



Zero Emission Freight Future

Proof of Concept in New Communities & Fleets

2022 DOE Vehicle Technologies Office Virtual Annual Merit Review

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CLEAN FUELS
OHIO
OHIO'S CLEAN TRANSPORTATION ADVOCATE

Overview



Timeline:

- Start: October 1, 2020
- End: December 31, 2023
- ~50% complete

Partners:

- **Project Lead:** Clean Fuels Ohio
- **Fleet Deployment Partners:** PITT OHIO, City of Columbus, Bimbo Bakery
- **Technical Partner:** Sawatch Labs
- **OEM Partners:** Lion Electric, Volvo, Motiv Power Systems, Fontaine Modification

Budget:

- Total Project Funding: \$1,343,175
 - *DOE Share:* \$670,000
 - *Cost Share:* \$673,175
- Budget Period 1: \$791,140
- Budget Period 2: \$333,705
- Budget Period 3: \$218,330

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

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 TI Goals

- **Improving fuel diversity:** MD/HD EVs promote greater fuel diversity
- **Increasing local resiliency:** promotes the use of a new transportation option; need more deployments in the industry
- **Reducing greenhouse gas emissions:** direct 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

Milestones



Budget Period 1			
Milestone	Type	Description	Progress
Kick-off meeting	Technical	Hold kick-off meeting within 30 days	Achieved
Sub-awardee contracts	Technical	Develop and finalize sub-awardee contracts	Achieved
PAC distribution list	Technical	Complete PAC member communications distribution list	Achieved
PAC webinar/conference call	Technical	Conduct PAC webinar/conference call to obtain feedback on project data gathering and analysis efforts	Achieved
SMART: EV and EVSE purchases	Technical	Complete initial EV and EVSE purchases	Achieved
Specifications created	Technical	Create detailed EV and EVSE specifications	Achieved
Demos operational	Go/No Go	Demonstration EVs, EVSE operational	Achieved

Milestones



Budget Period 2

Milestone	Type	Description	Progress
Data gaps identified	Technical	Telematics data gaps identified; improvements planned	In Progress
Telematics data analysis improved	Technical	Med-heavy duty telematics data analysis improvements	In Progress
SMART: Data gathering	Technical	Nationwide OEM, end-user data gathered	In Progress
Analysis needs identified	Technical	Analysis model data needs identified; development planned	In Progress
Analysis data gathered	Technical	Analysis model data gathered; development begun	In Progress
Analysis models	Go/No Go	EV analysis models created	In Progress

Project Accomplishments & Progress (1/2)



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



➤ Class 7 EV Step Van

- Fleet Partner: Bimbo Bakery
- OEM Partner: Motiv Power Systems, Fontaine Modification
- Bimbo's vehicle is currently being up-fitted, with an expected delivery date in Q3 2022.



➤ Class 8 EV Refuse Truck

- Fleet Partner: City of Columbus
- OEM Partner: Lion Electric
- The City of Columbus placed a Purchase Order with Lion Electric for the All-Electric Lion8 Refuse Truck, with expected delivery in Q4 2022.



➤ Class 8 EV Straight Truck

- Fleet Partner: PITT OHIO
- OEM Partner: Volvo
- PITT OHIO received delivery of their Volvo VRN Class 8 EV Straight Truck in April 2022 and has completed EVSE installation.

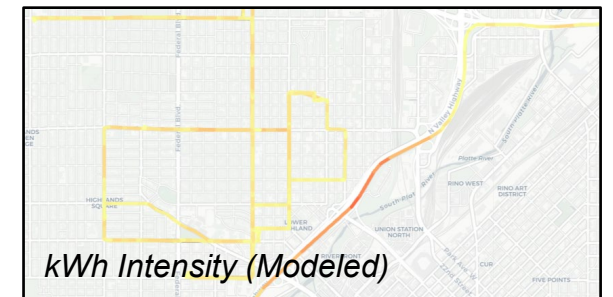
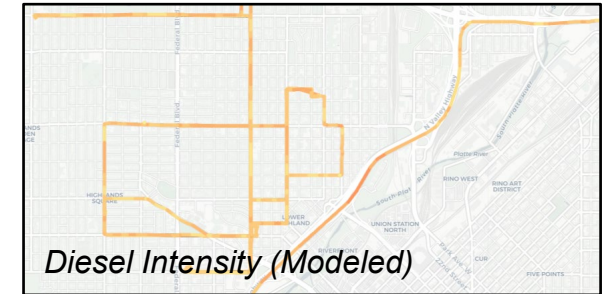
Project Accomplishments & Progress (2/2)



Fleet Deployment, Engineering, Specifications, and Data Collection Plans Completed

- Developed a **Data Collection & Analysis Plan** to inform a demonstration fleet deployment plan
- Developed a **fleet deployment plan**
- Convened and received input from a **Project Advisory Committee (PAC)**
- Designed **engineering plans** for the deployment of three MD/HD EVs
- Completed **specifications for EV/EVSE** and purchased/deployed vehicles and charging equipment

Sawatch Labs' diesel vs. kWh intensity modeling tool



Estimated Operational Metrics in a 2021 Peterbilt 220EV 200 Mile

These metrics estimate what the usage numbers would be if the miles driven by your 2012 INTERNATIONAL MA025 had been driven in a 2021 Peterbilt 220EV 200 Mile.

VMT	GHG Reduction	Operational Cost Difference*	TCO* (Lifetime)	TCO** (%)
26,970	68%	▼ More than -\$21,000	▼ -\$12,000-15,000	▼ -6%

Sawatch Labs' medium-/heavy-duty EV suitability analysis table

Collaboration & Coordination Among 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



Key Barriers

- Supply chain delays
- More data necessary for accurate data models
- Delay in data collection from delay in vehicles

Reduces carbon emissions in communities overburdened with environmental pollution

Showcases financial feasibility of electrifying fleets

Opportunities for replication by partners that have fleet stakeholders interested in electrifying in these MD/HD applications through incorporation of data collection and analysis to find best-fit vehicles

- City of Columbus: Refuse truck will align with Columbus Climate Action Plan's equity goals
- PITT OHIO: improving air quality from freight ground services & supply chain solutions
- Bimbo Bakery: reduce direct tailpipe emissions in communities around Ohio

Summary



Objectives

- Deploy MD/HD EVs by highly visible fleets in key vehicle platforms
- Prove the operational & financial case for EVs that will lead to Class 4-8 adoption in various applications
- 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