



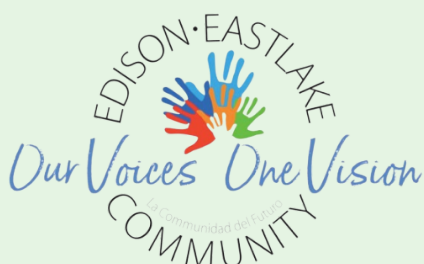
ARIZONA STATE UNIVERSITY
MASTER OF SUSTAINABILITY
SOLUTIONS

PREPARED BY

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Connecting Community and Climate

*Transportation Electrification Options for
Underserved Communities in Phoenix*



City of Phoenix

Executive Summary

Problem Description:

Underserved communities are disproportionately impacted by climate change, and current inequities present in our emissions-heavy transportation system only exacerbate these burdens. As of 2019, transportation accounted for 29% of total GHG emissions in the United States. Electric Vehicles (EVs) present an opportunity to lower emissions associated with transportation, as EVs emit zero tailpipe emissions. We define electric vehicles as cars, bikes, scooters, buses, and rail systems. As transitions to EVs occur, action can be taken to adopt more equitable practices within the transportation space, specifically in historically underserved communities.

In partnership with The City of Phoenix's EV Department, and with additional support from the Housing Department, the EV Changers team developed a transportation-oriented survey to be distributed to the Edison-Eastlake Community (EEC) in Phoenix. Efforts to understand the EEC's needs will lend to more efficient, connected, and accessible transportation in the upcoming transportation electrification movement.

Results

After collecting our survey data, we found that 41% of individuals said their primary method of transportation was their personal vehicle while 29% took public transportation. 80% were unfamiliar with electric vehicles, and 80% expressed an interest in benefitting from expanding public transportation options. Heat combined with disconnected public transportation were prominent challenges for EEC residents in daily activities. 55% of respondents indicated that owning an EV would positively impact their lives. The high cost of electric vehicles was the primary reason individuals would not buy an EV for themselves.

"Electric Vehicles present an opportunity to lower emissions associated with transportation, as they emit zero tailpipe emissions."

- Karen Apple

City of Phoenix Electric Vehicle Program Manager

Recommendations:

We encourage the City of Phoenix to consider 4 essential concepts as they move forward with the planning of future EV programs.

Cooling- Urban design concepts which integrate shading will be crucial to incorporate into future plans if the City wishes to foster an environment in which public spaces are comfortable, safe, and accessible.

Connectivity- Expanding micro mobility access, education programs, and customer support options will be necessary to create a more cohesive and functional public transportation system.

Climate- Climate positive and low emissions transportation options should be highly prioritized in future planning decisions if the City is to meet its 2050 goal of carbon neutrality.

Cost- The recommendations we have outlined are cost effective for the City as well as affordable for residents. We have performed a rudimentary cost analysis to support this statement.

Introduction

Climate change is a profound issue facing the U.S. and all other nations. Action must be taken in the next decade to reduce GHG emissions if we are to preserve our world for generations to come. Traditional combustion engine vehicles are a major source of emissions globally. In Phoenix, gasoline-powered vehicles are the largest single source of GHG emissions, contributing to poor air quality among residents and visitors (City of Phoenix, 2020). This, in turn, negatively impacts physical health and well-being.

EVs are one critical piece of the solution to decarbonize the transportation sector in the city as they create zero tailpipe emissions. EVs refer to any fully electric mode of transportation, including but not limited to electric bicycles, cars, buses, scooters, and rail. The positive national and global landscape surrounding the adoption of electric vehicles is allowing cities and businesses to plan for and utilize incentives toward the transition to EVs (Noblet, 2021).

Top Benefits of EVs

No fuel required

Zero tailpipe emissions

Better performance

The City of Phoenix is looking to enact policy and community engagement solutions to speed the transition to EVs as a means of reducing GHG emissions, improving air quality, and advancing equitable mobility solutions - which refers to any form of transportation that is accessible regardless of wealth, background, or status and maximizes clean air and economic benefits (Creger, 2018). As this shift accelerates, action must be taken to ensure underserved communities, where residents are in areas with a disproportionate lack of electric or zero emissions transportation options, are considered in this shift.

In partnership with the City of Phoenix Electric Vehicle Program Manager, Karen Apple, five ASU Master of Sustainability Solutions students (i.e. The EV Changers) sought to create a better understanding of electric mobility and transportation needs for residents of the Edison-Eastlake Community (EEC). Our team worked closely with the City of Phoenix Housing Department to connect with the community and survey residents for their transportation and EV opinions. The collected survey results, a comparative analysis of city policies, and a cost analysis have been used to form recommendations to the City of Phoenix to inform future transportation programs and initiatives.

Project Description

To better understand the EV needs and preferences of EEC members, our team distributed a transportation survey. In partnership with the City of Phoenix Housing Department, we were able to engage with EEC members and distribute the survey by attending community bike rides, tabling events, and facilitating a listening session. Using data collected from our survey, comparative city analysis, and cost analysis, we developed recommendations which will be presented to the City of Phoenix Ad Hoc Committee for consideration. A primary goal for the EV Changers was the ability for this project to be replicated in various parts of the Phoenix Metropolitan Area as needs will vastly change throughout the city.

This project focused on the EEC due to the existing relationship that the City of Phoenix Housing Department has with residents and also the clear impacts that the EEC is facing from limited transportation options. The EEC is a resilient, diverse community that was able to provide meaningful insights on the safety and overall quality of public transportation, as well as outlooks on electric mobility.

Project Deliverables

Administer survey to Edison-Eastlake Community (EEC).

Gather data to understand transportation issues for EEC

Hold listening session with EEC Residents

Use EEC feedback to make recommendations to CoP

Convey pros and cons of engagement strategies used

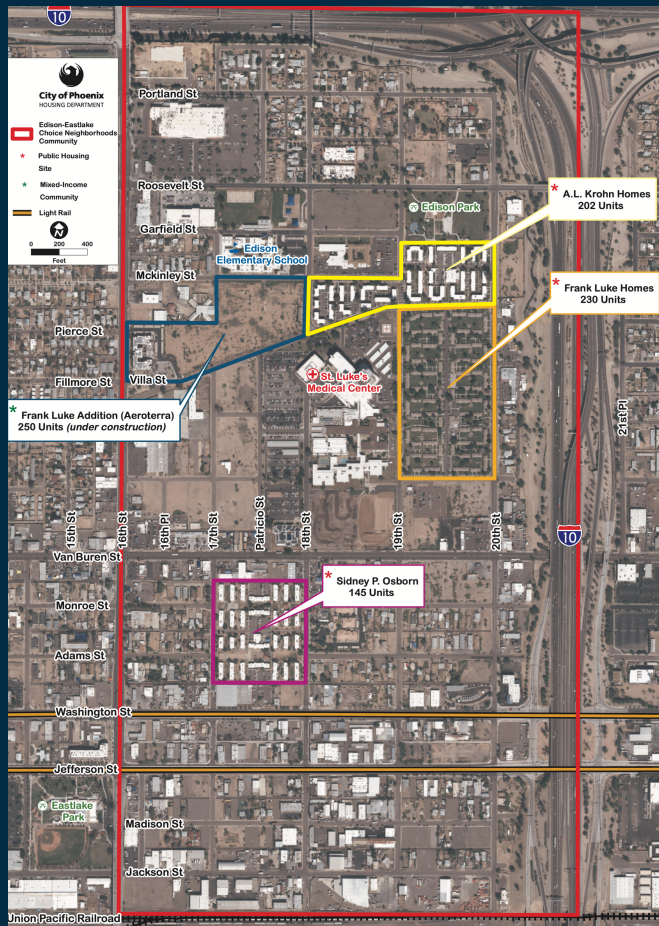


Site Description

Home to roughly 3,339 residents (BJA, 2021), the EEC has long been subject to transportation issues and discriminatory urban planning policies. Residents regularly contend with transportation-related issues, including noise and pollution from Interstate 10, a lack of public and private transportation options, and chronic health conditions - including asthma (City of Phoenix, 2018). Due to its location, the EEC is negatively impacted by the urban heat island effect and noise pollution caused by airplanes flying in and out of Sky Harbor International Airport. Public transportation options in the community are limited to only bus transit since a light rail stop does not currently exist within the boundaries of the EEC.

No bike share currently exists in the community either; one was previously implemented throughout the neighborhood but was pulled when the company (GridBike) went out of business.

In 2018, the City of Phoenix received a \$30 million Choice Neighborhood grant from the U.S. Department of Housing and Urban Development to revitalize the EEC. The City plans to use this grant to redevelop mixed-housing units and create a more connected community. The EEC One Vision Plan describes the community as a “transit-oriented community”, calling for the City to invest in transportation options that will support accessible intra- and inter-community travel (EEC One Vision Plan, 2018).




The EEC is located 2 miles from downtown Phoenix and is bounded by Interstate-10 to the north and east, Union Pacific railroad tracks to the south, and 16th street to the west. Pictured above are the community borders, the Aeroterra Community Center (where much of our in-person surveying was done), and Edison Park.



Survey Description

The survey conducted by our team included 17 questions related to general transportation and residents' knowledge of electric vehicles. To make the survey as accessible as possible, the survey was offered in both Spanish and English and translators were available to answer any questions residents had regarding the survey. The survey was distributed at tabling events, via email notifications, via tablet notifications, and at an in-person listening session. Due to approval limitations on the surveying process, the EV Changers were only able to open the survey up to individuals over the age of 18 at this time.

We included questions relating to:

- General demographics
 - Main modes of transportation
 - Miles traveled per day
 - Usage of Public Transit
 - Familiarity with EVs
 - EV incentive programs
 - Barriers to EV purchase
 - General transportation challenges
- 

Comparative Analysis of Cities

In order to better understand the efforts of other jurisdictions, the team performed a comparative analysis of 12 cities engaged in transportation electrification efforts with an component of equity explicitly outlined. Common themes from these cities' plans include:



Robust community engagement and partnerships



Efforts to make EV charging accessible to multi-family housing



EV car sharing programs



Electric bicycles and other micro-mobility solutions



Broad range of incentives and financial assistance

New York, NY

The EV Make Ready program directs \$206 million directly to disadvantaged communities through public EV charging stations.

Los Angeles, CA

The BlueLA car sharing program allows residents in 40 locations to rent electric vehicles for short-term use at a low price, just like bike share, but with electric vehicles.

Chicago, IL

Requires that, for the new construction of multi-family dwellings with at least 5 units or commercial properties with at least 30 units, 20% of parking spaces be equipped for EV charging.

Boston, MA

The Good2Go car share program is similar to BlueLA, but it operates on a sliding scale and was intentionally located in a historically black neighborhood. Condo owners must be permitted to install EV charging equipment thanks to the city's "right to charge" law.

Portland, OR

Low and moderate income households can receive an additional \$2,500 rebate for the purchase of a new or used electric vehicle, in addition to the already available \$2,500 state electric vehicle rebate.

San Antonio, TX

Climate Action Plan recommends developing community partnerships to encourage EV pilot programs, in addition to providing financing assistance via loan loss guarantees to help individuals with poor or no credit gain access to financing required to purchase an electric vehicle.

San Francisco, CA

The Muni Service Equity Strategy improves transit and connectivity for individual neighborhoods. The city is currently evaluating code changes to encourage EV charging in multi-family housing, and is developing a DC fast charger master plan to evaluate and respond to residents' needs.

Austin, TX

The Plug-in Austin program gives residents access to unlimited charging at more than 1,000 Level 2 charging stations across the city for only \$4.17 per month.

Seattle, WA

A goal that all shared mobility (rideshare, bikeshare, scooters, taxis) by electric by 2030. The city has installed 6 public DC fast chargers in public locations, and is updating their comprehensive plan to prioritize dense neighborhoods to support walking and biking, as well as dedicating at least one city block to be entirely car-free.

Cost Analysis

Both electric bicycles and electric scooter share programs present challenges associated with initial cost and program upkeep. According to Russell Meddin, founder of Bike Share Philadelphia, the cost per e-bike is between \$4,000 and \$5,000, which includes the cost of kiosks and docking stations (Beitsch, 2016). Due to the additional cost of upkeep, electric bike shares might be less feasible for the City to create itself. The City of Phoenix could try to attract private partners, such as the Lyft-owned electric bike-share - Citi Bike.

Similarly, Phoenix would likely encounter financial difficulties trying to create an e-scooter program and may benefit from launching a pilot program. The City of Phoenix could leverage partners such as Bird and Lime from its E-scooter Pilot Program to create a viable e-scooter share program in the EEC. However, the program would likely require subsidization to offset the pay-per-mile system the e-scooter companies currently have in place.

Program Feature	Approximate Cost
Cost per e-bike	\$1,500 - \$2,400
Cost per e-bike docking station (15-19 bikes)	\$40,000 - \$50,000
Operating cost per e-bike	\$900-\$3,500 annually
Operating cost per docking station	\$1,730 annually
Kiosk and solar array	\$12,000 per station
Cost per e-scooter	\$1,000
Cost per e-scooter docking station (holds six scooters)	\$6,000



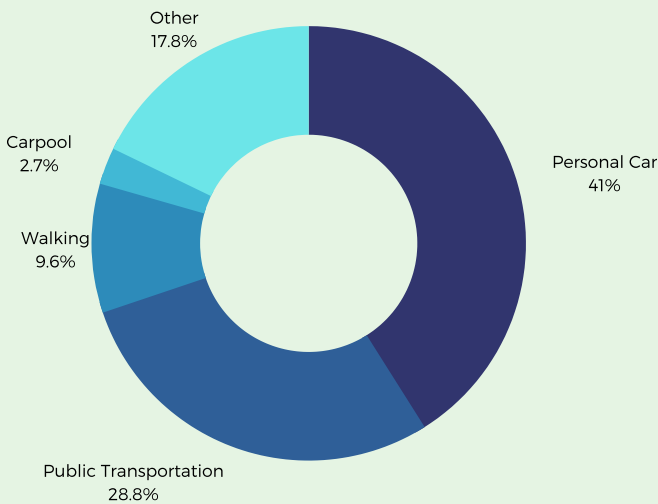
Promising Equitable Practices:

- Capital Bikeshare
 - Offers five dollar annual memberships for residents who qualify for low-income assistance programs like Supplemental Nutrition Assistance Program (SNAP) and Temporary Assistance for Needy Families (TANF).
- Baltimore City Dockless Vehicle Pilot Program
 - Requires vendors to place 25% of vehicles deployed daily in the “equity zones,” consisting of 15 Community Statistical Areas based on household income levels

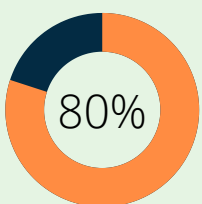


Survey Results

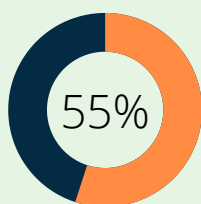
The EV Changers received 84 survey results from residents within the EEC. 41 percent of individuals indicated that their primary method of transportation was their own personal vehicle followed by 29 percent being public transportation (Figure 1). For those residents who do have their own personal vehicle, the EV Changers team included questions based on how many individuals ride with them and how many average miles they travel daily. Over 80 percent of the residents ride with 2 or fewer people in their vehicle and around 43 percent of respondents state they only ride 10 miles or less per day. Individuals with fewer driven miles per day in their own personal vehicle are a great candidate to encourage opting for public transit or electric mobility options instead.



F.1 Breakdown of EEC Residents main methods of transportation



F.2 80% of respondents interested in expanding public transportation.



F.3 55% of respondents felt owning an EV would positively impact their quality of life



F.4 Word Bubble representing the different responses from residents for the question "What's the first word that comes to mind when you think of EV's"

A large portion of the residents, about 80 percent, were somewhat familiar or entirely unfamiliar with electric vehicles. The most present transportation challenges that residents face in the EEC include heat/weather, long walks to destinations, and cost to own and operate a vehicle. 80 percent of respondents expressed a significant interest in benefitting from expanding public transportation options throughout the community with a mobility hub, which is a mix of e-bike, e-scooter, and EV car share, being a second option (Figure 2). Cost surrounding purchasing an electric vehicle came out to be the most contributing factor to individuals not using an electric vehicle for themselves. With that being said, 55 percent of respondents felt that owning an EV would positively impact their quality of life (Figure 3). We asked residents what word came to mind when they thought of EV's and created a word bubble with the most popular responses (Figure 4).

Recommendations

The EV Changers vision for this project is that everyone will have access to sustainable, safe, and affordable transportation options in the Edison-Eastlake Community. The four pillars below (cooling, connectivity, climate, and cost) are based on input from the community and align with the values and goals sought after by our project partner, City of Phoenix, as well as this team of ASU students. We've broken down our recommendations into these sections, along with short, medium, and long-term goals that will truly realize the vision for transportation electrification in this community and beyond. Short term goals will be achieved within 0 to 3 years, medium term goals will be achieved within 3 to 6 years, and long term goals will be achieved in 6 to 9 years.

Cooling:

Short-term: Increasing shading near bus stops and on walking paths will provide individuals with a safe, cooler route to their destination. Regardless of the micro-mobility solution or share program chosen for a community, proper shading should be provided for bikes or scooters in the docking stations to ensure longevity and use of equipment.

Mid-term: Edison-Eastlake Community residents expressed a strong interest in rideshare discounts, which could alleviate heat and safety concerns, especially in the summer. Our team recommends that residents who choose a hybrid or EV car for their rideshare will receive a higher discount.

Long-term: Increasing shading and cooling infrastructure within and around the EEC will encourage people to walk, bike, and use transit. This solution is in alignment with the City of Phoenix's Climate Action Plan goals of creating a network of 100 cool corridors in vulnerable communities by 2030 and prioritizing communities most vulnerable to heat, such as the EEC.

Climate:

Short-term: Publicly available standard AC plugs will encourage the use of personal e-scooters, e-bicycles, and mobility devices, and provide an opportunity for free re-charging for longer trips. This was of particular concern for residents with mobility scooters. The plugs - which could be installed on light posts, publicly-owned buildings, or in parks - could also be utilized for L1 car charging where parking is available.

Mid-term: The Phoenix Climate Action Plan calls for 50% of car sales being electric vehicles by 2030. To reach this goal, we recommend increasing residents' access to electric vehicles through rebates or vouchers that reduce the cost of a used electric vehicle. 42% of surveyed residents indicated rebates/vouchers as their first choice for a city program related to EVs.

Long-term: Although current EV ownership is low in the Edison-Eastlake Community, we recognize the importance of building the infrastructure that will allow residents to access convenient and affordable charging in the future. City of Phoenix officials anticipate 280,000 additional EVs by 2030, and pledge to "include equity considerations when identifying locations for EV charging accessible to the public." We strongly recommend the installation of a publicly-available EV charging station within the EEC, which is particularly important for renters.

Recommendations

Connectivity:

Short-term: When conducting our listening sessions, there was an overwhelming response from residents over concern for their safety when using public transportation. Hesitation to take public transportation came from residents' testimonies of being harassed at bus stops by people experiencing homelessness loitering in the area. Advertising the number of the Phoenix CARES program at bus stops for residents to call when feeling uneasy or unsafe. This will hopefully increase community confidence in public transit while also connecting homeless community members to the resources they need.

Mid-term: Around 5 percent of residents stated their primary method of transportation was their bicycle. A partnership being made between the EEC and a local bike co-op would be beneficial to increase education and expansion of bicycle use for residents. Increasing residents' education on how to use public transportation with a bike will allow residents to feel confident and comfortable with using those two methods of transportation together.

Long-term: Increasing modes of transportation throughout the EEC will allow residents to find last-mile options. Providing an electric bike share with a connected network for EEC and introducing a frequent circulator bus or shuttle within the community, which could even be electric at some point, would expand the mobility options for residents.

Cost:

Short-term: The EEC has existing community bikes given to them from Grid Bike after the company closed its doors. If a partner cannot be found to use leftover Grid Bikes in a low-cost conventional bike share for EEC residents, then they could be sold or donated to EEC residents. Investing in cooling infrastructure, including cool pavements, vegetation, and trees and other coverings would be short-term activities providing long-term benefits for EEC residents.

Mid-term: Partnering with ride share companies like Uber and Lyft to provide discounts for EEC residents, specifically for hybrid and full-electric vehicles will increase resident mobility without contributing to air pollution.

Long-term: Partnering with rideshare companies already geared towards full-electric options like ENVOY Rideshare will provide more EV options to residents and may help to engender a culture of adopting emission-free mobility.

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- more to be added later