## UTC Project Information

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Electric Vehicle Sharing Planning and Operations</th>
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<tr>
<td>University</td>
<td>University of South Florida</td>
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| Funding Source(s) and Amounts Provided (by each agency or organization) | USDOT: $47,532  
USF: $32,508 |
| Total Project Cost            | $80,039                                          |
| Agency ID or Contract Number  | Sponsor Source: Federal Government  
CFDA #: 20.701  
Agreement ID: 69A3551747119 |
| Start and End Dates           | Start date: 11/30/2016  
End date: 11/29/2017 |

### Brief Description of Research Project

Car sharing has been recognized as a missing link to sustainable transportation that integrates flexibility, mobility and accessibility from private vehicles and economy and sustainability from public transits. The environmental and social benefits of car sharing can be further enhanced by using electric vehicles (EVs). This research aims to propose methodologies and tools for planning, designing and operating EV sharing systems, considering the interdependent relationships among the EV service, the power system, and society. The focus of this research is one-way station based EV sharing. These developments expect to promote clean energy transportation and shared mobility in society.

This project has four tasks: (i) First, we will conduct relevant literature review to understand the research frontier and relevant research gaps in this area; (ii) Second, we will analyze problem settings and propose mathematical models; (iii) Third, we will develop an efficient solution approach and (iv) test the proposed models with numerical examples and case studies. The four tasks are planned to be accomplished in two years. The work in the first year (Phase I) will focus on Task i and ii.
### Describe Implementation of Research Outcomes (or why not implemented)

This research is being implemented as planned.

![Illustration of station based one way EV sharing system](image)

**Fig. 1. Illustration of station based one way EV sharing system**

### Impacts/Benefits of Implementation (actual, not anticipated)

Numerical experiments are conducted with data of Yantai city, China to illustrate the efficiency of the proposed simulation rules, the optimization model and the customized solving algorithm. We found that given a specific set of installed stations and fleet sizes, average objective value of only 40 simulations could approximate the true expectation of system dynamic operation costs very well. Several groups of experiments are conducted to illustrate how the key parameters influence the best feasible cost items, total numbers of built charging stations and deployed vehicles, also the optimal EV sharing system design.

### Web Links

- Reports
- Project website

[http://ctech.cee.cornell.edu/final-project-reports/]