-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

EcoCAR
The NeXt Challenge

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.

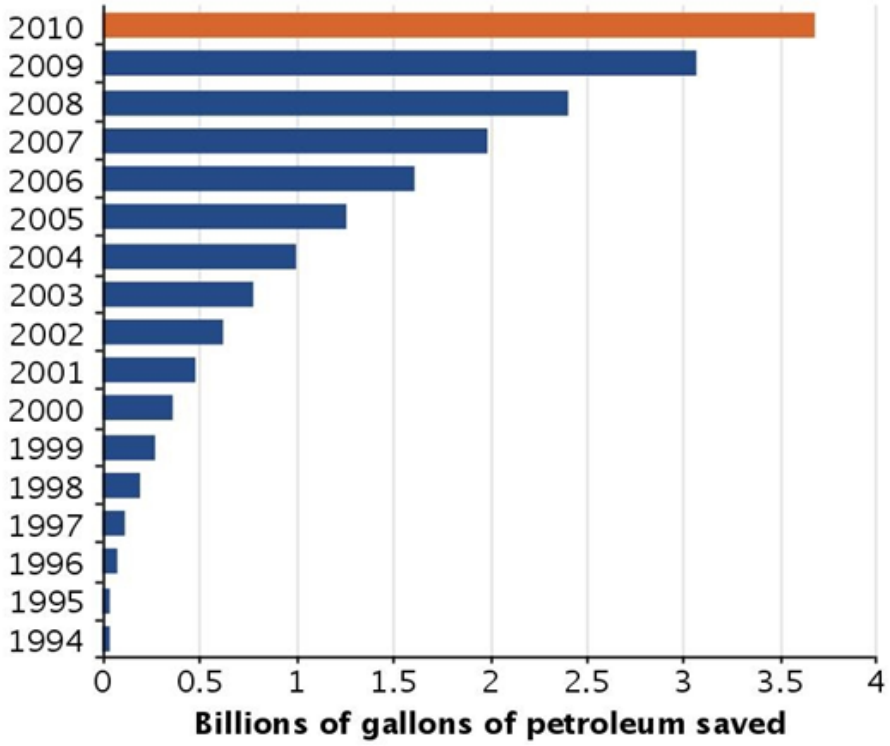
Primary Focus – Achieve Petroleum Reduction …
by Implementing Next-Steps when R&D is completed

Roughly 10% of VTP base budget supports Deployment (Technology Introduction) efforts

Clean Cities Efforts Get Results !

Over 3.5 Billion Gallons of Petroleum Reduction since 1993

- Over 800,000 AFVs on the road
- 12,000 alternative fueling and charging stations (CC influenced >70%)
- Long term goal of 2.5B gal/year by 2020



Clean Cities

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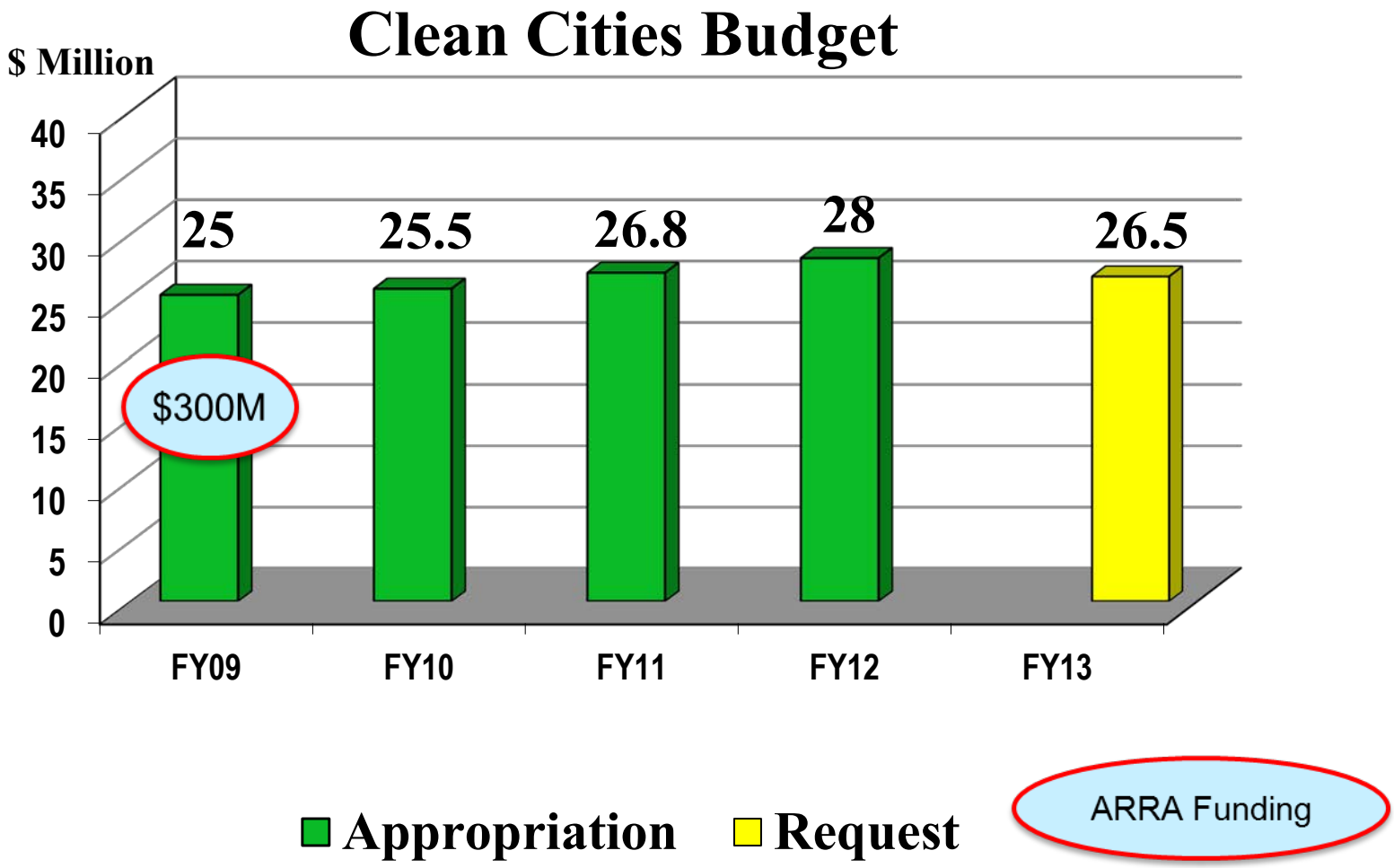
Clean Cities Budget History



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 Fleet 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 2012 –

Program grown To 20 National CF Partners

VEOLIA ENVIRONMENTAL SERVICES, Johnson Controls, BEST BUY, SYLVANIA, at&t, ups, PEPSICO, FedEx, ThyssenKrupp, Coca-Cola, verizon, Frito Lay, Schwan's, Ryder, GE, STAPLES, PG&E, ENTERPRISE HOLDINGS (Alamo, enterprise, National), ARAMARK, WM WASTE MANAGEMENT

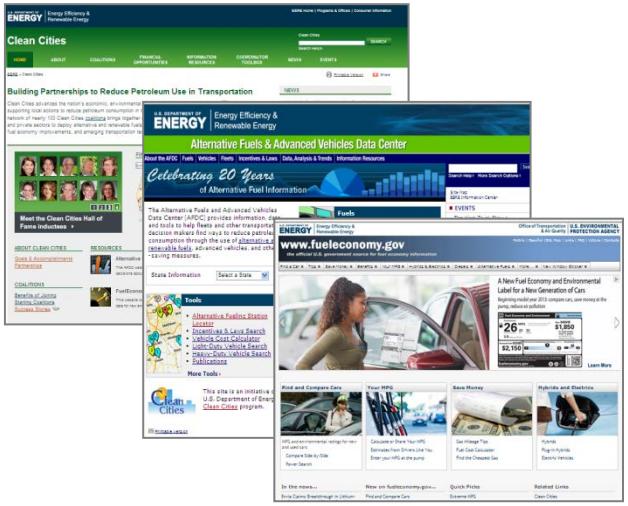
(logos used with permission of companies represented)

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

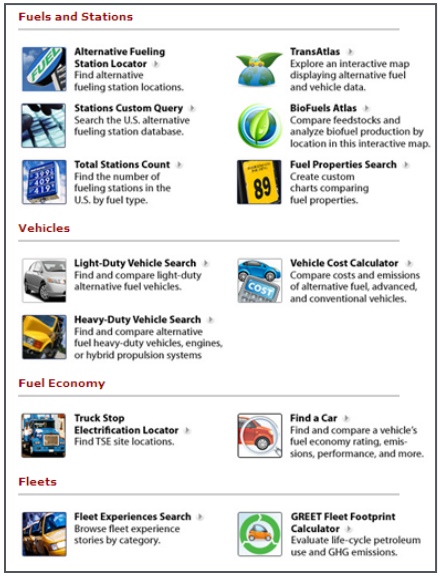
- *Non-biased source of VT data and information*
- *Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC)*
- *On-line tools and cost calculators, other web resources*
- *Training for first responders and public safety officials*
- *Technical response service*
- *Public workshops, webinars, industry 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 - helped deploy over 1,500 stations and 8,500 vehicles (projects being presented & reviewed at AMR this week)

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.

- Sep 2011 - 16 electric vehicle projects in 24 states totaling $8.5 million were announced (currently being implemented).

- May 2012 - $5M funding opportunity announced for community based “Implementation Initiatives to Advance Alternative Fuel Markets.” (**Closes Jun 18** -- awards anticipated in FY12-Q4).

Clean Cities Recovery Act Awards- Total DOE Funds Disbursement by State

Grant Dollars	State	Grant Dollars	State
$31,184,384	Texas	$4,316,547	Nevada
$30,954,099	California	$3,727,123	Maryland
$28,673,400	New York	$3,348,128	Virginia
$16,648,491	Georgia	$2,857,533	Florida
$15,950,864	Washington	$2,621,543	Nebraska
$15,403,404	Illinois	$622,340	Louisiana
$15,228,240	New Jersey	$594,794	Colorado
$15,041,601	Wisconsin	$545,899	Oklahoma
$15,009,703	Michigan	$536,866	Oregon
$14,950,249	Utah	$399,061	Arizona
$13,479,360	Connecticut	$300,093	Pennsylvania
$12,980,000	Kentucky	$197,783	Minnesota
$11,355,406	Ohio	$161,801	Alabama
$8,985,696	Indiana	$114,959	Tennessee
$8,467,012	North Carolina	$77,000	Massachusetts
$7,719,451	Kansas	$39,559	Arkansas
$5,519,862	Idaho	$11,600	Mississippi
$4,933,814	Missouri		
$4,570,964	South Carolina	**$297,528,630**	**Total**

Clean Cities Recovery Act Awards- Total Alternative Fuel Stations by State

Stations	State	Stations	State
345	Illinois	16	Missouri
245	California	15	Colorado
156	Washington	13	Florida
127	Indiana	11	Arizona
112	North Carolina	10	Louisiana
105	New York	10	Oklahoma
99	Texas	9	Oregon
67	South Carolina	6	New Jersey
50	Utah	6	Virginia
40	Ohio	6	Nebraska
27	Michigan	4	Idaho
25	Georgia	1	Maryland
19	Connecticut	1	Nevada
17	Wisconsin	1	Alabama
16	Kansas	**1,559**	**Total**

Clean Cities Recovery Act Awards- Total Alternative Fuel Vehicles by State

Vehicles	State	Vehicles	State
1,033	Washington	159	North Carolina
888	Texas	100	Nebraska
534	New York	79	Kansas
531	Utah	48	Nevada
517	California	32	Idaho
493	South Carolina	20	Louisiana
462	Michigan	20	Alabama
412	Illinois	14	Tennessee
382	Georgia	8	Pennsylvania
343	Maryland	5	Minnesota
327	Indiana	2	Oregon
302	Ohio	2	Colorado
281	Wisconsin	2	Massachusetts
279	Virginia	2	Mississippi
278	New Jersey	1	Arizona
272	Connecticut	1	Arkansas
270	Florida	1	Oklahoma
207	Kentucky		
183	Missouri	**8,490**	**Total**

Technology Integration Overview

Other Key Activities

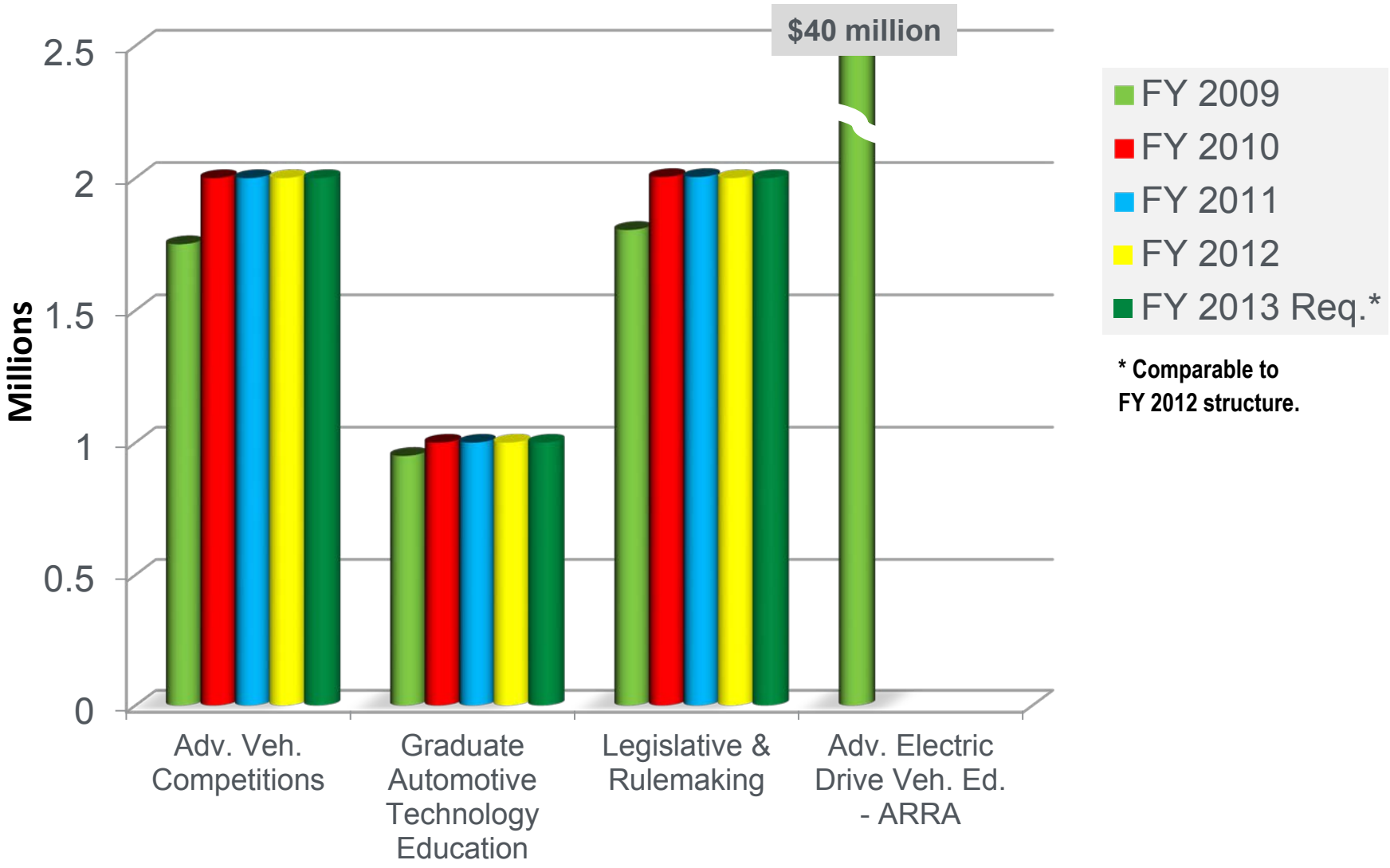
- Advanced Vehicle Competitions
- Education Programs
  - Graduate Automotive Technology Education
  - Advanced Electric Drive Vehicle Education Program

GATEWAY TO THE FUTURE
GATE
GRADUATE AUTOMOTIVE TECHNOLOGY EDUCATION

Budget History

(continued – including other TI Activity areas)

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



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.

Advanced Vehicle Competitions

- Since 1987, DOE has sponsored more than two dozen university-level advanced vehicle technology competitions.
- Provides college engineering students an opportunity to conduct hands-on research and development with leading-edge automotive propulsion, fuels, materials, and emissions control technologies.

EcoCAR The NeXt Challenge

Secretary Chu at EcoCAR Finals

- Virginia Tech took top honors!

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

March 22, 2012
President Obama visits with Ohio State University EcoCAR2 Team after Energy Address

Year 1 Simulation and Modeling finals to be held in Los Angeles, CA – May 18-23, 2012

EcoCAR2 Teams

Colorado State University

The Ohio State University

Wayne State University

University of Victoria

Michigan State University

Cal State LA

Purdue University

University of Washington

Virginia Tech

Rose-Hulman Institute of Technology

Year 1
Modeling & Simulation

Year 2
Subsystem Integration

Year 3
Refinement

Penn State

University of Waterloo

The University of Tennessee

North Carolina State University

Embry-Riddle Aeronautical University

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.

- 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

Advanced Electric Drive Vehicle Education Program

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

- Selections announced by President Obama on August 5, 2009.
- 10 projects receive $39.1 million in ARRA funding.
  - 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
U. S. Department of Energy

Vehicle Education

Legislative & Rulemaking

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