Southeast Alternative Fuel Deployment Partnership (SEAFDP)

June 11, 2019

Project ID: ti090

Principal Investigator:
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Center for Transportation and the Environment

[This presentation does not contain any proprietary, confidential, or otherwise restricted information.]

Overview

Timeline

- Start: October 1, 2017
- End: September 30, 2020
- 25% Complete

Budget as of 3/31/2019

Budget Period	DOE Share	Cost Share	Total Cost	$ Expended	$ Remaining
1	$3,088,509	$4,330,115	$7,418,624	$1,878,418	$5,540,206
2	$1,417,357	1,929,315	$3,346,672	$0	$3,346,672
3	$115,915	$0	$115,915	$0	$115,915
Total Project	*$4,621,781*	*$6,259,430*	*$10,881,211*	*$1,878,418*	*$9,002,793*

Barriers for AFV Adoption

- Alternative Fuel Vehicle & Infrastructure Cost
- Availability of Fueling & Charging Infrastructure
- Service, Maintenance, & Training Impacts
- Availability of Reliable Data for Calculating ROI & KPIs

Partners

Clean Cities & Utility

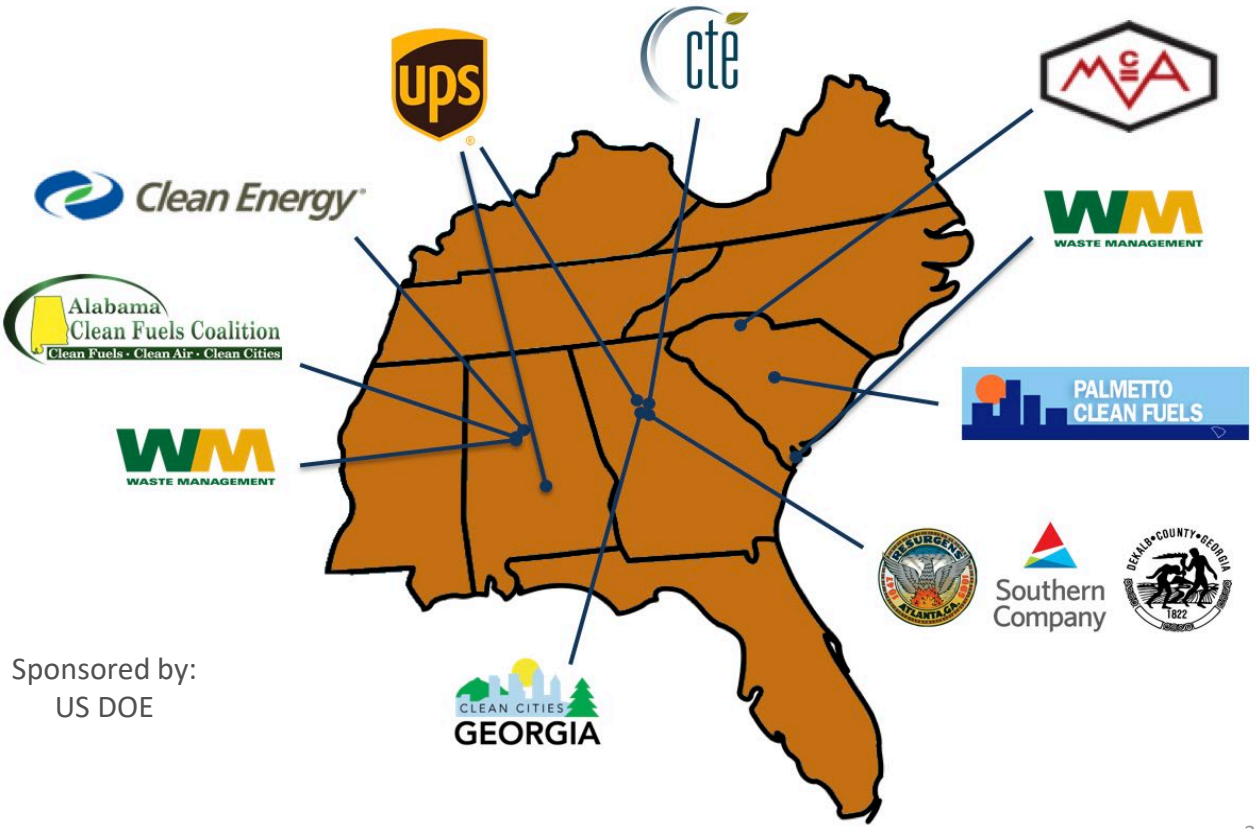
- Alabama Clean Fuels Coalition
- Clean Cities-Georgia
- Palmetto Clean Fuels Coalition
- Southern Company

Vehicle & Infrastructure

- City of Atlanta
- Clean Energy Fuels*
- DeKalb County
- McAbee Trucking
- UPS
- Waste Management-Hardeeville
- Waste Management-Birmingham*

*Pending – Any proposed future work is subject to change based on funding levels.

SEAFDP Project Team



Sponsored by:
US DOE

Project Objectives

Objectives

- Deployment of Alternative Fuel Vehicle (AFV) Fleets and Infrastructure
- Development of Alternative Fuel Corridors
- Development of Strategic AFV Fleet Partnerships
- Analysis of CNG Stations for Future Hydrogen Infrastructure Deployment

Tech Integration Goals

- National Security
  - - Fuel Diversity/Alt Fuels
- Economic Growth
  - - Growing Alt Fuel Industry & Workforce
- Affordability for Business & Consumers
  - - Cost Savings
  - - Mobility
- Reliability/Resiliency
  - - Infrastructure/AF Corridors

Barrier Impact

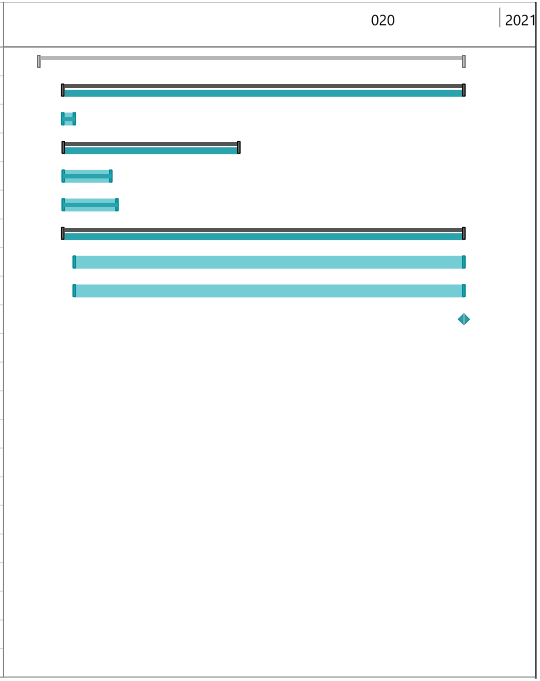
- Increased adoption/awareness of AFVs (niche fleets)
- Increased availability of alt. fuel infrastructure
  - - Locally & continuous corridors in SE
- Document best practices for procurement, deployment, training, & maintenance
- Data collection to assess benefits and inform decisions

Project Approach – Scope of Work

- Reduce emissions and petroleum consumption in the Southeast by deploying approximately 280 AFV fleet vehicles in niche fleet markets in Georgia, Alabama, and South Carolina.
- Collect AFV operational and maintenance data during an approximate 12-month deployment evaluation period.
- Educate fleet owners on the technical and financial feasibility of various AFV technologies and applications and how they compare to their gasoline and diesel counterparts.
- Identify gaps for compressed natural gas (CNG) and electric vehicle support equipment (EVSE) infrastructure to support creation of alternative fuel corridors and extended range AFV travel throughout the Southeast.
- Facilitate local and regional partnerships between AFV market players throughout the supply chain to alleviate barriers for AFV adoption and provide consultation for organizations as they enter the market.
- Using findings from project activities, develop a best practices, policies, and procedures case study to accelerate the deployment of commercially available alternative fuel vehicles and infrastructure in niche fleet markets across the U.S.

Project Approach – Work Plan

ID	WBS	Task Name	Duration	Start	Finish
0	0	DOE SEAFDP Master Work Plan v1.3	784 days?	Sun 10/1/17	Wed 9/30/20
1	1	Project Management & Reporting	739 days	Sat 12/2/17	Wed 9/30/20
2	1.1	DOE Award Negotiations	30 edays	Sat 12/2/17	Mon 1/1/18
3	1.2	Subcontract Execution	324 days	Mon 12/4/17	Thu 2/28/19
16	1.3	Create Project Management Plan & Work Plan	122 edays	Mon 12/4/17	Thu 4/5/18
17	1.4	Plan & Conduct Project Kickoff Meeting	138 edays	Mon 12/4/17	Sat 4/21/18
18	1.5	Progress Reporting	739 days	Sat 12/2/17	Wed 9/30/20
22	1.6	Case Study Development	33.45 emons	Mon 1/1/18	Wed 9/30/20
23	1.7	Public Relations & Community Outreach	33.45 emons	Mon 1/1/18	Wed 9/30/20
24	1.8	Project Closeout	0 emons	Wed 9/30/20	Wed 9/30/20
25	2	Vehicle & Infrastructure Readiness	509 days	Sun 10/1/17	Wed 9/11/19
26	2.1	Requirements Analysis & Route Evaluation	30 edays	Sat 4/21/18	Mon 5/21/18
27	2.2	Vehicle Procurement	407 days	Sun 10/1/17	Mon 4/22/19
41	2.3	Infrastructure Procurement	347 days	Mon 12/4/17	Tue 4/2/19
46	2.4	Vehicle Build & Delivery	405 days?	Mon 12/4/17	Fri 6/21/19
60	2.5	Infrastructure Build & Commissioning	220 days	Thu 10/18/18	Wed 8/21/19
65	2.6	Training Confirmation	398 days	Sat 3/3/18	Wed 9/11/19
73	2.7	KPI Workshop & DMP Update	327 days	Tue 1/2/18	Thu 4/4/19
79	3	Vehicle & Infrastructure Acceptance & Deployment	738 days	Mon 12/4/17	Wed 9/30/20
80	3.1	Vehicle & Infrastructure Acceptance Testing	473 days	Mon 12/4/17	Wed 9/25/19
100	3.2	Vehicle & Infrastructure Deployment, Data Collection, & A	738 days	Mon 12/4/17	Wed 9/30/20
115	3.3	Hydrogen Infrastructure Integration Study	538 days	Fri 9/7/18	Wed 9/30/20



Project Approach – Work Plan

- **Task 0: Project Management and Reporting**
  - Manage day-to-day project activity; identify and mitigate issues as they arise
  - Maintain PMP, schedule, and budget; monitor progress against schedule and budget
  - Track progress though creation of Quarterly Management Reports (QMRs)
  - Maintain log of best practices, policies, procedures, and lessons learned
  - Coordinate with Clean Cities partners on Development of Alt. Fuel Corridor and Strategic Fleet Partner SOW
  - Outline case study requirements; develop case study(ies)
- **Task 1: Vehicle and Infrastructure Readiness**
  - Procurement, build, delivery, & inspection of vehicles and associated infrastructure
  - CNG fueling station design and build of 3 CNG fueling stations
  - Training on operation and maintenance of equipment
  - Key Performance Indicators (KPIs) workshops
- **Task 2: Vehicle and Infrastructure Acceptance and Deployment**
  - Vehicle and infrastructure testing and acceptance
  - CNG fueling station commissioning
  - One year of KPI reporting for each partner and each vehicle make and model
  - Hydrogen Integration Study

Project Approach – Clean Cities

Objective 2: Development of Alternative Fuel Corridors

- Task 1: Southeast AF Corridor Mapping
- Task 2: Identification of Gaps in Existing NG and EVSE Corridors
- Task 3: Identification of Potential Fleet Partners in Priority Locations
- Task 4: Identification of Potential Fueling Station Partners in Priority Locations
- Task 5: Alternative Fuel Corridor Signage Development

Objective 3: Development of Strategic AFV Fleet Partnerships

- Task 1: Evaluate Supply Chain Partnerships to Identify & Alleviate Barriers for AFV Adoption
- Task 2: Conduct Surveys of AFV Fleet Owners to Identify and Document Obstacles and Solutions
- Task 3: Develop & Publish Case Study on SE AFV Fleet Procurement/Deployment Lessons Learned & Best Practices

Project Approach – H2 Study

- Evaluate the 3 CNG stations commissioned under the project to analyze and assess opportunities, costs, and benefits of using CNG station locations for future hydrogen fueling infrastructure deployment.
- Coordination with Federally Funded Research and Development Centers (FFRDCs) already engaged in relevant activities funded through EERE's Fuel Cell Technologies Office
- Incorporate Lessons Learned from CTE's OCTA H2 infrastructure project with Trillium and Air Products
  - Trillium has built and is currently operating a CNG facility at the OCTA MacArthur Avenue Irvine bus facility. Bring in lessons learned from building and operating a co-located hydrogen facility.

Milestones

	Milestone	Type	Description	Status
BP1	Route Evaluation Complete	Technical	CTE will present route evaluation results to fleet partners identifying any deployment risks.	80% Complete (4/5 Fleet Partners)
	Purchase Orders Placed	Administrative/ Technical	Vehicle and infrastructure purchase orders are verified by vendors.	80% Complete (4/5 Fleet Partners)
	Infrastructure Commissioned	Technical	EVSE and CNG fueling stations complete and ready for use.	50% Complete (2/4 Infrastructure Partners)
	Vehicle Delivery	Technical	Vehicles delivered to respective fleet partners.	42% Complete
	Vehicle Delivery and Training Complete	Go/No Go	Vehicles delivered and necessary training is complete.	50% Complete
BP2	Data Collection To-date Summary	Technical	Vehicle and infrastructure data collection summary report and analysis.	In Progress
	Deployment Summary Report	Go/No Go	Vehicle and infrastructure deployment summary progress to-date.	In Progress
BP3	KPI Report 1	Technical	Summary of AFV operation and maintenance for the quarter.	In Progress
	KPI Report 2	Technical	Summary of AFV operation and maintenance for the quarter.	Not Started
	KPI Report 3	Technical	Summary of AFV operation and maintenance for the quarter.	Not Started
	KPI Report 4 (Final KPI Report)	Technical	Summary of AFV operation and maintenance for the quarter.	Not Started
	Hydrogen Infrastructure Integration Study	Technical	Study of Hydrogen / CNG Fueling Integration Study/Scenarios.	Not Started
	Case Study Published	End of Project Goal	Best practices, policies, and procedures resulting from AFV deployment, facilitated development of AFV corridors, and development of strategic AFV partnerships.	In Progress

Budget Period 1 Milestones

Milestone	Type	Description	Status
Route Evaluation Complete	Technical	CTE will present route evaluation results to fleet partners identifying any deployment risks.	80% Complete (4/5 Fleet Partners)
Purchase Orders Placed	Admin/ Technical	Vehicle and infrastructure purchase orders are verified by vendors.	80% Complete (4/5 Fleet Partners)
Infrastructure Commissioned	Technical	EVSE and CNG fueling stations complete and ready for use.	50% Complete (2/4 Infrastructure Partners)
Vehicle Delivery	Technical	Vehicles delivered to respective fleet partners.	42% Complete
Vehicle Delivery and Training Complete	Go/No Go	Vehicles delivered and necessary training is complete.	Complete & Ongoing

Budget Period 2 Milestones

Milestone	Type	Description	Status
Data Collection To-date Summary	Technical	Vehicle and infrastructure data collection summary report and analysis.	In Progress
Deployment Summary Report	Go/No Go	Vehicle and infrastructure deployment summary progress to-date.	In Progress

Budget Period 3 Milestones

Milestone	Type	Description	Status
KPI Report 1	Technical	Summary of AFV operation and maintenance for the quarter.	In Progress
KPI Report 2	Technical	Summary of AFV operation and maintenance for the quarter.	Not Started
KPI Report 3	Technical	Summary of AFV operation and maintenance for the quarter.	Not Started
KPI Report 4 (Final KPI Report)	Technical	Summary of AFV operation and maintenance for the quarter.	Not Started
Hydrogen Infrastructure Integration Study	Technical	Study of Hydrogen / CNG Fueling Integration Study/Scenarios.	Not Started
Case Study Published	End of Project Goal	Best practices, policies, and procedures resulting from AFV deployment, facilitated development of AFV corridors, and development of strategic AFV partnerships.	In Progress

Go/No Go BP1 –> BP2

SEAFDP Partner	Expected # of Vehicles	% of Total Vehicle Share	Vehicles Delivered to Date	% of Vehicle Share Delivered	Expected Completion Date	Training Complete?
City of Atlanta	58	21%	2	3%	3Q19	✓ CNG ✗ EV
DeKalb County	32	12%	32	100%	1Q19	✓ CNG
McAbee Trucking	4	1%	0	0%	3Q19	✗ CNG
UPS	160	57%	125	78%	3Q19	✓ CNG ✓ PHEV ✗ EV
Waste Management – Hardeeville	25	9%	6	24%	1Q20	✗ CNG
Overall Project	*279*	*100%*	*165*	*59%*	*1Q20*	✗ CNG ✓ PHEV ✗ EV

Project Accomplishments & Progress

- Completed Call for Projects to add two CNG Station projects as replacement for one withdrawn partner in Birmingham
- Executed subcontracts with scope changes within original budget
- Finalized Clean Cities partners scope of work for Objectives 2 & 3
- Pre-deployment data and projections completed for all 5 fleet partners
- Deployed 117 of the 279 project vehicles to date

Project Accomplishments & Progress

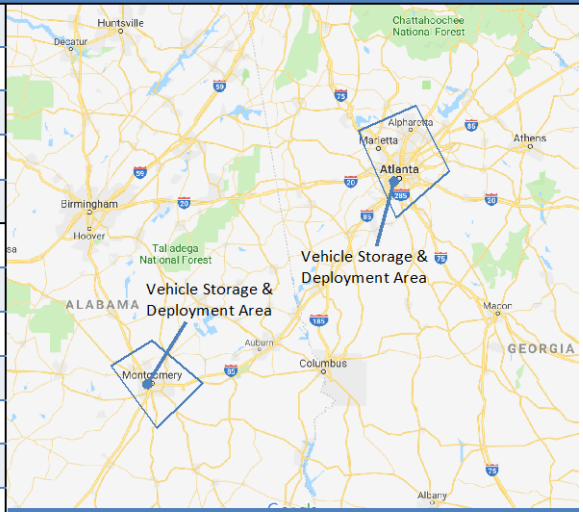
United Parcel Service (UPS)

Vehicle Attributes	**Vehicle Make**	Workhorse	Ford	Workhorse
	Vehicle Model	Next Gen	F59	EGEN
	Fuel Type	Electric	CNG	PHEV*
	Onboard Fuel Storage	123 kWh	4,200 scf (34 GGE)	70 kWh
	Expected Range	100 mi.	140-150 mi.	60 mi.
Deployment Plan	**Service Type**	Package Delivery	Package Delivery	Package Delivery
	Hours Driven per Day	8 hours	10-12 hours	8-10 hours
	Miles Driven per Day	40-60 mi.	50-100+ mi.	40-60 mi.
	Fuel Consumed per Day	49-74 kWh	1,500-2,900 scf (12-23 GGE)	47-70 kWh
	Est. Fuel Cost per Day	$5-8**	$24-46	$5-8**
	Fueling Station Location	Various	Various	Various
	Fueling Station Owner	UPS	UPS	UPS
	Time Required to Fuel	6-8 hours	5-10 min.	6-8 hours
	Time of Day for Fueling	Overnight	Overnight	Overnight
	Vehicle Storage Location	UPS sites	UPS sites	UPS sites
Deployment Risks	**Driving Range**	Low	Low	Low
	Fueling Strategy	Low	Low	Low

Comments

- The alt-fuel vehicles will be deployed on fixed routes. The vehicles will be used for package delivery service routes in Montgomery, AL & Atlanta, GA.
- UPS has matched each alt-fuel vehicle with an appropriate duty cycle. The risk of an alt-fuel vehicle running out of fuel while in service is low.
- The alt-fuel vehicles will utilize existing CNG fueling stations and electric vehicle charging stations owned and operated by UPS, which limits fueling risks.
- UPS has vast prior experience with both electric and CNG vehicles. Overall deployment risk is low.
- *UPS plans to use vehicle as all-electric vehicle as much as possible.
- **Cost based on average commercial utility costs in GA and AL.

SEAFDP ROUTE EVALUATION



Annual Impact

CO_2

Emissions reduced each year by operating the alt-fuel vehicles: **460 tons CO2**

Annual fuel cost savings by operating the alt-fuel vehicles in place of traditional diesel and gasoline vehicles: **$912,264**

Project Accomplishments & Progress Continued

- Finished construction of 2 out of the 3 compressed natural gas (CNG) refueling stations
- Held KPI workshops for fleet partners to outline data collection plans
- Participated in vehicle maintenance trainings at UPS

Collaboration & Coordination Among Project Team

- Biweekly Meetings
- DropBox Fileshare
- Quarterly Progress Reports

Project Sponsor

US DOE

Regional Utility Partners

Southern Company

Prime Recipient / Project Manager

cte

Clean Cities Coalitions

Alabama Clean Fuels Coalition
Clean Fuels · Clean Air · Clean Cities

CLEAN CITIES GEORGIA

PALMETTO CLEAN FUELS

Deployment Partners

RESURGENS ATLANTA, GA

Clean Energy

WM WASTE MANAGEMENT

MCA

ups

DEKALB COUNTY GEORGIA 1822

Overall Impact

Achievements

- 117 AFVs deployed into routine service (42% of project vehicles)
- WM CNG fueling stations commissioned in Hardeeville, SC and Birmingham, AL
- Engaged Clean Energy to install public-access CNG fueling station in Birmingham, AL, fulfilling original project scope (replaced withdrawn partner) and contributing to alt. fuel corridor develop.

Upcoming Tasks

- Execute contracts with new project partners
- Continue to take delivery of AFVs, perform inspections/acceptance testing, and deploy into service
- Ongoing validation and data collection of project vehicles – process raw vehicle and infrastructure data and publish first key performance indicator (KPI) report
- Execute alt. fuel corridor development activities in coordination with Alabama, Georgia, and South Carolina Clean Cities organizations (focus on Mapping and Signage Deployment)
- Identify priority locations for achieving interstate corridor designations in SE, identify potential fleet operators / station owners in proximity, and conduct outreach

Summary

- Objective: Accelerate deployment of commercially available AFV fleet vehicles and infrastructure in niche markets
  - Deployment of AFV Fleets & Infrastructure
  - Development of Alternative Fuel Corridors in SE in partnership with Clean Cities
  - Development of Strategic AFV Fleet Partnerships
- Goals:
  - Reduce emissions in SE through AFV deployment (almost 300 vehicles as a result of project)
  - Collect and AFV operational and maintenance data to analyze benefits, inform decisions, and assess ROI
  - Develop best practices, policies, and procedures case study as a resource for fleet owners as they look to adopt AFVs or continue transition/scale up of their AFV fleet
- Collaboration:
  - Project team members represent entities from private, public, and non-profit sectors that are engaged in and actively support the deployment of alternative fuel vehicles (AFVs) and infrastructure.
- Accomplishments/Progress:
  - 42% of project vehicles deployed [expect approximately 265 deployed by end of 3Q19]
  - 2 private CNG stations commissioned to support Waste Management fleet operations
  - Clean Energy committed to installing public-access CNG fueling station in Birmingham, AL
  - Coordination with Clean Cities on alt. fuel corridor development underway

Technical Back-Up Slides

SEAFDP Technical Overview

- At the time of this report, CTE is in the process of analyzing raw vehicle data for creation of the first draft key performance indicator (KPI) report.
- The following KPIs are a sample of the type of information that will be analyzed and tracked for all project vehicles:
  - Availability & Utilization
  - Fuel Efficiency & Cost
  - Fuel & Emissions Reductions
- The following data elements are a sample of the type of information that should be provided on a per vehicle basis:
  - Daily Mileage
  - Daily Operating Time
  - Total Fuel Consumed (CNG DGE, kWh)
  - Maintenance Records