

IDENTIFYING ELECTRIC VEHICLE (EV) CHARGING INFRASTRUCTURE CHARACTERISTICS AND INCENTIVES FOR EV ADOPTION BY YELLOW CAB COLUMBUS

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ABSTRACT

We examined incentives and characteristics of EV charging infrastructure that will help expand the use of electric vehicles in Columbus by transportation service providers. In this study, Yellow Cab Columbus (YCC) is used as a case study to explore feasibility of adopting a 100% electric fleet. We found that the majority of cab drivers are interested in switching to EV's if the lack of charging stations is addressed. We also conducted a cost analysis of one of YCC's current vehicles compared to an EV.

RESEARCH OBJECTIVES

- I. Identify current state of Yellow Cab's fleet and determine its wants, needs, and interests in switching to EVs.
- II. Survey Yellow Cab drivers to determine their opinions and concerns.
- III. Determine locations for EV charging infrastructure in Columbus convenient for YCC drivers.

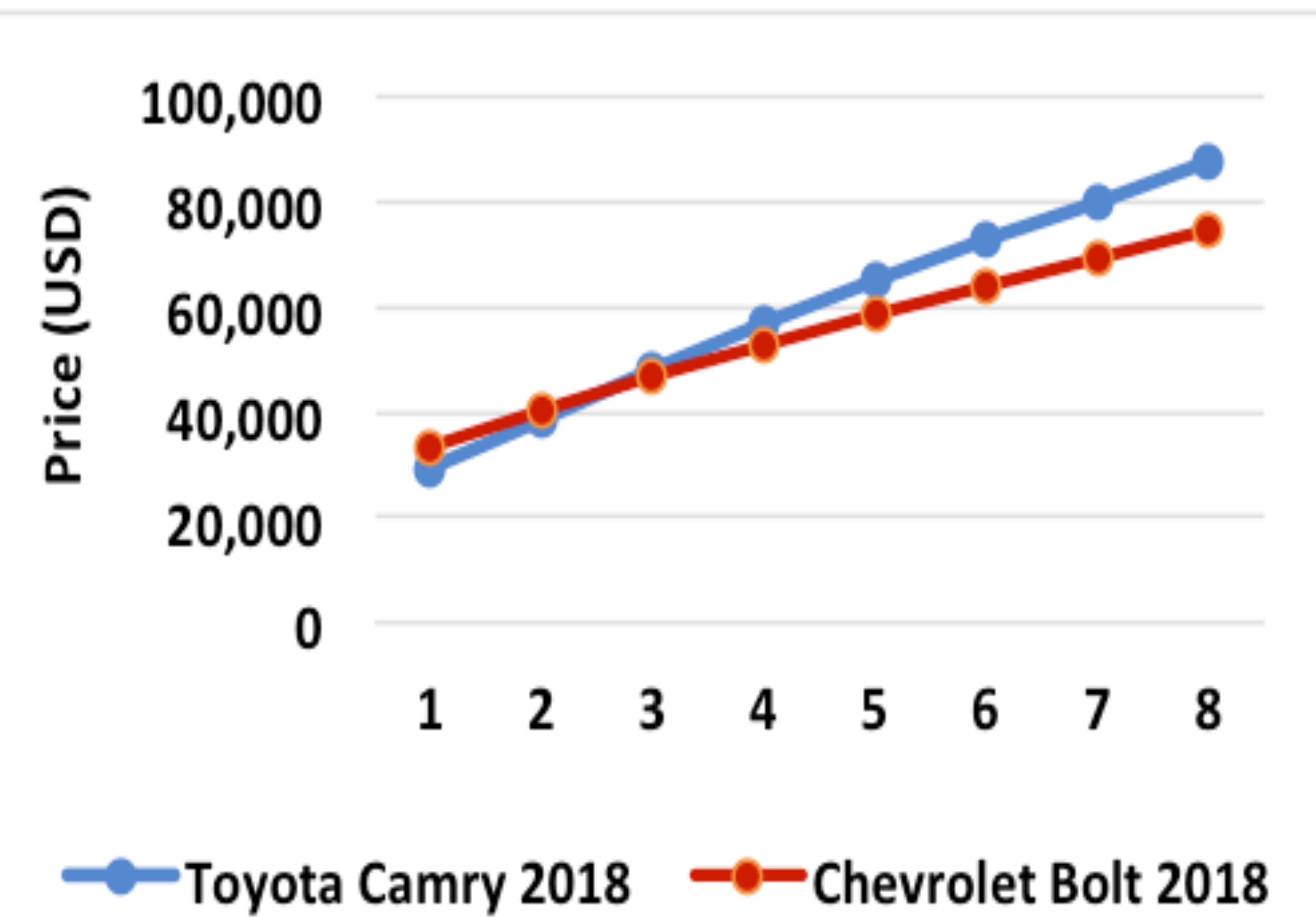
METHODS

- I. Communicated with YCC CEO Morgan Kauffman and SMART Columbus contacts.
- II. Analyzed early adopters of EV fleets in the U.S. These case studies and surveys were reviewed to contribute to the development of survey questions for Yellow Cab. Compared prices of a current YCC vehicle and an EV.
- III. Analyzed survey results to determine locations and characteristics of chargers and willingness of YCC drivers to adopt EVs.

Objective I

Through a series of meetings with Yellow Cab Owner/CEO, Morgan Kaufman, and SMART Columbus contacts, we found that YCC intends on incorporating the Chevrolet Bolt 2018 into their fleet and will continue to work closely with SMARTColumbus to ensure the EV fleet will be supported by the infrastructure of the City of Columbus. He hopes to have a full electric and decentralized fleet in the future.

Price Analysis of Chevy Bolt 2018 vs. Toyota Camry 2018



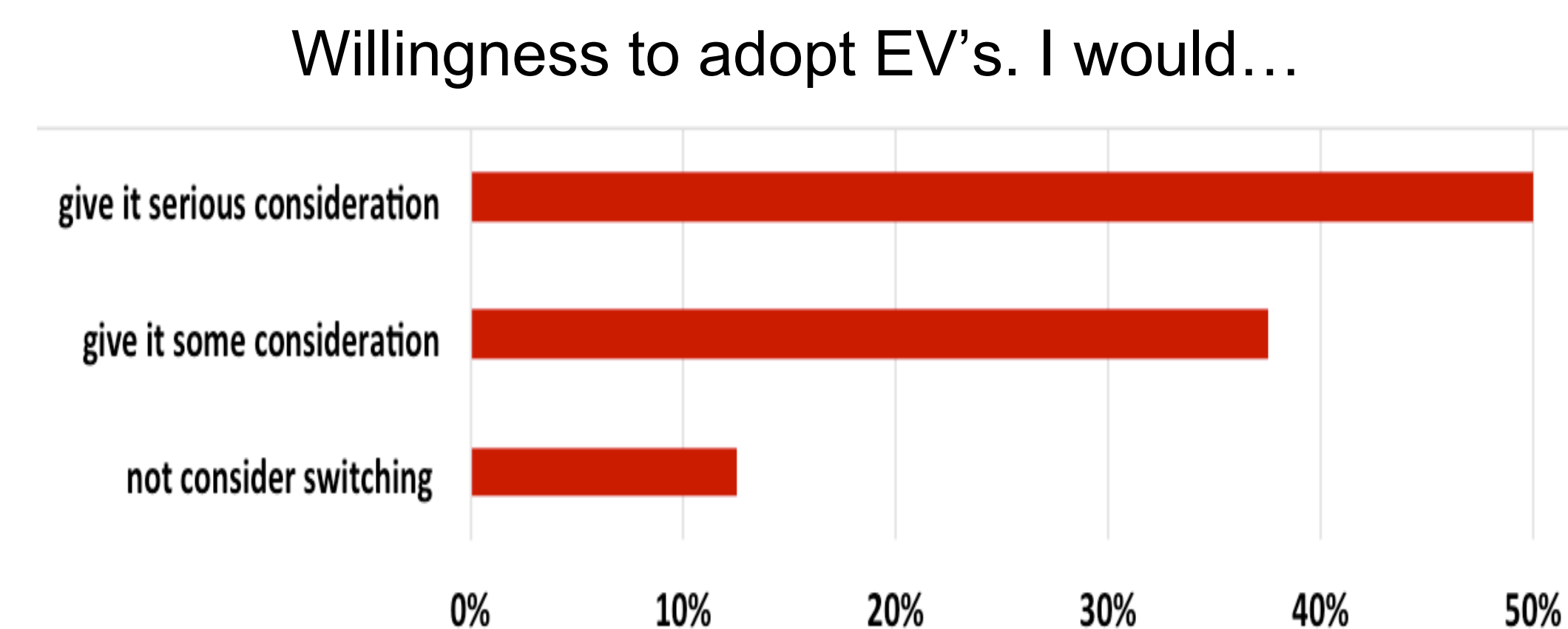
Vehicle Make Model and Year	Initial Cost of Vehicle (USD)	Price to Refuel (USD)	Range on full tank (miles)	Miles driven per year	Refuels a year	Refuel Price (USD)	Maintenance cost <60k Miles (\$/mile)	Maintenance cost >60k Miles (\$/mile)
Toyota Camry 2018	\$23,495.00	\$ 36.35	507.5	55000	108.37	\$ 3,939.41	0.034	0.11
Chevy Bolt 2018	\$37,495.00	\$ 6.80	238	55000	231.09	\$ 1,570.97	0.033	0.10

Explanation of Price Analysis

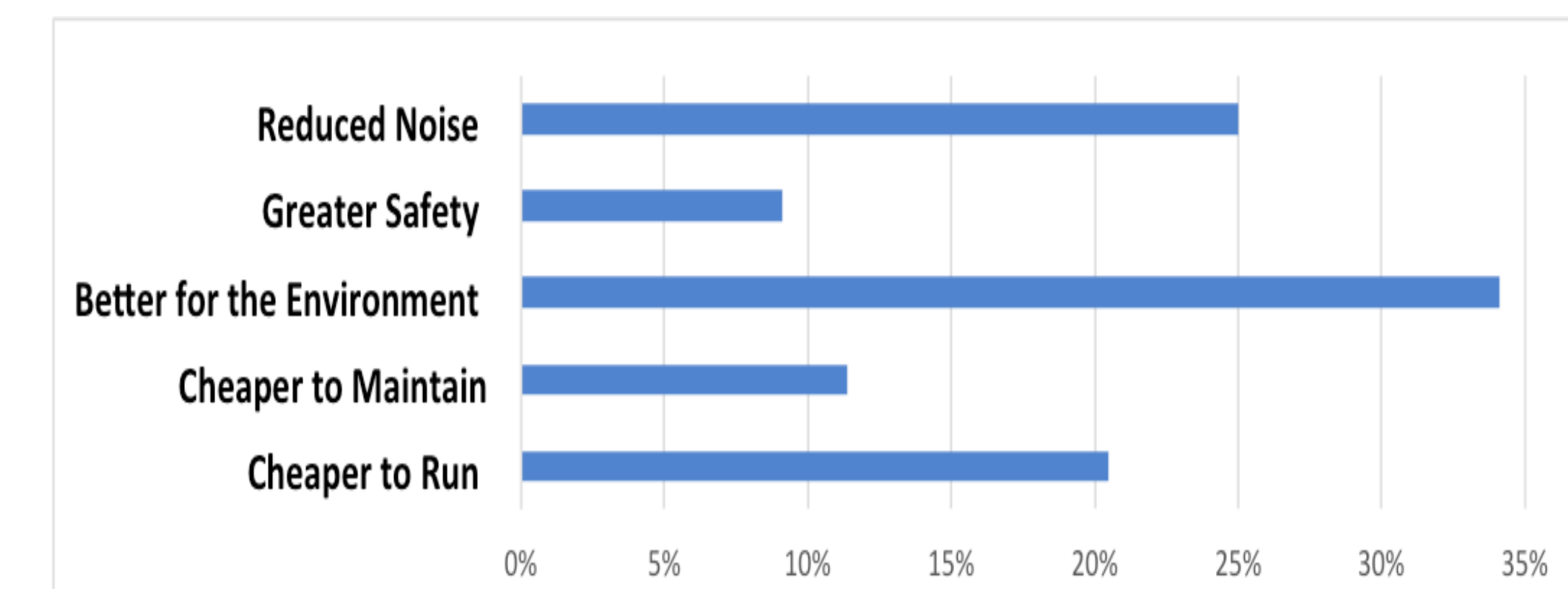
- The breakeven point is around 2.5 years.
- The purchase price of the Chevy Bolt is higher than the Toyota Camry but the fuel and maintenance cost are higher for the Camry.

Objective II

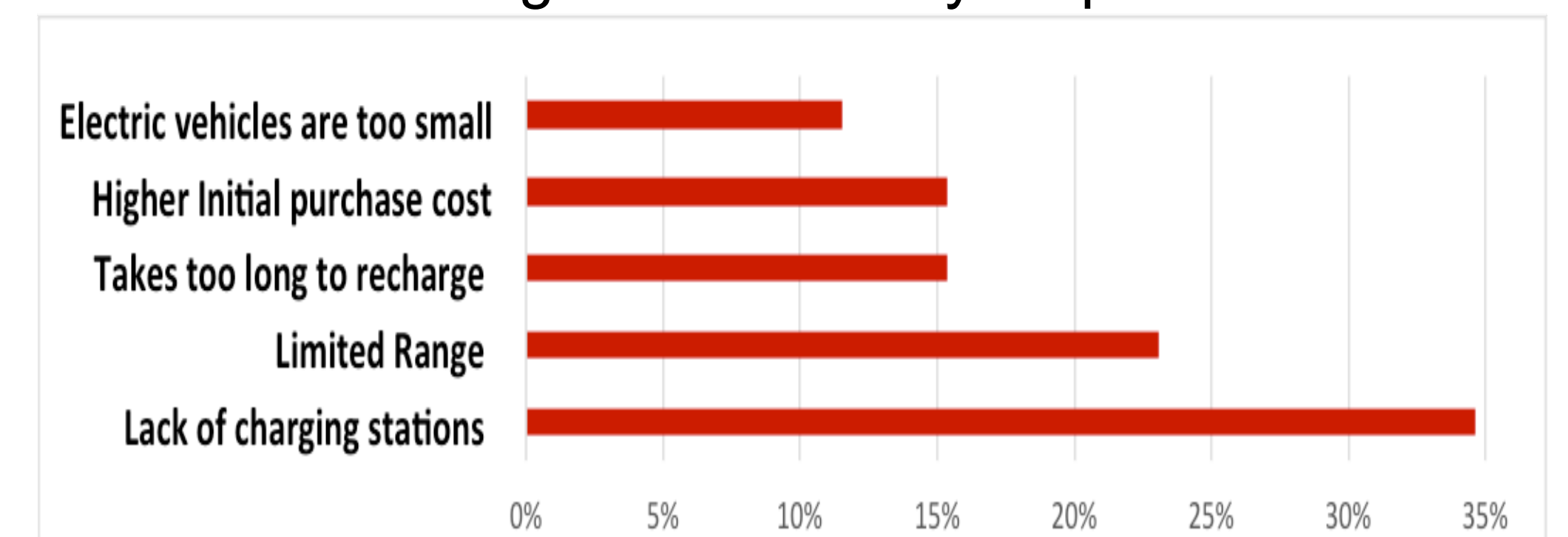
17% of Yellow Cab Columbus drivers responded to the key questions detailed below.



Advantages identified by respondents

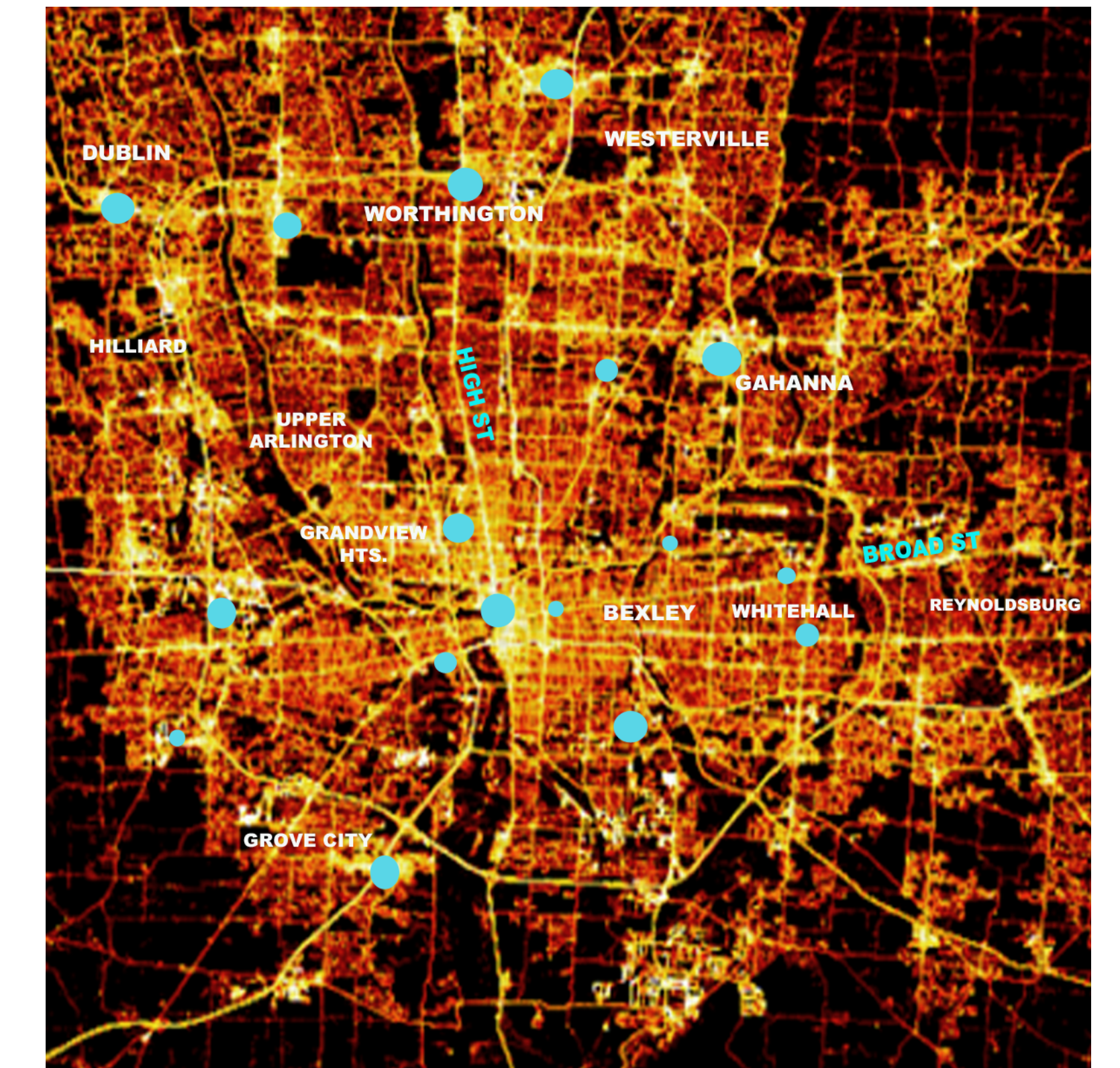


Disadvantages identified by respondents



Objective III

The biggest barrier to switching to EV's identified by the survey is lack of charging locations. We have placed locations based off of our review of the heat map and survey respondents' preferences for chargers on a heat map of YCC drivers' trip destination frequency.



Key
 = charger(s)
 *larger dots = multiple chargers

DISCUSSION & RECOMMENDATIONS

From our survey, we found that 50% of Yellow Cab drivers would seriously consider adopting EV's. However, perceived barriers such as lack of charging locations, limited range, and charging time must be addressed during implementation. We suggest installation of DC fast chargers at locations pertinent to YCC drivers. DC fast chargers add 90 miles of range per 30 min. of charging for the Chevy Bolt.

REFERENCES

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