2013 DOE Vehicle Technologies Program Review Presentation
Project ID: ARRAVT070

Interstate Grid Electrification Improvement Project

Jon O. Gustafson
Cascade Sierra Solutions

May 13-17, 2013

Overview

Timeline

- Begins May, 2011
- December, 2014
- 80% Complete

Budget

- DOE Share $22.2 KK
- Cost Share $26.4 KK

Barriers

- No e-Infrastructure
- No on-board equipment
- No financing

Partners

- Trucking Companies
- Truck Stops
- Equipment Manufacturers
- Public Alliances
- National Labs and TRCs

DOE Interstate Electric Improvement Project

Shorepower Truck
Electrification Project

Objectives of this Study

This project will accelerate the reduction of petroleum consumption and associated emissions and greenhouse gases by truckers. It will:

- Implement transportation electrification infrastructure at fifty (50) sites along major interstate corridors.
- Provide a 20% rebate incentive for battery operated and/or shore power enabled idle reduction equipment on 5,000 medium and heavy-duty trucks.

Objectives of this Study

Truckers cannot leave behind diesel until grid-power is easily available along routes and until e-powered equipment is standard on trucks.

When a meaningful sample of the nation's fleet becomes equipped with electrical equipment and demonstrates economic viability of electrical power over diesel fuel, then:

- **Trucking fleets will require those technologies in new trucks**
- **Truck stops and docks will deploy necessary grid power along major corridors and truck layover sites**
- **An industry transformation will shift away from diesel to the grid**

Over Arching Project Goals

- ARRA Related Goals
  - Create or maintain 500 full and part-time jobs
  - Demonstrate viability of alternative energy source in transportation

- VT ARRA Project Goals
  - New grid technologies on trucks
  - Technology deployment at truck stops
  - Fuel savings of 8 million gallons per year
  - Careful analysis of utilization

ARRA and VT Project Goals

Year 1 Tasks:

Identify, finalize selection, and secure contracts to build (50) TSE sites.

Design and produce build plans for each TSE site.

Develop the marketing plan and introduce the rebate program to the trucking industry.

Recruit truck owners and deploy half of the rebate incentives by 11/1/2011

ARRA and VT Project Goals

Year 2 Tasks:

Successfully complete fifty (50) TSE sites by 5/15/2013

Mark each site opening with an event.

Successfully distribute all remaining rebates by 5/15/2013

Begin site utilization and tracking by 1/1/2013

ARRA and VT Project Goals

Year 3 Tasks:

Monitor utilization of 5,000 trucks over Years 2013 and 2014

Promote widely the successes of truck utilization and deployment of grid power for freight movement

Collaborate with grid power providers and highway planners to identify and remove obstacles for expansion of grid access for truckers

ARRA and VT Project Goals

Year 4 Tasks:

In a final report, analyze utilization data for patterns of high use

Evaluate the economic viability of grid power according to routes, season, and transportation sectors

Evaluate technical successes that indicate strong opportunities for innovation

Estimate 5 and 10 year future growth potential of the technology

Technical Approach

- Recruit 50 participating truck stops on the major Interstate corridors, coast to coast.
- Recruit owners of 5,000 heavy duty trucks that represent a statistical sample of the nation's long haul fleet to be data providers.
- Monitor kwh, miles and fuel use by route, location, time of day, weather, temperature, and type of on-board technology
- Interview characteristic populations and sub-groups where key trends develop

Technical Approach

Evaluate and correlate:

- Kwh per trip mile and gallons of fuel displaced for various divisions of the studied truck population, seasonally across various corridors.

Evaluate and report:

- Return on investment for the truck, truck stop owner and electric utility
- Identify new technologies enabled by grid power
- Scale these use and ROI findings to the national fleet.

Project Status

As of April 1, 2013

- 4 year demonstration project into 3rd year
- On-board technologies identified
- 50 sites across major US interstates selected
- 46 sites powered up, 4 completing construction
- 4,025 trucks fitted with on-board equipment
- Data tracking system installed and operating
- Wide market and rebate fleet promotion underway
- Study partners recruited for analysis phase work2

Project Status

As of April 1, 2013	Budget (DOE Contribution)	Actual to Date	% of Budgeted Expensed	DOE Funds Available	% of Budget Available
CSS & Rebates	$11,937,123	$10,750,357	90%	$1,186,766	10%
Total Infrastructure	$10,262,877	$7,670,901	75%	$2,591,976	25%
Total Project	$22,200,000	$18,421,258	83%	$3,778,742	17%

Selected Technology Mix for Rebates

APUs w /SPC	1,320
Battery HVAC	2,234
Evaporative coolers	76
Engine heat recovery	—
Trailer cold plates	272
TRU w/electric standby	189
E-hybrid TRUs	645
Shore power kits	1300

The Interstate Routes

Site Locations

Site Locations

Site Location Challenges

Private Equipment Partnerships

Equipment Alliances

Largest Truck Stop Partnerships

Data Analysis Reporting Partnerships

- NREL Data Analysis and Reporting
- National Laboratories and Boards
- Industry Associations

Technical Accomplishments

- Advanced pedestal engineering for 120 volt, 240 volt and 460 volt system applications completed
- Truck on-board equipment technologies coordinated
- Internet based data and transaction support program established and activated
- Optimal sites located adjacent major interstate freight routes
- Installation design and construction 90% completed
- Site marketing and promotion underway

Future Work

- Interview and survey leading adopters
- Publish quarterly utilization reports
- Initiate large fleet side-by-side idle reduction studies
- Finalize fuel savings analysis methodologies
- Finalize ROI business modeling for truck owners, truck stops and electric utility power suppliers

Summary

- Transformational anti-idling strategy toward grid power
- Fifty sites should grow to 250 sites by 2020
- 5,000 trucks should move to 100,000 trucks by 2020
- Annual diesel savings of 8,000,000 gallons in 2014 to move to 100,000,000 gallons per year by 2020

Contact

Cascade Sierra Solutions
4750 Village Plaza Loop
Suite 100
Eugene, OR 97401

(541) 302-0900
jon@cascadesierrasolutions.org

www.CascadeSierraSolutions.org