

Dr. Henry Louie

SU Center for Environmental Justice and Sustainability

Final Report

11 September 2014

Development of Electric Vehicle Load Forecasting Techniques for a Sustainable Future

This Final Report describes the activities related to my AY 2013/2014 Seattle University Center for Environmental Justice and Sustainability (CEJS) Fellowship.

In April 2013 I was awarded the CEJS Fellowship for my research proposal titled “Development of Electric Vehicle Load Forecasting Techniques for a Sustainable Future”. The project seeks to develop advanced techniques for forecasting the amount of electricity used by electric vehicles (EVs) when they recharge their batteries. The project involved obtaining data from over 2,000 EV charging stations in Seattle and San Diego, and performing statistical analyses and parametric modeling. An important goal stated in the proposal is to submit an article to an appropriate peer-reviewed journal by July 2014.

I began working on the project in the Summer of 2013. The parametric modeling progressed quickly and I submitted a manuscript titled “Data-Driven Modeling and Analysis of Aggregated Electric Vehicle Charging Station Load” to the *IEEE Transactions on Smart Grid*—the top journal in the field—in December of 2013. In April of 2014, I received comments from the peer-reviewers. The comments were generally positive and constructive, but it was clear that they wanted the work to be expanded to include time-series modeling of the data, in addition to the parametric modeling. I had planned to do the time-series modeling as a logical progression of the research, believing that the topic was rich enough to devote an entire paper to it.

I was invited to revise and expand the manuscript for additional review. Unfortunately, I

had just 60 days to conduct the additional research and document the results. The manuscript increased by 50 percent, from 8 pages to 12. Although I made an honest effort to expand the manuscript, I did not feel I had ample time to bring the additional work to maturity. The reviewers sensed this too, and the paper was rejected.

The *IEEE Transactions on Smart Grid* is a competitive top-tier journal with acceptance rate of about 12 percent and a five year impact factor of 5.78. The results of the research are still valid and valuable. I am now in the process of revising the paper and submitting it to *Electric Power Components and Systems*, a Taylor & Francis publication. I expect to complete this by the end of 2014. The additional work on time-series modeling will be more fully developed and submitted to *IEEE Transactions on Smart Grid*. I expect this to be completed by April 2015.

In addition to working on the proposed research topic, I also contributed to the CEJS in the following ways: I presented preliminary work in the November 2013 CEJS meeting and I served as a mentor to a CEJS Student Fellow, Patrick Berg. Patrick presented his work titled “Can Wind Power be used to Charge Electric Vehicles?” at the National Conference on Undergraduate Research.