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PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION **RESOLUTION E-4334**
June 24, 2010

R E S O L U T I O N

Resolution E-4334. San Diego Gas & Electric ("SDG&E") requests approval to establish three new temporary experimental residential rate schedules for plug-in electric vehicle ("PEV") charging.

PROPOSED OUTCOME: This Resolution approves implementation of the experimental rate schedules beginning January 1, 2011. The temporary rates will remain in effect until November 30, 2012 (or until completion of the related pricing pilot research project.)

ESTIMATED COST: To the extent that PEV charging creates material secondary impacts on existing distribution systems, cost recovery associated with upgrades will comply with applicable Commission orders and tariff rules.

By Advice Letter 2157-E, Filed on March 26, 2010.

SUMMARY

SDG&E's request to establish three new temporary experimental residential rate schedules for PEV charging as part of its Pricing and Technology Study ("Study") is approved. The Study will be performed by SDG&E, in collaboration with Electric Transportation Engineering Company ("eTec") and Nissan. This Resolution approves implementation of the experimental rate schedules beginning January 1, 2011. The temporary rates will remain in effect until November 30, 2012 (or until the completion of the Study). The request is consistent with state legislative and regulatory directives.

SDG&E filed Advice Letter ("AL") 2157-E on its own initiative on March 26, 2010. The Study will help to estimate the price elasticity of demand for PEV

charging by time-of-day and ultimately build an electric vehicle customer load profile.

Under GO 96-B, General Rule 5.1, rate increases may not be requested via an advice letter, except when that rate increase has already been authorized by statute or by the Commission. SDG&E's proposal is consistent with the GO 96-B General Rules governing all informal matters, in that it does not represent a rate increase, only a separate rate schedule with alternative time-of-use ("TOU") price differentials.

BACKGROUND

A number of interrelated Legislative and Commission initiatives help to inform the Commission's approach to electric vehicle ratemaking and tariffs. The Commission initiated Rulemaking (R.) 09-08-009 on August 24, 2009 to consider alternative-fueled vehicle tariffs, infrastructure and policies to support California's greenhouse gas emissions reduction goals. The Commission recognizes the societal benefits of alternative-fueled vehicles in achieving California's climate change goals but seeks to ensure that the charging of these vehicles does not adversely impact California's electric system in terms of safety and reliability. The R. 09-08-009 Scoping Memo identifies rate design, cost recovery guidance, and evaluation of direct charging management within the scope of the proceeding. As a result, the Study's focus on rate design and charging management aligns certain topics included in the scope of R. 09-08-009.

SB 626 (Kehoe, 2009) amends Public Utilities Code Section 740.2 to direct the Commission to evaluate policies to develop infrastructure sufficient to overcome any barriers to the widespread deployment and use of plug-in and electric vehicles, and to adopt rules by July 1, 2011 on specified matters, including infrastructure upgrades necessary for the widespread use of plug-in hybrid and electric vehicles, amongst other topics.

In addition SB 17 (October 11, 2009) requires each electrical corporation to develop and submit a smart grid deployment plan to the Commission for approval. In response to SB 17, a February 8, 2010 Ruling ("Ruling") in the Smart Grid Rulemaking (R. 08-12-009) solicits information to enable the Commission to

provide policy guidance so that electric utilities may develop Smart Grid deployment plans by July 1, 2011, as required by SB 17.

SB 17 adds Sections 8360 and 8366 to the Public Utilities Code:

> § 8360 It is the policy of the state to modernize the state's electrical transmission and distribution system to maintain safe, reliable, efficient, and secure electrical service, with infrastructure that can meet future growth in demand and achieve all of the following, which together characterize a smart grid:
>
> > (g) Deployment and integration of cost-effective advanced electricity storage and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air-conditioning.
>
> § 8366 Smart grid technology may be deployed in a manner to maximize the benefit and minimize the cost to ratepayers and to achieve the benefits of smart grid technology. The Commission, in consultation with the Energy Commission, the ISO, and electrical corporations, shall evaluate the impact of deployment on major initiatives and policies including:
>
> > (c) Achievement of state goals for reducing emissions of greenhouse gases as set forth in the California Global Warming Solutions Act of 2006 and other state directives.
> > (e) Modernizing the aging utility grid infrastructure.
> > (f) Meeting the future energy growth needs of the state with new and innovative technologies and methods that utilize the existing assets more efficiently, result in a less environmentally adverse net impact on the state, meet stringent costs versus benefit assessments, and provide the ratepayers with new options in meeting their individual energy needs.

The February 8, 2010 Ruling, under item 5, section, '5.3 Electric Vehicle-Related Issues' states, "The OIR [R. 08-12-009] and scoping memo included a consideration of issues related to electric vehicles….Since the Commission has initiated a proceeding that is broadly examining issues related to alternative-fueled vehicles, including plug-in hybrid and battery electric vehicles, we do not need to duplicate that examination here. However, the *Assigned Commissioner's*

Scoping Memo issued on January 12, 2010 in R. 09-08-009, does conclude that a consideration of standards related to electric vehicles is appropriately conducted in this [R. 08-12-009] proceeding since the adoption of Smart Grid standards more broadly is within the scope of this proceeding. We reaffirm that determination here. We therefore, invite comments on what standards the Commission should adopt pursuant to the use of electrical vehicles by customers."

Infrastructure improvement deployment plans and communication standards will therefore be addressed in R. 08-12-009. Additionally, the Ruling on the Smart Grid R. 08-12-009, also proposed metrics to which each utility will be expected to measure and report performance of deployment plan infrastructure improvements. The metrics are based on metrics contained in the U.S. Department of Energy's Funding Opportunity Announcements for the Smart Grid Investment Grant Program and Smart Grid Demonstration Program. As part of each utility's Smart Grid deployment plan and as given in Attachment C-Item 8 entitled "Deployment and Integration of Electric Vehicles" utilities will be expected to track:

- Estimated number of plug-in electric and hybrid electric vehicles in the service territory and estimated peak vehicle charging load.
- The magnitude and percentage of total load served by hybrid electric vehicles and/or equipment which can communicate information automatically with load.
- The number and percentage of installations on distribution and transmission system in response to hybrid electric vehicles.

To the extent that metrics proposed in Attachment C - Item 8, serve to influence the final guidelines for utility deployment plans, the Smart Grid proceeding may address the expected transmission and distribution infrastructure improvements that have also been scoped for discussion in Phase 2 of R. 09-08-009.

NOTICE

Notice of AL 2157-E was made by publication in the Commission's Daily Calendar. SDG&E states that a copy of the Advice Letter was mailed and distributed in accordance with Section 3.14 of General Order 96-B.

PROTESTS AND COMMENTS

SDG&E's Advice Letter AL 2157-E was not protested.

The only party to offer comment on AL 2157-E was the Natural Resource Defense Council ("NRDC"). The NRDC supports efforts by utilities to develop TOU rate programs for PEVs. NRDC states that "establishing TOU rate programs will encourage customers and charging service providers to charge during off-peak hours, thereby avoiding additional peak loads, unnecessary costs to the system, and the need for new generating capacity."

DISCUSSION

The San Diego region will benefit from eTec's grant-funded program for developing charging infrastructure beginning in 2010.

eTec manages The EV Project – the largest ever deployment of electric vehicles ("EV") and charging infrastructure in the U.S. On August 5, 2009 the U.S. Department of Energy ("DOE") granted eTec $99.8 million as part of a transportation electrification stimulus funding solicitation. Private investors matched public grant with 50 percent private funding, resulting in total project costs of approximately $199.6 million. Supported by over forty project partners[1],

[1] Project partners include: ECOtality, eTec, Nissan, Idaho National Laboratory, Zero Emission; Strategic partners include: American Lung Association, City of Phoenix, Oak Ridge National Laboratory, Snohomish County Public Utility District, APS, City of Seattle, Ohio State University, State of Oregon, ATX/Cross Country Automotive, City of Tucson, Pima Association of Governments (AZ), State of Tennessee, Bovis Lend Lease, Eaton Corporation, Portland General Electric, State of Washington, BP America, Electric Power Research Institute (EPRI), Puget Sound Energy, Tacoma Power, Center for Sustainable Energy, Gridpoint, Salt River Project, Tennessee Valley Authority, Coulomb Technologies, Hamilton County (TN), San Diego Association of Governments, Tucson Electric Power, City of Chattanooga, Johnston Marklee, San Diego Clean Fuels Coalition, Underwriter's Laboratories, Chattanooga EPB, Knoxville Utilities Board, San Diego Gas & Electric (SDG&E), University of California-Davis, City of Knoxville, King County(WA), San Diego Miramar College, Yazaki North America,

the EV Project will deploy up to 4,700 zero-emission electric vehicles and 11,210 supporting charging systems in eleven strategic markets in five states: Arizona, California, Oregon, Tennessee, and Washington.

The stimulus award granted by the DOE to eTec will provide approximately 1,000 Residential chargers for the first qualified 1,000 Nissan LEAF purchases in SDG&E's service territory. The project will also provide approximately 1,500 additional Level 2 Public/Commercial Chargers and 50 Fast Chargers. The California Energy Commission (CEC) awarded $8 million to eTec as matching funding for this project, which will likely result in additional Public/Commercial charging infrastructure being deployed to the San Diego region.

Research results and insights gained from the Study will contribute to the shaping of future rate design policy for PEVs.

The objective of the Study is to benefit California's understanding of the electric vehicle market. As described in SDG&E's Opening Comments filed October 5, 2009, in response to Question 21 of R. 09-08-009, the Study "will examine the complexity of the behavioral relationships that are manifest as price elasticities, which measure the sensitivity of PEV charging to the on-peak/off-peak time-of-use ("TOU") price differential, the overall electricity price level, prices of substitutes, customer demographics, and other relevant factors."[2]

The Study's working hypothesis is that greater variations in time-varying pricing, together with the use of accommodative vehicle technology, will shift more charging activity to off-peak periods. For the purposes of this Study, "technology" refers to the communication and control devices that will facilitate convenient and economic "smart charging" behavior.

Nashville/Davidson County, Maricopa Association of Governments, Seattle City Light, Zipcar, Nashville Electric Service, 350 Green

[2] AL 2157-E, Attachment C, Understanding the Impact of Electricity Pricing & Technology on Consumer PEV Time-of-Use Charging Behavior ("Study") Research, Development & Demonstration Proposal, January 29, 2010, page 3

This project is expected to provide information regarding customer acceptance and the necessary charging infrastructure needs for successful PEV deployment.

Residential customers who register to purchase a Nissan LEAF could qualify to receive the installation of a Level 2 charging facility at their home by eTec at great savings and will also be enrolled in the Study and randomly assigned to one of the proposed experimental rates.

Research deliverables include: (1) creation of a model that explains the impact of time-varying rates on charging behavior, (2) evaluation of the relationship between the locations of the charging facility (i.e. residential vs. non-residential) and the price signal and the use of the technology, and (3) development of load profiles that characterize observed PEV charging load shapes.

The Study is expected to ascertain to what extent price signals and enabling technology influence charging behavior. Each experimental rate is designed in varying degrees to influence the customer to shift charging off-peak, thereby improving the economics of PEV ownership. The temporary experimental rates represent different rates for charging at different times of day which correspond to electricity supply costs. It is expected that consumers will charge the PEV during the lowest cost periods of the day. The Study will attempt to determine how large the rate differential must be in order to accomplish this demand shift. Observed TOU charging behavior patterns will contribute to the building of an electric vehicle owner specific load profile which will shape the duration of time varying periods based on approximate periods of differing system demand.

Approval of SDG&E AL 2157-E will establish three new temporary experimental residential rate schedules for PEV charging

The Study's three temporary experimental electric vehicle rates were designed in collaboration with a Research Advisory Panel[3], the SEU Research Advisory

[3] The Research Advisory Panel includes representatives from UC Davis, EPRI, USD-EPIC, UCSD, CEC-PIER, US EPA, CCSE, SCE, SMUD, eTec, Coulomb Technologies, Boulder Energy Group, EEI and CPUC staff

Team[4], input from parties to the R.09-08-009 and other workshop participants. Approval of SDG&E AL 2157-E will establish three new temporary experimental residential rate schedules for PEV charging:

(1) EPEV-L – Experimental Plug-In Electric Vehicle Service – Low Ratio;
(2) EPEV-M – Experimental Plug-In Electric Vehicle Service – Medium Ratio; and
(3) EPEV-H – Experimental Plug-In Electric Vehicle Service – High Ratio.

The ratio (aka. differential) between on-peak and super off-peak rates is given in Table 1.

TABLE 1 On-Peak to Super Off-Peak Ratio

	Total Rate EPEV-L	Total Rate EPEV-M	Total Rate EPEV-H
Summer	1.949	3.830	5.710
Winter	1.238	3.033	4.827

Utility Distribution Company ("UDC") Rates are amplified in the Study in order to achieve the desired experimental rate price differential.

The UDC is comprised of the following components: transmission charge, distribution charge, public purpose program charges, nuclear decommissioning charge, ongoing competition transition charges, and reliability services. A total rate adjustment component ("TRAC") represents the difference between the UDC and the experimental rate and therefore is the component that allows for amplification of the UDC for the Study total rates given in Table 2. By varying the TRAC to achieve specific ratios between on-peak, off-peak and super off-peak prices, SDG&E has avoided any disputes over the appropriate cost-based level of transmission, distribution, or other component price levels while still recovering non-bypassable charges as dictated in Decision (D.) 08-09-012.

[4] The SEU Research Advisory Team includes representatives of Clean Transportation, Smart Grid/ Electric T&D, Rate Design, Load Research, Consumer Research, Smart Meter/ Metering, Customer Services, Billing, Resource Planning, Project Management, Regulatory and Legal sections

TABLE 2 Amplified Experimental Total Rate

Description	EXPERIMENTAL RATES Total Rate EPEV-L	Total Rate EPEV-M	Total Rate EPEV-H
Minimum Bill ($/day)	0.17	0.17	0.17
Metering Charge ($/Month)	n/a	n/a	n/a
Energy Charges ($/kwh)			
On-Peak - Summer	0.27045	0.29235	0.38381
Off-Peak - Summer	0.16459	0.18434	0.15352
Super Off-Peak - Summer	0.13873	0.07634	0.06722
On-Peak - Winter	0.17445	0.24565	0.33496
Off-Peak - Winter	0.16708	0.16333	0.13398
Super Off-Peak - Winter	0.14090	0.08100	0.06939

The TOU periods utilized in this Study are based on 2008-2009 EV-TOU forecasted sales (kWh) as provided in the workpapers that accompanied AL 2157-E and as given in Table 3.

TABLE 3

Time-of-Use Period	kWh Usage by TOU
On-Peak - Summer	1,459
Off-Peak - Summer	3,820
Super Off-Peak - Summer	1,721
On-Peak - Winter	1,502
Off-Peak - Winter	3,962
Super Off-Peak - Winter	1,537

These experimental rates will remain in effect until November 30, 2012 (or until the completion of the Study) after which the customer will be given the choice of otherwise applicable PEV rate schedules. If a customer does not make an election, they will be defaulted to SDG&E's Schedule EV-TOU3.

Costs Associated with Approval of the Study

Approval of the Study may result in two types of cost impact: (1) there may be a revenue shortfall from extreme unanticipated experimental rate schedule usage

variance, and/or (2) there may be additional system costs associated with eTec installations.

Revenue Shortfall - SDG&E does not expect the Study to result in any substantial revenue shortfall

Since the TOU periods utilized in this Study are based on 2008-2009 EV-TOU forecasted sales (kWh) it is possible that, though the experimental rate schedules are designed to be revenue neutral, actual electric vehicle charging patterns could vary from the TOU percentages in the current sales forecast, causing revenue shortfalls to occur. For example, if all usage were to shift to the super off-peak TOU period, then SDGE would realize a modest revenue shortfall. Given this worst case scenario, and in response to Energy Division data request DR_01_Q02b, SDG&E has estimated this shortfall to be approximately 0.022% of SDG&E's 2010 electric revenue requirement.

System Costs - SDGE states that it will not be seeking recovery of these costs since eTec is responsible for all costs associated with the installation of the EVSE.

Under current rules, neighborhood distribution upgrades triggered by customer installation of electric vehicle charging facilities (whether a participant of the Study or not) are treated the same as upgrades triggered by any new load, and are paid for by all distribution ratepayers. SDG&E is not proposing any special treatment for neighborhood distribution upgrade costs driven by Study participants, or any customer deciding to install a PEV charging facility at his or her residence.

In response to Energy Division data request DR_01_Q01d, SDG&E states that "eTec is responsible for all costs associated with the installation of the EVSE. SDGE will not be seeking recovery of these costs." However, in the event that there are secondary impacts as a result of eTec installations which necessitate distribution system upgrades, cost recovery will comply with applicable Commission orders and tariff rules.

This approval will not require incremental ratepayer funding, increase any rate or charge, cause the withdrawal of service, or conflict with any rate schedule or rule.

SDG&E states in AL 2157-E that it "will operate and fund the Study using existing utility staff, existing RD&D budgets (for data preparation, consumer research and analysis), and existing capital budgets (for load research and metering to gather energy consumption data). Therefore, this filing will not require incremental ratepayer funding, increase any rate or charge, cause the withdrawal of service, or conflict with any rate schedule or rule." SDG&E is of the opinion that any neighborhood distribution impacts due to residential charging facility installation are driven not by SDG&E's proposed Study, but by customers' decision to charge PEVs – and arguably, by the eTec/Nissan project, the dimensions of which were developed prior to, and independent of, SDG&E's proposed Study. SDG&E does not currently track the cost of distribution system upgrades required by residential customers installing 120V or 240V PEV charging facilities, and does not plan to specifically track such costs for Study participants. However, tracking will likely be considered in both the Smart Grid R. 08-12-009 deployment plan metrics and in Phase 2 of R. 09-08-009, according to the Scoping Ruling issued January 12, 2010 which asks, "how should a utility recover costs of distribution system upgrades attributable to electric vehicles?"

COMMENTS

This is an uncontested matter in which the resolution grants the relief requested. Accordingly, pursuant to Public Utilities Code section 311(g)(2), the Commission waives the otherwise applicable 30-day period for public review and comment.

FINDINGS AND CONCLUSIONS

1. This proposal to establish experimental plug-in vehicle rates was made on SDG&E's own initiative.

2. Since the utility proposal has not already been ordered, authorized or allowed in some sense with sufficient specificity by the Commission, a resolution is required.
3. To the extent this proposal serves to inform Phase 2 of R. 09-08-009, ALJ Regina DeAngelis directed SDG&E to serve this advice letter on the service list for R. 09-08-009.
4. The Study will help understand whether customers respond to large on-peak to off-peak price ratios, by shifting peak, reducing consumption or some combination of the two.

THEREFORE IT IS ORDERED THAT:

1. The request of SDG&E to establish new temporary experimental residential rate schedules for PEV charging as requested in Advice Letter AL 2157-E is approved.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on June 24, 2010; the following Commissioners voting favorably thereon:

/s/ Paul Clanon
Paul Clanon
Executive Director

MICHAEL R. PEEVEY
PRESIDENT
DIAN M. GRUENEICH
JOHN A. BOHN
TIMOTHY ALAN SIMON
NANCY E. RYAN
Commissioners