Arizona State University: Electric Vehicle Program

Executive Summary

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One solution to the problems of poor air quality in Phoenix, Arizona and global climate change is to alter the way the population uses transportation. In the US, around one-fifth of all carbon dioxide ($CO_2$) emissions are due to cars and trucks used for transportation and the increasing level of $CO_2$ emissions is exacerbating our impact on the climate and is causing a shift in climate. By switching from combustion engine vehicles to public transportation, electric vehicles, or going entirely vehicle-less, the amount of $CO_2$ being released into the atmosphere every day will be decreased and overall air quality within cities will improve. If public transportation, riding a bicycle or walking is not an option, electric vehicles (EVs) are ideal as a lower-carbon emitting option over traditional combustion engines when they are recharged using renewable energy sources, like solar. The ASU EV program will reduce barriers to EV adoption to help reduce $CO_2$ emissions related to transportation at the ASU campuses.

To encourage the adoption of EVs, this project pushed to overcome a few of the traditional barriers to adoption in partnership with University Sustainability Practices – initial cost, charging station infrastructure, and education about EVs. First, charging station infrastructure was installed on all four ASU campuses. Then, to discover the biggest barriers to EV adoption, a literature review was conducted to develop a general understanding of barriers which guided the creation of survey questions. This survey was distributed to all staff and faculty at ASU (over 9,500 individuals) and received over 1,400 responses. Of the 1,400 respondents, 96.6% of vehicle drivers own their vehicle, 80.2% indicated that they owned their own home, 53.8% have access to a plug within 15 feet of their parking space at their home, and 8.6% indicated that they already own a plug-in electric vehicle. Comparatively, in 2018 only 0.35% of vehicles in Arizona were plug-in electric vehicles (including battery electric vehicles and plug-in hybrid electric vehicles)

To begin building the EV program at ASU, other universities with EV programs were interviewed to learn best practices and to understand what is most effective in encouraging EV adoption on campus. The responses determined that ASU needs to: 1. Install more charging stations on campus; 2. Offer premium parking for EV/hybrid users or a discounted parking pass

or free charging; 3. Add charging stations to ASU interactive map; and 4. Develop an incentive program with EV dealerships. The project built partnerships with EV dealerships to lower the initial costs associated with buying and leasing EVs. Finally, to increase awareness of EVs, the dealership partners brought EVs to campus for a demonstration day paired with Earth Day.

Moving forward, the dealership incentive program could be expanded to include other brands (Tesla, Ford, Mercedes/Smart, etc.). Tesla may be the hardest brand to build an incentive program with because there is such a high level of demand for their vehicles. Alternatively, or in tandem, the incentive program could continue to follow UCSD's model and build relationships with manufacturers doing VGI testing on campuses. While they have the advantage of operating on their own microgrid, which takes out the entire process of needing to work with a local utility, ASU could still potentially fit into the research partnership mold as well because of the strong research capabilities. The EV program was a great start, but there was not time to evaluate the success of the program. A follow-up project could include continuing to work with USP and P&T to track the number of EVs coming to campus and see if the number increases over time now that some of the barriers have been reduced. With this evaluation, the program could either push forward if it is found to be successful or it could change course and try a new tactic if EV numbers on campus did not increase. Another step after encouraging the electrification of students, staff, and faculty vehicles would also be to electrify ASU's fleet. ASU uses over 70 vehicles in maintenance and operations and could be electrified. This process would necessitate strong partnerships with the facilities department, P&T, and others. This program also did not include evaluations of energy use and understanding how the increased energy use on campus affects solar usage. If there was a dramatic spike in energy demand from EV charging, does that mean solar being used for other functions on campus was reduced? Does this mean ASU should invest more heavily in solar installation on campus to compensate for the increased energy demand? An energy evaluation would be useful in evaluating next steps.