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March 26, 2010

ADVICE LETTER 2157-E
(U 902-E)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

SUBJECT: ESTABLISHMENT OF EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE (PEV) RATES

San Diego Gas & Electric (SDG&E) hereby submits for filing additions to its electric tariffs applicable throughout its service territory, as shown on Attachment A. Also attached are supporting documentation in Attachment B (Example of Rate Tables), and Attachment C (Details of PEV TOU Pricing and Technology Study).

PURPOSE

SDG&E is filing this Advice Letter to establish three new temporary experimental residential rate schedules for PEV charging: 1) EPEV-L - *Experimental Plug-In Electric Vehicle Service - Low Ratio;* 2) Schedule EPEV-M – *Experimental Plug-In Electric Vehicle Service - Medium Ratio;* and *3*) Schedule EPEV-H - *Experimental Plug-in Electric Vehicle Service – High Ratio.*

These proposed experimental electric vehicle rate schedules will be part of a Pricing and Technology Study ("Study") performed by SDG&E, in collaboration with Electric Transportation Engineering Company ("eTec") and Nissan, to better understand residential consumer time-of-use ("TOU") charging preferences, the use of smart-charging enabling technology (for charging the plug-in electric vehicle or "PEV"), and other relevant factors. Specifically, the study will estimate the price elasticity of demand for PEV charging by time-of-day, that is, customer charging behavior in response to time varying pricing. The proposed experimental rates will remain in effect until completion of the Study on November 30, 2012 (or updated per eTec's schedule), after which time the customer will be offered applicable and available PEV rates.

BACKGROUND

California enjoys the opportunity, commencing in late 2010, to observe PEV consumer charging behavior as Nissan and eTec deploy PEVs and charging facilities throughout the San Diego region. The use of CPUC approved experimental PEV rates coincident with this deployment, will allow valuable information to be gathered to better understand the degree to which consumer

time-of-day charging preferences are related to time varying rates. The results of this Study could prove to be relevant to the development of future rate design policies applicable to PEVs.

With this deployment of PEVs, the San Diego region will also benefit from eTec's grant-funded program for developing charging infrastructure beginning in 2010. This is the result of a stimulus award granted by the US Department of Energy (DOE) to eTec which will provide approximately 1,000 Level 2 home base chargers for the first qualified 1,000 Nissan Electric Vehicles (known as the "LEAF") purchases in the region. 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 result in additional charging infrastructure being deployed to the San Diego region. This project is expected to provide valuable information regarding consumer 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 Level 2 charging facility at their home by eTec at great savings and will also be enrolled in the Study and will be randomly assigned to one of the proposed experimental rates.

With the Commission's authorization to test the proposed residential experimental rates coincident with eTec and Nissan collaboration and deployment of PEVs in the San Diego region, California will be able to better characterize and understand the role that electricity pricing plays in influencing consumer PEV charging behavior. Specifically, this study will help explain the degree to which time-varying pricing, among other factors, will influence the consumer to charge during off-peak periods. The proposed experimental rates are designed to improve the likelihood of the study achieving this outcome.

R.09-08-009

The Commission has acknowledged that many automakers will be introducing electric charged vehicles to California roadways over the next five years. 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 seeks to ensure that the charging of these vehicles does not adversely impact California's electric system in terms of safety and reliability, while at the same time recognizing the benefits of these vehicles in achieving California's climate change goals.

The Commission is set to consider a range of topics related to alternative fueled vehicles in a multi-phased proceeding in R.09-08-009 ("AFV OIR"). The CPUC is in the process of gathering information it will need to inform its decisions. The AFV OIR -- as well as comments from the named respondents[1] and several other parties including electric vehicle manufacturers, charging service providers, environmental groups, consumer advocates, and others -- identified issues including tariff design, price signals, electric system impact, and enabling technology The Study results, with the use of the proposed experimental PEV rates, will help to inform the Commission in R.09-08-009 and provide relevant information going forward for the PEV industry, inside and outside California.

[1] The named respondents include Pacific Gas & Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, and Southern California Gas Company.

The use of the proposed experimental PEV rates coincident with the eTec/Nissan program will enhance other aspects under study during this PEV and charging facility deployment which could provide the Commission information to guide and encourage development of electric vehicle metering, the use of home electric vehicle charging infrastructure, PEV daily energy consumption profiles, and commercial and public charging infrastructure needs.

EXPERIMENTAL RESIDENTIAL TARIFF SCHEDULES

Well designed PEV tariffs can encourage charging during non-peak hours by establishing rates that are lowest during non-peak periods. SDG&E's proposed experimental rate schedules (Attachment A) represent PEV charging prices with varying on-peak to non on-peak pricing differentials, for two seasons (Summer & Winter), and will have the same TOU periods for each season.

SDG&E proposes three temporary residential experimental PEV rate schedules (one closely modeled after current rate Schedule EV-TOU), for use in the Study. These rates present time varying prices to the consumers. Each will offer PEV consumers the opportunity for low-cost PEV charging opportunities, and each rate schedule has differing prices by TOU period, where the price ratios between on-peak and non on-peak periods also differ.

Each of the new pricing variations incorporate a daily five-hour charging period from midnight to 5 am which will be subject to the lowest rates per kWh. SDG&E's proposed rate design assumption in selecting the five-hour window represents the time period (from midnight to 5 am) that reasonably approximates SDG&E's period of lowest system demand, and therefore the lowest cost. From a system perspective then, this creates the greatest opportunity for PEV drivers to charge the vehicle at the lowest possible cost. Increasing this period by more hours will increase this TOU price, reducing the opportunity for charging savings to those who could sufficiently charge between midnight and 5 am (super off-peak period). Since the purpose of the study is to better understand the value that PEV consumers place on achieving charging savings by observing the customer's charging time decisions and actions, it is important to include a rate with large pricing differences between the proposed three TOU periods. Expanding the super off-peak time period will raise the price of that period, and reduce the prices of the off-peak and on-peak periods, thereby reducing the price differences between TOU periods. This change will reduce the price incentives to charge off-peak and super off-peak. As proposed, these experimental rates provide the best opportunity to observe variations in PEV charging behavior when a consumer is making decisions regarding driving requirements (i.e., making judgments about how to best utilize super off-peak and off-peak pricing).

Participating customers will be randomly assigned to one of three rates for the duration of the Study. Random rate assignment is an essential requirement for Study integrity.

SDG&E developed the concept for this Study and the design of the proposed experimental rates in collaboration with all interested stakeholders in the AFV OIR and the San Diego region. SDG&E conducted three workshops (December 15, 2009, January 12, 2010 and January 22, 2010), as well as briefings with the CPUC staff, DRA, Commission Energy Division and UCAN to obtain input to improve the design of the experimental rates and the Study design. The

experimental rates proposed in this Advice Letter reflect that input, and DRA has expressed to SDG&E its concurrence with these rates. More active assistance from a Research Advisory Panel was sought from stakeholders with deeper backgrounds in PEV consumer behavior: University of California at Davis PHEV Research Center, Electric Power Research Institute Electric Transportation Program, University of San Diego EPIC Program, University of California at San Diego, CEC PIER Program, California utilities, and others (For additional detail regarding the proposed Study design, please see Attachment C).

The Study is designed for the purpose of understanding customer charging behavior in response to price. For proposed Schedules EPEV-M and EPEV-H, SDG&E designed the experimental rates by varying the Total Rate Adjustment Component (TRAC) to achieve specific ratios between on-peak, off-peak and super off-peak prices in order to avoid any disputes over the appropriate cost-based level of distribution, transmission, or other component price levels. This rate design methodology also allows SDG&E to recover non-bypassable charges (such as Public Purpose Program, DWR Bond, etc.) consistently among the pricing alternatives. Varying TRAC therefore allows SDG&E to set the total prices at desired levels to test and measure consumer responses to price by time-of-use period. To demonstrate this rate design concept (of varying TRAC), Attachment B contains the proposed experimental PEV rates by component.

SDG&E will operate and fund the Study using existing utility staff, existing electric 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.

EFFECTIVE DATE

SDG&E believes that this filing is subject to Energy Division disposition and should be classified as Tier 3 (effective after Commission approval) pursuant to GO 96-B.

PROTEST

Anyone may protest this advice letter to the Commission. The protest must state the grounds upon which it is based, including such items as financial and service impacts, and should be submitted expeditiously. The protest must be made in writing and received within 20 days of the date this advice letter was filed with the CPUC. There is no restriction on who may file a protest. The address for mailing or delivering a protest to the Commission is:

CPUC Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Copies of the protest should also be sent via e-mail to the attention of both Honesto Gatchalian (jnj@cpuc.ca.gov) and Maria Salinas (mas@cpuc.ca.gov) of the Energy Division. A copy of the protest should also be sent via both e-mail and facsimile to the address shown below on the same date it is mailed or delivered to the Commission.

Attn: Megan Caulson
Regulatory Tariff Manager
8330 Century Park Court, Room 32C
San Diego, CA 92123-1548
Facsimile No. (858) 654-1788
E-mail: mcaulson@semprautilities.com

NOTICE

A copy of this filing has been served on the utilities and interested parties shown on the attached list, including interested parties to service list R.09-08-009 by either providing them a copy electronically or by mailing them a copy hereof, properly stamped and addressed.

Address changes should be directed to SDG&E Tariffs by facsimile at (858) 654-1788 or by e-mail at SDG&ETariffs@semprautilities.com.

RON VAN DER LEEDEN
Director – Rates, Revenues & Tariffs

(cc list enclosed)

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY
ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No. **SAN DIEGO GAS & ELECTRIC (U 902)**

Utility type:
☒ ELC ☐ GAS
☐ PLC ☐ HEAT ☐ WATER

Contact Person: Megan Caulson
Phone #: (858) 654-1748
E-mail: MCaulson@SempraUtilities.com

EXPLANATION OF UTILITY TYPE
ELC = Electric GAS = Gas
PLC = Pipeline HEAT = Heat WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: 2157-E

Subject of AL: Establishment of Experimental Electric Plug-in Vehicle (PEV) Rates

Keywords (choose from CPUC listing): Rates, Electric Vehicle

AL filing type: ☐ Monthly ☐ Quarterly ☐ Annual ☒ One-Time ☐ Other

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution #:

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL

Summarize differences between the AL and the prior withdrawn or rejected AL[1]

Does AL request confidential treatment? If so, provide explanation:

Resolution Required? ☒ Yes ☐ No Tier Designation: ☐ 1 ☐ 2 ☒ 3

Requested effective date: No. of tariff sheets: 11

Estimated system annual revenue effect: (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: Schedules EPEV-L, EPEV-M, and EPEV-H, Table of Contents

Service affected and changes proposed[1]: N/A

Pending advice letters that revise the same tariff sheets: N/A

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Ave.,
San Francisco, CA 94102
mas@cpuc.ca.gov and jnj@cpuc.ca.gov

San Diego Gas & Electric
Attention: Megan Caulson
8330 Century Park Ct, Room 32C
San Diego, CA 92123
mcaulson@semprautilities.com

[1] Discuss in AL if more space is needed.

General Order No. 96-B
ADVICE LETTER FILING MAILING LIST

cc: (w/enclosures)

Public Utilities Commission
DRA
D. Appling
S. Cauchois
J. Greig
R. Pocta
W. Scott
Energy Division
P. Clanon
S. Gallagher
H. Gatchalian
D. Lafrenz
M. Salinas
CA. Energy Commission
F. DeLeon
R. Tavares
Alcantar & Kahl LLP
K. Harteloo
American Energy Institute
C. King
APS Energy Services
J. Schenk
BP Energy Company
J. Zaiontz
Barkovich & Yap, Inc.
B. Barkovich
Bartle Wells Associates
R. Schmidt
Braun & Blaising, P.C.
S. Blaising
California Energy Markets
S. O'Donnell
C. Sweet
California Farm Bureau Federation
K. Mills
California Wind Energy
N. Rader
CCSE
S. Freedman
J. Porter
Children's Hospital & Health Center
T. Jacoby
City of Chula Vista
M. Meacham
E. Hull
City of Poway
R. Willcox
City of San Diego
J. Cervantes
G. Lonergan
M. Valerio
Commerce Energy Group
V. Gan
Constellation New Energy
W. Chen
CP Kelco
A. Friedl
Davis Wright Tremaine, LLP
E. O'Neill
J. Pau
Dept. of General Services
H. Nanjo
M. Clark
Douglass & Liddell
D. Douglass
D. Liddell
G. Klatt
Duke Energy North America
M. Gillette
Dynegy, Inc.
J. Paul
Ellison Schneider & Harris LLP
E. Janssen
Energy Policy Initiatives Center (USD)
S. Anders
Energy Price Solutions
A. Scott
Energy Strategies, Inc.
K. Campbell
M. Scanlan
Goodin, MacBride, Squeri, Ritchie & Day
B. Cragg
J. Heather Patrick
J. Squeri
Goodrich Aerostructures Group
M. Harrington
Hanna and Morton LLP
N. Pedersen
Itsa-North America
L. Belew
J.B.S. Energy
J. Nahigian
Luce, Forward, Hamilton & Scripps LLP
J. Leslie
Manatt, Phelps & Phillips LLP
D. Huard
R. Keen
Matthew V. Brady & Associates
M. Brady
Modesto Irrigation District
C. Mayer
Morrison & Foerster LLP
P. Hanschen
MRW & Associates
D. Richardson
OnGrid Solar
Andy Black
Pacific Gas & Electric Co.
J. Clark
M. Huffman
S. Lawrie
E. Lucha
Pacific Utility Audit, Inc.
E. Kelly
R. W. Beck, Inc.
C. Elder
School Project for Utility Rate Reduction
M. Rochman
Shute, Mihaly & Weinberger LLP
O. Armi
Solar Turbines
F. Chiang
Sutherland Asbill & Brennan LLP
K. McCrea
Southern California Edison Co.
M. Alexander
K. Cini
K. Gansecki
H. Romero
TransCanada
R. Hunter
D. White
TURN
M. Florio
M. Hawiger
UCAN
M. Shames
U.S. Dept. of the Navy
K. Davoodi
N. Furuta
L. DeLacruz
Utility Specialists, Southwest, Inc.
D. Koser
Western Manufactured Housing Communities Association
S. Dey
White & Case LLP
L. Cottle
Interested Parties
R.09-08-009

ATTACHMENT A
ADVICE LETTER 2157-E

Cal. P.U.C. Sheet No.	Title of Sheet	Canceling Cal. P.U.C. Sheet No.
Original 21651-E	SCHEDULE EPEV-L, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - LOW RATIO, Sheet 1	
Original 21652-E	SCHEDULE EPEV-L, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - LOW RATIO, Sheet 2	
Original 21653-E	SCHEDULE EPEV-L, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - LOW RATIO, Sheet 3	
Original 21654-E	SCHEDULE EPEV-M, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - MEDIUM RATIO, Sheet 1	
Original 21655-E	SCHEDULE EPEV-M, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - MEDIUM RATIO, Sheet 2	
Original 21656-E	SCHEDULE EPEV-M, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - MEDIUM RATIO, Sheet 3	
Original 21657-E	SCHEDULE EPEV-H, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - HIGH RATIO, Sheet 1	
Original 21658-E	SCHEDULE EPEV-H, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - HIGH RATIO, Sheet 2	
Original 21659-E	SCHEDULE EPEV-H, DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - HIGH RATIO, Sheet 3	
Revised 21660-E	TABLE OF CONTENTS, Sheet 1	Revised 21643-E
Revised 21661-E	TABLE OF CONTENTS, Sheet 4	Revised 21603-E

SCHEDULE EPEV-L

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - LOW RATIO

APPLICABILITY

This is an experimental bundled service schedule available to selected (as described in Special Condition 1) residential customers exclusively for charging a plug-in electric vehicle (PEV). The PEV must be a currently registered Motor Vehicle, as defined by the California Motor Vehicle Code. This schedule is not available to customers with a conventional charge sustaining (battery recharged solely from the vehicle's on-board generator) hybrid electric vehicle (HEV).

This experimental schedule shall 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 Schedule EV-TOU-3. The purpose of this experimental schedule is to better understand residential customer time-of-use charging preferences and to estimate the price elasticity of demand for PEV charging. Customers that are selected to participate will be randomly assigned to an experimental PEV rate schedule.

TERRITORY

Within the entire territory served by the utility.

RATES

Description – EPEV-L	UDC Total (See Chart Below)	EECC Rate	DWR-BC Rate	Total Rate
Minimum Bill ($/day)	**0.1700**			
Energy Charges ($/kWh)				
On-Peak – Summer	**0.09479**	0.17051	0.00515	**0.27045**
Off-Peak – Summer	**0.09268**	0.06676	0.00515	**0.16459**
Super Off-Peak – Summer	**0.09243**	0.04115	0.00515	**0.13873**
On-Peak – Winter	**0.09302**	0.07628	0.00515	**0.17445**
Off-Peak – Winter	**0.09268**	0.06925	0.00515	**0.16708**
Super Off-Peak - Winter	**0.09243**	0.04332	0.00515	**0.14090**

Description – UDC Total	Transm	Distr	PPP	ND	CTC	RS	TRAC	UDC Total
Minimum Bill ($/day)								**0.1700**
Energy Charges ($/kWh)								
On-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00254	0.00066	0.00000	**0.09479**
Off-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	0.00000	**0.09268**
Super Off-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	0.00000	**0.09243**
On-Peak – Winter	0.01318	0.07151	0.00644	0.00046	0.00077	0.00066	0.00000	**0.09302**
Off-Peak – Winter	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	0.00000	**0.09268**
Super Off-Peak - Winter	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	0.00000	**0.09243**

Notes: Transmission Energy charges include the Transmission Revenue Balancing Account Adjustment (TRBAA) of $(0.00029) per kWh and the Transmission Access Charge Balancing Account Adjustment (TACBAA) of $(0.00006) per kWh. PPP rate is composed of: Low Income PPP rate (LI-PPP) $0.00233/kWh, Non-low Income PPP rate (Non-LI-PPP) $0.00217kWh (pursuant to PU Code Section 399.8, the Non-LI-PPP rate may not exceed January 1, 2000 levels), and Procurement Energy Efficiency Surcharge Rate of $0.00194 /kWh.

(Continued)

SCHEDULE EPEV-L

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - LOW RATIO

RATES (Continued)

Minimum Bill

The minimum bill is calculated as the minimum bill charge per day times the number of days in the billing cycle. Rate components under the minimum bill, including charges associated with Schedule EECC (Electric Energy Commodity Cost), will be calculated based on average minimum bill usage.

Rate Components

The Utility Distribution Company Total Rates (UDC Total) shown above are comprised of the following components (if applicable): (1) Transmission (Trans) Charges, (2) Distribution (Distr) Charges, (3) Public Purpose Program (PPP) Charges, (4) Nuclear Decommissioning (ND) Charge, (5) Ongoing Competition Transition Charges (CTC), (6) Reliability Services (RS), and (7) the Total Rate Adjustment Component (TRAC).

Franchise Fee Differential

A Franchise Fee Differential of 5.78% will be applied to the monthly billings calculated under this schedule for all customers within the corporate limits of the City of San Diego. Such Franchise Fee Differential shall be so indicated and added as a separate item to bills rendered to such customers.

Time Periods

All time periods listed are applicable to actual "clock" time.

	On-Peak	12 Noon - 8 p.m. Daily
	Super Off-Peak	12 Midnight - 5 a.m. Daily
	Off-Peak	8 p.m. – 12 Midnight Daily and 5 a.m. – 12 Noon Daily
Seasons:	Summer	May 1 - October 31
	Winter	November 1 - April 30

The time periods shown above will begin and end one hour later for the period between the second Sunday in March and the first Sunday in April, and for the period between the last Sunday in October and the first Sunday in November.

SPECIAL CONDITIONS

1. Limitation on Availability. This schedule is available to customers who have been selected to participate based on criteria developed by Electric Transportation Engineering Company (“eTec”) and Nissan to screen (in) potential Leaf participants or drivers. Among other criteria, Nissan may require from each driver the expectation of 800 miles per month minimum PEV use, with potentially other qualifications from eTec regarding the condition of the home suitability for a charging facility. No more than 1,000 customers shall be selected to participate in the Study. Customers that are selected to participate will be randomly assigned to an experimental PEV rate schedule.

(Continued)

SCHEDULE EPEV-L

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - LOW RATIO

SPECIAL CONDITIONS (Continued)

Limitation on Availability (Continued)

This schedule can *not* be taken in combination with a Net Energy Metering (NEM) tariff. NEM customers are allowed to participate in the experimental rate study, but usage related to PEV charging will be separately metered and billed and excluded from benefits under NEM. NEM customers will continue to net meter their remaining household load.

2. Metering. The point of service must contain facilities to separately meter PEV charging facilities. The customer shall supply, at no expense to the Utility, a suitable location for meters and associated equipment used for billing and load research. The Utility shall supply, own, and maintain all necessary meters and associated equipment utilized for billings. In addition, and for purposes of monitoring customer load, the Utility may install, at its expense, load research metering.

3. Term of Service: This experimental rate shall remain in effect until November 30, 2012 (or until the completion of the study). A customer receiving service under this schedule may elect to change to another applicable rate schedule but only after receiving service on this schedule for at least 12 consecutive months.

SCHEDULE EPEV-M

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - MEDIUM RATIO

APPLICABILITY

This is an experimental bundled service schedule available to selected (as described in Special Condition 1) residential customers exclusively for charging a plug-in electric vehicle (PEV). The PEV must be a currently registered Motor Vehicle, as defined by the California Motor Vehicle Code. This schedule is not available to customers with a conventional charge sustaining (battery recharged solely from the vehicle's on-board generator) hybrid electric vehicle (HEV).

This experimental schedule shall 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 Schedule EV-TOU-3. The purpose of this experimental schedule is to better understand residential customer time-of-use charging preferences and to estimate the price elasticity of demand for PEV charging. Customers that are selected to participate will be randomly assigned to an experimental PEV rate schedule.

TERRITORY

Within the entire territory served by the utility.

RATES

Description – EPEV-M	UDC Total (See Chart Below)	EECC Rate	DWR-BC Rate	Total Rate
Minimum Bill ($/day)	**0.1700**			
Energy Charges ($/kWh)				
On-Peak – Summer	**0.11669**	0.17051	0.00515	**0.29235**
Off-Peak – Summer	**0.11243**	0.06676	0.00515	**0.18434**
Super Off-Peak – Summer	**0.03004**	0.04115	0.00515	**0.07634**
On-Peak – Winter	**0.16422**	0.07628	0.00515	**0.24565**
Off-Peak – Winter	**0.08893**	0.06925	0.00515	**0.16333**
Super Off-Peak - Winter	**0.03253**	0.04332	0.00515	**0.08100**

Description – UDC Total	Transm	Distr	PPP	ND	CTC	RS	TRAC	UDC Total
Minimum Bill ($/day)								**0.1700**
Energy Charges ($/kWh)								
On-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00254	0.00066	0.02190	**0.11669**
Off-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	0.01975	**0.11243**
Super Off-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.06239)	**0.03004**
On-Peak – Winter	0.01318	0.07151	0.00644	0.00046	0.00077	0.00066	0.07120	**0.16422**
Off-Peak – Winter	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	(0.00375)	**0.08893**
Super Off-Peak - Winter	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.05990)	**0.03253**

Notes: Transmission Energy charges include the Transmission Revenue Balancing Account Adjustment (TRBAA) of $(0.00029) per kWh and the Transmission Access Charge Balancing Account Adjustment (TACBAA) of $(0.00006) per kWh. PPP rate is composed of: Low Income PPP rate (LI-PPP) $0.00233/kWh, Non-low Income PPP rate (Non-LI-PPP) $0.00217kWh (pursuant to PU Code Section 399.8, the Non-LI-PPP rate may not exceed January 1, 2000 levels), and Procurement Energy Efficiency Surcharge Rate of $0.00194 /kWh.

(Continued)

SCHEDULE EPEV-M

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - MEDIUM RATIO

RATES (Continued)

Minimum Bill

The minimum bill is calculated as the minimum bill charge per day times the number of days in the billing cycle. Rate components under the minimum bill, including charges associated with Schedule EECC (Electric Energy Commodity Cost), will be calculated based on average minimum bill usage.

Rate Components

The Utility Distribution Company Total Rates (UDC Total) shown above are comprised of the following components (if applicable): (1) Transmission (Trans) Charges, (2) Distribution (Distr) Charges, (3) Public Purpose Program (PPP) Charges, (4) Nuclear Decommissioning (ND) Charge, (5) Ongoing Competition Transition Charges (CTC), (6) Reliability Services (RS), and (7) the Total Rate Adjustment Component (TRAC).

The TRAC under this schedule is adjusted by time-of-use period so that total rates are set at levels to test and measure consumer responses to the price of electricity at different times.

Franchise Fee Differential

A Franchise Fee Differential of 5.78% will be applied to the monthly billings calculated under this schedule for all customers within the corporate limits of the City of San Diego. Such Franchise Fee Differential shall be so indicated and added as a separate item to bills rendered to such customers.

Time Periods

All time periods listed are applicable to actual "clock" time.

	On-Peak	12 Noon - 8 p.m. Daily
	Super Off-Peak	12 Midnight - 5 a.m. Daily
	Off-Peak	8 p.m. – 12 Midnight Daily and 5 a.m. – 12 Noon Daily
Seasons:	Summer	May 1 - October 31
	Winter	November 1 - April 30

The time periods shown above will begin and end one hour later for the period between the second Sunday in March and the first Sunday in April, and for the period between the last Sunday in October and the first Sunday in November.

SPECIAL CONDITIONS

1. Limitation on Availability. This schedule is available to customers who have been selected to participate based on criteria developed by Electric Transportation Engineering Company (“eTec”) and Nissan to screen (in) potential Leaf participants or drivers. Among other criteria, Nissan may require from each driver the expectation of 800 miles per month minimum PEV use, with potentially other qualifications from eTec regarding the condition of the home suitability for a charging facility. No more than 1,000 customers shall be selected to participate in the Study. Customers that are selected to participate will be randomly assigned to an experimental PEV rate schedule.

(Continued)

SCHEDULE EPEV-M

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - MEDIUM RATIO

SPECIAL CONDITIONS (Continued)

Limitation on Availability (Continued)

This schedule can *not* be taken in combination with a Net Energy Metering (NEM) tariff. NEM customers are allowed to participate in the experimental rate study, but usage related to PEV charging will be separately metered and billed and excluded from benefits under NEM. NEM customers will continue to net meter their remaining household load.

2. Metering. The point of service must contain facilities to separately meter PEV charging facilities. The customer shall supply, at no expense to the Utility, a suitable location for meters and associated equipment used for billing and load research. The Utility shall supply, own, and maintain all necessary meters and associated equipment utilized for billings. In addition, and for purposes of monitoring customer load, the Utility may install, at its expense, load research metering.

3. Term of Service: This experimental rate shall remain in effect until November 30, 2012 (or until the completion of the study). A customer receiving service under this schedule may elect to change to another applicable rate schedule but only after receiving service on this schedule for at least 12 consecutive months.

SCHEDULE EPEV-H

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - HIGH RATIO

APPLICABILITY

This is an experimental bundled service schedule available to selected (as described in Special Condition 1) residential customers exclusively for charging a plug-in electric vehicle (PEV). The PEV must be a currently registered Motor Vehicle, as defined by the California Motor Vehicle Code. This schedule is not available to customers with a conventional charge sustaining (battery recharged solely from the vehicle's on-board generator) hybrid electric vehicle (HEV).

This experimental schedule shall 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 Schedule EV-TOU-3. The purpose of this experimental schedule is to better understand residential customer time-of-use charging preferences and to estimate the price elasticity of demand for PEV charging. Customers that are selected to participate will be randomly assigned to an experimental PEV rate schedule.

TERRITORY

Within the entire territory served by the utility.

RATES

Description –EPEV-H	UDC Total (See Chart Below)	EECC Rate	DWR-BC Rate	Total Rate
Minimum Bill ($/day)	**0.1700**			
Energy Charges ($/kWh)				
On-Peak – Summer	**0.20815**	0.17051	0.00515	**0.38381**
Off-Peak – Summer	**0.08161**	0.06676	0.00515	**0.15352**
Super Off-Peak – Summer	**0.02092**	0.04115	0.00515	**0.06722**
On-Peak – Winter	**0.25353**	0.07628	0.00515	**0.33496**
Off-Peak – Winter	**0.05958**	0.06925	0.00515	**0.13398**
Super Off-Peak - Winter	**0.02092**	0.04332	0.00515	**0.06939**

Description – UDC Total	Transm	Distr	PPP	ND	CTC	RS	TRAC	UDC Total
Minimum Bill ($/day)								**0.1700**
Energy Charges ($/kWh)								
On-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00254	0.00066	0.11336	**0.20815**
Off-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	(0.01107)	**0.08161**
Super Off-Peak – Summer	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.07151)	**0.02092**
On-Peak – Winter	0.01318	0.07151	0.00644	0.00046	0.00077	0.00066	0.16051	**0.25353**
Off-Peak – Winter	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	(0.03310)	**0.05958**
Super Off-Peak - Winter	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.07151)	**0.02092**

Notes: Transmission Energy charges include the Transmission Revenue Balancing Account Adjustment (TRBAA) of $(0.00029) per kWh and the Transmission Access Charge Balancing Account Adjustment (TACBAA) of $(0.00006) per kWh. PPP rate is composed of: Low Income PPP rate (LI-PPP) $0.00233/kWh, Non-low Income PPP rate (Non-LI-PPP) $0.00217kWh (pursuant to PU Code Section 399.8, the Non-LI-PPP rate may not exceed January 1, 2000 levels), and Procurement Energy Efficiency Surcharge Rate of $0.00194 /kWh.

(Continued)

SCHEDULE EPEV-H

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - HIGH RATIO

RATES (Continued)

Minimum Bill

The minimum bill is calculated as the minimum bill charge per day times the number of days in the billing cycle. Rate components under the minimum bill, including charges associated with Schedule EECC (Electric Energy Commodity Cost), will be calculated based on average minimum bill usage.

Rate Components

The Utility Distribution Company Total Rates (UDC Total) shown above are comprised of the following components (if applicable): (1) Transmission (Trans) Charges, (2) Distribution (Distr) Charges, (3) Public Purpose Program (PPP) Charges, (4) Nuclear Decommissioning (ND) Charge, (5) Ongoing Competition Transition Charges (CTC), (6) Reliability Services (RS), and (7) the Total Rate Adjustment Component (TRAC).

The TRAC under this schedule is adjusted by time-of-use period so that total rates are set at levels to test and measure consumer responses to the price of electricity at different times.

Franchise Fee Differential

A Franchise Fee Differential of 5.78% will be applied to the monthly billings calculated under this schedule for all customers within the corporate limits of the City of San Diego. Such Franchise Fee Differential shall be so indicated and added as a separate item to bills rendered to such customers.

Time Periods

All time periods listed are applicable to actual "clock" time.

	On-Peak	12 Noon - 8 p.m. Daily
	Super Off-Peak	12 Midnight - 5 a.m. Daily
	Off-Peak	8 p.m. – 12 Midnight Daily and 5 a.m. – 12 Noon Daily
Seasons:	Summer	May 1 - October 31
	Winter	November 1 - April 30

The time periods shown above will begin and end one hour later for the period between the second Sunday in March and the first Sunday in April, and for the period between the last Sunday in October and the first Sunday in November.

SPECIAL CONDITIONS

1. Limitation on Availability. This schedule is available to customers who have been selected to participate based on criteria developed by Electric Transportation Engineering Company (“eTec”) and Nissan to screen (in) potential Leaf participants or drivers. Among other criteria, Nissan may require from each driver the expectation of 800 miles per month minimum PEV use, with potentially other qualifications from eTec regarding the condition of the home suitability for a charging facility. No more than 1,000 customers shall be selected to participate in the Study. Customers that are selected to participate will be randomly assigned to an experimental PEV rate schedule.

(Continued)

SCHEDULE EPEV-H

DOMESTIC EXPERIMENTAL PLUG-IN ELECTRIC VEHICLE SERVICE - HIGH RATIO

SPECIAL CONDITIONS (Continued)

Limitation on Availability (Continued)

This schedule can *not* be taken in combination with a Net Energy Metering (NEM) tariff. NEM customers are allowed to participate in the experimental rate study, but usage related to PEV charging will be separately metered and billed and excluded from benefits under NEM. NEM customers will continue to net meter their remaining household load.

2. Metering. The point of service must contain facilities to separately meter PEV charging facilities. The customer shall supply, at no expense to the Utility, a suitable location for meters and associated equipment used for billing and load research. The Utility shall supply, own, and maintain all necessary meters and associated equipment utilized for billings. In addition, and for purposes of monitoring customer load, the Utility may install, at its expense, load research metering.

3. Term of Service: This experimental rate shall remain in effect until November 30, 2012 (or until the completion of the study). A customer receiving service under this schedule may elect to change to another applicable rate schedule but only after receiving service on this schedule for at least 12 consecutive months.

TABLE OF CONTENTS

The following sheets contain all the effective rates and rules affecting rates, service and information relating thereto, in effect on the date indicated herein.

(Continued)

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SCHEDULE OF RATES

(Continued)

Attachment B
SDG&E Advice Letter 2157-E
Proposed PEV Rate Tables

SAN DIEGO GAS & ELECTRIC COMPANY - ELECTRIC DEPARTMENT
RESIDENTIAL -- REVENUE-NEUTRAL EV TOU RATE STRUCTURE
BASED ON 01/01/2010 RATES

LINE NO.	DESCRIPTION (A)	UNITS (B)	TRANSMISSION RATE (C)	DISTRIBUTION RATE (D)	PPP RATE (E)	NUCLEAR DECOMMISSION RATE (F)	CTC RATE (G)	RS RATE (H)	TRAC RATE (I)	TOTAL UDC RATE (J)	EECC RATE (K)	DWR BOND RATE (L)	TOTAL RATE (M)	LINE NO.
1	**Rate 1: EPEV-L (Low Ratio)**													1
2	On-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00254	0.00066	0.00000	0.09479	0.17051	0.00515	**0.27045**	2
3	Off-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	0.00000	0.09268	0.06676	0.00515	**0.16459**	3
4	Super Off-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	0.00000	0.09243	0.04115	0.00515	**0.13873**	4
5	On-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00077	0.00066	0.00000	0.09302	0.07628	0.00515	**0.17445**	5
6	Off-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	0.00000	0.09268	0.06925	0.00515	**0.16708**	6
7	Super Off-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	0.00000	0.09243	0.04332	0.00515	**0.14090**	7
8														8
9	**Rate 2: EPEV-M (Medium Ratio)**													9
10	On-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00254	0.00066	0.02190	0.11669	0.17051	0.00515	**0.29235**	10
11	Off-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	0.01975	0.11243	0.06676	0.00515	**0.18434**	11
12	Super Off-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.06239)	0.03004	0.04115	0.00515	**0.07634**	12
13	On-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00077	0.00066	0.07120	0.16422	0.07628	0.00515	**0.24565**	13
14	Off-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	(0.00375)	0.08893	0.06925	0.00515	**0.16333**	14
15	Super Off-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.05990)	0.03253	0.04332	0.00515	**0.08100**	15
16														16
17	**Rate 3: EPEV-H (High Ratio)**													17
18	On-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00254	0.00066	0.11336	0.20815	0.17051	0.00515	**0.38381**	18
19	Off-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	(0.01107)	0.08161	0.06676	0.00515	**0.15352**	19
20	Super Off-Peak: Summer	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.07151)	0.02092	0.04115	0.00515	**0.06722**	20
21	On-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00077	0.00066	0.16051	0.25353	0.07628	0.00515	**0.33496**	21
22	Off-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00043	0.00066	(0.03310)	0.05958	0.06925	0.00515	**0.13398**	22
23	Super Off-Peak: Winter	$/kWh	0.01318	0.07151	0.00644	0.00046	0.00018	0.00066	(0.07151)	0.02092	0.04332	0.00515	**0.06939**	23

Attachment C
SDG&E Advice Letter 2157-E
Details of PEV TOU Pricing and Technology Study

Understanding the Impact of Electricity Pricing & Technology on Consumer PEV Time-of-Use Charging Behavior

Research, Development & Demonstration Proposal*

January 29, 2010

Prepared by

San Diego Gas & Electric Company
Southern California Gas Company

*This work has been updated for Advice Letter 2157-E, U 902-E, March 26, 2010 – please see the final page of this document for a summary of updates since the January 29, 2010 version of this Proposal.

Understanding the Impact of Electricity Pricing & Technology on Consumer PEV Time-of-Use Charging Behavior

The research planning process included contributions from the following individuals and organizations:

Research Advisory Panel

- UC Davis, Tom Turrentine, PHEV Research Center
- EPRI, Bernie Neenan, Electric Transportation Program
- USD-EPIC, Scott Anders (& Nilmini Silva-Send)
- UCSD, Professor Graff Zivin (& Ben Gilbert)
- CEC-PIER, Phil Misemer
- US EPA, Zoltan Jung
- CCSE, Mike Ferry
- SCE, Russ Garwacki
- SMUD, Bill Boyce
- eTec, Don Karner
- Coulomb Technologies, Richard Lowenthal
- Boulder Energy Group, Bill Le Blanc
- EEI, Rick Tempchin
- CPUC Staff

SEU Research Design Team

- Clean Transportation – Jeff Reed, Greg Haddow, Joel Pointon, Chris Chen, James Ozenne, Aline Dew & Jason Greenblatt
- Smart Grid / Electric T&D – Lee Krevat, Tom Bialek & Mike Turner
- Rate Design – Lisa Davidson, Bob Hansen & Candice Churchwell
- Load Research – Leslie Willoughby & Kathryn Smith
- Consumer Research – Pat Kuhl
- Smart Meter / Metering – Ted Reguly, John Vanderlinde, Sydney Furbush & JC Martin
- Customer Services – Ed Fong & Bill Saxe
- Billing – Ken Clay & Cindy De La Rosa
- Resource Planning – Rob Anderson & Dave Barker
- Project Management – John Hayes
- Regulatory – Despina Neihaus & Billy Blattner
- Legal – Steve Patrick

Understanding the Impact of Electricity Pricing & Technology on Consumer PEV Time-of-Use Charging Behavior ("Study")
Research, Development & Demonstration Proposal

Proposed by
San Diego Gas & Electric Company
Southern California Gas Company

OBJECTIVE

The objective of the Study is to benefit California's understanding of the electric vehicle market by making use of San Diego Gas & Electric Company and Southern California Gas Company, the Sempra Energy Utilities' ("SEU") current collaboration with Electric Transportation Engineering Company ("eTec") and Nissan, to study consumer time-of-use ("TOU") charging preferences, the use of smart-charging enabling technology (for charging the plug-in electric vehicle or "PEV"), and other relevant factors, through a Study that includes the use of CPUC-approved experimental rates.[1] Research results and insights gained from the Study will be valuable to the ongoing alternative fuel vehicle ("AFV") rulemaking (R.09-08-009), and contribute to shaping the future of electric vehicle transportation. With the Commission's authorization to test experimental rate designs, California will also be able to better characterize and understand consumer charging behavior. This 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 price differential, the overall electricity price level, prices of substitutes, customer demographics, and other factors. The research proposal presented here is designed to maximize the unique opportunity the eTec / Nissan project provides for acquiring applicable and timely findings.

BACKGROUND

The San Diego region is one of five regional areas selected as test sites for evaluating PEVs and will receive funding for charging infrastructure beginning in 2010 from eTec.[2] This is the result of stimulus award granted from the United States Department of Energy ("DOE") to eTec for the five region project. This award was announced August 5, 2009 and will provide residential chargers for the first 1,000 qualifying Nissan Electric Vehicle

[1] Described in SEU's answer to question 21, Opening Comments, alternative fuel vehicle rulemaking (R.09-08-009), filed October 5, 2009.

[2] PEV (Plug-in Electric Vehicle) refers to a vehicle that uses a plug-in electric connection to charge a battery for transportation (e.g., a BEV or PHEV). The focus of the proposed Study is on the Nissan Leaf. The Leaf is a BEV (Battery Electric Vehicle), a 100% electric motor drive vehicle that uses stored electric battery power. These vehicles are also called Zero Emission Vehicles by the California Air Resources Board (CARB) due to the fact that they do not have tailpipe emissions. This is contrasted with a Plug-in Hybrid Electric Vehicle (PHEV) which is a hybrid vehicle with a plug-in feature with a larger battery. Some models are only powered by electric motors and gives a certain amount of "all-electric drive range" miles from the battery before using a small gasoline engine to generate "on-board electricity" (e.g. Chevy Volt).

(known as the Leaf) purchases in the region[3]. On August 8, 2009, the CEC awarded eTec $8 million as matching funding for this project, which will result in additional infrastructure being deployed to the San Diego region. Please see Appendix A for utility distribution infrastructure related efforts. Please see Appendix B for summary background on the Project.

WORKING HYPOTHESIS

It is expected that time-varying pricing combined with the use of vehicle technology will influence consumer charging behavior. In particular, greater price variations are expected to drive more charging activity to off-peak periods. Technology should make charging off-peak more accommodating. In order to design charging rates for the mass introduction of PEVs, these suppositions need to be verified and quantified.

As used here, "technology" (sometimes referred to as "smart technology") refers to communication and control devices that will facilitate charging behavior that is convenient and economic to the consumer. It is expected that consumers will use technology at the PEV end-use level to facilitate "smart charging" behavior. "Smart charging" is defined as charging at times that are both convenient and economic to the consumer, and compatible with the efficient operation of the utility system. The proposed research design for this Study will examine the relationship between time variant pricing and the consumer's use of technology, while controlling for other consumer factors.

RESEARCH DELIVERABLES

The Study is to yield the following:

- Create a model that explains the impact of time-varying rates on PEV charging behaviors.
- Evaluate the relationship between PEV charging behavior (at in-home, and non-home charging facilities) and time-variant pricing, the use of technology, and other relevant factors).
- Develop load profiles that characterize observed PEV charging load shapes, daily and in aggregate (e.g., average week-day, weekend, and season).

Timeline & Milestones

Timeframe	Milestone
Detailed Research Design Phase	
Oct 1, 2009	DOE Contract Completed
Nov 18, 2009	Announcement of EV Pricing Pilot at the AFV PHC
Dec 2009 to Jan 2010	All-stakeholders Workshop held on December 15, 2009,

[3] These chargers will be Level II (240V – J1772 compliant). The project will also provide approximately 1400 additional Level II Public/Commercial Chargers (240V that can accommodate all J1172 compliant vehicles) and 50 Fast Charge Units (480V). Qualifying drivers must have an expected 800 vehicle miles traveled (VMT) per month and commitment to have wireless internet router in the home.

	and January 22, 2010 to commence the facilitation of input from interested parties for developing a draft high level research plan by January 29, 2010
Dec 2009 to March 2010	Project planning with SEU / eTec / Nissan team to develop detailed research plan (Blueprint Phase)
March 2010	Detailed research plan submitted with Advice Letter Filing to the CPUC requesting approval for proposed experimental PEV rates
July to October 2010	Infrastructure installations commence
July to August 2010	CPUC approval of experimental rates (Advice Letter)
June 2010 to Feb 2011-on	Solicitation of PEV drivers / education & outreach
Dec 2010	Vehicle launch
June 2011	Infrastructure installation completed
Data Collection & Analysis Phase	
Dec 2010 to Feb 2013	Study commences (data gathering, data transfer & progress reporting)
February 2012	Study interim findings reported
July 2013	Study completed (unless Study timeline is extended to gather additional data)
September 2013	Final report
Note: Reporting Quarterly to DOE by eTec; track Project at: TheEVProject.com	

METHODOLOGY & OPERATIONAL DEFINITIONS

Model of PEV Charging Behavior

The purpose of the Study is to ascertain to what extent the level and structure of the electric retail rates offered to PEV customers influence when he or she charges the vehicle. Each experimental rate is designed in varying degrees to send a price signal to influence the consumer regarding at-home PEV charging and times when electricity is cheaper to supply, which can improve the economics of PEV ownership.

Two rate design factors are under examination. First, is the effect of the level of nominal and relative electricity rates ($/kWh) assessed for charging a PEV at home under a residential tariff. The Study proposes to charge different rates for charging at different times of the day that correspond to electricity supply costs (referred to as “On-Peak,” “Off-Peak” and “Super Off-Peak”). Rates during the On-Peak time of day will be higher than those at the Super-Off-Peak times starting at midnight and extending through the early morning hours. It is assumed that consumers will be induced by these price differences to charge the PEV during the lowest cost periods of the day. It is important then to determine how large a rate differential is needed to accomplish this, as well as what factors, other than the rates, influence charging behavior.

A related issue is how day (On-Peak) and evening (Off-Peak) are defined in terms of hours of the day. It is assumed that the earlier the lower rates are available in the evening, the easier it is for PEV owners to charge their vehicle fully. However, because system electricity usage (and therefore marginal supply cost) is high in the evenings (e.g., from 5 PM to 10 PM), charging rates have to be higher to reflect the cost of supply during those time periods.

This Study intends to sort out these effects to the extent to which prices and the specification of when they are low and high influence at-home charging. The Study therefore includes experimental rate schedules (or rate treatments) that vary according to the daily prices for charging and the hours to which they apply. The observed charging patterns will provide the data needed to better understand these influences and contribute to the eventual application for designing effective PEV rates in the future.

Time-of-Use Charging behavior will be characterized by a specification of the demand for electricity. This demand formulation has been used elsewhere to characterize household electricity demand under conventional time-of-use pricing, and more recently to estimate the substitution effect for more dynamic time-varying rates like Real-Time Pricing, Critical-Peak Pricing and Variable-Peak Pricing.[4] Notably, a variation of this formulation has been used to estimate substitution elasticities using the data gathered during the California pricing experiment in 2003 to 2004.[5]

Dependent Variable

Time-of-Use Charging

TOU Charging is defined as the ratio of on-peak charging kWh to non on-peak charging kWh per unit of time (e.g., day, month, season, year). Each participant will be on a PEV rate whereby vehicle charging is separately metered. Where possible, TOU Charging data will be gathered on a 15 minute interval or hourly basis (aggregated to TOU periods) using an Interval Data Recorder ("IDR") or AMI / smart meter.[6] For example, on a per day basis, this variable can be measured as follows:

- Total On-Peak kWh / Total Off-Peak kWh,
- Total On-Peak kWh/ Total Super Off-Peak kWh, and
- Total Off-Peak kWh / Total Super Off-Peak kWh.

These values can be aggregated by TOU and by any aggregation of time (e.g., week, week-end, and season).

[4] For a summary of estimates see: Neenan, B., January 2008. Eom. J. Price Elasticity of Demand for Electricity; Price Elasticity of Demand for Electricity: A Primer and Synthesis. EPRI, Palo Alto, CA: 2007, 1016264: Faruqui, A., Hladek, R., Sergici, S. January 2010. Rethinking Pricing - The Changing Architecture of Electricity Pricing in America. Public Utilities Fortnightly. pp. 30-38.

[5] Charles River Associates. March 16, 2005. Impact Evaluation of the California State-Wide Pricing Pilot. Final Report. Available from the California Energy Commission web site.

[6] Hourly TOU charging (load) data has the potential to be used for other purposes (e.g., creating hourly PEV load profiles aggregated by participant segment or in total, examining the duration of typical charge times).

Independent Variable

Time-Varying PEV Charging Rates (Pricing Treatment)

The proposed experimental time-varying PEV charging rates for this Study were developed following these guidelines:

- The definition of TOU periods is consistent with current Schedule EV-TOU
- Current TOU periods approximate periods of differing system demand (e.g., the Super Off-peak period of midnight to 5 AM reasonably approximates SDG&E's period of lowest system demand, and lowest cost; this TOU period creates the greatest opportunity for PEV drivers to charge the vehicle at the lowest possible cost).
- There will be 3 TOU periods, 7 days per week, with no seasonal variation
- Experimental PEV rates may not be indicative of future rate proposals
- The experimental PEV rates are proposed for this Study and intended to provide data for analysis of the price elasticity of demand
- Results of this Study could help to guide PEV rate design policy in the future
- Super-Off-Peak rates should not be less than the sum of the rate components: transmission, nonbypassables, and generation marginal energy costs
- On-Peak rates shouldn't greatly exceed residential customer rates for Tier 4 usage under their otherwise applicable residential rate
- There will be no "bill protection" (i.e., to "true up" the PEV customer's bill against an otherwise applicable PEV rate) since each proposed rate offers an opportunity for PEV customers to achieve savings above the current applicable EV-TOU rate. This requirement is essential to the Study in order to maintain the integrity of the research design and maintain the "pricing treatment" effectiveness.

To summarize, the pricing treatment will be PEV charging rates with varying on-peak to non on-peak pricing differentials, for two seasons (Summer & Winter for rate levels), and will have the same TOU periods for each season (Summer & Winter). Leaf customers will be randomly assigned to one of the experimental rates or pricing treatments (see Table 1.). Random assignment of participating customers to pricing (rate) treatments (vs. customer self selection) is critical to the Study to reduce or eliminate bias associated with a consumer selecting a rate that matches their driving profile / lifestyle. Randomization provides the means for understanding if charging behavior is due to pricing, driving profile / lifestyle, or other factors.

Each rate presents a price signal to the consumer for determining the most economic opportunity for PEV charging (see Table 2.). For example, corresponding with the TOU Charging as described above, on a per day basis, determining the price paid by consumers for PEV charging can be measured as follows:

- Total Cost of On-Peak kWh / Total Cost of Off-Peak kWh,
- Total Cost of On-Peak kWh/ Total Cost of Super Off-Peak kWh, and
- Total Cost of Off-Peak kWh / Total Cost of Super Off-Peak kWh.

These values can be aggregated by TOU and by any aggregation of time (e.g., week, week-end, and season).

Note that rates associated with the use of public or commercial charging facilities have not yet been identified, since this subject area is scheduled to be evaluated in the AFV rulemaking (R.09-08-009). It is critical to this Study to monitor such use, by location, time of day, kWh consumed by PEV participant, and the price paid for PEV charging. Data collection methods for achieving this objective have not yet been finalized with eTec and Nissan, et al.

Table 1. Participants will be randomly assigned to one of the experimental rates (example only – final rates subject to CPUC approval & may differ, Appendix C):

Pricing Treatment (3 Levels), Differentiated by Ratio of On-Peak to non-On-Peak Prices, by Three TOU Periods: • On-Peak – Noon to 8 PM • Off-Peak – 8 PM to Midnight & 5 AM to Noon • Super Off-Peak ("SOP") – Midnight to 5 AM	
High Ratio, 3 TOU Periods	**Experimental Rate 3**
Medium Ratio, 3 TOU Periods	**Experimental Rate 2**
Low Ratio, 3 TOU Periods	**Experimental Rate 1 (Modeled after current Schedule EVTOU)**

Table 2. Describes how each of the experimental rates differs in terms of the price signal they are likely to communicate to the customer.

Rate 1	Rate 2	Rate 3
Do not charge On-Peak in Summer	**Do not charge On-Peak, Summer & Winter**	**Do not charge On-Peak, Summer & Winter**
Okay to charge in Off-Peak or SOP	**Primarily charge in SOP**	**Primarily charge in SOP**
Okay to charge at anytime in winter season	**Charging in Off-Peak is less economically attractive**	**Charging in Off-Peak is not economically attractive**

Because previous research (cite UC Davis, EPRI research, when publically available) indicates that the majority of PEV consumers expect to charge at home, it is important to measure charging patterns during the shoulder peak period ("Off-Peak" period of 8 PM to Midnight), as well as the "Super Off-Peak" period of Midnight to 5 AM. If the vehicle battery is about 50% to 65% depleted, the Super Off-Peak period should be sufficient

time to reach a full charge. And, if the vehicle battery is depleted more than this level, it will be important to learn how much of the On-Peak rate the customer is willing to pay for additional "full or sufficient charge" assurance. For example, when faced with insufficient time in the Super Off-Peak to charge the vehicle to the desired charge level, do participants use the vehicle's timing devices to add the needed hours just before the Super Off-Peak period starts or ends, or do they ignore the value of the low cost Super Off-Peak charging period completely in favor of the assurance of a full charge by initiating charging when they arrive home or at a time that is most convenient to charging needs?

Note of caution – should the participant screening process for Leaf ownership, and the screening for participation in the Study yield insufficient numbers of participants for the Study necessary for the statistical analysis, the elimination of one of the pricing treatment groups may be required. In general, the smaller the expected differences between treatment groups, the greater the sample size requirements will be.

Conditioning Variables

Other factors can influence the charging substitution elasticities, in particular household demographics regarding who uses the PEVs, the purpose of the PEV use, and other external influences. To account for these factors, the following data will be collected from participants:

Driver Profile

Driver profile will be defined as miles per day and week (note: Nissan may select only those buyers with a minimum of 800 miles per month driving routines) with an estimate of various driving conditions (surface streets, freeway, type of terrain). Where available and applicable, driver profile data gathering will utilize and replicate the use of instruments used in previous studies for population comparative analysis (e.g., UC Davis, EPRI). This will allow for a comparison of observed behaviors with those reported by consumers in previous surveys, and thereby verify the applicability of other finding of those surveys.

Use of Charging Enabling Technology & Information[7]

There are a few enabling technologies available to Leaf participants that potentially will help facilitate charging in ways that are convenient and/or economic to the consumer (e.g., on-board timers that allow the consumer to set the time of day for charging the Leaf). It is likely that Leaf participants will differ in terms of technology use, frequency of use, and rationale for use. These technologies will be those that are commercially available to all Leaf owners. In addition to the information conveyed with these technologies, each Leaf participant will also receive educational material to understand

[7]The technology under study is limited to commercially functions available through the Leaf purchase and eTec charging equipment available to all participants of this Study. Therefore, "technology" will not be treated as an a priori independent variable or treatment (to which SEU would randomly assign each Leaf participant). Instead, "technology & information" will be tracked in terms of those technologies utilized, frequency of usage, and value of usage – please see Appendix D for examples.

the economic advantages, as well as environmental and utility system benefits of off-peak charging. This information will be included with material concerning other relevant facts about vehicle charging at home and in non-home locations. The technologies and the explanatory materials will be supplied by Nissan, and supplemented by SEU.

In order to understand how enabling technology and information affect charging behavior, related data will be tracked and analyzed over the course of the Study. In addition to understanding the statistical relationship between technology and information with TOU Charging, these data will also help to better understand what provides the most value to the participant, why, and how used, in order to improve PEV programs in general. Examples of enabling technologies can include:

- Customer controlled home & PEV end-use device related – on-board and separate programmable timers, and remote communication devices (cell phones, websites). Although separate in-home information applications and related-home energy management systems are related technologies and not part of this Study, follow-up inquiries will ask participants if they used technology other than those provided by the Leaf and eTec.
- Utility controlled AMI smart meter related (not part of this Study) – utility communications and interface through the AMI smart meter Home Area Network (HAN). Please see Appendix D for technology & information illustrations.

Participant Characteristics

The measurement of participant (or driver) characteristics will include household energy consumption data (historic and through the duration of the study) and data gathered through a modified, shortened form of the utility Residential Appliance Saturation Survey ("RASS"). These data include demographics (e.g., education, income, age), household occupancy, home characteristics (e.g., size, location) and appliance stock (please see Appendix G for an example of RASS type questions). This survey will be supplemented to collect data relevant to consumers charging systems (e.g., location of parking facility / garage, electric service panel, preferred charging configuration, costs of the charging configuration). This is particularly important for those without dedicated parking facilities and those living in Multiple Dwelling Units ("MDU"), should such facilities be screened by eTec to be included in the Study.

PV ownership and energy efficiency investments and practices will also be assessed. These data will be gathered using a self-reported, paper mail-in or on-line survey typical of the current RASS survey instrument. These data will be validated against the 2009 system wide RASS, the 2009 County Tax Assessor Data (e.g., size, AC, pool, building data), which is updated quarterly. In addition to study the relationship of these data with TOU charging, these data will be used to profile this population and sample against utility system wide characteristics, plus against data from other related PEV studies and samples (such as those conducted by UC Davis and EPRI). These data will also be useful to track and quantify or qualify differences in early PEV adopters versus those who adopt or purchase a PEV at a later point in time.

Some consideration will be given for polling the participants regarding their attitudes toward energy, the environment, benefit expectations in line with their PEV purchase intent, as well as other lifestyle choices. This would best implemented with the use of a standardized survey instrument with known validity and reliability, in order to use for comparative purposes.

Weather data will also be gathered from 10 regional weather stations to determine the degree to which weather explains TOU Charging behavior (e.g., use of the Leaf AC on hot summer days may increase the demand on the battery, which may reduce its range and use during hot summer days)

Driver Access to, and Use of, Charging Facilities

Over the duration of the Study, participants will be periodically requested to describe access to and use of charging facilities at home, at work or during day, and any other non-home charging facilities (i.e., Public/Commercial, Level 2 and Fast Chargers). As noted above, it is critical to this study to monitor the use of non-home charging facilities by location, time of day, kWh consumed by PEV participant, and the price paid for PEV charging. Data collection methods for meeting this need have not yet been finalized with Nissan and eTec.

Participant Updates

Every effort will be made to encourage participants to report any changes in their driver profile, charging decision-making, driving routine, and other relevant information through the use of periodic on-line survey instruments. A small nominal participation incentive may be necessary for each participant to encourage continuous and consistent customer updates through the duration of the Study.

The Study's PEV Population & External Validity

As noted above, Nissan and eTec will screen (in) potential Leaf participants or drivers (who will be randomly assigned to one of the experimental pricing or rate treatment groups, see Table 1. above). Among other criteria, Nissan will require from each driver the expectation of 800 miles per month minimum PEV use, with potentially other qualifications from eTec regarding the condition of the home suitability for a charging facility. These screening criteria will create a more homogeneous population from which to draw a sample. To the extent the screening criteria can be made available, these criteria will be identified and used as additional driver profiling data for the PEV Study (e.g., in the modeling and population profiling). Given this screening step, although this creates more homogeneity in the population under study, then how does this impact the applicability of the results of this Study, and to whom? For the purposes of Nissan, it's reasonable to assume that at a minimum, there is an interest in generalizing these results to the next generation of PEV owners, and not all future automobile buyers (certainly not all utility rate payers). It's reasonable to assume that this population of PEV drivers / owners is probably similar to near-future PEV drivers / owners. The findings from this Study, then will examine price elasticity within a very relevant population of customers,

that may better represent future or at least near term PEV owners. This study does not attempt to generalize its findings beyond this population of PEV consumers.

Other Factors under Consideration

- Where practical, the Study will also track consumers that are screened into the Leaf population, but decide to opt-out of the PEV Study and one of the experimental PEV rates. These and any other PEV (non-Leaf) customers will be offered one of the existing EV rates today.
- Investigate if the Study scope can include also tracking a sample of those PEV owners not in the first 1,000 applicant pool who will receive free home charging facilities. This will allow for more exploration of the impact of the potential home charging facility "first cost barrier" (associated with home charging installation costs). Also, this will allow for learning more about consumer receptivity to ways to reduce this potential barrier (e.g., rates or incentives that covers the customer side of the meter charging facility upgrade).
- Cautionary actions will be taken to reduce continuous polling of participants to reduce the potential for a "Hawthorne Effect" (i.e., in which awareness of being monitored impacts study subjects' behavior).

Analytics & Data Management

Regression analysis will be used to derive the price elasticity model; and overall consumer preference model (to predict TOU Charging behavior).

Pricing Treatment Group comparison testing will be performed using a four-way analysis of variance ("ANOVA") to test for statistically significant difference between the pricing treatment groups.

As noted above PEV driver profile comparisons and descriptive statistics will be provided to allow for comparisons of this PEV population and other populations (UC Davis, SEU customers, EPRI, and more).

There is a potential for secondary use of the data set and analytic tools from this Study (SEU data only), so steps will be taken early on to ensure that data management requirements are put in place. (Note: Although not yet confirmed, there is also potential for additional data collection and analysis collaboration with Grid Point, Idaho National Labs, UC Davis & Ohio State).

Reporting & Data Set Development

Proposed reporting requirements should include at least one interim report, as well as a final report documenting the work completed with the following:

- Executive summary presenting an overview of the findings
- Introduction summarizing the objectives of the project
- Methods section presenting procedures, instruments, sampling, assignment of participant to treatment groups, and related, including the analytics employed

- Results section presenting the results in detail, including a validity assessment of the findings and the reliability of the results
- Conclusion section summarizing the findings, implications and recommendations
- Appendix section containing further documentation of analyses, instruments and procedures used, and other support materials (e.g., those cited in the Methods section)
- Delivery of a complete data set or data sets at the completion of the project according to agreed upon specifications, maintaining customer confidentiality and anonymity.

This document has been updated since the publication of the January 29, 2010 version of this Proposal for the purposes of Advice Letter 2157-E, filed March 26, 2010. The following critical changes have been made:

1. All references to and illustrations of potentially proposed experimental PEV rates have been removed and replaced by the relevant Attachments to and text within SDG&E Advice Letter 2157-E, filed March 26, 2010.
   - Table 1
   - Appendix C
   - Guidelines used for developing proposed rates, as well as other relevant language within the Independent Variable section of the Proposal
2. Removal of a reference to "utility remote-disconnect" technology in Appendix D, since it was determined to be not applicable to the smart charging technologies illustrated in Appendix D.
3. Under the section entitled "Reporting & Data Set Development" in discussing the final delivery of a complete data set or data sets at the completion of the project according to agreed upon specifications, "maintaining customer confidentiality and anonymity" was added.
4. Under the section entitled "Participant Characteristics" it was clarified that the Study should collect information on the parking facilities associated with the dwelling unit, especially with those living in Multiple Dwelling Units ("MDU"), and added, "should such facilities be screened by eTec to be included in the Study."
5. Under the section entitled "Other Factors Under Consideration" the Study plan will no longer "explore the rates that can be offered to those Leaf customers who opt out of the Study (or any PEV customer); the example noted was, "could they be allowed to select one of the experimental rates." These customers will be offered one of the existing EV rates.
6. The following have been added to the Research Advisory Panel:
   - Coulomb Technologies, Richard Lowenthal
   - EEI, Rick Tempchin

Appendix A

EPRI Transportation Program Background
Where applicable, the work of the EPRI Electric Transportation Program will be utilized in the PEV Study. This Program conducts R&D on electric vehicles and associated infrastructure technologies. Major accomplishments claimed by this Program are:

- Formation of major collaborative PHEV programs with the automotive industry, including General Motors, Ford Motor Company, and Eaton Corp.
- Developing proof-of-concept PHEV drive systems in multiple transportation platforms
- Expanding market penetration of electric drives in the non-road market through value demonstrations
- Validating the environmental benefit of electric vehicles to commercial and industrial entities and communities in which the entities are located
- Analysis of potential impacts on utility systems

SDG&E is active in the EPRI advisory structure for this program, which provides a mechanism for providing direction consistent with utility needs, and to use Program results to support our PEV programs, and for coordinating our activities with those of EPRI to avoid duplication of efforts.

International Electrotechnical Commission (IEC) Communications Standards
IEC Technical Committee 57 is developing the communication standards for what has come to be called “smart grid”. This body of work includes major standards families, such as IEC 61850 and 61970. The need for a PEV component has been discussed in several TC-57 working groups, including the coordination working group (WG), which is WG-19. It is being determined whether to place this activity in an existing working group or start a new working group under TC-57. Either way, the IEC standards are designed to reuse applicable building blocks from earlier standards. For example, the PEV object model standards will draw from existing logical nodes (building blocks) in the existing DER and station equipment standards. New logical nodes are added only when necessary. Domain information for the standards writing needs to come from domain experts. This can include contributions from SDG&E’s PEV team’s project work and from other efforts such as the recent work by NIST. The IEC working group uses these contributions in creating an international standard, via an international ballot process. The contributions are not just used outright. They are vetted by the working group and rewritten in the IEC schema. The standards are essential to avoiding costly custom engineering of each new technology into smart grid interoperability. They create a plug-and-play process for integration of new technologies, such as PEV, into smart grid operations.

Appendix B
Nissan Leaf, Vehicle Support & eTec Project Background

Nissan Leaf Features

- Five Passenger Hatchback
- About 100 miles/charge
- 100% Electric - Zero Emission Vehicle
- Accepts Level 1, Level 2 and DC Fast Charging
- Lithium Ion Battery (24kWh capacity)
- About 8 hours for full charge – Level 2 (240v @ 15 A – 3.3 kW charge power)
- < 30 min to go to 80% SOC on DC Fast Charge
- Recycled materials for interior and other components
- Displays SOC in "distance to empty", GIS Map of area reachable
- Programmable on/off charge cycles that can interface with cell phones

Note: see NissanUSA.com at LEAF "Register" Page for more information

Program / Project Support Features

- First responder training
- Code inspection officials coordination
- Roadside assistance development
- Installation contractor training & certification
- Dealer training
- Public awareness

eTec Project Background

This project is a eTec, USDOE and Nissan collaboration to carry out the largest deployment of EVs & charging infrastructure in US history under FOA – 28 ARRA Stimulus Funding. The following cities make up the scope of participation: San Diego, Seattle, Portland/Salem, Phoenix/Tucson, and Nashville/Knoxville/Chattanooga

$200 million in project funding was secured to deploy charging infrastructures in US (about $100 million ARRA); plus, an additional $8 million grant from CEC to eTec was awarded for installing additional infrastructure. San Diego Region infrastructure planned is as follows:

- 1,000 "Free" Level 2 (240V) EVSE – Residential Charging Installations
- About 1,450 Level 2 (240V) EVSE – Public and Commercial Chargers
- 50 or more DC (480V) "Fast Chargers"

Appendix C
Proposed PEV Experimental Rate Examples

(Please see Attachment B of SDG&E Advice letter 2157-E)

Appendix D
Use of Smart Charging Enabling Technology Illustration

The Technology & Information that can be applied to PEVs vary in scope and complexity. Here are examples of each (some of which are not commercially available):

Potential PEV Owner Information Requirements

- Charging Status (available charge capacity, estimated charge time)
- Rates & TOU Pricing
- Charging-to-Miles Costs
- Estimated Charging Time (Charging Status while charge in-progress)
- Utility Critical Peak Period
- PEV Educational Material (e.g., TOU rates, charging costs)

Delivery & Interface Technology (to set or control charging times by time or by price)

- In Home Timer
- In Home Display (IHD)
- Web Application
- Home Energy Management System (EMS)
- Cell Phone Application (remote control)
- In Home Automation Devices
- AMI Smart Meter Home Area Network (HAN)
- AMI Smart Meter Remote Disconnect

Example of Specific Information & Technology potentially available to each Leaf Participant in this Study:

Smart Charging Enabling Information & Technology	Availability for Study	
	Expected to be Available	Not Available (or limited)
Leaf on-board timer to set charging times	**X**	
Internet site for TOU programming of the Leaf charging times	**?**	**X**
Remote access to charge status on Leaf (cell phone application)	**X**	
One-time, basic level of educational information regarding PEV charging economics & environmental benefits	**X**	

Remote access to TOU programming of the Leaf charging times & charging status (cell phone application)	**?**	**X**
Periodic updates & reminders via internet / cell phone regarding PEV charging economics & environmental benefits (critical peak periods)		**X**
"PEV economics & benefits" calculator function for tracking costs & air pollutant benefits – real time (on-line)		**X**

Appendix E – Example of Potential Survey Questions

Your Home & Lifestyle

A1 What type of building is your home, listed on the service address label on the front cover of this survey?
- ⊂⊃ Single-family detached house
- ⊂⊃ Townhouse, duplex, or row house
- ⊂⊃ Apartment or condominium (2 – 4 units)
- ⊂⊃ Apartment or condominium (5 or more units)
- ⊂⊃ Mobile home
- ⊂⊃ Other *(Describe):* _____

A2 Do you own or rent your home?
⊂⊃ Own / buying ⊂⊃ Rent / lease

A3 In approximately what year was your home built?
⊂⊃ Before 1960 ⊂⊃1980-1999
⊂⊃ 1960-1979 ⊂⊃2000 or later

A4 How many bedrooms are in your home?
- ⊂⊃ No bedrooms *(studio apartment)*
- ⊂⊃ 1 bedroom ⊂⊃ 3 ⊂⊃ 5
- ⊂⊃ 2 bedrooms ⊂⊃ 4 ⊂⊃ 6 or more

A5 How many square feet of **living space** are there in your home, including bathrooms, foyers and hallways?
(Exclude garages, basements and unheated porches.)
- ⊂⊃ Less than 750 ⊂⊃ 1251 – 1500 ⊂⊃ 2501 – 3000
- ⊂⊃ 751 –1000 ⊂⊃ 1501 – 2000 ⊂⊃ 3001 – 4000
- ⊂⊃ 1001 – 1250 ⊂⊃ 2001 – 2500 ⊂⊃ Greater than 4000

⊂⊃ Or actual sq. ft. _____

A6 For each of the following age groups, how many people, including yourself, usually live in your home?

	Number of People Usually Living in this Home								
Age	None	1	2	3	4	5	6	7	Over
5 and under	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃
6 – 18	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃
19 – 64	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃
65 and over	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃	⊂⊃

Space Cooling

CENTRAL AIR CONDITIONING/COOLING

C1 Do you pay for central air conditioning for your home?
⊂⊃ Yes ⊂⊃ No, it is part of my rent/condo fee *(Go to C5.)*
⊂⊃ No, do not have central air conditioning *(Go to C5*

C2 What type and how many central air conditioning/cooling system(s) do you have in your home?

	Number of Central Cooling Systems		
	1	2	3 or more
Central air conditioning	⊂⊃	⊂⊃	⊂⊃
Central evaporative cooler *(swamp cooler)*	⊂⊃	⊂⊃	⊂⊃
Heat pump *(heats and cools)*	⊂⊃	⊂⊃	⊂⊃

C3 What type of thermostat does your main cooling system(s) use?
- ⊂⊃ Programmable thermostat
  (Digital units usually have a digital readout and buttons. Mechanical units usually have a clock or rotary timer and tabs, pins or levers.)
- ⊂⊃ Standard thermostat
  (Allows you to set the temperature and turn the air conditioner on or off. You cannot set on/off times.)
- ⊂⊃ No thermostat
  (Simple on/off control)

C4 Which of the following statements best describes how you usually operate your central air conditioning system?
- ⊂⊃ Maintain the thermostat setting at constant temperature
- ⊂⊃ Raise the thermostat setting when no one is home
- ⊂⊃ Thermostat setting automatically changes at different times
- ⊂⊃ Manually turn on/off air conditioner as needed
- ⊂⊃ Rarely use the central air conditioning system

Appendix F – Glossary

PEVs (Plug-in Electric Vehicles) – use a plug connection to charge battery for transportation.

EV (Electric Vehicle) or BEV (Battery Electric Vehicle) – 100% electric motor drive vehicle that uses stored electric battery power (via either Level 1 – 120V (long charge time) or Level 2 – 240V (shorter charge time) connection. These vehicles are also called Zero Emission Vehicles by the California Air Resources Board (CARB) due to the fact that they do not have tailpipe emissions (electric fuel – no tailpipe).

PHEVs (Plug-in Hybrid Electric Vehicles) – The vehicles build from a hybrid design with a plug-in function and a larger battery. For some, the wheels are only powered by electric motors and gives a certain amount of "all-electric drive range" miles from stored electricity (e.g., PHEV 20, PHEV 40) before using gasoline to generate "on-board electricity" and allow for many more miles (e.g., Chevy Volt). Other PHEVs will alternate between gasoline engines and electric motors (like a Prius hybrid), but stay in electric mode longer more often due to the on-board stored electricity. These provide a larger MPG, but it is difficult to isolate "all electric drive" portion of operation. These can use either 120V or 240Vcharging; will cut charging time approximately in half with 220V (two fuels – has a plug and a tailpipe).

NEVs (Neighborhood Electric Vehicles) – These are also BEVs, but due to size of battery and vehicle, they are limited to low speeds and limited range (due to battery size and vehicle safety restrictions). Top speed ~ 25 MPH on roads posted 35 MPH. NEVs are sometimes referred to as Low Speed Electric Vehicles, therefore "neighborhood" type vehicles. Good application for campuses, retirement communities, and more (electric fuel – no tailpipe – small and slow).

Price Elasticity of Demand – a measure of the sensitivity of a quantity demanded of a good to its change in price. It is measured as the ratio of the percentage change in quantity demanded to the percentage change in its price. A high elasticity indicates a change in price will lead to a sharp change in the quantity demanded; whereas, a low elasticity indicates a change in the price yields only minimal changes in the quantity demanded.

Appendix G – Acronyms & Terminology

OEM – Original Equipment Manufacturer, such as Nissan, GM, Ford, etc. for auto manufacturers

SOC – State-Of-Charge or how much remaining battery energy is available.

V2G – Vehicle to Grid; supplying energy from vehicle batteries to the grid.

TOU – Time of Use or time of day used for charging a vehicle, corresponds with rates or pricing (super off-peak = lowest rate and on-peak = highest rate)

EVSE – Electric Vehicle Supply Equipment, abbreviation used for charger hardware.

Li-ion – Lithium-ion battery is a generic term for many variations of battery chemistry.

NiMH – Nickel Metal Hydride Battery: chemistry typically used in current hybrid models (e.g. Prius).

kWh Rating – Battery energy capacity rating (e.g., Nissan LEAF has a 24 kWh battery capacity).

J1772 – SAE, Society of Automotive Engineers connector standard for 120V and 240V vehicles to charge.