outlined by the ACR
- Deploy to a wide range of market segments
 - Accelerate adoption through support of both nascent and mature technologies
 - Program is only a first step towards air quality requirements and GHG goal
- Enhance market stability
 - Provide “long-term” confidence for customers to make purchase decisions
 - Collect valuable data to enhance future programs
- Minimize cost barrier to adoption
 - More costly and complex (customer, charge rate, lead time) than light-duty market
 - Support standardization, innovation and reduce grid impacts

Vehicle Population Comparison

California Medium-Duty Vehicle Comparison to CARB Expanded Zero Emission Scenario

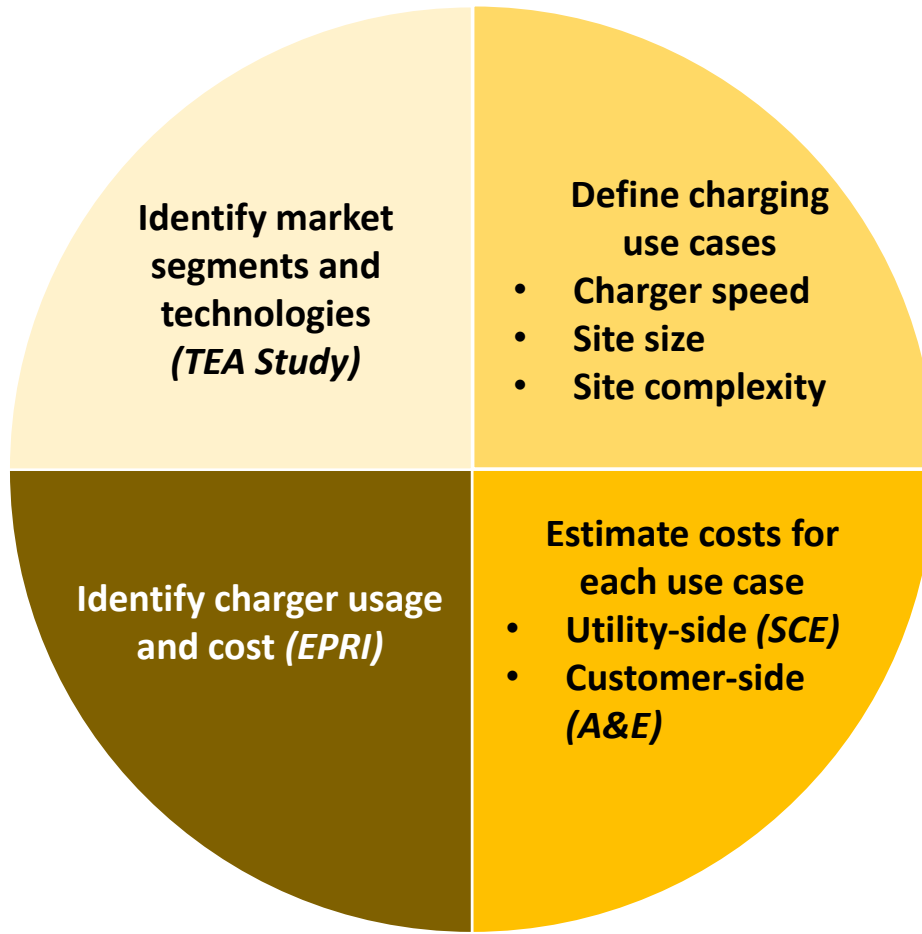


California Heavy-Duty Vehicle Comparison to CARB Expanded Zero Emission Scenario



- Vehicle segments included in application defined by TEA Study: forklifts, truck stop electrification, transport refrigeration units, yard tractors, cranes, airport ground support equipment, medium-duty trucks, heavy-duty trucks, buses
- Challenge: vehicle categorization (weight class and segment classification different for ARB, EMFAC, TEA Study, EPA)

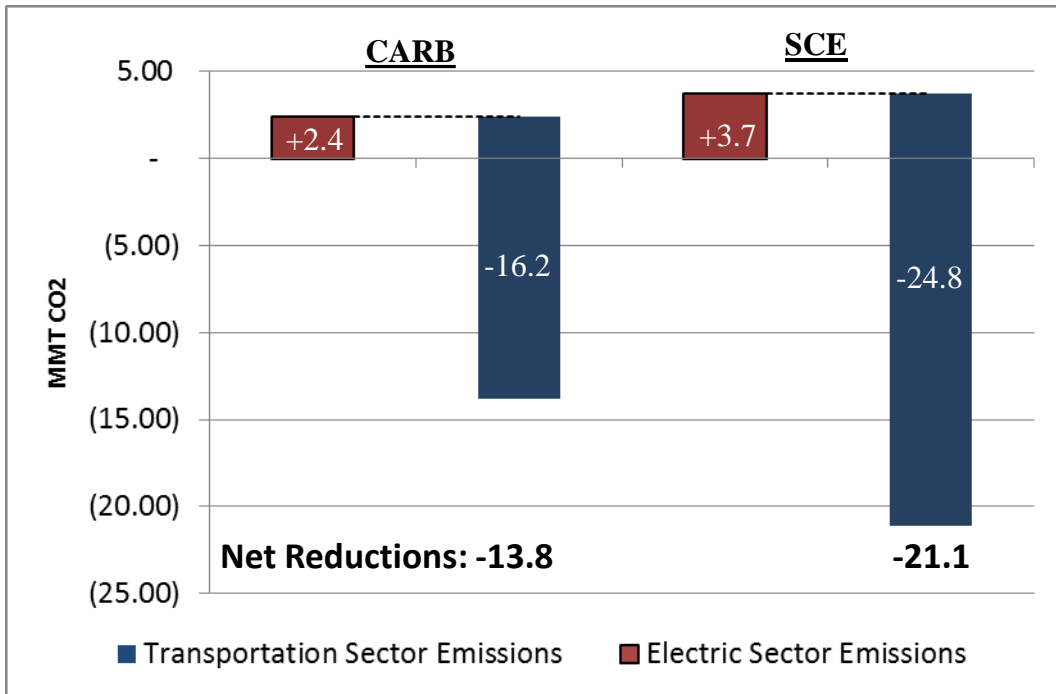
Cost estimation incorporated four main categories



- Program costs are cap on authorized spending
- Nine vehicle segments based on TEA Study
- Charging use cases:
 - Four charger sizes (10kW, 26kW, 52kW, 200kW)
 - Site size ranged from 2 to 50 chargers
 - Varied site complexity (simple, average, complex)
- Calculated cost per site based on vehicle population and number of sites per year

Emission Reduction Analysis

California 2030 Emissions from Transportation versus Electric Sector



- SCE used an internal production simulation model (PLEXOS) to determine economic electricity dispatch and associated emission intensities of electricity generation to serve electric vehicles
- Using CARB Low Carbon Fuel Standard (LCFS) methodology, SCE calculated the net emission reductions from transportation electrification
- SCE's forecast supported by the filing achieves a greater GHG reduction than CARB's forecast

Appendix

Energy for What's AheadSM



Medium-Duty Heavy-Duty (MDHD) Program Summary

- As in Charge Ready Pilot program, SCE would deploy, own, and maintain the electric infrastructure needed to serve charging equipment for in-scope vehicles and provide a rebate for charging station
 - In addition to trucks, program would support plug-in buses, forklifts and other off-road equipment
 - Providing the charging infrastructure reduces two major barriers to TE adoption in non-light-duty market segments—the burden of upfront costs, and the complexity of installing charging infrastructure
 - Participants must be non-residential SCE customers, own or lease participating site, grant SCE access, agree to take TOU rate, maintain charging equipment, show proof of vehicle acquisition
- Request: \$553 million¹
- Benefits:
 - Accelerate adoption, provide market funding certainty, improve safety, focus on DAC, promote innovation, decrease GHG emissions, improve local air quality
- Key Metrics:
 - Status reports to ED and stakeholders identifying progress, achievements, and lessons learned executing the program, customer participation, costs, emission reductions, customer interest and satisfaction; processes such as procuring deployment services, time, and costs; and post-deployment impacts. Status reports may also include recommendations from the Advisory Board to improve the program.

¹ Includes cost-effective installation of separately metered circuit, service drop, panel, trenching wiring and conduit as needed as well as a rebate to cover the costs of charging equipment that meets SCE's requirements and its installation

New EV Rates Designed to Incentivize EV Adoption

- New commercial EV rates to stimulate not only near-term adoption of EVs but also charging during times that benefit both customers and the grid
 - Rates designed specifically for EVs in each commercial/industrial rate classes¹
 - Super off-peak daytime TOU periods added to help integrate renewables and encourage low-cost charging²
 - Long-term solution to demand charge barrier through a 10-year introductory period:
 - Yr1 – Yr5: Demand charges eliminated w/ super-off-peak price as low as 8 cents/kWh
 - Yr6 – Yr10: Demand charge phased in incrementally over period w/ super-off-peak price as low as 7 cents/kWh
 - Yr11+: Sustained demand charges that are lower than otherwise applicable commercial rates w/ super-off-peak price as low as 6 cents/kWh
- Request: No costs requested
- Benefits
 - Accelerate the EV market by temporarily eliminating demand charges (which have long been viewed as barriers to entry), provide attractive volumetric rates during daytime super-off-peak periods and overnight; and lower summer season charges to mitigate seasonal bill volatility.

¹ TOU-EV-7: Monthly maximum demand of 20 kW and under, TOU-EV-8: Monthly maximum demand of 21 kW to 500 kW, TOU-EV-9: Monthly maximum demand above 500 kW

² As proposed in 2016 Rate Design Window application and represented in Figure III-7 of SCE Testimony. Super Off-Peak period is 8 a.m. to 4 p.m. daily

Key Metrics and Evaluation Criteria

- SCE proposes to prepare annual reports to provide status updates on portfolio implementation to the Commission and interested stakeholders.
 - Annual reports will provide a high-level summary for each initiative, the amount of funds expended to date, and the status of each pilot, project, and program.
 - More information is needed to inform a variety of transportation issues (future areas for utility programs, customer acceptance of vehicle-grid integration, etc.).
- In addition to providing annual reports, SCE also proposes to provide a close-out report on every project and program completed during the previous year.
 - Each report will provide a comprehensive description of the completed initiative, including findings, lessons learned, and metrics.
- Annual reports and final close-out reports will inform future Commission policy and help guide the design of future utility transportation electrification programs.

Rate TOU Periods and Charges

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January	Off-Peak							Super-Off-Peak								Mid-Peak				Off-Peak				
February																								
March																								
April																								
May																								
June	Off-Peak															On-Peak				Off-Peak				
July																								
August																								
September	Off-Peak							Super-Off-Peak								Mid-Peak				Off-Peak				
October																								
November																								
December	Off-Peak							Super-Off-Peak								Mid-Peak				Off-Peak				

Years	1-5	6-10	11+
Facilities-Related Demand Charge (\$/kW)	\$0	\$3	\$9
Super-Off-Peak (¢/kWh)	8	7	6
Off-Peak (¢/kWh)	13	12	11
Mid-Peak (¢/kWh)	26	24	21
On-Peak (¢/kWh)	37	33	24

Residential Make-Ready Rebate

- Provides a rebate to residential customers living in single-family residences or multi-unit dwellings to install an EV charging make-ready
 - The pilot complements, but does not duplicate, the existing Charge Ready Pilot Program by targeting residential customers
 - Participants must have access to a dedicated parking space, obtain property owner approval, provide proof of EV purchase or lease, provide receipt from electrician, agree to TOU service
- Request: \$4 million
 - Budget includes cost of make-ready rebates (new circuit and for some customers, the cost of a new panel), enrollment and rebate processing (including compliance verification) and education and outreach to potential participating customers estimated at 5,000
- Duration
 - Twelve months following pilot's launch or until funding has been exhausted
- Benefits
 - Supports EV adoption
 - Improves safety of electric services through incentivized use of licensed electric contractor
 - Increases adoption of residential TOU rates
 - Increases use of alternative fuels, which improves air quality and reduces GHG emissions
- Key Metrics
 - Pilot aims to confirm customer interest in a home-charging program, validate cost assumptions and evaluate EV customer satisfaction with time-of-use (TOU) rates to prepare for a potential broader future phase

EV Driver Rideshare Reward Pilot

- Provides a cash reward to rideshare and taxi drivers who use an EV and exceed a specified number of rides during a given time period
 - Designed to encourage EV adoption by rideshare drivers and increase EV miles traveled within SCE's service territory
 - SCE intends to work with rideshare services to reach existing drivers and with EV dealers to promote the pilot at the point of sale.
 - SCE may leverage the online Clean Fuel Reward program and work with third-party low-income purchase incentives (e.g., CARB's Enhanced Fleet Modernization Program and Plus Up Pilot Project) to reach potential participants.
- Request: \$4.0 million
 - Budget includes cost of rewards, enrollment and rebate processing (including compliance verification) and education and outreach to potential participating customers
- Duration
 - Twelve months following the pilot's launch or until funding has been exhausted
- Benefits
 - Encourages EVs in public transportation and increases EV miles traveled
 - Promotes the purchase of EV vehicles for users who participates in the rideshare economy
 - Increases use of alternative fuels, which improves air quality and reduces GHG emissions
 - Introduces more passengers to the experience of riding in an EV
- Key Metrics
 - Volume of participants by vehicle type and community, voluntary survey results, miles traveled, volume and amounts of rewards issued

Urban DC Fast Charging Clusters Pilot

- Proposes to deploy five Direct Current Fast-Charging sites, clustered in high-density areas; each site may include up to five dual-port charging stations, for up to 50 DCFC ports total
 - Pilot will determine interest in DCFC in urban areas and evaluate charging behaviors of end-users
 - Participants must be non-residential SCE customers, own or lease participating site, grant SCE access, agree to take TOU rate, maintain charging equipment, grant public access to site, be located in urban areas near residential neighborhoods as determined by SCE
- Request: \$4 million
 - Budget includes rebates to participating customers to cover the base cost, including hardware and installation of selected charging stations qualified by SCE
- Duration
 - Twelve months following the pilot's launch
- Benefits
 - Provides new charging options in certain urban areas for EV drivers
 - Stimulates innovation and possibly new business models in the charging market
 - Increases use of alternative fuels, which improves air quality and reduces GHG emissions
- Key Metrics
 - Number of charging events, times, duration, load profiles and adherence to off-peak periods, DR event participation levels

Make Ready and Rebate for Transit Buses

- Similar to the medium- and heavy-duty vehicle program, SCE is proposing a one-year pilot to install infrastructure and provide a rebate toward the purchase of the charging stations for buses
 - This project will focus specifically on progressive transit agencies that are already preparing to receive electric buses and will provide charging infrastructure to speed adoption of electric transit buses.
 - Proposal estimates that 20 chargers could be installed at four sites which could service approximately 100 buses
 - Customers must qualify as a government transit agency, own or lease participating site, grant SCE access, agree to take TOU rate, maintain charging equipment, provide proof of vehicle acquisition
- Request: \$4 million
 - Budget includes rebates to participating customers to cover a base cost for charging stations, including hardware and installation of certified charging stations
- Duration:
 - Twelve months following the pilot's launch
- Benefits:
 - Priority review program that supports transit agencies that are already moving on fleet conversion
 - Stimulates innovation and possibly new business models in the charging market
 - Increases use of alternative fuels, which improves air quality and reduces GHG emissions
- Key Metrics
 - Number of charging events, times, duration, load profiles and adherence to off-peak periods, DR event participation levels

POLB Rubber Tire Gantry (RTG) Crane Electrification Project

- Deploy make-ready infrastructure to serve nine cranes at the Port of Long Beach's SSA Marine Terminal, currently fueled by diesel to electric power
 - Project will support POLB SSA Marine Terminal J in accelerating the conversion of the Port's current RTG crane to electric power by deploying the electric infrastructure necessary to serve the new electric RTG crane
- Request: \$3.0 million capital
 - SCE will not design or deploy electric infrastructure until the customer has secured the required funding, completed a firm order for the RTGs, and committed to operate them for a minimum of ten years from completion of infrastructure
- Duration:
 - Twelve months following the customer's approved RTG funding and completed firm order for the RTGs
- Benefits:
 - Promotes electrification of additional RTG cranes at the POLB and other port operators in California
 - Increases use of alternative fuels, which improves air quality and reduces GHG emissions
- Key Metrics:
 - Number of charging events, times, duration, load profiles and adherence to off-peak periods, DR event participation levels

POLB International Transportation Service (ITS) Terminal Yard Tractor Project

- Deploy make-ready infrastructure, including 24 charging points, to support the ITS Terminal at the Port of Long Beach to electrify the terminal's fleet of yard tractors
 - Project will support the ITS Terminal's evaluation of electric yard tractors and help accelerate deployment of electric yard tractors
 - If the ITS Terminal's evaluation is successful, the terminal has indicated that it may purchase 68 electric tractors
- Request: \$0.5 million capital
 - SCE will not break ground on the project until the customer has ordered the relevant yard tractors and commits to using the infrastructure for a minimum of ten years from completion of infrastructure
- Duration:
 - Twelve months to design and to deploy the infrastructure
- Benefits:
 - Promotes electrification of additional yard tractors at the POLB and other port operators in California
 - Increases use of alternative fuels, which improves air quality and reduces GHG emissions
- Key Metrics:
 - Number of charging events, times, duration, load profiles and adherence to off-peak periods, DR event participation levels