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Economics Panel- VGI Roadmap Workshop, Oct 29, 2018

Additional submitted attachment is included below.



Vehicle Grid Integration Roadmap Update Workshop Economics panel

Presenter Dean Taylor – Principal Advisor, Energy and Environmental Policy

California Energy Commission workshop October 29, 2018

Trends

- Grid impacts are changing
 - New focus
 - Distribution system impacts
 - Addressing the duck curve
 - Emerging types of charging
 - Medium duty and heavy duty EVs!
 - Large away-from home charging stations!
- Goal is behavior change to help the grid
 - Simpler solutions (e.g., passive VGI) have made faster progress
 - V1G and V2G have faced more barriers



Trends (cont'd)

- VGI is complicated
 - Many agencies
 - Interwoven with consumer issues
 - Competing business models
 - Net value has many elements
 - Up-front and on-going costs
 - Many types of benefits
 - Non-monetized costs and benefits
 - Many studies with different conclusions on net value and different terminologies
- Coalition of automakers' and utilities' main request
 - More analysis before any mandates in regulations or grants



Background

- VGIWG Task 1 Glossary sub-team consolidated over 10 different benefits frameworks to address
 - Who needs the benefit?
 - What is the benefit?
 - What meets the need?
 - How to meet the need?
 - How is meeting the need measured?
- Current version is work-in-progress



Background: Examples of Benefits

- Avoided cost to the driver (compared to alternative)
 - Low cost to charge at night
 - Low-cost to charge in the day (except 4-9 pm)
 - Lower cost charging equipment
 - Avoiding or reducing networking fees
- Avoided cost to the grid (compared to alternative)
 - Distribution cost upgrades (transformers, feeders, substations)
 - Storage mandate with V2G



Background: Benefits (cont'd)

- Value to the site host¹
 - LCFS (17-25 cents per kWh)
 - Payments from the drivers
 - Attract new customers
 - Help with sustainability goals
- Avoided cost to the site host (compared to alternative)
 - Reducing or avoiding demand charges
 - Avoiding high cost energy charge times
 - Avoiding or deferring panel upgrades
- Value to the aggregator
 - LCFS smart charging (incremental credits)
 - Energy or ancillary services to CAISO

¹For fleet site hosts, the value is slightly different



- Update the VGIWG glossary
- Continue refining the consolidated benefits framework
- Expand utility marketing of optional TOU rates to residences and commercial accounts
- Launch more commercial rates designed to encourage EV adoption
 - By more utilities
 - E.g., demand charge phase in with time-variant energy charges
 - E.g., demand charge neutralization



- Adopt on a wide scale the current best practices by utilities and automakers
 - Utilities
 - Upgrade transformers to larger size at end of life
 - DERiM for IOUs (on-line maps showing circuit capacity)
 - Educating on charging options / trade-offs
 - Safety education
 - Autos
 - Dash board controls on time of charge
 - Providing level 1 and/or level 2 cord sets
 - Educating on level 1 and level 2



- Increase marketing of the new LCFS to site hosts and aggregators (by all stakeholders)
- Compare all the existing VGI studies on net value
- Finish the VGIWG original task 2 on net value from VGI
 - Examine all use cases
 - Answer the benefits to the driver, all ratepayers, the site host and the aggregator
 - Understand all of the costs
 - Analyze trade-offs
- Finish the VGIWG original task 3 on developing lowcost policy solutions to encourage VGI
 - Examine all use cases and wide range of policies



- Fund large-scale demonstrations of V1G
 - for most use cases and communication protocols
 - Both automakers and charging network providers
 - E.g., increase scale of prior pilots
 - to validate net value, functionality, cybersecurity and customer experience
- Prioritize adoption of simple actions that can change driver or site host behavior
- Improve agency coordination on consumer and VGI topics
 - The concern is that many up-front and network costs are being added to the charging station by different agencies
 - Need to understand the costs and benefits more
 - Prioritize finishing the SB 454 process
- Develop clear business case for automakers to put a VGI communication protocol into large scale production
 - Not enough information to do wide-scale mandates of communication protocols at this time



- Demonstrate EVs in existing DR programs
 - Separate DR programs into generation system and distribution system programs
- Develop separate effort on medium and heavy duty and non-road EVs
 - Understand single, double, and triple shift operations
 - Understand need for away-from home charging
 - Develop and test solutions for active and passive solutions
 - Find favorable use cases (e.g. school buses?)
- Convene an on-going data analysis working group
- Hold at least one more VGI roadmap workshop
 - Review 1st draft roadmap, add and prioritize



Appendix



Demand Charge 101

Takeaways:

- Demand charges make up most of electric bill if utilization level is 1% but only 15% if utilization level is 70%
- With a monthly utilization level over ~ 30%, a bill with demand + energy charges is desirable compared to the alternative (energy only charges)









Medium & Heavy Duty Electric Transportation Rate Designs at SCE

Presenter Hank Elgin – Load Research Analyst

EPRI Bus and Truck Utility Working Council Tempe, AZ October 23rd, 2018

Transportation Electrification – State Policy Direction

The California Legislature (SB350) added to Pub. Util. Code § 740.12 which includes the following directives:

"(A) Advanced clean vehicles and fuels are needed to reduce petroleum use, to meet air quality standards, to improve public health, and to achieve greenhouse gas emissions reduction goals.

(G) Deploying electric vehicles should assist in grid management, integrating generation from eligible renewable energy resources, and *reducing fuel costs* for vehicle drivers who charge in a manner *consistent with electrical grid conditions*."



"Consistent with Electrical Grid Conditions"

SCE's New Time-of-Use (TOU) Rates



- Peak periods shifted to later in the day.
- Establishes new flexible generation capacity cost component (aka "ramping", all days).
- Introduces a "peak" time varying component in distribution rates.
- Super off-peak energy prices occur in the middle of winter weekdays/weekends.



"Reducing Fuel Costs"

- TOU Periods provide low cost charging opportunities and facilitate the integration of renewable energy.
- TOU proposal includes introducing a "peak" component of distribution rates which is time-varying.
- Demand charge rate structures result in higher average rates for low load factor customers.
- SCE adopted an Economic Development Rate mentality for its TE Application.
- SCE proposed a 5-year introductory period without demand charges followed by a 5-year phase-in of demand charges to facilitate this infant industry.
- End-state TE rate structures envisioned to be consistent with remaining customers' rate structures.



Life Cycle Schematic of TE Rate Proposal Illustrative





Rate Proposal Illustrative

Sample Rates				
	Short Term	Long Term (Cost Based)		
Demand (\$/kW)	Х	\$10.00		
Energy (\$/kWh)	\$0.15	\$0.10		



		Monthly Bill		
Short Term	Long Term		Short Term	Long Term
Х	\$3,000		Х	\$4,000
\$2,250	\$1,500		\$11,250	\$7,500
\$2,250	\$4,500		\$11,250	\$11,500
50% Energy on Short Term Er	Bill Savings hergy Only Rate	la	Customer will be in oad factor (flatter loa	different as higher ad curve) is achieved



SCE's Optional Rate Designs Favorable for Electric Transportation

Rate Schedule	Maximum Demand (Voltage Level)	Applicability	Rate Structure	
TOU-EV-7 ^{1/}	≤ 20 kW	 Customer Charge; TOU Energy Charges; 5-year intro period w/ no demand charge, followed by 		
TOU-EV-8 ^{1/}	21 -500 kW	the charging of EVs on a premise or public right of way where a separate SCE meter to serve EV charging facilities is required	 year phase-in of demand charges; At the end of the 10th year, rate will include FRD demand charge to collect 60% of all distribution capacity costs; the remaining 40% will be collected through TOU energy charges 	
TOU-EV-9 ^{1/}	> 500 kW (Secondary, Primary, Subtransmission)	identites is required		
TOU-8-Option A	> 500 kW (Secondary, Primary, Subtransmission)	Applicable to customers who participate in Permanent Load Shifting (PLS), Cold Ironing pollution mitigation programs or the charging of zero emissions electric transportation intended for the transport of people or goods.	 Customer Charge; TOU Energy Charges; FRD Charge 	

1/ CPUC approved in SCE's Transportation Electrification Application (A.17-01-021). Awaiting FERC approval.

