



Technology Integration Overview

June 7, 2016

Linda Bluestein (Presenter)
Connie Bezanson

Activities

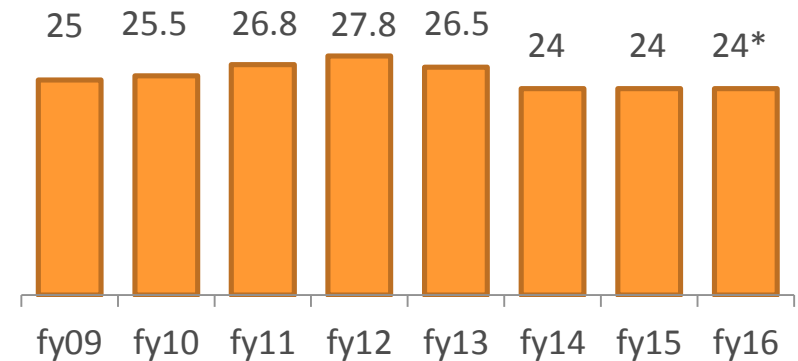
- ☐ VT Deployment (Clean Cities) – A voluntary, locally based government/industry partnership initiative.
- ☐ Legislative and Rulemaking.
- ☐ Advanced Vehicle Competitions.



VT Deployment Aligns with EERE Strategic Plan

- ❑ Increase use of higher-efficiency advanced technology vehicles.
- ❑ Increase use of vehicles that use renewable, low-carbon, domestic fuels and infrastructure.
- ❑ Improve overall efficiency of the transportation system.
- ❑ Support national goals to reduce GHG emissions by 17% by 2020; 26-28% by 2025 and 83% by 2050 (vs 2005 baseline).

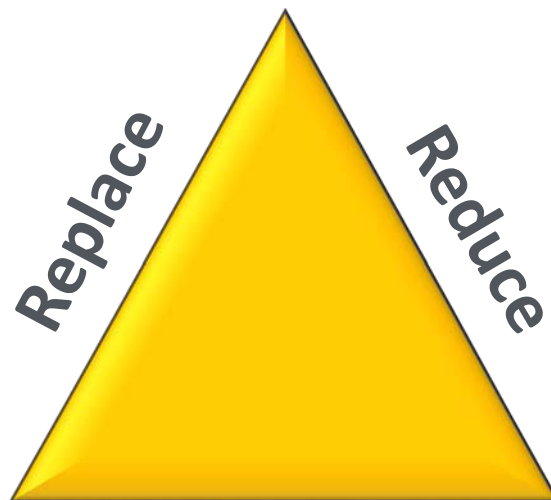
Clean Cities Base Budget History



*Base budget: Additional \$10M in FY16 for Alternative Fuel Vehicle Community Partner Projects, per Congressional direction

Low-Carbon Fuels

Electric Vehicles
Biodiesel
Ethanol
Drop-in fuels
Hydrogen
Gaseous Fuels



Eliminate

Idle Reduction

Heavy-Duty Trucks
School & Transit
Buses
Light-Duty Vehicles

New Area of
Emphasis:
Holistic
Transportation
System view, smart
cities

Fuel Economy

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



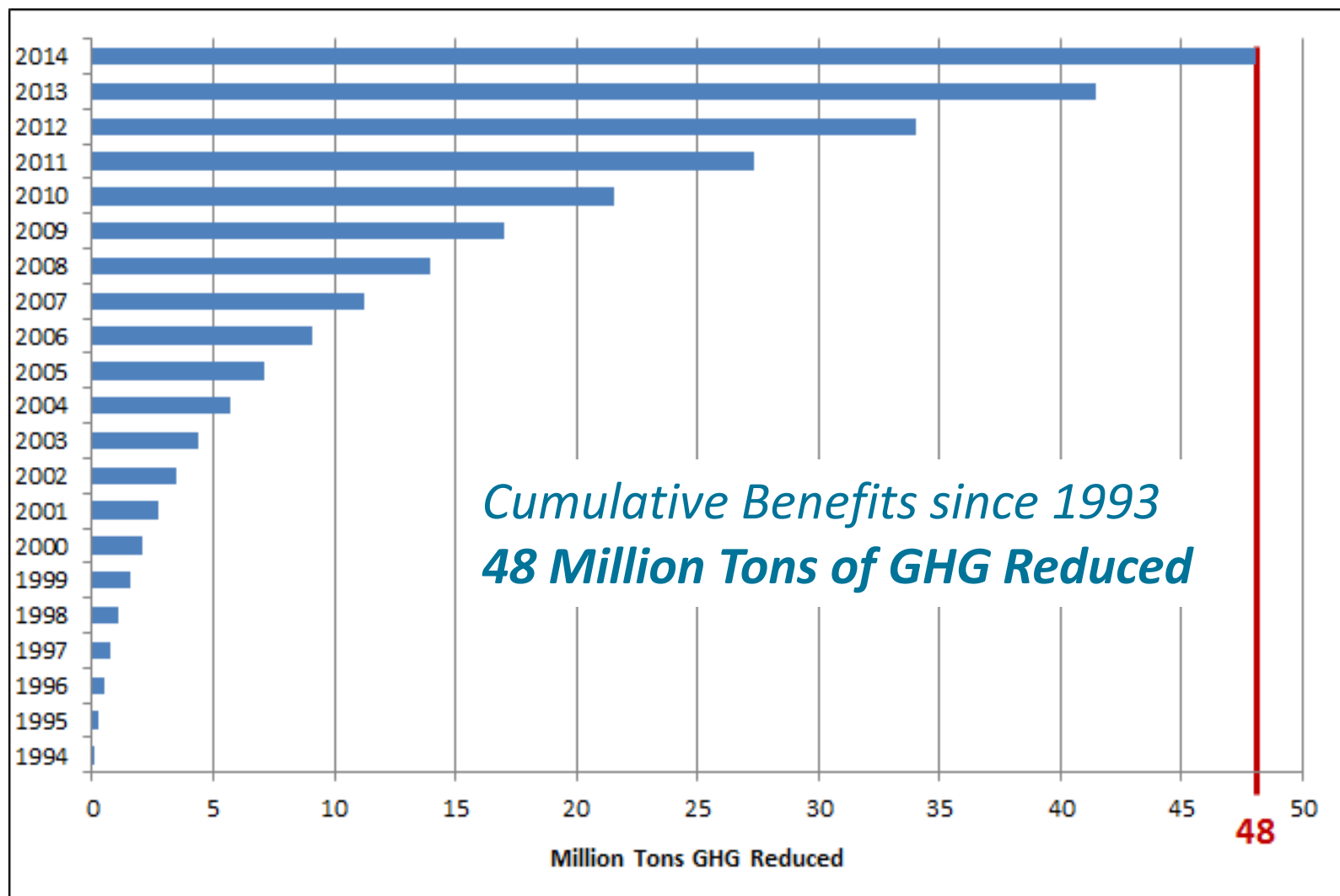
Hybrids

Light- and heavy-duty
Electric hybrids
Plug-In hybrids

VT Deployment: Accomplishments (GHG Reduction)

2014 Accomplishments:

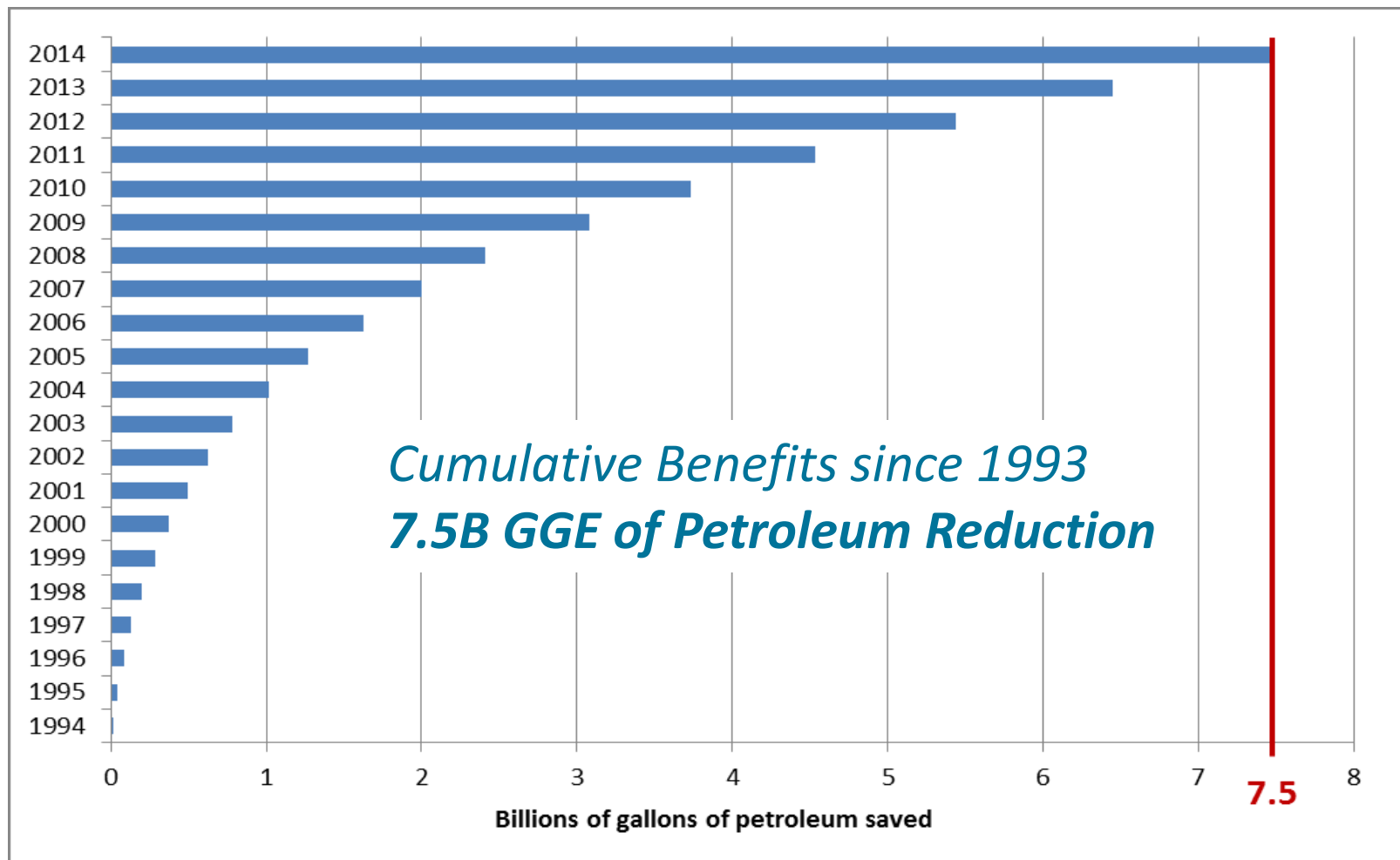
- ❑ *1 Billion GGE reduction and **6.6 Million Tons GHG reduced.***
- ❑ *Equivalent to removing 1.5 million cars from the road.*



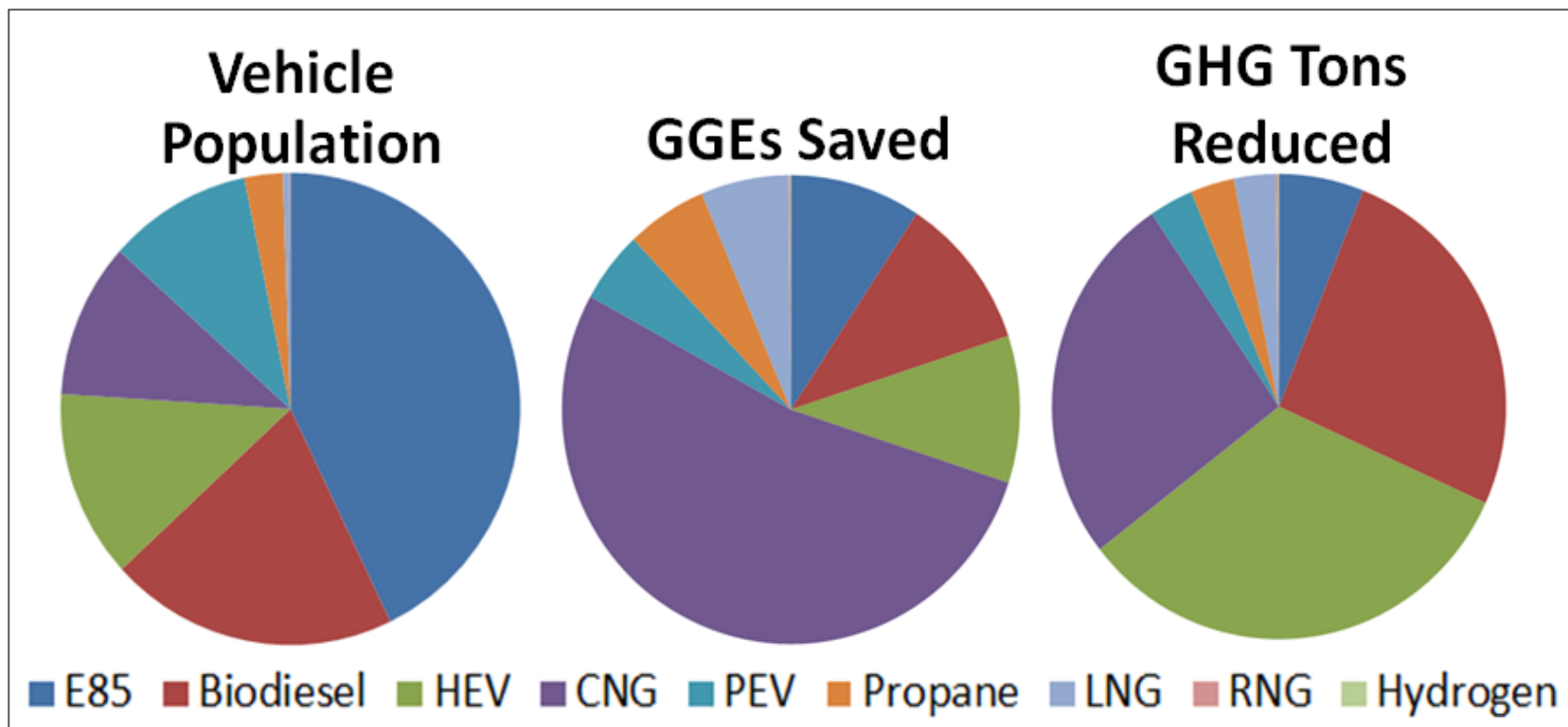
VT Deployment: Accomplishments (Petroleum Reduction)

2014 Accomplishments:

- ❑ **1 Billion GGE reduction** and 6.6 Million Tons GHG reduced.
- ❑ *Equivalent to removing 1.5 million cars from the road.*



VT Deployment Accomplishments by Alternative Fuel



Who's Who in Clean Cities - DOE

DOE Headquarters (HQ)



Dennis Smith
Director



Linda Bluestein
Co-Director



Shannon Shea
Communications
Manager



Mark Smith
National Partners
Manager



Nick Bleich
Workplace Charging
Challenge

★ Leveraging
CC team &
stakeholders

DOE Regional Managers National Energy Technology Laboratory (NETL)



Dan Nardozzi
Northwest



Dave Kirschner
North Central



Darren Stevenson
Mid-Atlantic



Erin Russell-Story
Northeast



Brett Aristegui
California



Neil Kirschner
South Central



Trev Hall
Southeast

VT Deployment Strategy (Leveraging People & Resources)



Implement national policies and initiatives by facilitating change

Provide a national unbiased source of information.

Provide tools, experts to address barriers and solve problems.

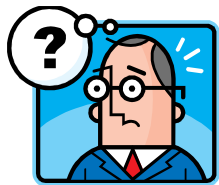
Develop corporate partnerships with industry and national fleets as well as public fleet partners—federal, state, regional and local – to increase awareness and publicize success through mass media and outreach.

Provide financial assistance to jump start markets and incentivize private investment.

Clean Cities Deployment Efforts include 5 Major Activities



Consumer Information, Outreach, and Education: *DOE-developed tools help consumers save money on fuel cost and help fleets understand their options for cost-effective alternatives to gasoline and diesel fuel (includes FE.gov and AFDC).*



Technical & Problem Solving Assistance: *DOE experts help leaders address permitting and safety issues, technology shortfalls, and other project implementation barriers.*



Training and Stakeholder Coordination: *DOE helps convene key community, industry, and business leaders to develop and implement projects, leverage resources, address local barriers, and assure relevant workforce development.*



Identification/Tracking of Essential Program Metrics: *Coalitions track local/regional market conditions, facilitate infrastructure development, share best practices and lessons-learned.*



Competitively-Awarded Financial Assistance: *Federal cost-share encourages initial private sector match and long-term investment.*

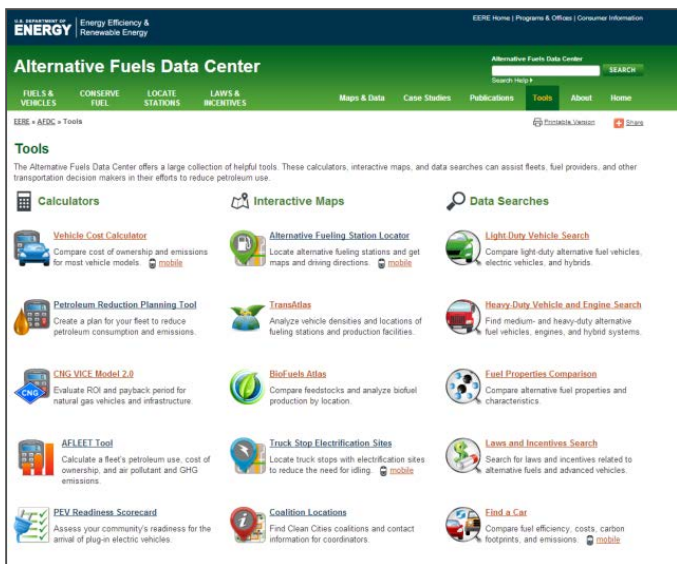
Clean Cities Coalitions



Nearly 100 coalitions with thousands of stakeholders
Representing ~80% of U.S. population

Consumer Information, Outreach, and Education

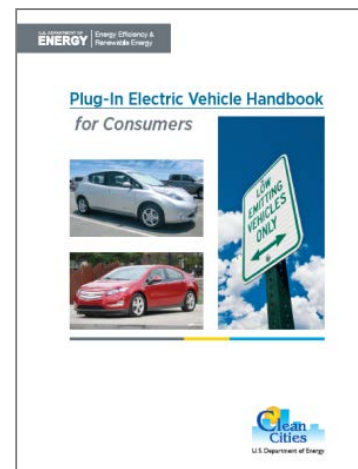
- ❑ Non-biased source of VT data and information.
- ❑ Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC).
- ❑ Online tools and cost calculators, other web resources.
- ❑ Fact Sheets, publications, handbooks, success stories.
- ❑ Technical Response Service and Hotline.
- ❑ Public workshops, webinars, industry technical conferences.



Online Tools



Technical Response Service



Publications



Tools, Publications, Data and Mobile Apps

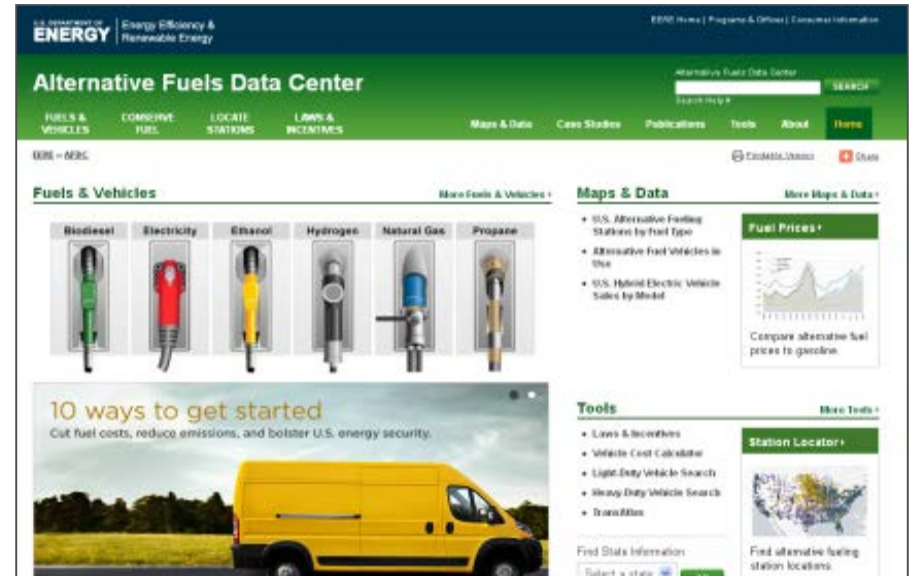
Fueleconomy.gov

Enables consumers to find the fuel-efficient vehicle that meets their needs, as well as save gas and money with their current vehicles.



Alternative Fuels Data Center

Helps fleets choose the right alternative fuel or other petroleum reduction approach for them, with almost 100 case studies and 14 interactive tools.






Calculators



Vehicle Cost Calculator

Compare cost of ownership and emissions for most vehicle models.  [mobile](#)



Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum consumption and emissions.



CNG VICE Model 2.0

Evaluate ROI and payback period for natural gas vehicles and infrastructure.



AFLEET Tool

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



JOBS Model


Estimate economic impacts of natural gas, hydrogen, or fuel cell infrastructure.



Interactive Maps



Alternative Fueling Station Locator

Locate alternative fueling stations and get maps and driving directions.  [mobile](#)



TransAtlas

Analyze vehicle densities and locations of fueling stations and production facilities.




BioFuels Atlas

Compare feedstocks and analyze biofuel production by location.



Truck Stop Electrification Sites

Locate truck stops with electrification sites to reduce the need for idling.  [mobile](#)



Coalition Locations

Find Clean Cities coalitions and contact information for coordinators.



Data Searches



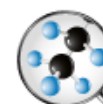
Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



Laws and Incentives Search

Search for laws and incentives related to alternative fuels and advanced vehicles.




Fuel Properties Comparison

Compare alternative fuel properties and characteristics.



Find a Car

Compare fuel efficiency, costs, carbon footprints, and emissions.  [mobile](#)



State Information

Find state information about alternative fuels and advanced vehicles.


www.afdc.energy.gov/tools



Calculators



Vehicle Cost Calculator


Compare cost of ownership and emissions for most vehicle models.  [mobile](#)



Interactive Maps



Alternative Fueling Station Locator

Locate alternative fueling stations and get maps and driving directions.  [mobile](#)



Data Searches



Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum consumption and emissions.



TransAtlas

Archive vehicle densities and locations of alternative fueling stations.



Laws and Incentives Search

Search for laws and incentives related to advanced vehicles.



CNG VIC

Evaluate natural gas vehicle fuel properties and



Petroleum Reduction Planning Tool


Create a plan for your fleet to reduce petroleum consumption and emissions.



AFLEE

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



Locate truck stops with electrification sites to reduce the need for idling.  [mobile](#)



Compare fuel efficiency, costs, carbon footprints, and emissions.  [mobile](#)



JOBS Model

Estimate economic impacts of natural gas, hydrogen, or fuel cell infrastructure.



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State Information

Find state information about alternative fuels and advanced vehicles.


www.afdc.energy.gov/tools



Calculators



Vehicle Cost Calculator

Compare cost of ownership and emissions for most vehicle models.  [mobile](#)



Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum consumption.



CNG VICE Model

Evaluate ROI of natural gas vehicles.



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Interactive Maps



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Locate alternative fueling stations and get maps and driving directions.  [mobile](#)



TransAtlas

Analyze vehicle densities and locations of



Data Searches



Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



Laws and Incentives Search

Search for laws and incentives related to advanced vehicles.

AFLEET Tool

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.

Comparison

Compare fuel properties and

efficiency, costs, carbon

footprints, and emissions.  [mobile](#)



JOBS Model

Estimate economic impacts of natural gas, hydrogen, or fuel cell infrastructure.



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Compare cost of ownership and emissions for most vehicle models.  [mobile](#)



Interactive Maps



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Data Searches



Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



Petroleum Reduction Planning Tool

Create a petroleum reduction plan.



TransAtlas



Laws and Incentives Search

Find laws and incentives related to alternative and advanced vehicles.



CNG Vehicle Comparison

Evaluate natural gas vehicle fuel properties and costs.



Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.

Comparison


Compare fuel properties and costs.




AFLE

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



Locate truck stops with electrification sites to reduce the need for idling.  [mobile](#)



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Calculators



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Interactive Maps



Alternative Fueling Station Locator

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Data Searches



Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum use.



TransAtlas

Analyze vehicle densities and locations of alternative fueling stations.



Laws and Incentives Search

Search for laws and incentives related to advanced vehicles.



CNG Vehicle

Evaluate natural gas vehicle properties and



Laws and Incentives Search

Search for laws and incentives related to alternative fuels and advanced vehicles.

Comparison


model properties and




AFL

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



Locate truck stops with electrification sites to reduce the need for idling.  [mobile](#)



Compare fuel efficiency, costs, carbon footprints, and emissions.  [mobile](#)



JOBS Model

Estimate economic impacts of natural gas, hydrogen, or fuel cell infrastructure.



Coalition Locations

Find Clean Cities coalitions and contact information for coordinators.



State Information

Find state information about alternative fuels and advanced vehicles.

www.afdc.energy.gov/tools

Technical and Problem Solving Assistance

- ❑ Capture lessons learned and develop best practices.
- ❑ Technical Forums and User Groups.
- ❑ Address unforeseen permitting and safety issues.
- ❑ Identify chronic vehicle or infrastructure field problems.
- ❑ Incident investigations (learn from failures).



Model EVSE Permit

Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with the National Electrical 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 electrical 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:
Owner Name:	Street Address:	Phone Number:
City:	State:	ZIP Code:
Subowner'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 editions 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.



Partnerships: Media Partners Help us Reach the Masses



- ❑ >200 professionally produced segments to date on EVs, alt-fuels, advanced vehicles, fuel economy, EcoCAR, and other VTO highlights.
- ❑ Bi-weekly Clean Cities success stories.
- ❑ Programs air on PBS, Discovery, Velocity, and American Forces Network worldwide on allied military bases.
- ❑ Features available on Clean Cities' websites and  channel.



Partnerships: National Clean Fleets (NCFP)

Working with top fleets across the country to reduce petroleum/GHG footprint

27 Partners



Partnerships: National Parks Interagency Agreement (Since 2010)

- ❑ Provides Technical & Financial Assistance to NPS for ***high visibility*** transportation projects in National Park Properties to:
 - Support the operation of AFVs and GHG reduction goals.
 - Conduct appropriate training, outreach, and educational programs for Park Visitors, Rangers, and other NPS employees.
 - Call attention to NPS success stories and benefits achieved.
 - Leverage resources with NPS and private sector partners.



Financial Assistance: 2016 Announcements

2 Aggregate Purchasing Project awards (\$3.0M) – FY15 announced Jan 2016

- ❑ CALSTART – (focus on ZEV/MOU states):
 - Develops a cooperative EV purchasing process for state and local government fleets.
 - Goal of facilitating 10,000 EV sales annually.
- ❑ National Assn. of Regional Councils:
 - Develops national and regional group contracting agreements.
 - Includes multiple EPAAct-defined alternative fuel vehicle types.

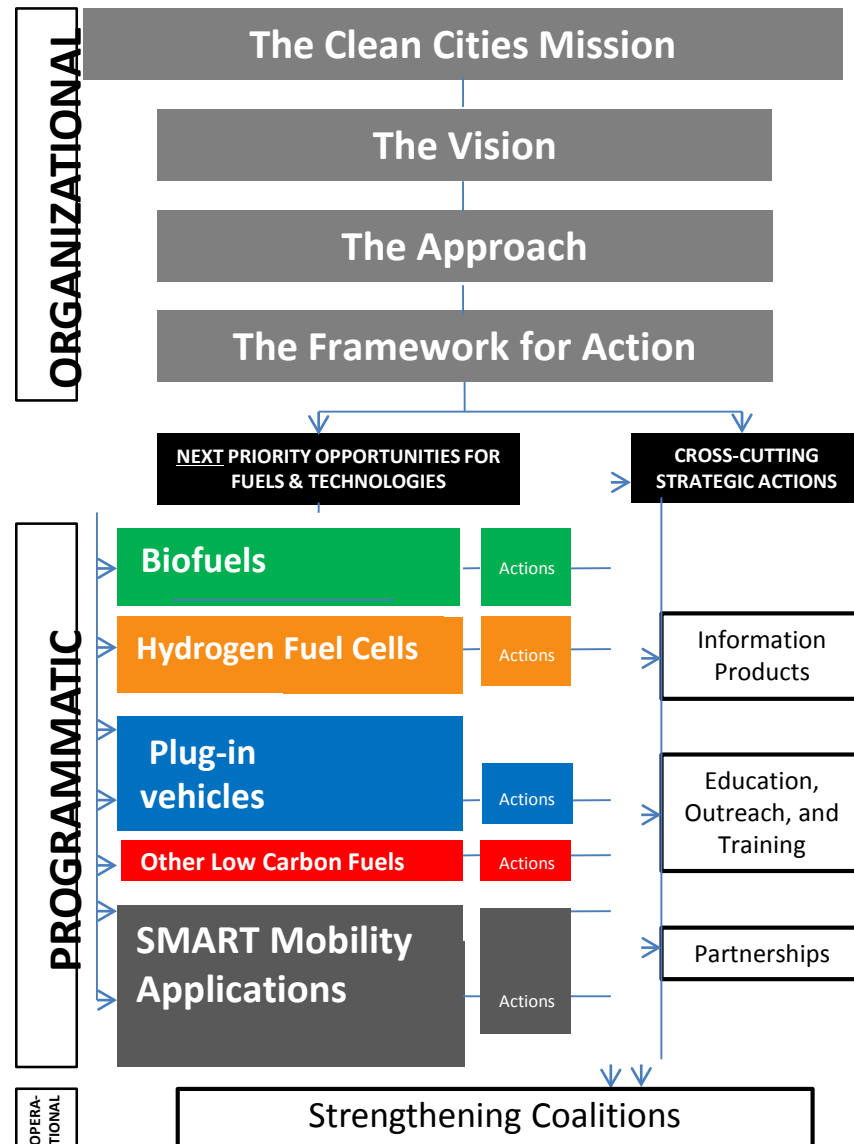
FY16 broad FOA – Two Deployment topics (out of 11)

- ❑ ***EV Everywhere Plug-In Electric Vehicle Local Showcases (\$2.5M)*** – seeks to establish local demonstration centers that will provide a hands-on consumer experience and in-depth education for commercially available PEVs and EVSE.
- ❑ ***Alternative Fuel Vehicle Workplace Safety Programs (\$1.5M)*** – to provide safety training and workshops related to garage facility/building upgrades that are required for gaseous fuels (natural gas, propane, and hydrogen).

FY16 Multi-Topic FOA – Alternative Fuel Vehicle Community Partner Projects (\$10M)

- ❑ *Coming Soon. Supports highly-leveraged public-private partnerships to significantly accelerate alternative fuel use.*

Clean Cities Strategic Plan Overview



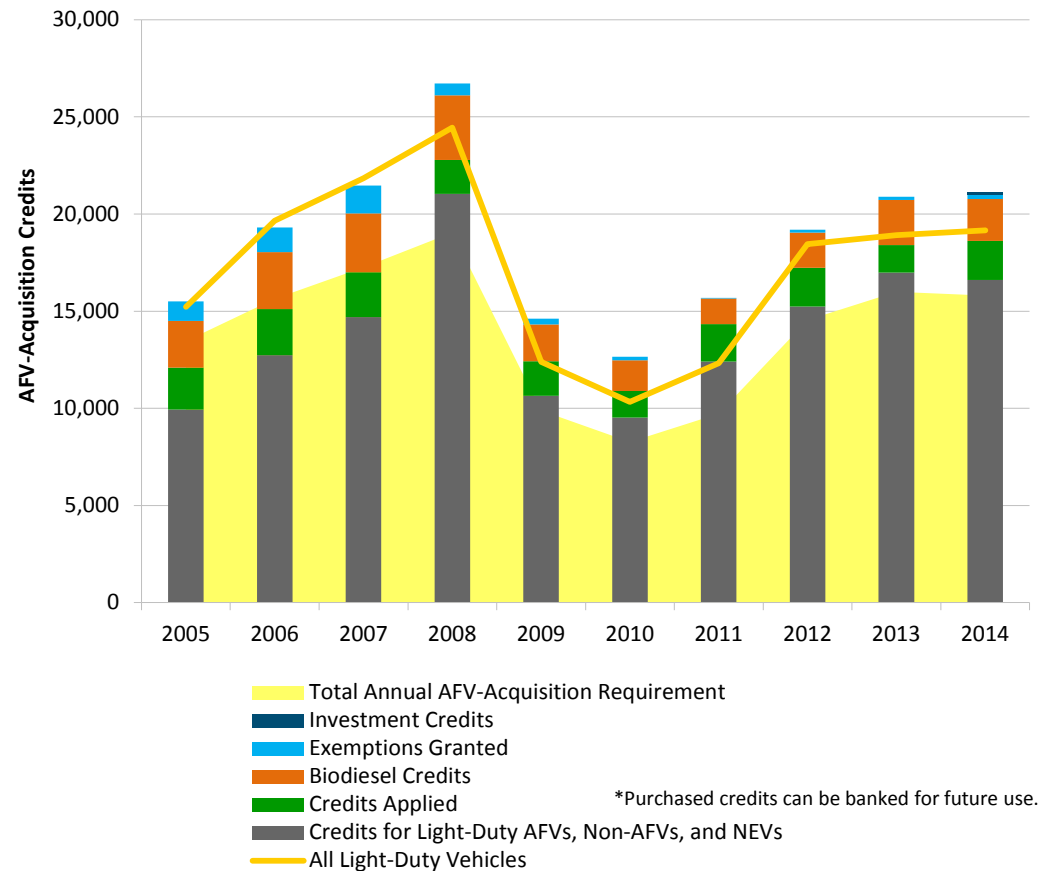
Clean Cities 2015-2016 Notable Accomplishments

- ❑ National Partners saved 81 million GGEs of petroleum.
- ❑ Updated AFLEET tool (Alternative Fuel Life Cycle Environmental and Economic Transportation); 5,000 users.
 - AFLEET calculates a fleet's petroleum use, cost of ownership and air pollutant and GHG emissions.
- ❑ Adding Transportation as a System (TaaS) activities to Clean Cities portfolio.
- ❑ Supporting partnership with DOT on Smart Cities Challenge; participating in DOE/DOT MOU.
 - Clean Cities coalitions are engaged with seven Smart Cities finalists.
- ❑ Relaunched popular Alternative Fuel Price Report available on AFDC website.

State and Alternative Fuel Provider Fleet Regulatory Activities

- ❑ EPA Act requires State fleets and Alternative Fuel Provider fleets to acquire AFVs, deploy fuels.
- ❑ Implementing program revisions providing credit for acquisitions of non-AFV electric drive vehicles, and investments in infrastructure, emerging technologies, etc.
- ❑ Management of legislative and regulatory activities for VTO, including designation of alternative fuels.

Standard Compliance Methods



Consistent 100% Program Compliance by Covered State and Alternative Fuel Provider Fleets

Training the Next Generation of Engineers

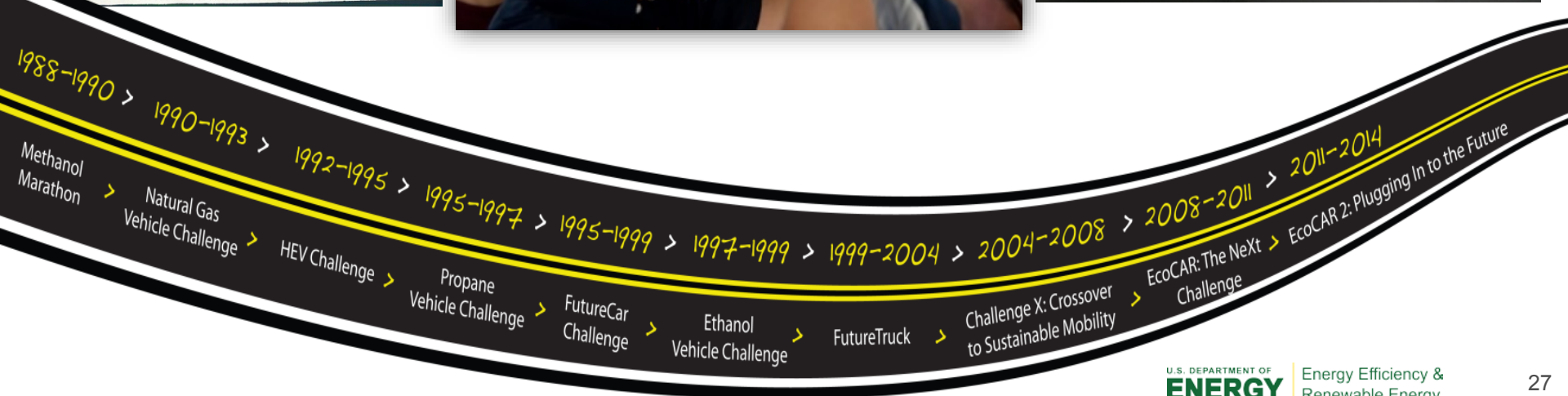
Advance Vehicle Technology Competitions

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



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



Our Impact

- ❑ 93 North American universities have participated since 1989.
- ❑ 531 individual university teams have competed.
- ❑ More than 16,500 students have participated.
- ❑ 83% of AVTC graduates have entered the automotive industry.
- ❑ 69 patent applications submitted by AVTC graduates.



President Obama visits the Ohio State University EcoCAR team

OEMs

Suppliers

Software Cos.

Academia

Government

EcoCAR3

- ❑ 4 year competition (2014 – 2018).
- ❑ Based on a real-world vehicle design process.
- ❑ 16 Teams are challenged to reduce the environmental impact of a GM-donated vehicle by minimizing the vehicle's fuel consumption and reducing its emissions.
- ❑ Consider cost and explore innovation.
- ❑ All while retaining the vehicle's performance, safety, and consumer appeal.



- ❑ DOE is teaming with General Motors and more than 30 other government and industry leaders.

Year 2 Competition: Yuma, AZ and San Diego, CA



- ❑ May 16 – 21, 2016.
- ❑ Safety and technical inspections and Vehicle testing at the GM Desert Proving Grounds in Yuma, AZ.
- ❑ In San Diego, teams will participate in more than a dozen technical, communications, and project management presentations highlighting their activities.

16 North American Universities

Arizona State University
California State University – LA
Colorado State University
Embry-Riddle Aeronautical University
Georgia Institute of Technology
McMaster University
Mississippi State University
Ohio State University
Pennsylvania State University
University of Tennessee, Knoxville
University of Alabama
University of Washington
University of Waterloo
Virginia Tech
Wayne State University
West Virginia University

Summary

Focus continues on tools, resources, education and supporting local coalitions that can help bring new petroleum reduction projects to market.

- ❑ Biggest factor: GHG reduction and sustainability.
- ❑ Strategic Planning important to set goals and objectives for the program for the next five years and beyond; allows stakeholders to help SMART drive the agenda.
- ❑ Updated tools. Resources and technical support and funding opportunities for communities and businesses.

FY16 FOA Topics:

- ❑ *EV Everywhere PEV Showcases;*
- ❑ *Workplace Safety; and*
- ❑ *Alternative Fuel Vehicle Community Partner Projects.*

EcoCAR 3:

- ❑ Student designed vehicles evaluated by industry leaders at the Year 2 competition. Teams will focus on full development and integration on their designs in the third year of the competition.

www.vehicles.energy.gov



U. S. Department of Energy

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