2011 DOE Vehicle Technologies Program Review Presentation
Project ID: *ARRAVT070*

Interstate Grid Electrification Improvement Project

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May 12, 2011

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

Overview

- **Timeline**
  - **Begins May, 2011**
  - **Ends May, 2014**
  - **5% Complete**

Budget
- **DOE Share $22.2 KK**
- **Match $29.7KK**

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

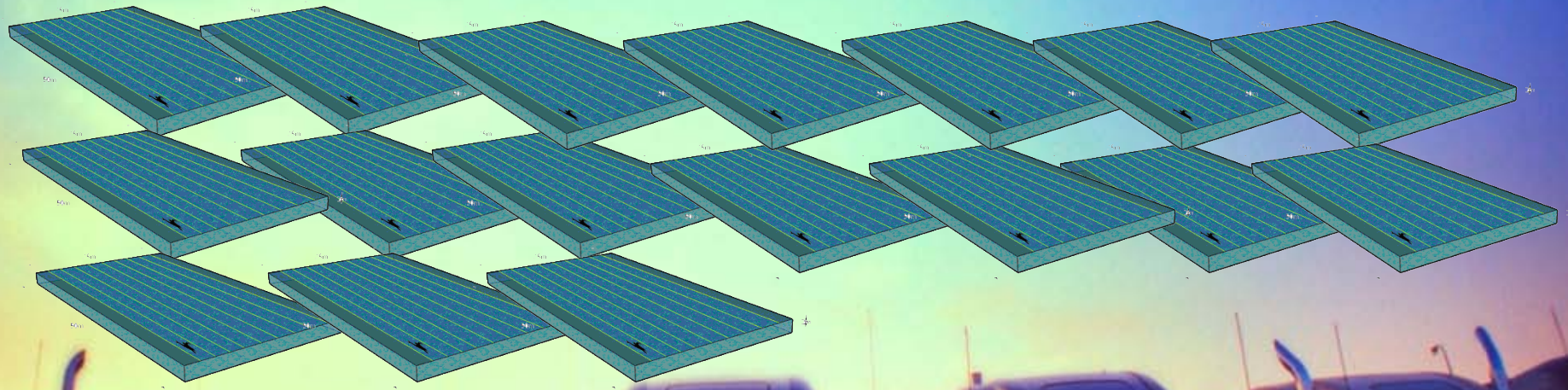
- **Partners**
  - **Trucking Companies**
  - **Truck Stops**
  - **Equipment Manufacturers**
  - **Public Alliances**
  - **Lenders/Foundations**

The CSS Mission

CSS identifies, promotes and finances technology to save fuel and reduce pollution from the legacy fleet of trucks.

CSS Achievements to Date

- **Upgraded or replaced over 5,000 trucks**
- **Deployed over $80M in clean equipment**
- **Saved over 13 million gallons of fuel**
- **Equivalent to 20 Olympic swimming pools**
- **Saved over 130,000 tons CO_2 emissions**
- **Equivalent to annual carbon footprint of 6,500 Americans**



CSS Strategies

- ✓ **EPA SmartWay Upgrades**
- ✓ **Truck Replacement**
- ✓ **Truck Stop Electrification (TSE)**

SmartWay Upgrades

SmartWay Strategies *Costs vs. Fuel Savings*

Trailer Side Fairings
$1,450 - $2,500
Saves 7%

Trailer Mounted Gap Reducers
$700 - $1,100
Saves 2%

Smart Way Approved Tractor Cap
$1,300 differential cost
Saves 5%

2010 Engine
$9,000 Plus Model Year Escalator - more than 2007 compliant engine
85% less PM than 2006MY
85% less NO_x than 2009MY

Diesel Exhaust Fluid
$.01 CPM
Burn 2 gallons DEF per 100 gallon/diesel
CPG = $3.00

Trailer Boat Tail
$2,000 - $3,000
Saves 5%

Low Rolling Resistance Tires
$2,500 Trailer (2%)
$3,000 Tractor (2%)
Saves 4%

Idle Reduction Equipment (APU's)
$6,000 - $15,000
Saves 8%

Fuel Tank Side Fairings
$1,700 - $2,100
Saves 1%

Aero Mirror & Bumper
$325 differential cost
Saves 2%

Tractor (18% fuel savings)
Additional Costs per Tractor: $20,025 - $29,425
Additional Weight: 850 lbs (approx)

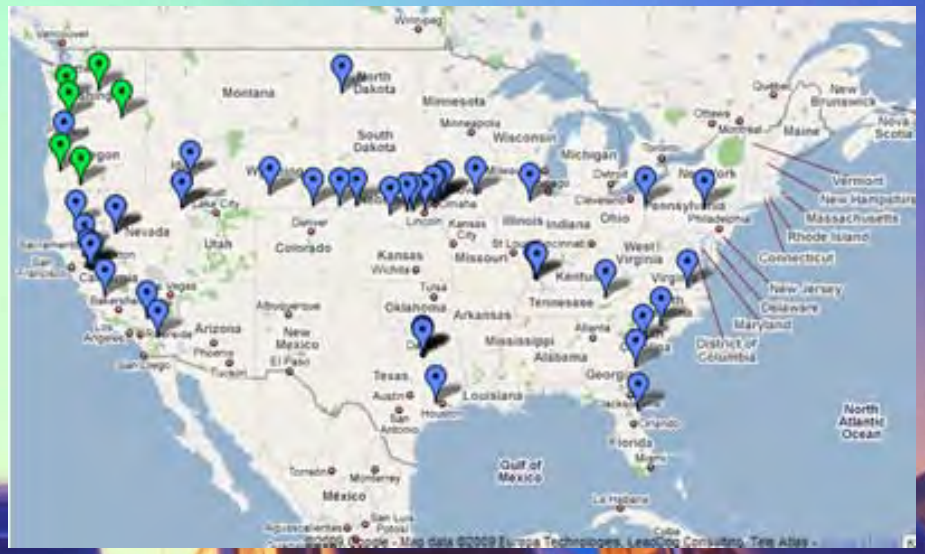
Trailer (16% fuel savings)
Additional Costs per Trailer: $6,650 - $9,100
Additional Weight: 900 lbs (approx)

* Fuels saving strategies are not cumulative. Conservative estimate of 25% overall savings yields ROI on all equipment = 1.8 yrs to 2.6 yrs. (Based on long-haul application, 120,000 annual VMT, 2,000 idle hours on APU, and $3.00/gal.)

* Information Courtesy of Interstate Distributor Company: IDC Shippers Summit & Green Freight Training Program 2010

Truck Stop Electrification

- Reduces fuel consumption from idling engines and TRUs
- Saves approx. 1 gallon/hr
- CSS establishing national network of 50 truck stops
- Grants for 20% off plug-in equipment



TSE Project Objectives

- **ARRA Related Goals and Objectives**
  - **Effect 500 full and part-time jobs**
  - **Demonstration of alternative energy source in transportation**

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

Technical Approach

Technical Approach:

- Locate 50 participating truck stops. Install 25 connections per site.
- Recruit owners of 5,000 trucks seeking to power trucks with electricity whenever possible during out-of-service hours.
- Monitor utilization and analyze patterns of use and diesel fuel displacement.

Technical Approach

Unique Aspects of Approach

- Truck selection process to be unbiased and representative of national long-haul trucking population
- Utilization commitment required for capital incentive
- Monitoring to be comprehensive

Technical Approach

Technical Solutions

- Project uses only existing, proven truck technologies

- Participating truckers are early adopters of other environmental and fuel saving strategies

- New positioning strategy created for truck stop services

Technical Approach

Environmental Aspects

- No new hazard brought to any TSE site
- Emissions impact to local community completely favorable
- Health effects to drivers completely positive

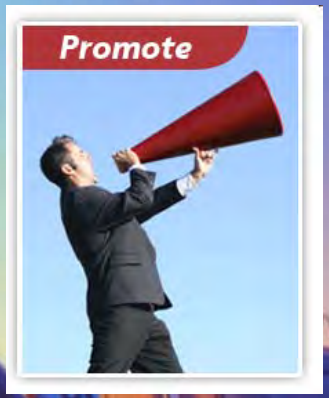
Technical Approach

Milestones and Go/No-Go Decisions

- Definitization period May, 2010 to November, 2010 complete
- Pedestal engineering, vendor selection in November, 2010
- Administrative Go/No-Go review by DCAA in January, 2011
- Program rollout with major fleets, truck stops in February, 2011
- First rebates February, 2011, first site construction February, 2011
- Final rebates and construction projected for September, 2012
- System utilization, analysis period January, 2013 to January, 2014 with final report projected for May, 2014

Technical Accomplishments

- Advanced pedestal engineering for 120 volt and 240 volt applications, 480 volt system acquisition finalized
- Internet based data and transaction support program established and activated
- Portable air conditioning unit design/fabrication contracting
- Installation and construction update
- Site marketing and promotion planning



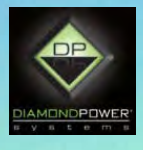
Collaborations/Partnerships

Areas of Collaboration

Equipment Suppliers	**Inventors and manufacturers**
Financial Sources	**Banks, grants, foundations**
Research Alliances	**Transportation research and analysis centers**
Public Alliances	**Governance bodies for highways and trucking**
Power providers	**Utilities and power policy groups**

Public and Private Partnerships

Equipment Alliances



Public and Private Partners

Research and Industry Alliances

University of California Transportation Center, UC – Berkeley, Davis

American Trucking Research Institute, Washington D.C.

Four Heavy Truck OEM design/engineering alliances

Argonne National laboratory

Southwest Region Universities Transportation Center, Texas A&M

Electric Power Research Institute

Technology Maintenance Council of American Trucking Association

Transportation Research Board of the National Institute of Science

Proud Supporter of SmartWay℠

WEST COAST COLLABORATIVE
A public-private partnership to reduce diesel emissions

5,000 Operators and Fleets

- 250 Private Fleet Departments
- 1,500 Common Carriers
- 10,000 Owner Operators

Reached through:

- Trade associations
- Public and trade media
- Regulatory Channels
- Outreach Centers

Future Work

2011-12 Work Plan

- Complete 50 truck stops
- Deploy along I-5, I-95, I-10/20 initially, then I-35, I70-80/90
- Initiate tracking of power utilization April, 2011
- Focus on large fleets having TSE strategy
- Widely publicize the saving results of early movers

2013-14 Work Plan

- Monitor utilization of participating fleets
- Analyze pattern of adoption
- Report findings in early 2014

Summary

- TSES is a transformational anti-idling strategy
- 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

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