

Draft Utah Electric Vehicle Time of Use Pilot Program and Analysis

**Utah Electric Vehicle Time of Use
2016**

Prepared by the Load Research Group
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Draft Utah EV TOU Pilot Study December 2016

Introduction

The electric vehicle (EV) incentive program, as described under Section 54-20-103 of the Utah Sustainable Transportation and Energy Plan (STEP) Act, was designed to promote customer choice in plug-in electric vehicle charging equipment infrastructure. As part of the EV program, the STEP Act required the Company to include “time of use pricing for electric vehicle charging”.

This paper describes the procedures to be used in development of the Utah EV TOU Load Study. This study will provide load data to estimate the peak capacity shift associated with a TOU participation to the Utah Public Service Commission. The remainder of this document discusses the purpose of this research, overview of the incentive program, analytical needs of the research, participant recruitment, the pilot study timeline, and limitations to the research.

Purpose

In an effort to understand customer and Company benefits associated with the implementation of an EV TOU program, it is necessary for the Company to implement a load research study to accurately measure how peak load for these customers will shift under two TOU regimes.

Conceptual Incentive Program Framework

In order to propose a TOU study of Utah EV owners, it is necessary to understand how the program will be implemented. At this time the preliminary conceptual Utah EV TOU Load Pilot Program is described below.

1. Customers will be recruited into what is called the random assignment group where customers with a registered EV will be offered to participate for one year in a study in which they will either be on TOU rate design #1, TOU rate design #2, or the control group in which they may not go onto either TOU option. The control group will provide the baseline load shape for existing EV customers so that an accurate estimate of capacity savings can be determined for the 2 TOU rate options. Load research meters capable of measuring 15 minute interval usage will be installed for these customers.
2. Customers who are not part of the random assignment groups and can provide a copy of their DMV registration to the Company proving EV ownership may sign up for either TOU rate design #1 or #2. The purpose of this tranche will be to measure the desirability of the two rate options.

Analytical Requirements of the Study

A statistically defensible analysis will be implemented by the Company to accurately measure peak load shifts under the two TOU regimes. Additional information on the proposed sampling plan is available in the companion document *Draft Utah Electric Vehicle Time of Use (2016) Load Recorder Study Proposed Sampling Procedures*. The recommended sample design will incorporate the use of either three or four strata per sample population. Based on previous Company load research experience, the Utah EV TOU Pilot Study will call for the installation of 40 to 60 load recorders for a control group and for two additional TOU sample groups; therefore, a combined 120 to 180 load recorders will be necessary for the study. Based on the level of recorders installed, the sample design estimates are anticipated to achieve a precision level of $\pm 10\%$ at the 90% confidence level. The strata boundaries for this sample will be based upon the ‘cumulative square root of f’ rule as defined in studies by Dalenius and Hodges.

Most load studies are based on average monthly energy calculated for a given 12 month period. Billing distributions in load studies typically reveal a large number of customers in the lower usage categories and relatively smaller amount of customers in higher usage categories. When drawing sample customers from the distribution of EV customer energy usage, it is necessary to employ a schema that will select customers from across the entire usage spectrum. At PacifiCorp, we utilize stratified sampling with systematic, random selection. Fundamentally, the sample is divided into several homogenous groups (strata), which in essence translates to low usage, low-medium usage, medium-high usage, and high usage groups.

Load Research Metering

As previously described, it is anticipated that upwards of 180 load research meters will be necessary to conduct the Utah EV TOU Load Study. A more precise estimate of the required number of load research meters for this study are not available at this time since the load research stratification process requires the average monthly energy use for each Utah EV owner. Currently, the Company is unable to identify which of their customers own an EV and is working on acquiring Utah DMV records for those customers that own an EV. This may require the services of a 3rd party intermediary to ensure a firewall exists between the Company and confidential EV owner records.

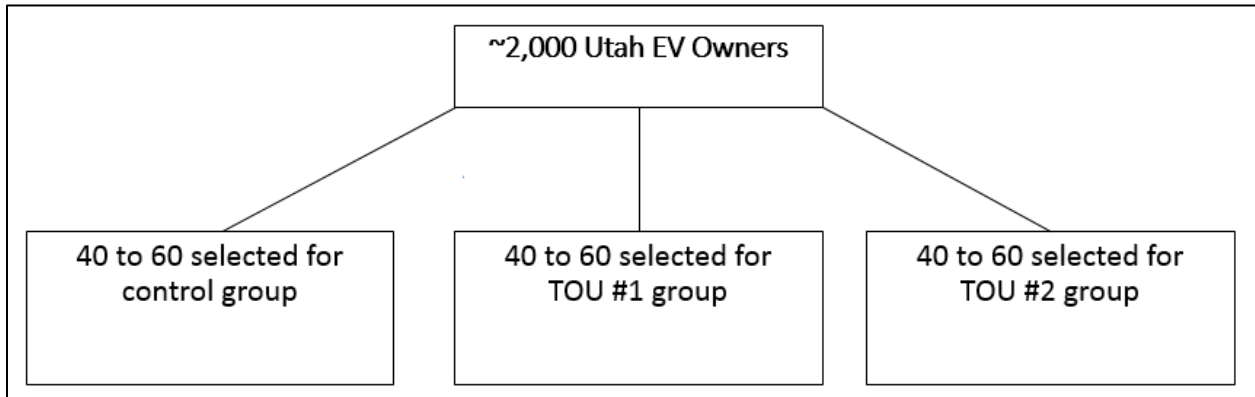
The precise number of load research meters required for this research will be determined once the Company can link average monthly use to Utah EV ownership.

Load Research Participation

Once the Load Research Group has acquired access to the DMV records, the Company will then randomly select 120 to 180 customers out of the roughly 2,000 existing EV owners in the Company’s service territory for the Utah EV TOU Pilot Study. This process may require a 3rd party intermediary to send a letter to the randomly selected EV owners/customers to see if they are willing to participate in the study under the specific option randomly assigned to them (TOU #1, TOU #2, or control). Once the customer expresses their willingness to participate, the

customer will be required to contact the Company so that a load recorder can be installed on their home.

Figure 1: Load Research Sampling Group Development



It is anticipated that some compensation will be necessary to obtain the required level of successful participation in the three randomly assigned groups. Further, it will also be necessary for the Company to develop educational materials so that customers can fully understand how their billing may be affected by participation in the TOU study.

Timing of Load Research

The Company will not commence spending money and recruiting customers for this study until Commission approval is received. Assuming Commission approval of the EV TOU pilot by July 1, 2017, the Company will target full recruitment of the 120 to 180 customers in the randomly assigned groups by January 1, 2018. The range of sample data employed will encompass the twelve month period ending December 2018. Billing data for the twelve months ending December 2016 will be used to determine appropriate stratification.