Decentralized Mobility Ecosystem

Market Solutions for 21st Century Electrified Mobility

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Organization: Clean Fuels Ohio

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CLEAN FUELS OHIO

OHIO'S CLEAN TRANSPORTATION ADVOCATE

2021 DOE Vehicle Technologies Office Virtual Annual Merit Review

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Overview

Timeline:
- Start: October 1st, 2019
- End: December 30th, 2022
- ~50% complete

Budget:
- Total Project Funding: $1,341,999
- DOE Share: $619,999
- Cost Share: $722,000
- Budget Period 1: $455,061
- Budget Period 2: $480,323
- Budget Period 3: $456,615

Barriers Addressed:
- Financial risks and burdens of EV fleets and EVSE
- EVSE access and range anxiety
- Transit hubs with inefficient or lack of EV ecosystem planning
- Barriers to vehicle electrification in the mobility and transportation services sectors

Partners:
- **Lead:** Clean Fuels Ohio
- **Implementation:** Columbus Yellow Cab
- **Design & Engineering:** HNTB
- **Technical Lead:** Mobikit
- **Technical Support:** NREL

Project Objectives

Objectives:

- Create a decentralized and electrified mobility ecosystem, leveraging Columbus Yellow Cab's growing fleet of electric vehicles (EVs) to bring mobility hubs to three quadrants of the Columbus Region for use by any licensed drivers
- Demonstrate an operationally and economically successful model for EV adoption and charging station deployment by transportation service fleets and major parking providers

VTO TI Goals:

- **National Security:** promotes transportation electrification and reduces dependence on foreign fuels
- **Economic Growth:** the decentralized model can be replicated to increase EV feasibility, adoption, and economic opportunities
- **Affordability for Business/Consumers:** the decentralized model lowers the per mile operational and total fleet ownership costs
- **Reliability/Resiliency:** decentralized EVSE provides more charging locations and options for many types of drivers

Impact:

- Proven and successful business model that provides a replicable path for other fleet operators to adopt and scale
- Coordinated and decentralized EV transportation planning
- Increases accessibility and availability of EVSE
- Demonstrate solutions addressing main barriers to vehicle electrification in the mobility and transportation services sectors

Project Approach

Budget Period 1:
Program Development

- Begin analysis of CYC data to inform mobility hub deployment plan
- Finalize mobility hub deployment plans
- Create specifications for electric vehicle (EV) purchases and create specifications for electric vehicle supply equipment (EVSE)

Budget Period 2:
Data Collection & Analysis

- Deploy EVs and EVSE at three locations
- maintain and refine mobile EV reservation platform
- Market EV mobility hubs to relevant user audiences
- Complete replication playbook draft and seek feedback

Budget Period 3:
Presentations of Findings and Dissemination

- NREL data integration
- Launch, maintain and refine mobile EV reservation platform
- Disseminate final replication playbook
- Complete and document final project deliverables

Milestones

Budget Period 1			
Milestone	**Type**	**Description**	**Progress**
Taxi data analyzed and web-based platform created	Technical	Develop data collection and analysis plan to inform Mobility Hubs; Begin analysis of CYC data to inform Mobility Hub deployment plan; and Create geospatial planning app and web-based platform	**Achieved**
Project Advisory Committee established and supported.	Technical	Convene and operate Project Advisory Committee; Recruit new PAC members; and Support PAC member feedback and information sharing	**Achieved**
Mobility hub deployment plans completed	Technical	Utilize data gathering and analysis conducted to develop mobility hub deployment plan; Create and design engineering plans for mobility hub deployment; and Finalize mobility hub deployment plans	**Achieved**
Specifications for electric vehicle purchases and EVSE completed	Technical	Create specifications for electric vehicle (EV) purchases; and create specifications for electric vehicle supply equipment (EVSE)	**Achieved**
Deployment Plans Finalized	Go/No Go	Essential project data has been compiled and deployment plans have been finalized	**Achieved**

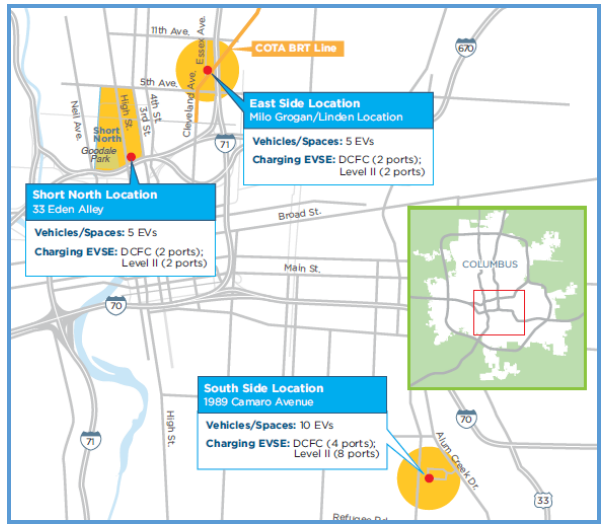
Milestones

Budget Period 2			
Milestone	**Type**	**Description**	**Progress**
Mobility Hubs Deployed	Technical	Deploy EVs and EVSE at Southside (complete), Short North and Eastside (in-progress) mobility hub locations	In Progress
Electric vehicle reservation platform completed and refined	Technical	Launch and maintain mobile EV reservation platform for the public (currently available for taxi drivers)	In Progress
Marketing for electric vehicle mobility hubs completed	Technical	Market and operate EV mobility hubs to relevant user audiences	In Progress
Replication Playbook completed and feedback requested	Go/No Go	Replication Playbook Finalized and Distributed for Comment	In Progress

Project Accomplishments and Progress (1/3)

Mobility Hub Deployment Plan and Specifications for EV and EVSE Purchases Completed

- Taxi **data analyzed and web-based platform created** by Mobikit
- **Mobility hub deployment plans completed** by Columbus Yellow Cab and HNTB
- **Specifications for electric vehicle purchases and EVSE completed** by Columbus Yellow Cab
- **Deployment plans finalized** by Columbus Yellow Cab
- Convened quarterly **Project Advisory Committee meetings**



Project Accomplishments and Progress (2/3)

Columbus Yellow Cab Mobility Hub Locations

Clean Fuels Ohio and Columbus Yellow Cab are overseeing the deployment of three Decentralized Mobility Hubs at the following locations in the Columbus, Ohio area comprised of the following number of EV's and EV charging station ports.

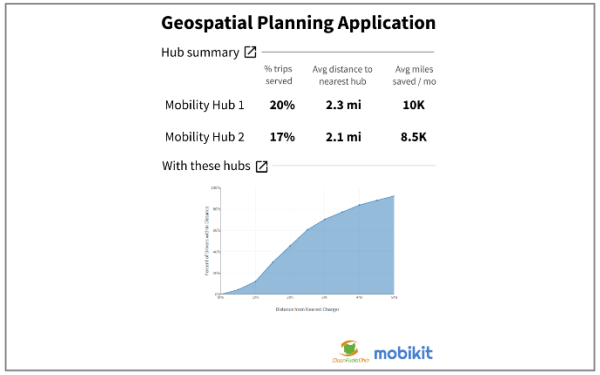
Location (Geographic Zone)	Vehicles/Spaces	Charging EVSE
South Side (1989 Camaro Drive) • Yellow Cab owned parking lot • Complete	10 EVs	DCFC (4 ports); Level II (8 ports)
Short North (1159 N. High St) • Six (6) spaces committed by City • In-Progress	5 EVs	DCFC (2 ports); Level II (2 ports)
East Side (Milo Grogan/Linden) • Intersection of Essex and Cleveland Ave • In-Progress	5 EVs	DCFC (2 ports); Level II (2 ports)
3/4 Quadrants Deployed	20 EVs	DCFC (8 ports); Level II (12 ports)

Project Accomplishments and Progress (3/3)

Mobility Hub Geospatial Planning Tool Developed from EV Fleet Data and Demo Provided

mobikit

- Mobikit developed a **data collection and analysis plan** to inform the Mobility Hubs and have also:
- Used Columbus Yellow Cab's Tesla Application Programming Interface credentials to gather, transform, and **load data into their SaaS platform to analyze their fleet activity** via exploration tools
- Developed a **prototype geospatial planning tool application** allowing urban planners and fleet owners to upload fleet activity data, specify a region of interest for mobility hub panning, and choose number of mobility hubs desire
- Presented a **demo of the geospatial planning tool** to the Project Advisory Committee



Collaboration and Coordination Among Project Team

Implementation Lead: Deployment and demonstration of first-of-a-kind, decentralized mobility ecosystem, featuring electric vehicles, EVSE charging infrastructure, and a unified, neutral app platform to allow EV usage for taxi, TNC, car share, delivery and more.

Design & Engineering Lead: Financial & Technical assistance for EVSE deployment via PUCO approved Program.

Technical Lead: Data analysis, operational and cost modeling, prep for dataset integration with the Transportation Secure Data Center (TSDC), Fleet DNA and/or LiveWire; project results reporting

Clean Cities Coalition Replication Partners: Replication of playbook, tools and analysis to demonstrate the feasibility and financial viability of deploying mobility hubs in other cities across the country

YELLOW CAB COLUMBUS 1928

HNTB

mobikit

EP-ACT Eastern Pennsylvania Alliance for Clean Transportation

Clean Cities

Overall Market Impact

Achievements to date:

- Completed initial design, engineering plans, EV & EVSE purchases for mobility hubs at three locations
- Analyzed and incorporated CYC taxi data, Columbus Library data, and EV charging station data into Mobikit's web-based geospatial planning tool to recommend additional mobility hub locations

This project directly addresses the operational and economical viability for EV adoption and charging station deployment in transportation service fleets and by major parking providers by:

- Accessing mobility hub EVs through an app-based platform (available to licensed drivers for any use from driving employment to personal use)
- Providing paperless administration and financial transactions, key less entry, and EV operation

Upcoming:

- Rest of Budget Period 2
  - Deploy remaining Mobility Hubs
  - Launch and maintain mobile EV reservation platform for public
  - Market EV Mobility Hubs to relevant user audiences
  - Create replication playbook draft
- Budget Period 3
  - Continue to market and operate Mobility Hubs and maintain EV reservation platform
  - Finalize replication playbook and resources
- Key remaining challenges
  - Marketing the EV Mobility Hubs to a wide user audience
  - Securing interest in the EV reservation platform for the public

Summary

Objectives	• Create a decentralized and electrified mobility ecosystem, leveraging Columbus Yellow Cab's growing fleet of electric vehicles (EVs) to bring mobility hubs to three quadrants of the Columbus Region • Demonstrate an operationally and economically successful model for EV adoption and charging station deployment by transportation service fleets and major parking providers
Approach	• Program Development (inform mobility hub deployment plan, begin data analysis) • Data Collection & Analysis (deploy mobility hubs, refine mobile EV reservation app) • Presentations of Findings and Dissemination (launch and maintain EV reservation app)
Accomplishments	• Taxi data analyzed and web-based platform created by Mobikit • Mobility hub deployment plans completed by Columbus Yellow Cab and HNTB • Specifications for electric vehicle purchases and EVSE completed by Columbus Yellow Cab • Deployment plans finalized by Columbus Yellow Cab • Convened quarterly Project Advisory Committee meetings
Up Next	• Deploy remaining Mobility Hubs • Launch and maintain mobile EV reservation platform for public • Market EV Mobility Hubs to relevant user audiences • Create replication playbook draft with assistance from CYC, Mobikit, and HNTB

Technical Back-Up Slides