



Energy+Environmental Economics

C&I Rate Design for EVs

Flexible Rate Designs
Bridging Private Sector and Utilities

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About E3

- + Headquartered in San Francisco, founded in 1989**
- + Economics and grid impacts of EVs, and supporting utilities in development of EV programs**
- + Long term CO2 pathways and impact of clean transportation (electric and gas)**
- + Large electric user rate discounts & procurement analysis to reduce costs and achieve sustainability goals**





Key Rate Design Criteria

- + Electric vehicle rate design should incorporate best practices in rate design (Bonbright Principles)**
 - Customer understanding & ease of implementation
 - Collect utility's cost of service
 - Current customers pay for use of current assets
 - Fairly apportion the annual cost of service among customers & avoid undue discrimination

- + Balancing these principles can be an art rather than a science and can involve prioritizing policy goals**



Rate Designs & EV Applications

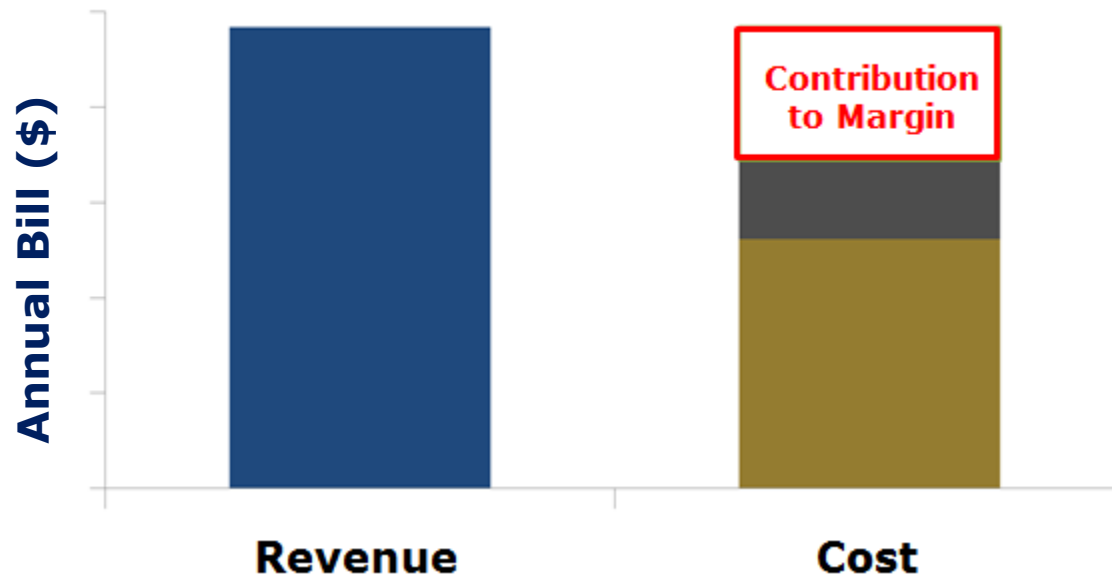
	Example Load/Customer Types	
	Airport GSE* Flexible Charging Off-peak period	Public DCFC Inflexible Charging On-peak period
Energy Rate Design	<ul style="list-style-type: none">• TOU energy rates• Dynamic rates such as SDG&E's VGI rate	<ul style="list-style-type: none">• Energy-only rates
Demand Rate Design	<ul style="list-style-type: none">• High on-peak demand charges	<ul style="list-style-type: none">• Low on-peak demand charges

- + **Diverse charging profiles across EV applications means there are no universally appropriate rate designs**
- + **However, there are universally applicable EV discount structures**
 - Sharing of benefits related to increased throughput
 - Reduced charges while usage grows



Contribution to Margin Concept

Contribution to Margin (CTM) from PEV Charging Load



- + **Increased throughput from electric vehicles provide downward pressure on rates & increased CTM**
- + **Benefit typically diminishes with customer size**
 - Utility rates for small and medium-sized users are typically greater than utility's marginal costs of serving load



Example: Rate Discounts to Support Electrification

- + **The Port of Long Beach expects its electric usage to quintuple to 250 MW from 2010 to 2030 largely due to electrification**
- + **The Port's Maritime Entity customers receive two types of electricity discounts under Southern California Edison's (SCE) Schedule ME**
 - A discount of 50% of the contribution to margin (CTM) for each customer in each month:
 - $CTM = \text{customer's bill} - \text{marginal costs} * \text{monthly usage}$
 - New electric infrastructure loads above 10 MW are to be supplied at 50 kV:
 - Can yield additional demand charge reductions above 2kV-50kV service
- + **Discounts recognize that electricity cost reductions can help support the Port's electrification program, contributing to improved air quality in region**



Example: SCE's Optional EV Rates

- + **SCE's new EV rate option balances many of these issues**
- + **Three new, optional commercial rate schedules—EV-7 (<20 kW), EV-8 (21-500 kW) and EV-9 (> 500 kW)**
 - TOU energy-only for 5 years, includes generation capacity
 - Demand charge phase-in years 6-10
 - From year 11
 - 60% of distribution demand and 100% of transmission in demand
 - 40% of distribution demand in energy (incentivizes off-peak use)
- + **Revenue neutral to the non-EV rates that would otherwise serve the EV customers**
 - Helpful in early years but users with load factor above class average and on-peak users will likely pay more



Outside-of-the-Box Ideas

BIP & Conjunctive Billing

+ Interruptible rates

- i.e, SCE's BIP program reduces generation capacity charge
- Called ~once a year
- Load factor impacts



<https://campaignsoftheworld.com/outdoor/mini-outside-the-box/>

+ Conjunctive Billing

- Commonly used for electrified rail, conjunctive billing calculates demand charges based on the highest combined load across all the EVSP's accounts in a utility's service area rather than at each individual location
- Results in savings if chargers are not in use simultaneously



Outside of the Box (con't)

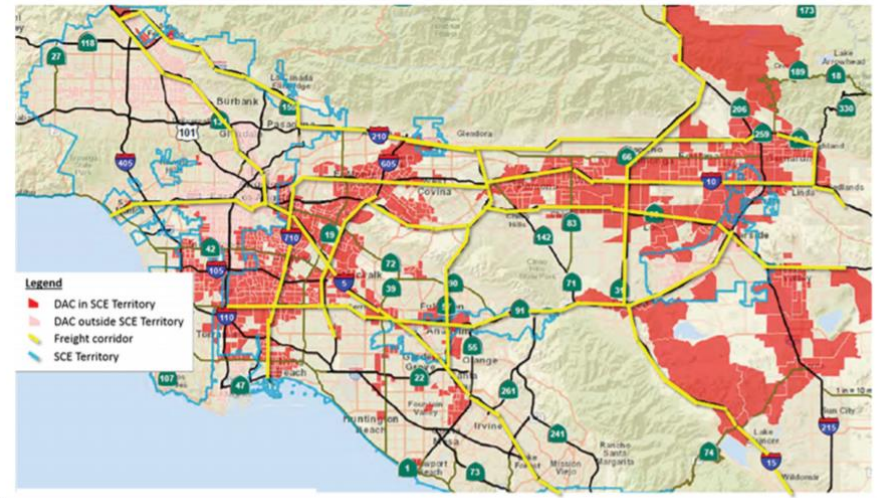
Economic Development Rates

- + **Economic development rates (EDR) provide rate discounts to attract or retain commercial loads**
 - PG&E EDR standard discount of 12% for 5 years
 - Enhanced EDR Option provides a 30% discount for customers located in an area with annual unemployment rate greater than 125% of state's average
 - "But For" test

https://www.pge.com/tariffs/tm2/pdf/ELEC_SCHS_EDR.pdf

[http://www3.sce.com/sscc/law/dis/dbattach5e.nsf/0/F5582C9D0A9A3659882580AE007F74A4/\\$FILE/A1701XXX-SCE%20TE%20Testimony%201-20-17.pdf](http://www3.sce.com/sscc/law/dis/dbattach5e.nsf/0/F5582C9D0A9A3659882580AE007F74A4/$FILE/A1701XXX-SCE%20TE%20Testimony%201-20-17.pdf), p. 14

*Figure II-4
Disadvantaged Communities are Heavily Impacted by Air Pollution from Freight Corridors³⁰*



- + **Perhaps a similar structure could be applied to promote vehicle electrification in areas with poor air quality**



Example Application: DCFC

+ Problem:

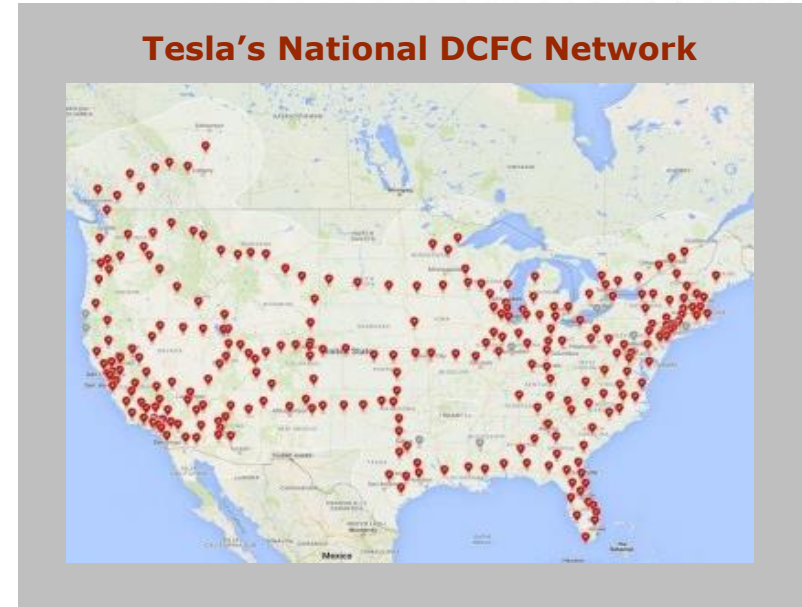
- DCFC typically served on C&I rates which include demand charges.
- Growing usage

+ Potential Solutions:

- EDR-style fixed % discount
- Shared throughput discount
- Reduced demand charges or energy-only rates

+ Benefits:

- Timing shifts costs into later years from upfront (assuming growth)
- Requires care to ensure costs are not over-recovered in later years
- Potential for stranded costs if EV charging load fails to materialize





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Thank You!

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