Zero Emission Freight Future

Proof of Concept in New Communities & Fleets

2023 DOE Vehicle Technologies Office Annual Merit Review Presentation

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CLEAN FUELS OHIO

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Overview

Timeline:

- Start: October 1, 2020
- End: December 31, 2023
- ~70% completed

Barriers Addressed:

- Lack of data on medium and heavy-duty electric vehicles (EVs)
- Low EV deployment in the freight and refuse operations sectors
- Low levels of EV adoption in other sectors (government, transit, utility) that rely on Class 4-8 vehicles

Budget:

- **Total Project Funding:** $1,343,175
  - DOE Share: $670,000
  - Cost Share: $673,175
- **Funding for FY 2022:** $333,705
- **Funding for FY 2023:** $218,330

Partners:

- **Project Lead:** Clean Fuels Ohio
- **Fleet Deployment Partners:** PITT OHIO, City of Columbus, Bimbo Bakeries
- **Technical Partner:** Sawatch Labs
- **OEM Partners:** Volvo, Motiv Power Systems, Lion Electric Co. (former)

Project Objectives

Objectives

- Deploy MD/HD EVs by highly visible fleets in key vehicle platforms
- Improve MD/HD EV datalogging & reporting capabilities
- Prove the operational & financial case for EVs, leading to Class 4-8 adoption in various applications
- Address critical gaps in MD/HD vehicle data and analysis to enhance fleet decision-making and EV adoption

Impact

- Demonstrate successful deployment of MD/HD EVs
- Compile data on MD/HD EVs & analyze performance
- Improve datalogging & reporting capabilities for MD/HD EVs
- Provide replication guidance for increased adoption in other sectors with Class 4-8 fleets

VTO Technology Integration Goals

- **Improving fuel diversity:** MD/HD EVs promote greater fuel diversity
- **Increasing local resiliency: P**romotes the use of a new transportation option; need more deployments in the industry
- **Reducing greenhouse gas emissions: D**irect reduced GHG emissions & promotes transportation electrification for further GHG reduction

Project Approach

Budget Period 1:
Overall Program Development

- Develop data collection & analysis plan
- Convene Project Advisory Committee (PAC)
- Develop Fleet Demonstration Deployment Plan
- Create design, engineering plans
- Create specifications for EV & EVSE
- Purchase EVs & EVSE
- Deploy EVs & EVSE

Budget Period 2:
Demonstration, Analysis, & Tool Creation

- Identify data gaps for MD/HD telematics improvements
- Gather necessary data on all relevant telematics factors
- OEMS gather & analyze data on EV deployments to date
- OEM data & analysis informs EV analysis models
- Gather analysis model data
- Begin development of models

Budget Period 3:
Presentation of Findings & Dissemination

- Analysis model tool finalized
- Create outline & completion plan for replication resources
- Seek feedback on replication resources
- Disseminate final replication resources & tools

Project Accomplishments & Progress (1/2)

Successful Medium-/Heavy-Duty EV Deployments from Ohio Fleets

Class 8 EV Straight Truck

Fleet Partner: PITT OHIO

OEM Partner: Volvo

Status: Vehicle and charger operating since May 2022

Application: Regional Freight/Logistics

Location: Cleveland, OH

Class 7 EV Delivery Step Van

Fleet Partner: Bimbo Bakery

OEM Partner: Motiv Power Systems

Status: Vehicle and charger operating since April 2023

Application: Regional Food/Beverage Delivery

Location: Dayton, OH

BATTLE MOTORS BYD MACK

Class 8 EV Refuse Truck

Fleet Partner: City of Columbus

OEM Partner: Lion Electric (former)

Status: OEM rescinded PO due to longer than expected arrival of vehicle, City receiving bids from 3 new OEMs, expected to make final PO in September 2023 with estimated 90-day delivery before end of 2023

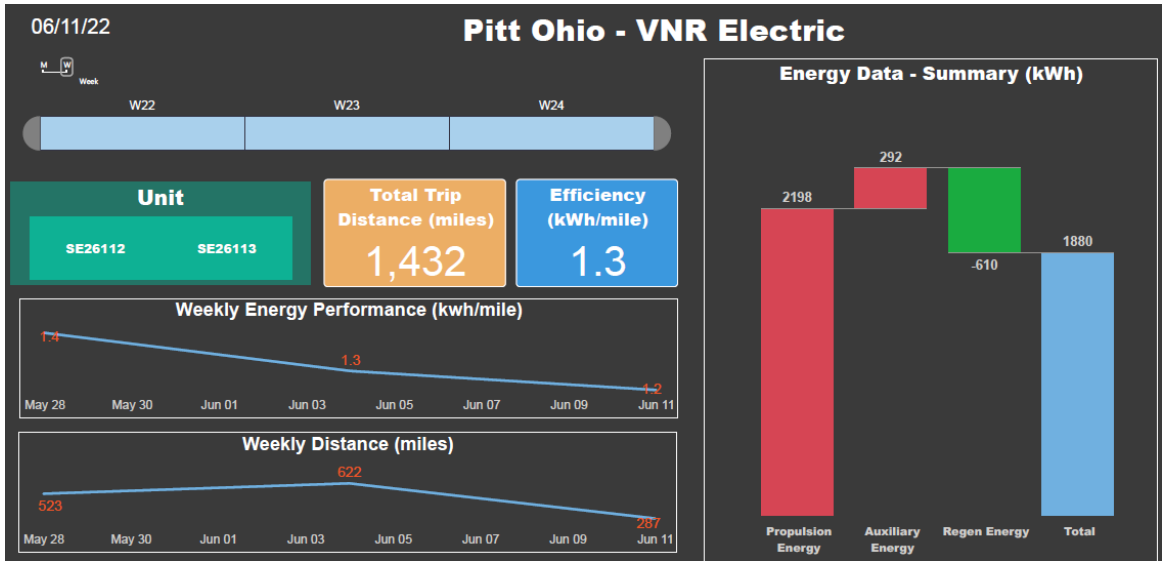
Application: Refuse/Garbage Pick-up & transfer

Location: Columbus, OH

Project Accomplishments & Progress (2/2)

Data Collection & Analysis from Class 7 EV Straight Truck (PITT OHIO)

- Collected 1 year of vehicle telemetry, operations, and fuel usage data from Class 7 EV Straight Truck (May 2022 – April 2023)
- Approximately 25% of the energy being used being offset by regenerative energy captured throughout the course of the driver's day-to-day routes and stops
- Truck is averaging between 1.12 kWh/mile with a 28-mpg efficiency using a 264-kWh battery pack (approximately a 200-mile range)



Collaboration and Coordination among Project Team

Project Lead: Principal Investigator, project administration, coordination of partner organizations, fleets, and stakeholders, and project results dissemination

Technical Lead: Data analysis, telematics analytics leader, operational and cost modeling, MD/HD EV telematics tool development

Fleet Demonstration Partners: Deployment and demonstration of MD/HD EVs in various applications (freight, refuse)

OEM Partners: Technology and solution providers for fleet demonstration providers looking to deploy and demonstrate MD/HD EVs

CLEAN FUELS OHIO

SAWATCH

PITT OHIO
SUPPLY CHAIN • GROUND • LTL • TL

BIMBO
Bakeries USA

THE CITY OF COLUMBUS
ANDREW J. GINTHER, MAYOR

BATTLE MOTORS

VOLVO

MOTIV DELIVERS

BYD

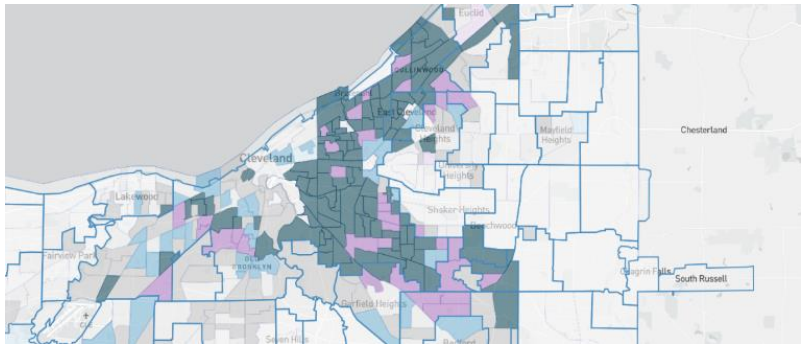
MACK

Contribution to Energy Equity & Environmental Justice

Key Barriers

- Delays/Long Delivery Times for specific EV models (refuse)
- More data necessary for accurate data models
- Delay in data collection from delay in vehicles

Goal: Utilize the Greenlink Equity Map (GEM) Tool to identify disparities in energy burden, climate risks, and pollution impacts for these three MD/HD EV pilot demonstration cities



- Reduces carbon emissions in communities overburdened with environmental pollution
- Showcases financial feasibility of electrifying fleets for both private and public sector benefiting community members

- City of Columbus: Refuse truck will align with Columbus Climate Action Plan's EJ and sustainability goals
- PITT OHIO: Improving air quality from freight ground services & supply chain solutions around NE Ohio
- Bimbo Bakery: Reduce direct tailpipe emissions in communities around the Dayton area

Summary

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- Deploy MD/HD EVs by highly visible fleets in key vehicle platforms
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- Address critical gaps in MD/HD vehicle data and analysis to enhance fleet decision-making & EV adoption

Approach

- Overall Program Development
- Demonstration, Analysis, & Tool Creation
- Presentation of Findings & Dissemination

Accomplishments

- Data Collection & Analysis Plan
- Developed a Fleet Deployment Plan
- Convened Project Advisory Committee
- Designed engineering plans for fleet deployment
- Completed specifications and purchased/deployed EVs & EVSE

Up Next

- Identify MD/HD EV telematics improvements
- Gather OEM & End-User Data to inform project
- Develop the MD/HD EV analysis model
- Assemble & disseminate replication resources and tools