Technology Integration Overview –

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Technology Integration Overview

Activities

- Clean Cities – A voluntary, locally based government/industry partnership
- Legislative and Rulemaking
- Advanced Vehicle Competitions
- Education Programs
  - Graduate Automotive Technology Education
  - Advanced Electric Drive Vehicle Education Program
Deployment efforts accelerate market transformation by increasing public awareness & consumer acceptance/adoption of new vehicle technologies that are being developed through the Vehicle Technology Program’s (VTP) R&D activities.

Deployment programs are essential when the success of new technologies depends on consumers changing their driving and purchasing habits.

Primary Focus – Achieve Petroleum Reduction …
by Implementing Next-Steps when R&D is completed

Roughly 10% of VTP base budget supports Deployment (Technology Introduction) efforts
Clean Cities Efforts Get Results!

Over 4.5 Billion Gallons of Petroleum Reduction since 1993

- Over 660,000 AFVs on the road
- 14,000 alternative fueling and charging stations (CC influenced >70%)
- Long term goal of 2.5B gal/year by 2020

![Bar chart showing billions of gallons of petroleum saved from 1994 to 2011.](chart.png)
Clean Cities Budget History

Clean Cities Budget

$ Million

Community Projects*
Base Request
Appropriation

FY10 FY11 FY12 FY13 FY14
26 27 28 28 28
90

* Alternative Fuel Vehicle Community Partner Projects
High-impact, state and local community-based projects to displace on-road vehicle petroleum use with alternatives such as natural gas, electricity, or biofuels.

(Est. 9 awards up to $10.0 million each - Competitively-awarded and cost-shared).

Purpose:

• Greatly accelerate the introduction and adoption of natural gas vehicles, PEVs, and other alternative fuels through community-based partnerships that introduce alternative fuel and advanced vehicles at scale.

• Establish model communities that can be replicated across the country.

• Capture data and lessons learned to develop best practices, case studies, and success stories that will serve as templates for other communities.

• Demonstrate sustainability beyond the initial Federal commitment, and encourage private-sector leadership and investment.
Clean Cities
Portfolio of Technologies

**Alternative Fuels**
- Electric Vehicles
- Biodiesel
- Ethanol
- Hydrogen
- Propane
- Natural Gas

**Idle Reduction**
- Heavy-Duty Trucks
- School & Transit Buses
- Light-Duty Vehicles

**Fuel Economy**
More Fuel efficient vehicles, adopting smarter driving and vehicle purchasing habits

**Hybrids**
- Light- and heavy-duty
- Electric hybrids
- Plug-In hybrids
- Hydraulic hybrids
Local Coalition Support / Partnership Development

- Coordination with key community and business leaders,
- Identification of potential fleet and funding partners
- Facilitating Infrastructure development projects,
- Collecting data and tracking progress
- Coalition technical training and strategy implementation,
- ~100 coalitions serving 78% of the US population

(photo courtesy of White House)
Direct Impact: The 100 largest commercial fleets account for more than 1 million vehicles. Every 2,000 vehicles converted to alternative fuel = 1M gal/year petroleum displacement.
Non-biased source of VT data and information
Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC)
On-line tools and cost calculators, other web resources
Training for first responders and public safety officials
Technical response service
Public workshops, webinars, industry technical conferences
Deployment Within National Parks

Photos courtesy of NPS
• Address unforeseen permitting and safety issues,
• Identify chronic vehicle or infrastructure field problems
• Incident investigations (technology failures)
• Capture lessons learned and develop best practices

Model EVSE Permit

http://www.afdc.energy.gov/afdc/pdfs/EV_charging_template.pdf

(NREL stock photos)
Recent Awards – 16 Clean Cities Community Readiness and Planning for Plug-In Electric Vehicles and Charging Infrastructure awards (projects being presented & reviewed at AMR this week; also presented and reviewed at May 1, 2013 University of Tennessee event)

Future Directions - Community Readiness, Barrier Reduction, and Sustainable Policy Development

• Local public-private partnerships will collaborate to develop strategies and local petroleum reduction policies to deploy alternative fuel vehicles and infrastructure, streamline permitting processes, and address critical barriers.

• Nov. 2012 – Announced $11.1M for 20 community based “Implementation Initiatives to Advance Alternative Fuel Markets” awards. (currently being implemented)
Projects being presented at this AMR

OBJECTIVES & GOALS:

• Plan and implement policies
  - Development of local/regional electric charging infrastructure
  - Implementation of local policies, procedures, and incentives

• Prepare communities for successful deployment and implementation of plug-in electric drive vehicles.

• Stimulate community based electric vehicle infrastructure readiness planning and implementation activities in anticipation of larger electric vehicle deployment efforts in the future.
PROJECTS SELECTED:

- Projects received $8.5 million to facilitate local public-private partnerships that will develop EV deployment strategies.
- The funding recipients range from communities with extensive EV planning experience to those that prior to this award have not previously had the resources to do so.
- One-year projects helped communities address their specific needs
  - updating permitting processes
  - revising codes
  - training municipal personnel
  - promoting public awareness
  - developing incentives
Clean Cities Community Readiness & Planning for Plug-In Electric Vehicles & Charging Infrastructure

- $8.5 million
- 16 projects across 24 states and DC
- 1 year projects to facilitate local partnerships
- Results: Publicly releasable and replicable plans
Technology Integration Overview

Other Key Activities

- Advanced Vehicle Competitions
- Education Programs
  - Graduate Automotive Technology Education
  - Advanced Electric Drive Vehicle Education Program
Training the Next Generation of Engineers

Provide a new generation of engineers with knowledge and skills in developing and commercializing advanced automotive technologies.

25 years of university-level advanced vehicle technology competitions!
EcoCAR 2: Plugging into the Future

- Challenges students from 15 North American Universities
- 3 year competition following a real-world engineering process
- Joined by Natural Resources Canada, General Motors and over 25 other industry sponsors
- Each team is building its own unique PHEV architecture and renewable fuel such as Hydrogen, Ethanol or Biodiesel

Year 2 Integration
Yuma, AZ – May 13-19, 2013
San Diego, CA – May 20-24, 2013

Provide a new generation of engineers with knowledge and skills in developing and commercializing advanced automotive technologies.
Training the Next Generation of Engineers

Graduate Automotive Technology Education

- Receive DOE funding for student fellowships and curriculum development.
- Each center has established a graduate engineering education program that offers courses emphasizing that center's technology specialty.
- In 2011, 7 GATE Centers awarded - $6.4 million (DOE) over 5 years
- Focus on three critical automotive technology areas: hybrid propulsion, energy storage, and lightweight materials.

Seven Centers of Excellence Awarded in 2011

- The Ohio State University - Energy Storage and Hybrid Propulsion
- University of Michigan, Dearborn - Hybrid Propulsion
- University of Colorado, Colorado Springs (UCCS) and the University of Colorado, Boulder (CU-Boulder) - Energy Storage and Hybrid Propulsion
- Purdue University - Hybrid Propulsion with emphasis on Medium/Heavy Duty
- Clemson University - Hybrid Propulsion
- Pennsylvania State University - Energy Storage
- University of Alabama, Birmingham - Lightweight Materials
Advanced Electric Drive Vehicle Education Program

Accelerate the development and production of various electric drive vehicle systems through support of educational programs to substantially reduce petroleum consumption.

• 10 projects selected in 2009 focused on:
  – Engineering Degree & Certificate Programs
  – Emergency Responder and Safety Training
  – Consumer & K-12 Educational Outreach
  – Developing and Providing Teaching Materials
  – Training Service Personnel, Vehicle Mechanics, and Supporting Infrastructure

• National Fire Protection Association
• Missouri University of Science and Technology
• Wayne State University
• West Virginia University
• University of Michigan
• J. Sergeant Reynolds Community College
• Michigan Technical University
• Purdue University
• City College of San Francisco
• Colorado State University
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Legislative & Rulemaking

Vehicle Education