



# Sub-Metering

3/11/2020

# Overview

The California Statewide PEV Submetering Pilot tested the ability of a submeter to provide accurate, revenue grade EV charging load

There were two phases which were similar: a 3<sup>rd</sup> party provided metering and energy charging services for the EV customer

The information from the 3<sup>rd</sup> parties was used by utilities to provide subtractive billing

# Items Studied



Service offerings developed by the 3<sup>rd</sup> parties



The accuracy of the submeters embedded in the EV chargers

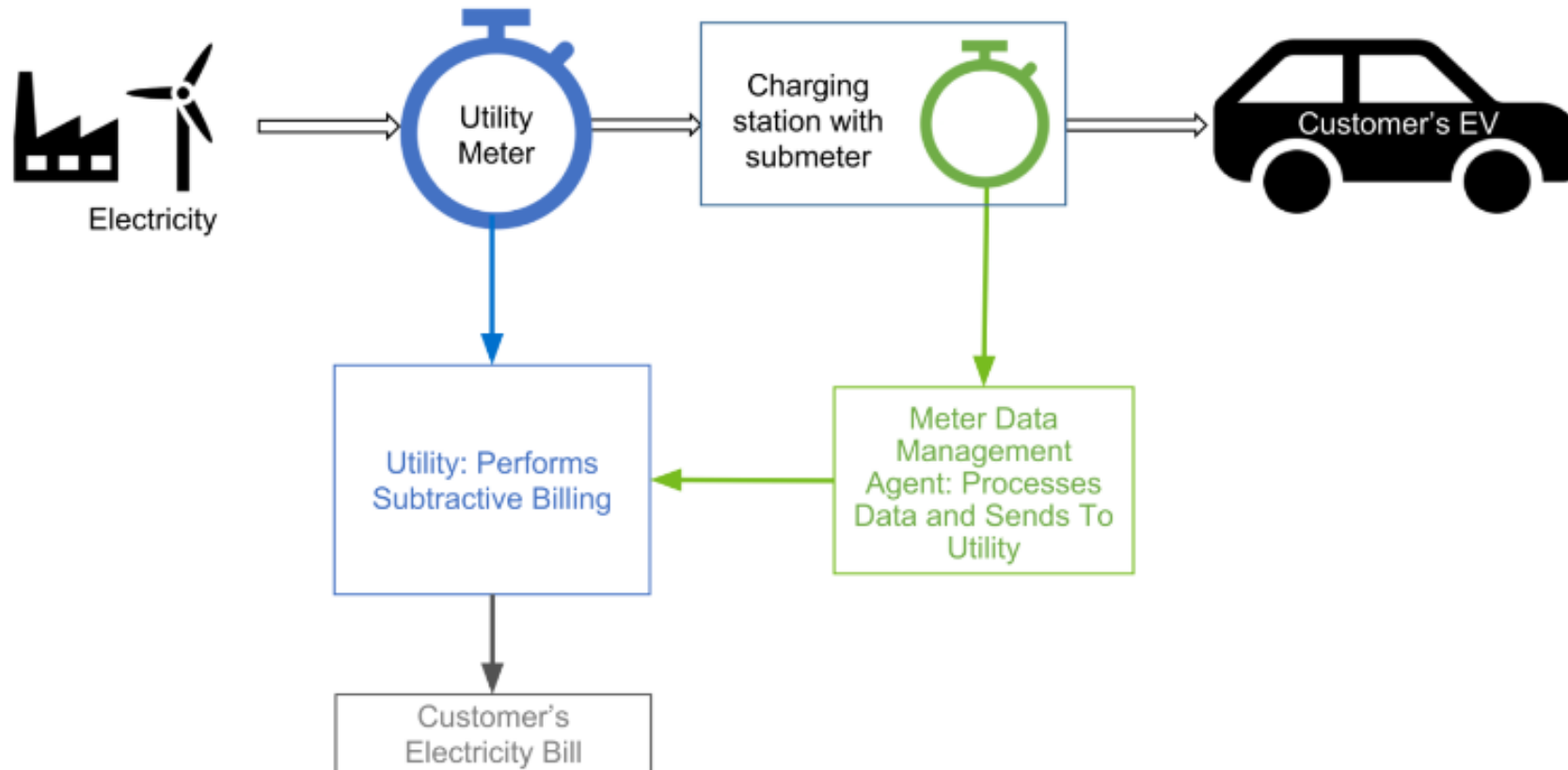


The experience of the customers in the pilot



The demand of the marketplace for this type of service

# The system



# Reasons Why Customers Participated

- A welcome survey was conducted, and 372 customers responded:
  - Ability to pay a lower rate for electricity for the EV
  - Ability to save money on the charging station

# Issues



Missing Data



Submeter Accuracy



Multiple Formatting



Customer Privacy



Customer Service



Cost



Cybersecurity

# Missing Data



EVSE leveraged the customer's broadband system



Additional customer service needed

# Submeter Accuracy

- This testing was done in-situ using Nexant supplied data loggers
- To determine the basis of the errors a 3<sup>rd</sup> party lab was hired to test meters in a lab environment
- None of the submeters met an 1% accuracy limit in bench testing

% of Customers Passing (15-minute kW Intervals, with +/- 2% Threshold)				
	PG&E	SCE	SDG&E	Total
Chargepoint	0.0%	0.0%	0.0%	0.0%
Kitu		0.0%		0.0%
eMotorWerks	37.5%	0.0%	0.0%	17.6%
Total	15.8%	0.0%	0.0%	5.2%

% of Customers Passing (Daily kWh Intervals, with +/- 2% Threshold)				
	PG&E	SCE	SDG&E	Total
Chargepoint	22.2%	0.0%	0.0%	5.7%
Kitu		0.0%		0.0%
eMotorWerks	42.9%	0.0%	0.0%	18.8%
Total	31.3%	0.0%	0.0%	9.6%

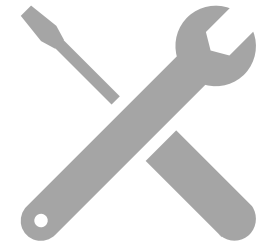
% of Customers Passing (Daily kWh Intervals, with +/- 5% Threshold)				
	PG&E	SCE	SDG&E	Total
Chargepoint	44.4%	0.0%	0.0%	11.4%
Kitu		100.0%		100.0%
eMotorWerks	57.1%	14.3%	0.0%	31.3%
Total	50.0%	8.7%	0.0%	19.2%



# Data Formatting



Although a template existed,  
misunderstandings occurred



Easiest issue to fix

# Customer Privacy



Mandated customer privacy requirements made it difficult to troubleshoot issues



Can be mitigated through privacy clause in customer contract



# Customer Service

- Multiple actors made it difficult for customers to resolve issues
  - Utilities
  - Service providers



# Cost

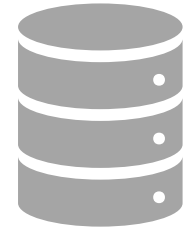
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- In the pilot utilities paid service providers for meter interval data of \$17.50/month/customer per customer in comparison to utility meter monthly interval costs of \$0.04/month/customer in addition to a \$210 customer enrollment payment

# Cybersecurity



Vendor outsourcing of cloud services



Contractual requirements for data storage needs and geographical locations



New EVs will  
have 240VAC  
cord sets  
included

Potentially limited appeal  
in the residential market  
to install a separate EVSE

# Appendix

# Reasons to enroll

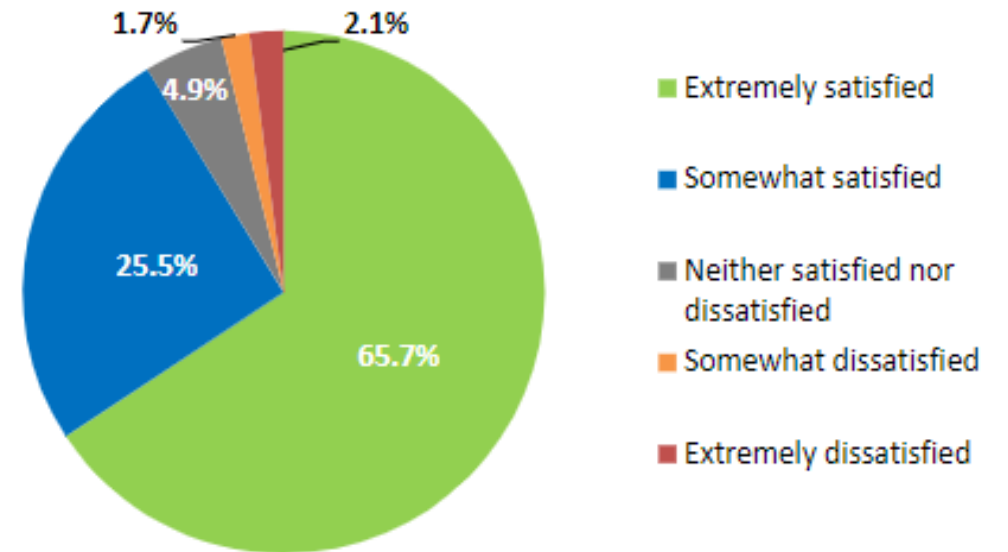
How important was each of the following aspects of submetering in deciding to sign up for the pilot?	Not at all Important	Somewhat Unimportant	Somewhat Important	Extremely Important	Top 2 Box
Ability to pay a lower rate for electricity used by my PEV	1%	1%	11%	86%	97%
The availability of an incentive for the PEV submeter	2%	4%	23%	71%	94%
The cost of the vehicle charging station (including incentives)	4%	5%	31%	59%	90%
Ability to charge my vehicle more quickly	6%	8%	27%	59%	86%
Ability to measure the amount of electricity my vehicle is using	5%	10%	43%	42%	85%
The safety and reliability of the charging station	7%	13%	33%	47%	80%
The ability to control the charging station from my smartphone	7%	14%	45%	34%	79%
Other aspects	31%	3%	10%	56%	66%



# Un-enrollments

- Approximately 10% of customers (42 out of 434), dropped out during the pilot. When asked on a program exit survey why they were leaving, the two most frequently cited reasons for discontinuing enrollment were: "Not enough bill savings" and "Other billing problems."

How important was each of the following aspects in contributing to your un-enrollment from the pilot?	Not Important at All	Somewhat Unimportant	Somewhat Important	Extremely Important	Top 2 Box
Not enough bill savings	0%	10%	20%	60%	80%
Other billing problems	13%	0%	0%	50%	50%
Errors resulting from submeter accuracy	10%	0%	0%	40%	40%
Late or inaccurate bills	10%	10%	10%	30%	40%
Utility customer service	30%	0%	20%	20%	40%
MDMA customer service	20%	0%	20%	10%	30%
Other technical problems	14%	0%	0%	29%	29%
Other non-technical or billing problems	0%	0%	0%	17%	17%
No longer have an EV	10%	0%	0%	0%	0%



# Key Findings, Conclusions and Recommendations

Using submetering via a third-party to generate subtractive utility bills is not yet a viable technology for full scale deployment.

Key issues include: ensuring the accuracy of submetered data; ensuring that meter data and submeter data are synchronized at comparable time intervals; ensuring that submeter data is reliably transferred from the customers via the MDMA's to the utilities; ensuring that bills are accurate and timely; developing a fully automated process for participant sign-up; developing a fully automated billing process that includes standards for data editing, verification, and validation.

The primary motivations for customers to participate in the pilot were the opportunity to pay a lower rate for electricity used by the PEV, and an incentive payment toward the purchase of a PEV charging station.

Once customers were enrolled in the pilot, the majority (81%) said that they were "extremely satisfied" and a substantial proportion of participants (46%) shifted their charging to off-peak hours during the pilot, although only about half of those maintained that behavior after the pilot ended.

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Billing issues experienced in Phase 2 were caused by two problems. First, MDMA's were sometimes late in delivering the submetering usage data to the utilities. This caused customers to receive their bills late or to receive bills with no submetering data (and no savings). Secondly, only about 5% of submeters tested in the field could meet the same accuracy standard as utility-supplied revenue-grade meters.

The costs to customers to separately meter PEV charging depends on the residence type, and can vary widely due to existing circuits, preferred equipment, and local permits and installation costs. Based on an analysis Nexant conducted for this evaluation, the average customer will spend \$1,640 to install a second utility-grade meter vs. a cost of \$1,266 to install a charging station with embedded submeter.

Using data from third parties to submeter a customer's electrical load and create a subtractive bill is viable at the scale of a pilot— however, for the technology to meet the needs of the entire state of California, an estimated investment of \$3,000,000 to \$4,500,000 per large utility is required to modify customer billing systems.

Nexant believes that development of a more specific submetering performance management standard would help alleviate the potential for different definitions of accuracy and performance and create an environment of certainty for all parties.

Nexant also recommends the standard include development and specification of a standard protocol for delivering submetering data to the utilities. Standardization of the submetering data delivery structure will be critical for cost minimization of system implementation for all parties in the data management process