-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

Clean Cities
U. S. Department of Energy

GATEWAY TO THE FUTURE
GATE
GRADUATE AUTOMOTIVE TECHNOLOGY EDUCATION

EcoCAR2
PLUGGING IN TO THE FUTURE

Deployment Rationale

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.

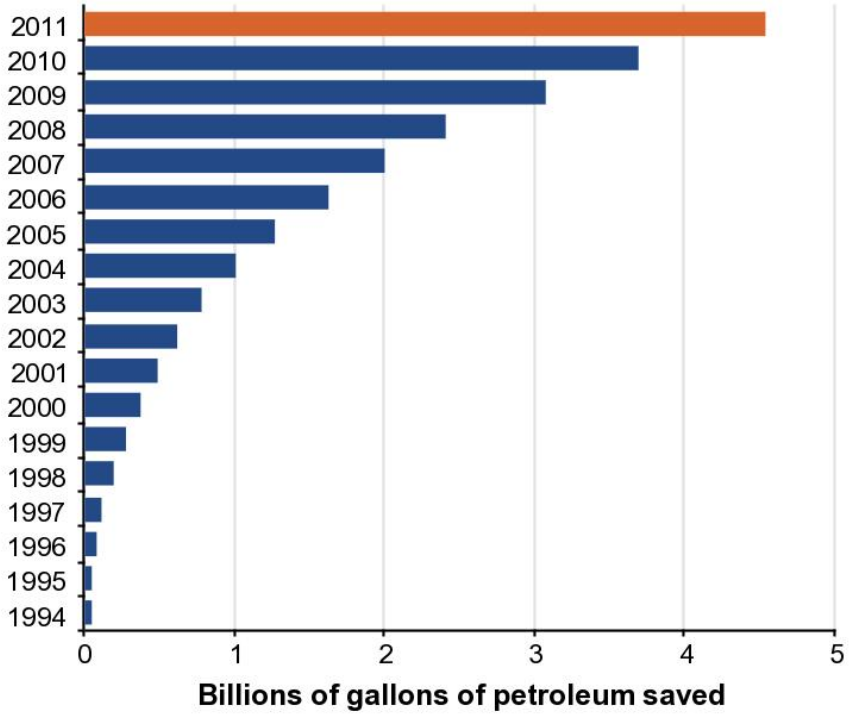
Primary Focus – Achieve Petroleum Reduction …
by Implementing Next-Steps when R&D is completed

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



Clean Cities

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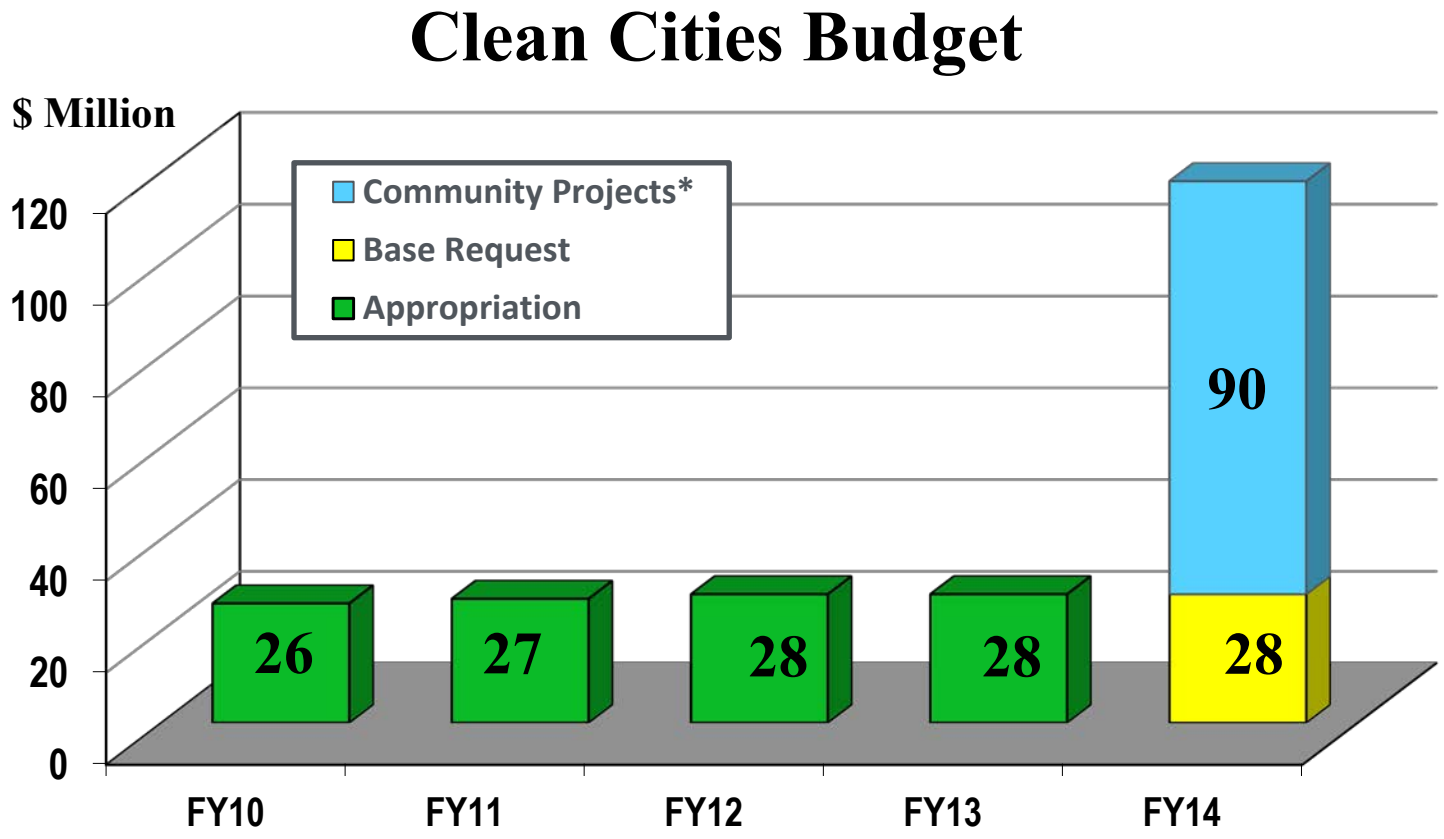
Clean Cities Budget History



* Alternative Fuel Vehicle Community Partner Projects

Alternative Fuel Vehicle Community Partner Projects: *New effort in FY 2014*

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)

National Clean Fleets Partnership

April 2011 - President Announces Clean Fleets Partnership with 5 charter partners

(photo courtesy of White House)

- Challenge to top fleets across the country to adopt alt-fuels, advanced vehicles, petroleum reduction plans
- Pace-setters for others to follow

April 2013 –

Program grown To 22 National CF Partners

KWIK TRIP, Johnson Controls, BEST BUY, SYLVANIA, at&t, ups, PEPSICO, FedEx, ThyssenKrupp, Coca-Cola, verizon, FritoLay, Schwan's, Ryder, GE, Advanced Disposal, PG&E, ENTERPRISE HOLDINGS (Alamo, enterprise, National), ARAMARK, WM WASTE MANAGEMENT, STAPLES, AMPAMERICAS

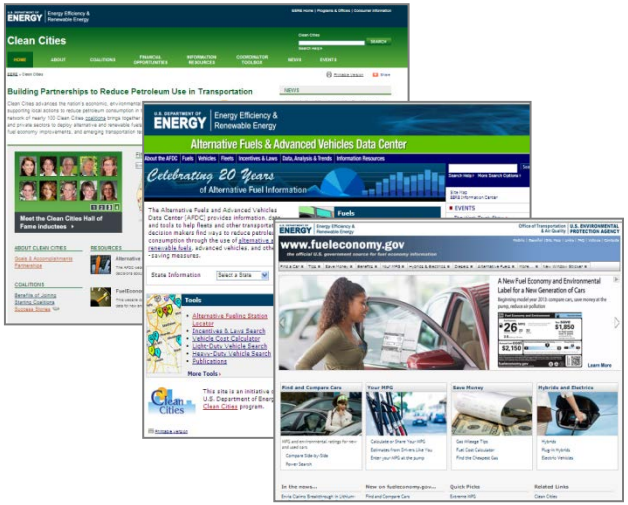
(logos used with permission of companies represented)

Direct Impact: The l00 largest commercial fleets account for more than 1 million vehicles. Every 2,000 vehicles converted to alternative fuel = 1M gal/year petroleum displacement.

Consumer Information, Outreach, and Education

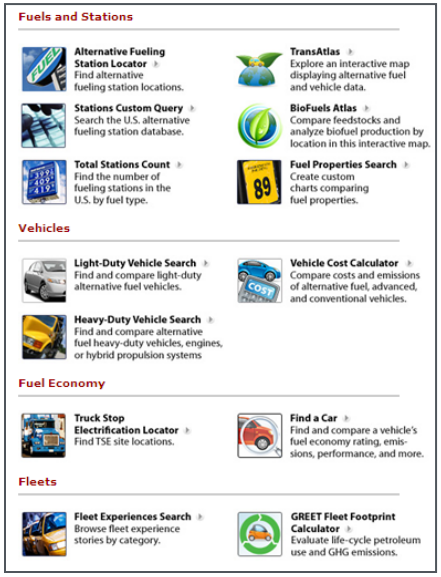
- *Non-biased source of VT data and information*
- *Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC)*
- *On-line tools and cost calculators, other web resources*
- *Training for first responders and public safety officials*
- *Technical response service*
- *Public workshops, webinars, industry technical conferences*

Tech Bulletins



Websites

Technical Response Service



On-line Tools

Deployment Within National Parks

Partnership

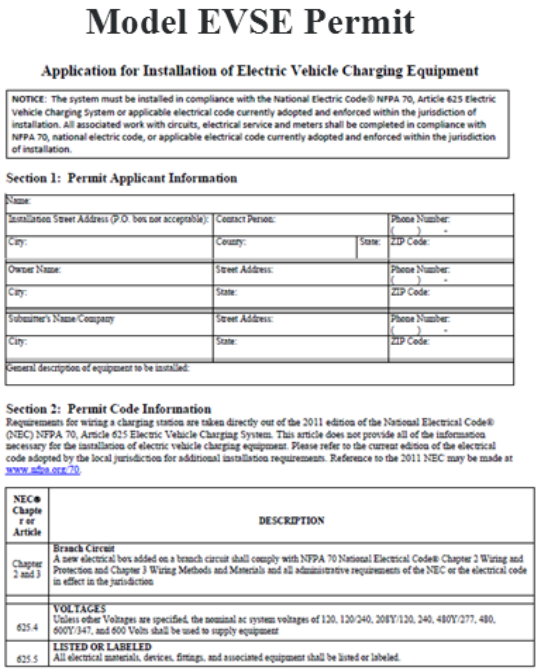
Clean Cities
U.S. Department of Energy

NATIONAL PARK SERVICE

Photos courtesy of NPS

Technical & Problem Solving Assistance

- *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

Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with the National Electric Code® NFPA 70, Article 625 Electric Vehicle Charging System or applicable electrical code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

Section 1: Permit Applicant Information

Name:			
Installation Street Address (P.O. box not acceptable):	Contact Person:		Phone Number: ( ) -
City:	County:	State:	ZIP Code:
Owner Name:	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
Submitter's Name/Company	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
General description of equipment to be installed:			

Section 2: Permit Code Information

Requirements for wiring a charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

NEC® Chapter or Article	DESCRIPTION
Chapter 2 and 3	**Branch Circuit** A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code® Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction
625.4	**VOLTAGES** Unless other Voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment
625.5	**LISTED OR LABELED** All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.

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

(NREL stock photos)

Competitively-Awarded Financial Assistance:

Encourages private sector match and long-term investment

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

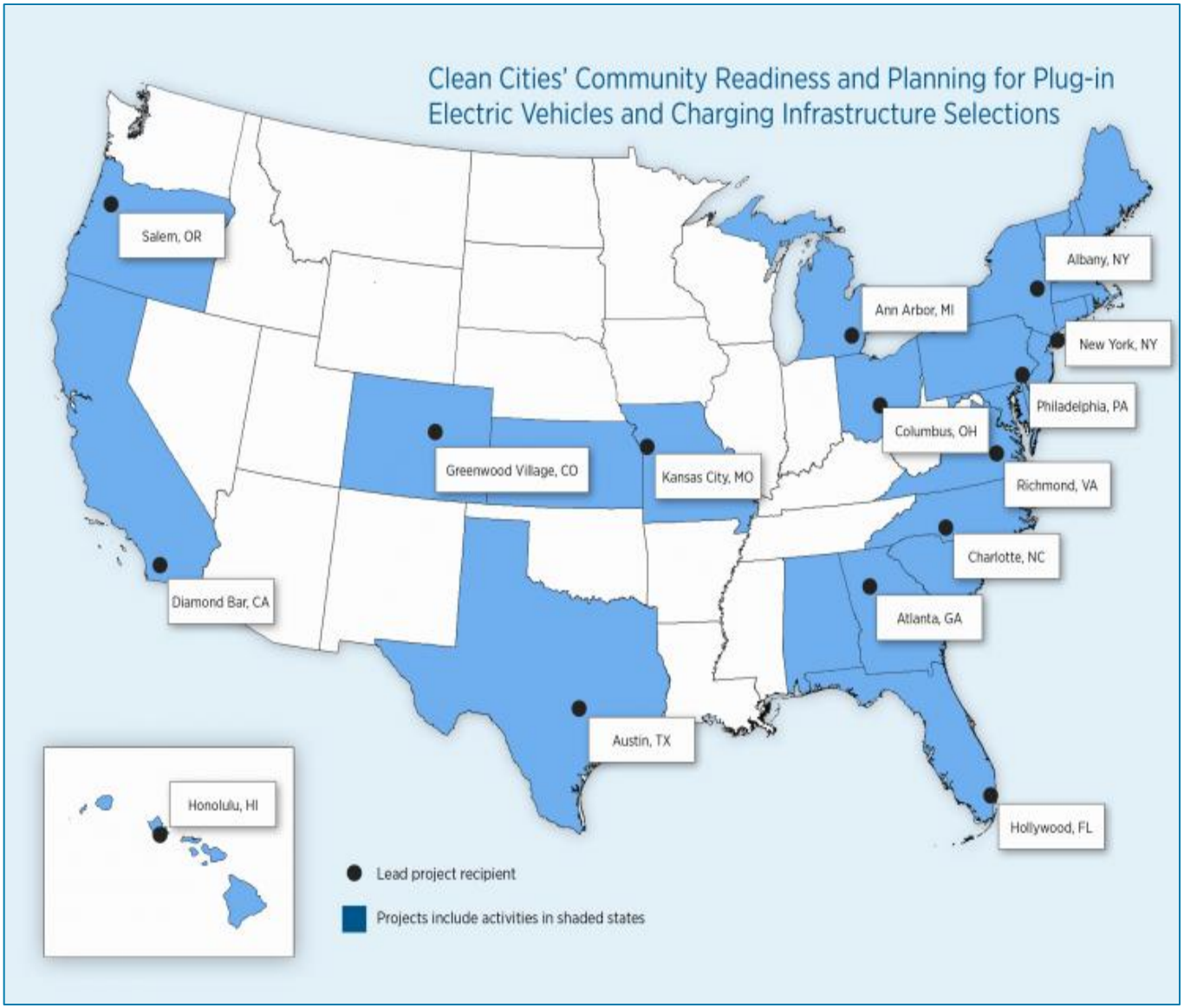
OBJECTIVES & GOALS:

- 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

GATEWAY TO THE FUTURE
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GRADUATE AUTOMOTIVE TECHNOLOGY EDUCATION

Training the Next Generation of Engineers

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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!

25th ANNIVERSARY AVTC
ADVANCED VEHICLE TECHNOLOGY COMPETITION

Senator Albert Gore, Jr. (D-TN) congratulates Cameron Sumner of the University of Tennessee. Tennessee came in first place in the GM/SAE Methanol Marathon with a cumulative score of 764 points. The 1,100-mile, five-day rally came to a conclusion on Capitol Hill on May 4.

* * * *

General Motors Public Relations (202)775-5040

1988–1990 > Methanol Marathon
1990–1993 > Natural Gas Vehicle Challenge
1992–1995 > HEV Challenge
1995–1997 > Propane Vehicle Challenge
1995–1999 > FutureCar Challenge
1997–1999 > Ethanol Vehicle Challenge
1999–2004 > FutureTruck
2004–2008 > Challenge X: Crossover to Sustainable Mobility
2008–2011 > EcoCAR: The NeXt Challenge
2011–2014 > EcoCAR 2: Plugging In to the Future

EcoCAR 2: Plugging into the Future

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

- 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

Training the Next Generation of Engineers

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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

Contact Information

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

www.vehicles.energy.gov

Clean Cities
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Vehicle Education

Legislative & Rulemaking

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