



First Responder Safety Awareness Presentation Training

2010 Clean Cities Coordinator Peer Exchange Meetings

Presented by: Judy Moore
NAFTC Assistant Director—Communications/Outreach

www.naftc.wvu.edu/cleancitieslearningprogram
www.cleancities.energy.gov



A Program of
West Virginia University

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

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Training Agenda

- First Responder Safety Awareness Presentation Training
 - Review of Presentation/Curriculum Materials
 - Presentation Tips for Delivery
- First Responder Media Tips for Coordinators

First Responder Safety Awareness Presentation

- The Awareness Presentation is primarily for use by Clean Cities Coalitions to promote the need for first responder safety training to government officials, public safety officers, code officials, and other key decision makers.

Presentation Objectives

- Highlight the role of alternative fuels and advanced vehicle technologies in reducing petroleum consumption and harmful emissions in the United States.
- Explain the importance of education and outreach related to alternative fuel and advanced vehicle technologies, particularly proper first responder training.

Presentation Objectives Cont'd

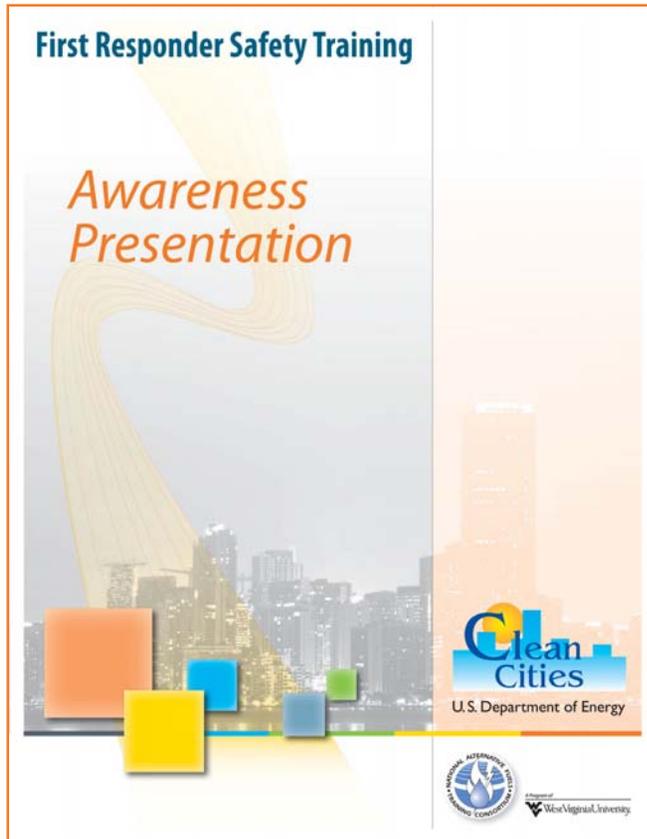
- Provide an introduction to/overview of the *Clean Cities Learning Program* First Responder Safety Training.
- Convince your audience to support first responder training!
- Set a tentative date for their local first responders to attend the *Clean Cities Learning Program* First Responder Safety Training.

Target Audiences

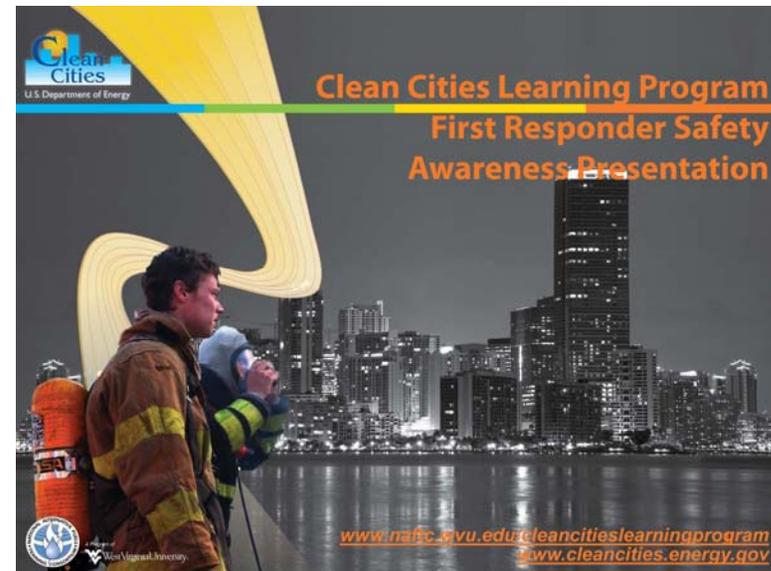
- State, County, Local Government Officials
- Fire Marshals
- Fire Chiefs
- Fire Training Officers
- City Managers
- Safety, Code, and Permitting Officials
- Fleet Managers

Curriculum/Materials

- What you will receive



Manual with supporting information and resources for delivery.



PowerPoint presentation.



Video

Sample Page Spreads

Module 4: Electric Drive Vehicles

Clean Cities Learning Program First Responder Safety Awareness Presentation

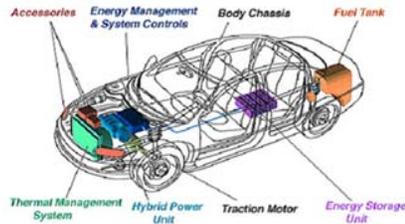


Figure 24: Cutaway view of an HEV. Source DOE

Supplemental Instructional Resources:

For an animation that shows how HEVs work, visit FuelEconomy.gov at <http://www.fueleconomy.gov/feg/hybridtech.shtml>.



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Teaching Tip:

Before each seminar presentation, use TransAtlas (<http://rpm.nrel.gov/transatlas/launch/>) to create a map showing HEV density in the area that corresponds with the geographic location of most interest to the audience. For example, zoom in to show the Denver metropolitan area when presenting this seminar in that area of the country. Insert that map into the PowerPoint presentation.

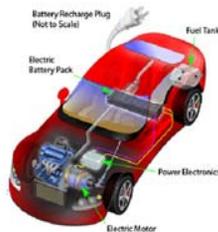


Figure 25: Schematic of a PHEV. Source: National Renewable Energy Laboratory

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Introduction to Electric Drive Vehicles

Promoting Awareness of First Responder Safety Training

FCEVs

A very limited number of FCEVs are on the road today, most of which are used as demonstration or testing vehicles. In 2008, Honda began leasing a limited number of FCX Clarify FCEVs to select California consumers, with intentions to roll out more vehicles as the fueling infrastructure develops. FCEVs may differ from one vehicle to the next, but FCEVs usually have several basic components in common: an electric motor/controller, a battery pack, a hydrogen fuel tank, and a fuel cell stack (see Figure 26). Electricity is generated by fuel cells to power an electric motor and accessories. The main byproducts of the fuel cell reaction are water and heat. FCEVs are more efficient than conventional vehicles and produce no tailpipe emissions.



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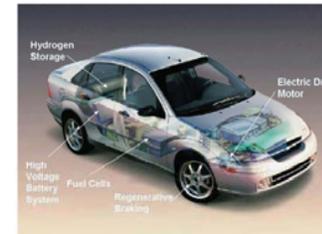


Figure 26: Cutaway view of an FCEV. Source: Ford

Identifying Electric Drive Vehicles

The most important task of a first responder is to identify whether the vehicle is an electric drive vehicle. Under normal driving conditions, this is easily accomplished. However, more likely than not, first responders are approaching a mangled vehicle that no longer resembles a vehicle newly out of a showroom or off a dealership lot.



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Recognition

In some cases, vehicles are more easily identified than others. For instance, the Honda Insight and the Toyota Prius (see Figure 27) are designed on special platforms that, at this time, are only

Clean Cities Learning Program

xlv

Sample Page Spreads Cont'd

About the Clean Cities Learning Program

Clean Cities Learning Program First Responder Safety Awareness Presentation

Web Site Link:

For information about the 2008 J.D. Power and Associates forecast, see <http://www.hybridcars.com/news/jd-power-forecasts-three-fold-growth-hybrids-and-diesels.html>. For EDTA HEV sales figures, see http://www.electricdrive.org/index.php?ht=d/Articles/cat_id/5514/pid/2549.



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technologies later on. These vehicles are typically referred to as aftermarket conversions or retrofits. The EPA and the California Air Resources Board regulate aftermarket conversions to ensure the vehicles meet applicable air quality standards. Future changes to these regulations may relieve some of the burden aftermarket conversion companies and system manufacturers currently face, which will likely lead to increased aftermarket conversion vehicle populations.

One thing is certain: alternative fuels and advanced vehicle technologies are here today and here to stay. Alternative fuel and advanced vehicles will continue to evolve to incorporate improved technology and adapt to the changing market.

Importance of Education and Outreach

Many groups and individuals make up the network necessary to support the alternative fuel and advanced vehicle technologies industry, including:

- Current and prospective users (fleets, consumers)
- Vehicle and component manufacturers
- Fuels industry representatives (infrastructure developers, producers, etc.)
- Government officials
- Automotive service technicians
- First responders

Ensuring that these groups and individuals are properly informed about the key aspects of the vehicles, fuels, and technologies is essential to the continued success of alternative fuels and advanced vehicle technologies. There are often myths and misinformation related to alternative fuels and advanced technologies that can spread quickly and have negative effects on the industry as a whole. Education, outreach, and training are critical elements to ensure that all individuals and groups involved, including potential future users of alternative fuels and advanced vehicle technologies, are presented with an accurate picture of the industry.

As explained above, alternative fuels and advanced vehicle technologies are important for many reasons, including their potential to significantly reduce the nation's consumption of petroleum, and first responders must understand the roles these fuels and technologies play. AFVs, such as natural gas

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Importance of Education and Outreach

Promoting Awareness of First Responder Safety Training

Teaching Tip:

Transition into the Clean Cities Learning Program First Responder Safety Training Overview by reminding participants that, as key players in the industry, training customized for first responders is essential to the success of alternative fuels and advanced vehicle technologies.

vehicles, and advanced vehicle technologies, such as electric drive systems, are being used on our roads today with increasing frequency, so it is critical that first responders are prepared to respond to any and all types of incidents involving these vehicles. Proper training to respond to alternative fuel and advanced vehicle incidents means first responders can continue to save lives without being concerned about vehicles with unfamiliar components and considerations.

The participants of this seminar have an opportunity to support the alternative fuels and advanced vehicle technologies industry by spreading the word about the importance of these fuels and vehicles, as well as the necessity of proper education, outreach, and training. The users of alternative fuel and advanced vehicles must be able to drive on our nation's roads confidently, knowing that first responders are properly trained to deal with incidents as they occur. Further, first responders should be able to talk intelligently about alternative fuels and advanced vehicle technologies when approached by consumers, government officials, and the media, and the Clean Cities Learning Program First responder Safety Training will ensure they are prepared to do so.

Teaching Note:

First Responder Safety Training Video



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PowerPoint Icons

- Each icon connects the material from the module and references the corresponding PowerPoint slide.



Teaching Tips Icons

Supplemental Instructional Information:

Standard compliance for state and alternative fuel provider fleets requires covered fleets to acquire a certain percentage of AFVs each year based on the number of light-duty vehicles they acquire. Alternative compliance allows covered fleets to obtain a waiver from the AFV-acquisition requirements of standard compliance and instead implement petroleum-reduction measures. State or alternative fuel provider fleets are considered "covered fleets" if they own, operate, lease, or otherwise control 50 or more non-excluded light-duty vehicles and, of those 50 vehicles, at least 20 are used primarily within a single Metropolitan Statistical Area/ Consolidated Metropolitan Statistical Area and are capable of being centrally fueled.

About the Clean Cities Learning Program

Clean Cities Learning Program First Responder Safety Awareness Presentation

Supplemental Instructional Information:

Standard compliance for state and alternative fuel provider fleets requires covered fleets to acquire a certain percentage of AFVs each year based on the number of light-duty vehicles they acquire. Alternative compliance allows covered fleets to obtain a waiver from the AFV-acquisition requirements of standard compliance and instead implement petroleum-reduction measures. State or alternative fuel provider fleets are considered "covered fleets" if they own, operate, lease, or otherwise control 50 or more non-excluded light-duty vehicles and, of those 50 vehicles, at least 20 are used primarily within a single Metropolitan Statistical Area/ Consolidated Metropolitan Statistical Area and are capable of being centrally fueled.

In addition to the federal requirements that apply to state fleets, most states have enacted regulations related to alternative fuel and advanced vehicle acquisitions as well as alternative fuel use. While not subject to federal regulations, municipal fleets are often required to use alternative fuel and/or fuel-efficient vehicles as a result of local regulations and directives. For example, the New York City Administrative Code requires that at least 80% of the New York City light-duty, non-emergency fleet, and 20% of bus fleets operated in New York City are AFVs. Alternative fuel use requirements are also enacted at the local levels. All diesel vehicles in the San Francisco municipal fleet, for example, must operate using biodiesel blends of at least 20% (B20).

Incentives

The adoption and use of alternative fuels and advanced vehicle technologies is also encouraged through incentives offered at the federal, state, and local levels. Private companies, such as utilities and insurance companies, also provide incentives. These incentives come in all shapes and sizes, including monetary incentives such as tax credits and grants, as well as non-traditional incentives such as exemptions from parking fees and high occupancy vehicle restrictions.

Private Initiatives

Many fleets, regardless of the regulations, acquire and use alternative fuel and advanced vehicles voluntarily. An increasing number of private companies and organizations are making commitments to reduce their overall emissions, including those that are related to transportation. The use of alternative fuels and fuel-efficient vehicles is an excellent way to lessen their impact on the environment and reduce the need for petroleum in the process.

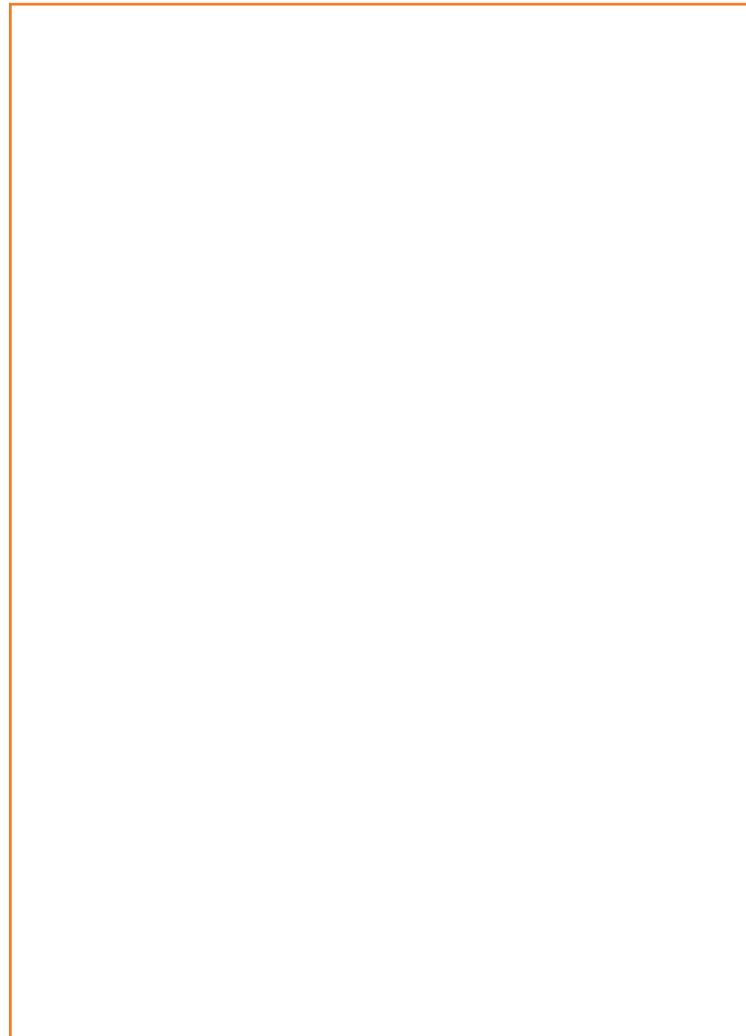
Consumer Demand

Consumer interest in AFVs and advanced vehicle technologies is growing as a result of many factors, including higher conventional fuel costs, more vehicle options, improved technology and reliability, and an increasing concern for the environment. Vehicle manufacturers listen to consumer demand and act accordingly. With the Chevy Volt, for example, General Motors responded to

Definition / Important Terms Icons

Definition: Alternative Fuels

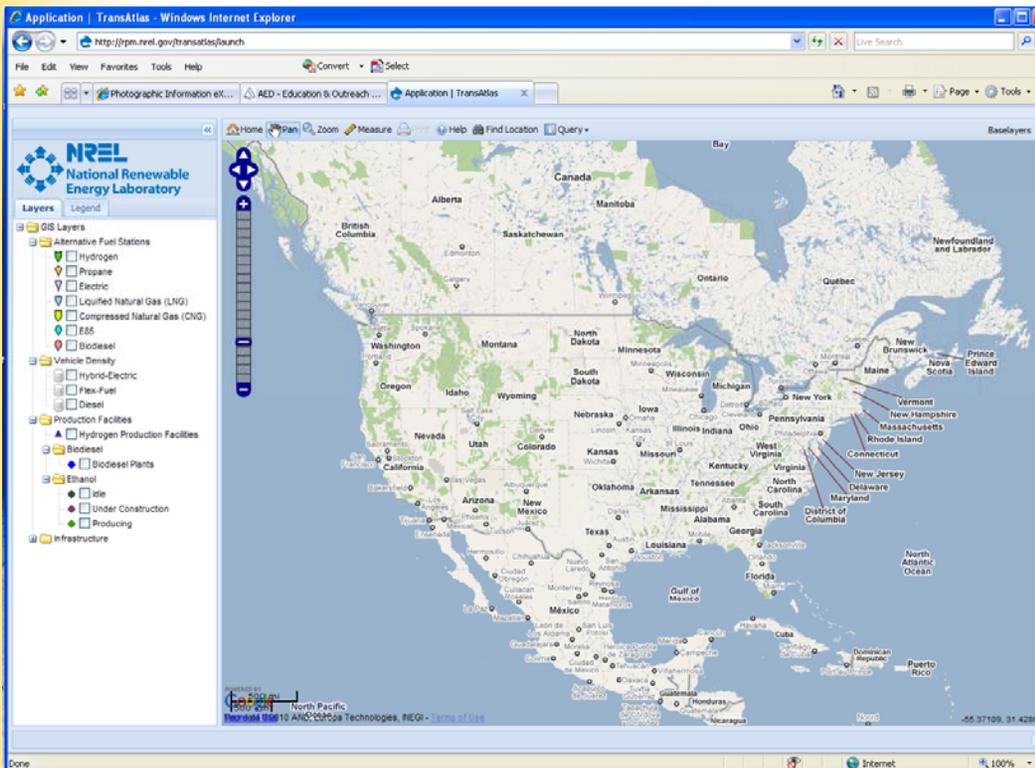
As defined by EPA Act 1992, alternative fuels are methanol, ethanol, and other alcohols; blends of 85% or more of alcohol with gasoline (E85); natural gas and liquid fuels domestically produced from natural gas; liquefied petroleum gas (propane); hydrogen; electricity; biodiesel (B100); coal-derived liquid fuels; fuels, other than alcohol, derived from biological materials; and P-Series fuels (added to the definition in 1999).



Hands-On Interactive Teaching Tip

Teaching Tip:

Before each seminar presentation, use TransAtlas (<http://rpm.nrel.gov/transatlas/launch/>) to create a map showing HEV density in the area that corresponds with the geographic location of most interest to the audience. For example, zoom in to show the Denver metropolitan area when presenting this seminar in that area of the country. Insert that map into the PowerPoint presentation.

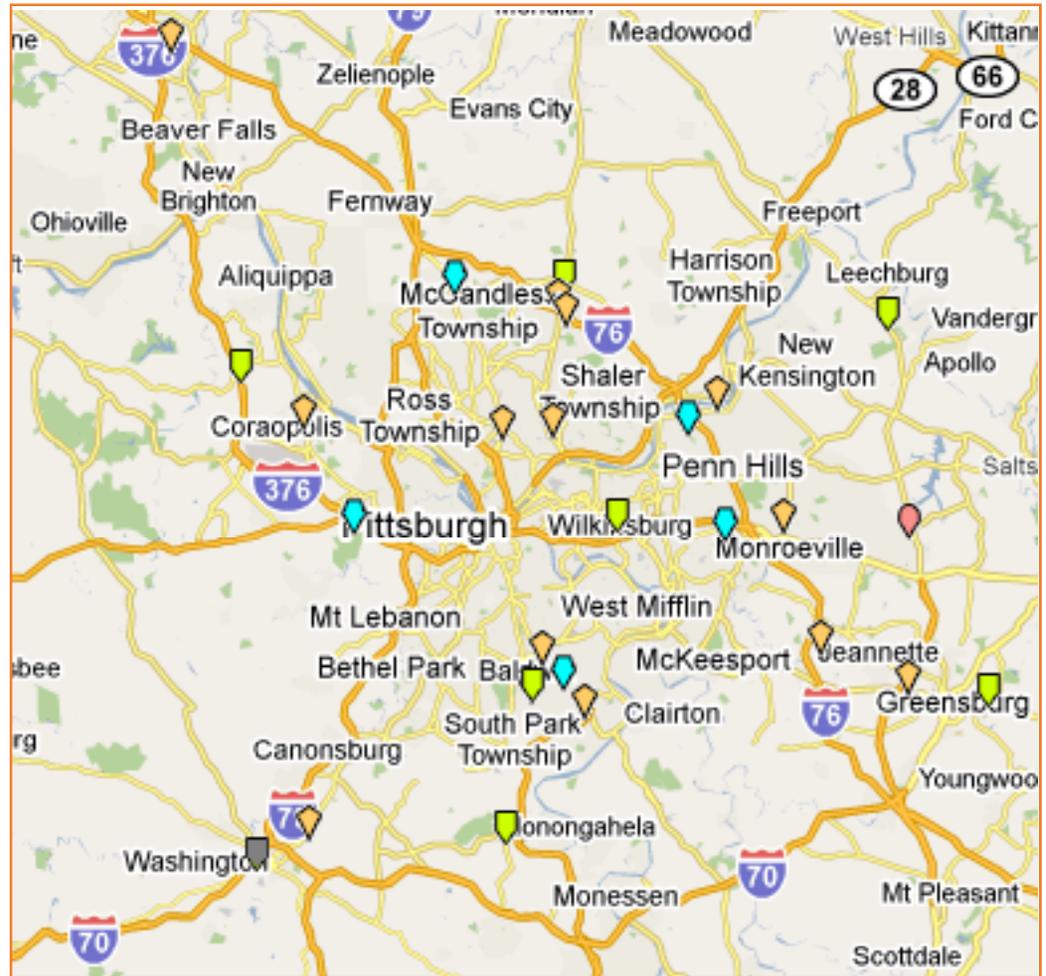


Actual Example for Pittsburgh, PA



Layers Legend

- GIS Layers
 - Alternative Fuel Stations
 - Hydrogen
 - Propane
 - Electric
 - Liquefied Natural Gas (LNG)
 - Compressed Natural Gas (CNG)
 - E85
 - Biodiesel



Web Site Links

Web Site Link:

For information about the Pew Charitable Trust report, see:

http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf



Repowering Jobs, Businesses and Investments Across America



Module Review and Highlights

Module 4: Electric Drive Vehicles

Clean Cities Learning Program First Responder Safety Awareness Presentation



Figure 37: Hurst rescue tool set. Source NAFTC



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Module Review and Highlights

Electric drive vehicles are increasing in popularity and vehicles such as HEVs have become commonplace. To help ensure their safety and the safety of others, first responders must be properly trained to handle electric drive vehicle incidents. Electric vehicles present unique challenges because of their use of electric traction motors and battery technology instead of ICEs. When responding to accidents involving electric drive vehicles, first responders must be aware of considerations such as:

- Silent/electric drive mode – Electric drive vehicles in battery-only mode are extremely quiet and first responders may assume that the lack of sound means the vehicle is not on, though this is not always the case.
- High-voltage components – Electric drive vehicles are equipped with numerous high-voltage components, including cables, battery pack, inverters, and fuel cell stack (in the case of FCEVs).
- Battery safety – High-voltage batteries contain chemicals that have inherent dangers and require special procedures when dealing with battery fire or battery pack spills or leaks.

The Electric Drive Vehicle module provides first responders with in-depth training and information related to these and many other topics so that electric drive vehicle response procedures are second nature.

Definition:

In a vehicle extrication, cribbing is a miscellaneous size wood used to stabilize an object so that trapped victims can be safely removed, etc. Cribbing is commonly used to stabilize overturned cars.

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Clean Cities Learning Program

Toolbox



Clean Cities Learning Program TOOLBOX

[Toolbox Overview](#) | [Media Relations](#) | [Workshop/Event Management](#) | [Marketing Communications](#) | [Interactive Media](#)
[First Responder Safety Training](#) | [Petroleum Reduction Technologies](#)

Welcome to the Clean Cities Learning Program Toolbox!

The National Alternative Fuels Training Consortium (NAFTC) is working in partnership with the U.S. Department of Energy (DOE) Clean Cities Program to develop the turn-key Clean Cities Learning Program to raise awareness and foster a greater understanding of alternative fuels, alternative fuel vehicles, and advanced vehicle technologies through a targeted outreach and education effort. This program will enable Clean Cities Coalitions and other stakeholders to better implement petroleum reduction technologies by advancing the use of alternative fuels, alternative fuel vehicles, advanced vehicle technologies, and idle reduction technologies through state-of-the-art curricula, training, and outreach and education materials, all of which will be disseminated by the NAFTC and U.S. DOE Clean Cities.



- [Download Toolbox Overview \(.pdf file\)](#)

Please use the above navigation to view main sections, the side links menu to view topics within the sections, and the 'Previous' and 'Next' buttons to go between pages.

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[Next ▶](#)



A Program of



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[Clean Cities Home](#)

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- [About NAFTC](#)
 - [NAFTC National Training Centers](#)
- [About Clean Cities Learning Program](#)
 - [Goals and Objectives of Grant](#)
 - [Benefits of Participating](#)
- [Suggested use/ explanation of toolbox materials](#)
 - [Organizational diagram](#)
- [Resources/links to learn more about AFVs and alternative fuel technology](#)

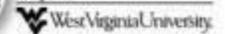


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A Program of



Marketing & Communications Materials

- Guidelines /resources to assist in the identification of and market to target audiences for workshop, presentation, and webinar participants;
- Guidelines/materials to aid in the development of media relationships, leading to increased media coverage and program reach through the *Clean Cities Learning Program* execution.

Key Areas of Toolbox

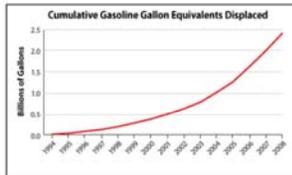
- Toolbox overview
- Media relations
- Workshop/event management
- Marketing communications
- Interactive media
- First Responder Safety Training
- Petroleum Reduction Technologies

Sample Fact Sheets

Clean Cities Learning Program Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

About U.S. Department of Energy Clean Cities

Sponsored by the U.S. Department of Energy's (DOE) Vehicle Technologies Program (VTP), Clean Cities is a government-industry partnership designed to reduce petroleum consumption in the transportation sector. Clean Cities contributes to the energy, environmental, and economic security of the United States by supporting local decisions to reduce our dependence on imported petroleum.



Clean Cities Mission and Background

The mission of Clean Cities is to advance the energy, economic, and environmental security of the United States by supporting local decisions to adopt practices that reduce the use of petroleum in the transportation sector. Clean Cities coordinators lead local geographically-based coalitions composed of local fleets, fuel providers, and decision-makers that focus on a united goal: petroleum reduction. There are nearly 90 coalitions covering areas where 229 million U.S. citizens live—approximately 78% of the country's total population. Since its inception in 1993, Clean Cities and its stakeholders have displaced more than 2 billion gallons of petroleum.



Clean Cities Goals

The goal of Clean Cities is to expand and stimulate alternative fuel and advanced technology markets to reduce petroleum consumption by 2.5 billion gallons by 2020.

Clean Cities is focusing on three primary methods to achieve this goal:

Replacement: Replacing petroleum used in the transportation sector with alternative fuels and low-level blends of non-petroleum replacement fuels.

Reduction: Reducing petroleum use by promoting energy efficiency in vehicles through fuel-efficient, advanced technology vehicles.

Elimination: Eliminating petroleum or other fuel use by promoting idle reduction, greater use of mass transit systems, and other congestion mitigation approaches.



Clean Cities also maintains the Alternative Fuels and Advanced Vehicles Data Center, a robust Web site that features information and tools related to Clean Cities' transportation technologies areas.

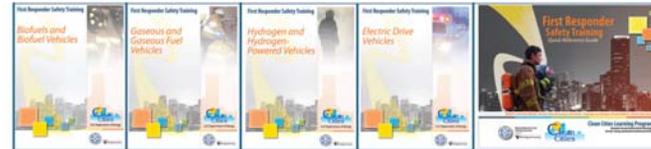
www.naftc.wvu.edu/cleancitieslearningprogram
www.cleancities.energy.gov
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Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

Clean Cities Learning Program Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

About the Clean Cities Learning Program

The Clean Cities Learning Program is a grant funded by the U.S. Department of Energy. Developed by the National Alternative Fuels Training Consortium (NAFTC) and its partners to raise awareness and foster a greater understanding of alternative fuel and advanced technology vehicles, this effort will provide Clean Cities Coalitions and other stakeholders with state-of-the-art curricula and training, education and outreach materials, and a concentrated marketing and communications plan. One of the most unique aspects of this project is the focus on developing a nationwide partnership between U.S. Department of Energy (DOE) Clean Cities Coalitions and NAFTC National Training Centers. This partnership will provide target audiences with awareness and technical education that encourage decisions to adopt vehicles and fuels that will significantly reduce the consumption of petroleum-based fuels.



Clean Cities Learning Program Goals/Objectives

- **First Responder Safety Training** classroom materials will include information on emergencies involving alternative fuels, alternative fuel vehicles, and advanced vehicle technologies addressing biofuels (ethanol and biodiesel), gaseous fuels (natural gas and propane), hydrogen, and electric drive vehicles.
- The **Petroleum Reduction Technologies** training program will discuss alternative fuels, alternative fuel vehicles, and advanced vehicle technologies.
- A marketing and communications plan and an online toolbox will include materials and resources to support all project-related tasks, including the development of workshop hosts and participants. The marketing plan will promote increased media relationships and result in positive media coverage of all activities.
- National AFV Day Odyssey 2010 is a nationwide education and outreach event that informs the general public and other target audiences about the benefits of alternative fuels and advanced vehicle technologies. The NAFTC, partners, sponsors, and site coordinators, including USDOE Clean Cities Coalitions, NAFTC, National Training Centers, industry, and other organizations help plan, promote, market, and participate in Odyssey, which is scheduled for Friday, October 15, 2010.

Clean Cities Learning Program and Clean Cities Coordinators

The Clean Cities Learning Program will provide Clean Cities Coordinators with new and exciting materials to use in convincing target audiences to adopt alternative fuels and petroleum reduction technologies and enable decision makers to develop partnerships with educational institutions. The potential impact of the program is a large reduction of foreign petroleum consumption through the increased number of alternative fuel and advanced technology vehicles.



Visit the Clean Cities Learning Program Toolbox at www.naftc.wvu.edu/cleancitieslearningprogram

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Sample Fact Sheets Cont'd

Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

GASEOUS FUELS

Compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LPG), more commonly referred to as propane, are gaseous alternative fuels, as defined by the Energy Policy Act of 1992.



Natural Gas. Natural gas is an odorless, non-toxic, non-corrosive, non-carbonic gaseous mixture of hydrocarbons and other gases. Most natural gas is extracted from wells or in conjunction with crude oil production. Smaller amounts are derived as biogas, a renewable form of natural gas, from decaying organic materials, such as waste from landfills. Natural gas accounts for approximately 22% of the energy used in the United States. Of this, only about 0.1% is currently used for transportation fuel. Because of the gaseous nature of this fuel, it must be stored onboard a vehicle in either a compressed gaseous or liquefied state.

CNG. To provide adequate driving range, CNG must be stored onboard a vehicle in tanks at high pressure.

LNG. To produce LNG, natural gas is purified and condensed into liquid by cooling it.

Propane. Propane is a three-carbon alkane gas produced as a byproduct of natural gas processing and state oil refining. When stored under pressure in a tank, propane becomes a colorless, odorless liquid. As pressure is released, the liquid propane evaporates and turns into gas that is then used for combustion. An odorant is added to propane for leak detection. It accounts for about 2% of the energy used in the United States; however, less than 2% of U.S. propane consumed is used for transportation fuel.

GASEOUS FUEL VEHICLES

Gaseous fuels are used in both light-duty and heavy-duty vehicle applications. Vehicles that run on LNG, CNG, or propane operate in the same way as conventional vehicles, and include an internal combustion engine (ICE), transmission, drive shaft, and fuel storage system, but require some modifications to the engine calibration and fuel management systems (primary fuel storage systems). The ICE converts fuel into mechanical energy and ignites it in much the same manner as the ones found in conventional gasoline vehicles.

Gaseous fuel vehicles may be configured in one of three ways: dedicated, dual fuel, or dual fuel. Dedicated vehicles run on only one alternative fuel. Dual fuel vehicles can run on either alternative fuel or gasoline. Dual fuel vehicles run on alternative fuel (natural gas) and use diesel for ignition aids. Light-duty vehicles typically operate in dedicated or dual fuel modes, and heavy-duty vehicles operate in dedicated or dual fuel modes.

VEHICLE SAFETY

As with all fuels, natural gas and propane are flammable, and gaseous fuel vehicles meet the same safety standards as conventional vehicles. However, only properly trained personnel with the appropriate protective gear should approach a vehicle in the case of an accident. First responders must understand the different components that make these vehicles unique in an emergency situation.

Natural Gas. Natural gas vehicle (NGV) fuel tanks are strong and extremely puncture resistant. In addition, NGVs must meet the National Fire Protection Association (NFPA) NFPA 52 Vehicle Fuel System Code. Based on a survey of over 8,300 natural gas fleet vehicles that traveled over 175 million miles.

Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

ELECTRIC DRIVE TECHNOLOGY

Electric drive vehicles use batteries to power the vehicle some or all of the time. The power used to charge the battery can be taken from the electric power grid or the advanced technology built into the vehicle (e.g., regenerative braking, electric drive motor/actuator, automatic start/stop). The electric drive travels from battery packs to traction motors, and the traction motors provide power to the wheels.

Plug-In Hybrid Electric Vehicle (PHEV). A PHEV is charged with electricity like a BEV and can run under like an HEV, giving the vehicles combined range. A PHEV's emission reduction capabilities.

PHEVs are outfitted with onboard chargers that a battery pack when plugged into an standard electric (EV). PHEVs are powered by two energy sources: a larger high voltage battery. PHEVs use fuel in smaller displacement engines and produce fewer emissions as compared to vehicles.

ELECTRIC DRIVE VEHICLES

Electric drive technology is currently featured in four different vehicle types:

Battery Electric Vehicle (BEV). BEVs run on electricity at all times, taking electricity from the power grid through onboard charging infrastructure. In some cases, electricity is also generated from the vehicle's regenerative braking system. The primary components of a BEV are electric motor/generator(s), controller, transmission, and a battery pack. The electric motor convert the vehicle's electrical energy into mechanical energy. Generally, one electric motor/generator drives the wheels or generates electricity, while the battery pack serves as a primary energy storage device. BEVs produce zero emissions when no fuel is combusted.

Hybrid Electric Vehicle (HEV). HEVs typically combine an internal combustion engine (ICE) with the battery and one or two motor/generators. The ICE, which is typically powered by gasoline but may use other fuels, converts the vehicle's fuel into electrical energy and sends power to the wheels. HEVs can have a parallel design, a series design, or a combination of the two. In parallel HEVs, the gas tank supplies fuel for the ICE and the batteries.



U.S. STATISTICS

| Alternative Fuel | Number of vehicles in use (2009) ¹ | Total use (2009) ² |
|------------------|---|-------------------------------|
| CNG | 115,373 | 100 |
| LNG | 3,151 | 25 |
| Propane | 151,549 | 143 |

U.S. Energy Information Administration, Alternatives to Traditional Transportation Fuels (ATTF) Database of Vehicle Data Center (ATTFDC).
¹ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
² GGE, Gasoline gallon equivalent.

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¹ U.S. Energy Information Administration, Alternatives to Traditional Transportation Fuels (ATTF) Database of Vehicle Data Center (ATTFDC).
² U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
³ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁴ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁵ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).

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Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

BIOFUELS

Biofuels, including ethanol and biodiesel, are derived from a wide range of vegetable oils and animal fats, including waste vegetable oil from restaurants. Pure biodiesel (B100) is often blended with diesel to create biodiesel blends. Blends of 20% biodiesel/80% diesel blend (B20) and above are considered alternative fuels under the Energy Policy Act (EPACT) of 1992.

Biodiesel. Biodiesel is a non-toxic, renewable, odorless, and biodegradable liquid fuel. It can be produced domestically from a wide range of vegetable oils and animal fats, including waste vegetable oil from restaurants. Pure biodiesel (B100) is often blended with diesel to create biodiesel blends. Blends of 20% biodiesel/80% diesel blend (B20) and above are considered alternative fuels under the Energy Policy Act (EPACT) of 1992.

Ethanol. Ethanol is a colorless, odorless, renewable, and biodegradable fuel that is most often added to gasoline to boost octane and/or meet air quality requirements. Ethanol, also known as ethyl alcohol, can be produced from starch, sugar, or corn feedstocks or from cellulosic materials. Ethanol used as an 85% blend mixed with gasoline (E85) is considered an alternative fuel under EPACT 1992.

BIOFUEL VEHICLES

Biofuels are used as cleaner replacements for conventional fuels. Biodiesel and biodiesel blends can offset the use of diesel, while ethanol blends can offset the use of gasoline in light-duty vehicles. Vehicles that run on biodiesel and ethanol operate in the same way as conventional vehicles; the internal combustion engine (ICE) converts the fuel into mechanical energy.

Biodiesel Used in Diesel Vehicles. With proper fuel tank maintenance and fuel blending, B20 and lower-level biodiesel blends generally require few or no diesel engine modifications. At these low levels, users may actually see improvements in engine performance due to biodiesel's lubricating properties and higher cetane number. B100 or other high-level biodiesel blends can be used in some diesel engines built after 1994 with biodiesel-compatible motor parts such as hours and gaskets; users are advised to consult manufacturer warranty statements.



U.S. STATISTICS

| Alternative Fuel | Number of vehicles in use (2009) ¹ | Total annual fuel use in vehicles (2009) ² |
|------------------|---|---|
| Biodiesel | N/A | 324,329,000 GGE ³ |
| E85 | 450,327 ⁴ | 82,454,000 GGE ⁵ |

U.S. Energy Information Administration, Alternatives to Traditional Transportation Fuels (ATTF) Database of Vehicle Data Center (ATTFDC).
¹ U.S. Department of Energy (DOE), Alternative Fuels & Advanced Vehicle Technologies Data Center (AFV) (AFV).
² GGE, Gasoline gallon equivalent.
³ Represents total gallons of biodiesel blended with diesel or used as B100 in vehicles.
⁴ Includes only those E85 vehicles believed to be using E85. Primarily fleet-operated vehicles with E85 fuel capability. As of 2010, the National Renewable Energy Laboratory estimates FFVs in use at about 8.2 million (DOE, AFVDC).

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Fuel Cell Electric Vehicles (FCEV)

Like BEVs, FCEVs use electricity to power motors located near the vehicle's wheels. In contrast to BEVs, FCEVs produce their primary electricity using a fuel cell. The fuel cell is powered by filling the fuel tank with hydrogen (FCV) or methanol. But usually have several basic components in common: an electric motor/controller, a battery pack, a hydrogen fuel tank, and a fuel cell stack. Electricity is generated by fuel cells to power an electric motor and accessories. The main byproducts of the fuel cell reaction are water and heat. FCEVs are more efficient than conventional vehicles and produce no tailpipe emissions.

Full-sized BEVs and PHEVs will be commercially available in Model Year (MY) 2011, with several models of these vehicle types available by MY 2012. FCEVs are currently available to select consumers in limited areas.

U.S. STATISTICS

- From 1999-2009, 1.6 million HEVs were sold, including approximately 290,000 in 2009 alone.
- As of 2008, 56,901 BEVs were in use.⁶
- Approximately 5,000,000 gasoline gallon equivalents of electricity were used in electric drive vehicles in 2008.⁷
- As of May 2010, there were 538 electric vehicles supply equipment (EVSE) locations in the U.S.⁸

©2010 WVU. All rights reserved. Hybrid Market Database, 2009.
¹ U.S. Energy Information Administration, Alternatives to Traditional Transportation Fuels (ATTF) Database of Vehicle Data Center (ATTFDC).
² U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
³ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁴ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁵ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁶ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁷ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
⁸ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).

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Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

Compressed Hydrogen

Like natural gas, hydrogen can be stored in two forms:

Compressed Hydrogen

Hydrogen Labels. Source: NAFTC

HYDROGEN-POWERED VEHICLES

Hydrogen vehicles are still largely in development with a limited number of vehicles in use by select organizations and consumers in certain areas. Hydrogen can be used to power vehicles in two ways: (1) in an internal combustion engine (ICE) hydrogen-powered vehicle by igniting the hydrogen to release its energy or (2) in a fuel cell electric vehicle (FCEV) electrochemically, by passing molecules through a fuel cell.

ICE Hydrogen-Powered Vehicles. In an ICE hydrogen-powered vehicle, hydrogen is stored in fuel tanks and

FCEV Fuel Cell Electric Vehicles. FCEVs use electricity to power motors located near the vehicle's wheels. In contrast to electric vehicles, fuel cell vehicles produce their primary electricity using a fuel cell. The fuel cell is powered by filling the fuel tank with hydrogen (FCV) or methanol. But usually have several basic components in common: an electric motor, a battery pack, a hydrogen fuel tank, and a fuel cell stack. Electricity is generated by fuel cells to power an electric motor and accessories. The main byproducts of the fuel cell reaction are water and heat.

VEHICLE SAFETY

Hydrogen vehicles undergo the same rigorous testing as conventional vehicles and will be required to meet all the same standards for safety, including crash testing and air bags. However, only properly trained personnel with the appropriate protective gear should approach a hydrogen-powered vehicle in the case of an accident. First responders must understand the different components that make these vehicles unique in an emergency situation. For example, the energy required to initiate hydrogen combustion is much lower than that required for other common fuels, making vehicle fires more of a concern. First responders must also be prepared to deal with battery fires as well as battery pack spills or leaks related to FCEVs.

U.S. STATISTICS

- Though they are not commercially available on a national scale, there were approximately 313 hydrogen vehicles in use in the United States as of 2008.¹
- In 2008, approximately 117,000 GGE of hydrogen were used in vehicles.²
- As of May 2010, there were approximately 56 hydrogen fueling stations in the United States.³

U.S. Energy Information Administration, Alternatives to Traditional Transportation Fuels (ATTF) Database of Vehicle Data Center (ATTFDC).
¹ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
² U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).
³ U.S. Department of Energy, Alternative Fuels & Advanced Vehicle Technologies (AFV).

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Sample Fact Sheets Cont'd

Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

CLEAN CITIES LEARNING PROGRAM FIRST RESPONDER SAFETY TRAINING OVERVIEW

The Clean Cities Learning Program First Responder Safety Training module provides responders with the information and resources they need to respond to incidents involving alternative fuel and advanced vehicle technologies.

- Bifuels and Biofuel Vehicles
- Gaseous Fuels and Gaseous-Fuel Vehicles
- Hydrogen and Hydrogen-Powered Vehicles
- Electric Drive Vehicles

INTRODUCTION TO: GASEOUS FUELS AND GASEOUS-FUEL VEHICLES

The Gaseous Fuels and Gaseous-Fuel Vehicles module focuses on compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LPG), more commonly referred to as propane, as well as the vehicles that use these fuels. There are more than 275,000 gaseous fuel vehicles on the road today and this number is expected to increase.¹



Benefits. Gaseous fuels and gaseous fuel vehicles are beneficial in many ways, including:

- **Increases Energy Security.** The United States imports more than 60% of its petroleum, much of which comes from less stable countries.² Most of the natural gas and propane consumed in the United States is produced domestically and distributed via an established infrastructure.
- **Decreases Emissions.** Compared with conventional vehicles, gaseous-fueled vehicles produce lower amounts of harmful emissions. Natural gas vehicles produce fewer



amounts of nitrogen oxides, carbon monoxide, particulate matter, toxic and carcinogenic pollutants, and CO₂. The use of propane vehicles can also lower CO₂ and other emissions.

• **Protects the Environment.** Natural gas and propane are nontoxic and present no threat to soil, surface waters, or groundwater in the event of a spill.

• **Vehicle Reliability and Performance.** Gaseous-fueled vehicles often report service lives that are two to three years longer than comparable gasoline-fueled vehicles and extended time between required maintenance.^{3,4}

¹U.S. Energy Information Administration (EIA), *Alternative to Traditional Transportation Fuels*, 2008.
²EIA, *Annual Energy Review*, Chapter 4, *Alternative Fuels*, December 2008.
³Alternative Fuels & Advanced Vehicle Data Center, *What is a Natural Gas Vehicle? Accession to National Petroleum Council, Response Report*, December 2005, p. 20.
⁴U.S. Environmental Protection Agency, *Alternative Fuels*, December 2005, p. 20.



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Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

CLEAN CITIES LEARNING PROGRAM FIRST RESPONDER SAFETY TRAINING OVERVIEW

- Bifuels and Biofuel Vehicles
- Gaseous Fuels and Gaseous-Fuel Vehicles
- Hydrogen and Hydrogen-Powered Vehicles
- Electric Drive Vehicles

INTRODUCTION TO: ELECTRIC DRIVE VEHICLES

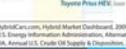
The Electric Drive Vehicles module focuses on electric drive (EDV) technologies, including different types of vehicles that currently feature this technology: plug-in hybrid electric vehicles (PHEVs), hybrid electric vehicles (HEVs), and battery electric vehicles (BEVs). HEVs already have a large presence on the road today. In fact, from 1999-2009, 1.6 million HEVs were sold, including in 2009 alone.¹ Other electric drive vehicle types will become more prevalent in the near future. Full sized BEVs and PHEVs will be commercially available in more areas of the country.²



Toyota Prius HEV. Source: EPA.

Benefits. Electric drive vehicles are beneficial in many ways, including:

- **Increases Energy Security.** The United States imports more than 60% of its petroleum, much of which comes from less stable countries.³ Electricity is produced domestically and distributed via an established infrastructure. BEVs and PHEVs can be charged through outlets installed in homes and businesses. Though HEVs and PHEVs may still use petroleum fuels, these vehicles have significantly higher fuel economy and thus reduce the overall amount of fuel consumed.
- **Promotes the use of Renewable Resources.** BEVs and PHEVs can take advantage of electricity produced from renewable resources such as solar energy, wind, and biomass.
- **Decreases Emissions.** Electric drive vehicles reduce or eliminate nitrogen oxides, hydrocarbons, particulate matter, or any of the other harmful pollutants that come from conventional fuel use.
- **HEVs and PHEVs operating in electric drive mode do so with no harmful emissions.**
- **BEVs produce no emissions at any time.**
- **FCEVs only emit water and heat as a byproduct of the fuel cell reaction.**



Toyota Prius HEV. Source: EPA.

¹HybridCars.com, *Hybrid Market Dashboard*, 2009.
²EIA, *Energy Information Administration, Alternative to Traditional Transportation Fuels*, 2008.
³EIA, *Annual Energy Review*, Chapter 4, *Alternative Fuels*, December 2008.

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Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

CLEAN CITIES LEARNING PROGRAM FIRST RESPONDER SAFETY TRAINING OVERVIEW

- Bifuels and Biofuel Vehicles
- Gaseous Fuels and Gaseous-Fuel Vehicles
- Hydrogen and Hydrogen-Powered Vehicles
- Electric Drive Vehicles

The Clean Cities Learning Program First Responder Safety Training module provides responders with the information and resources they need to respond to incidents involving alternative fuel and advanced vehicle technologies.

INTRODUCTION TO: BIOFUELS AND BIOFUEL VEHICLES

The Biofuels and Biofuel Vehicles module focuses on biodiesel and ethanol, and use of these fuels in diesel and gasoline vehicles, respectively. The Energy Information Administration (EIA) estimates that more than 450,000 flexible-fuel vehicles (FFVs) are using an 85% ethanol blend mixed with gasoline (E85) and over 124,129,000 gasoline gallon equivalents of biodiesel were used in fuel vehicles in 2008 alone.¹ Because biofuels can be blended into conventional fuel and used to operate conventional vehicles without significant alterations to the vehicle engine and components, these fuels have significant potential for continued increased use in the future.

Benefits. Biofuels and biofuel vehicles are beneficial in many ways, including:

- **Increases Energy Security.** The United States imports more than 60% of its petroleum, much of which comes from less stable countries.² Biodiesel and ethanol can be produced domestically and used in conventional engines, directly offsetting the use of imported petroleum. Furthermore, biofuels are renewable and can be produced from agricultural crops (e.g., corn, soy), promoting the growth of the U.S. agricultural sector.
- **Decreases Emissions.** Compared with using conventional fuels, biofuels produce lower amounts of harmful emissions:

- **B02 blends have been shown to decrease emissions of particulate matter, carbon monoxide, hydrocarbons, and carbon dioxide, as compared to diesel fuel.³**
- **Using E85 in an FFV has been shown to decrease emissions of hydrocarbons, nitrogen oxides, particulate matter, carbon monoxide, and carbon dioxide, as compared to diesel fuel.⁴**
- **Promotes the Environment.** Biodiesel and ethanol are a threat to surface waters, ground water, an environment compared to petroleum fuels.



Source: EPA.

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Clean Cities Learning Program FACTSHEET Alternative Fuel and Advanced Vehicle Technologies Curricula, Training, and Education and Outreach Activities

CLEAN CITIES LEARNING PROGRAM FIRST RESPONDER SAFETY TRAINING OVERVIEW

- Bifuels and Biofuel Vehicles
- Gaseous Fuels and Gaseous-Fuel Vehicles
- Hydrogen and Hydrogen-Powered Vehicles
- Electric Drive Vehicles

INTRODUCTION TO: HYDROGEN AND HYDROGEN POWERED VEHICLES

The Hydrogen and Hydrogen Powered Vehicles module focuses on hydrogen as a vehicle fuel as well as the vehicles that use hydrogen, including internal combustion engine hydrogen-powered vehicles and fuel cell electric vehicles (FCEVs). As of 2008, about 300 hydrogen-powered vehicles were in use in the United States, but significant research and development efforts are underway to make these vehicles commercially available in more areas of the country.



FCEV. Source: EPA.

Benefits. Hydrogen and hydrogen-powered vehicles are beneficial in many ways, including:

- **Increases Energy Security.** The United States imports more than 60% of its petroleum, much of which comes from less stable countries. Hydrogen can be produced domestically from a variety of resources, including natural gas, coal, and nuclear power.

• **Promotes the use of Renewable Resources.** Hydrogen can also be produced from renewable resources such as solar energy, wind, and biomass.

• **Decreases Emissions.** Hydrogen-powered vehicles do not emit nitrogen oxides, hydrocarbons, particulate matter, or any of the other harmful pollutants that come from conventional fuel use. In fact, the only emissions from hydrogen fuel is water.

¹HybridCars.com, *Hybrid Market Dashboard*, 2009.
²EIA, *Energy Information Administration, Alternative to Traditional Transportation Fuels*, 2008.
³EIA, *Annual Energy Review*, Chapter 4, *Alternative Fuels*, December 2008.

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Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

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Promotional Flyer

Clean Cities Learning Program

*Alternative Fuel and Advanced Vehicle Technologies
Curricula, Training, and Education and Outreach Activities*

The National Alternative Fuels Training Consortium (NAFTC) is working in partnership with the U.S. Department of Energy (DOE) Clean Cities Program to develop the turn-key Clean Cities Learning Program to raise awareness and foster a greater understanding of alternative fuels, alternative fuel vehicles, and advanced vehicle technologies through a targeted education and outreach effort. This program will enable Clean Cities Coalitions and other stakeholders to better implement petroleum reduction technologies by advancing the use of alternative fuels, alternative fuel vehicles, advanced vehicle technologies, and idle reduction technologies through state-of-the-art curricula, training, and education and outreach materials, all of which will be disseminated by the NAFTC and U.S. DOE Clean Cities. See back for available training details.



www.naftc.wvu.edu/cleancitiesprogram
www.cleancities.energy.gov

The National Alternative Fuels Training Consortium is the only nationwide alternative fuel vehicle and advanced technology vehicle training organization in the U.S.

National Alternative Fuels Training Consortium
West Virginia University
Rodgyview Business Park
1109 Frederick Lane
Morgantown, WV 26508
304-293-7882

The U.S. DOE Clean Cities Program is a government-industry partnership designed to reduce petroleum consumption in the transportation sector by advancing the use of alternative fuels and vehicles, idle reduction technologies, hybrid electric vehicles, fuel blends, and fuel economy measures.



Clean Cities Learning Program

*Alternative Fuel and Advanced Vehicle Technologies
Curricula, Training, and Education and Outreach Activities*

First Responder Safety Training

Designed specifically to reduce the risks taken by first responders when responding to an incident involving alternative fuels, alternative fuel vehicles, and advanced vehicle technologies. 4-hour workshops will be available on the following topics:

- First Responder Safety Training: Biofuels (biodiesel and ethanol) and Biofuel Vehicles
- First Responder Safety Training: Gaseous Fuels (natural gas and propane) and Gaseous Fuel Vehicles
- First Responder Safety Training: Hydrogen and Hydrogen-Powered Vehicles
- First Responder Safety Training: Electric Drive Vehicles



Petroleum Reduction Technologies

Designed specifically to raise awareness and foster a greater understanding of alternative fuels, alternative fuel vehicles, advanced vehicle technologies, petroleum reduction technologies, fuel economy and idle reduction, and related technologies. Workshops will be available on the following topics:

- Biodiesel
- Ethanol
- Natural Gas
- Propane
- Hybrid Electric Vehicles (including plug-in hybrids)
- Hydrogen
- Fuel Economy and Idle Reduction

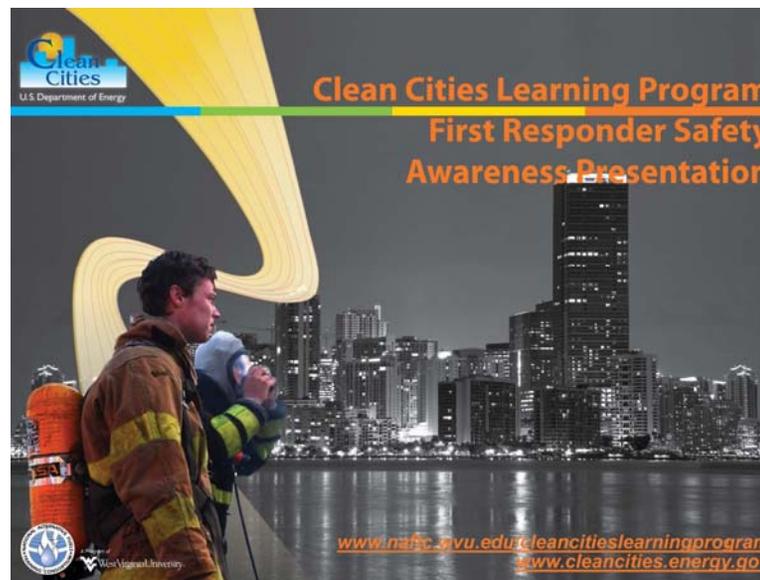



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www.cleancities.energy.gov



Additional Presentation Resources

- In addition to the overall Awareness Presentation PowerPoint slides, additional fuel and technology specific slides/resources are provided.
- This allows coordinators to customize the presentation based on the following timing structure suggestions.



Timing/Structure

- Presentation has been developed so you can easily modify the delivery time based on your audience need and availability.
- Standard delivery is 30 minutes and can be reduced to 10 minutes or expanded to 2 hours. Suggested structures for delivery include:
 - **10 minute presentation**
 - Opening/overview – 8 minutes (includes 7 minute video)
 - Wrap-up/conclusion – 2 minutes
 - **30 minute presentation**
 - Opening/overview – 10 minutes (includes 7 minute video)
 - Overview of First Responder Safety Training – 5 minutes
 - Media training – 3 minutes
 - Wrap-up/conclusion – 12 minutes

Timing/Structure Cont'd

- **1-hour presentation**
 - Opening/overview – 20 minutes (includes 7 minute video)
 - Overview of First Responder Safety Training– 15 minutes (choose various slides from one or more topics)
 - Media training – 5 minutes
 - Wrap-up/conclusion – 20 minutes
- **2-hour presentation**
 - Opening/overview – 30 minutes (includes 7 minute video)
 - Overview of First Responder Safety Training– 60 minutes
 - Biofuels (15 minutes)
 - Gaseous Fuels (15 minutes)
 - Hydrogen (15 minutes)
 - Electric Drive (15 minutes)
 - Media training – 5 minutes
 - Wrap-up/conclusion – 25 minutes

Timing/Structure Cont'd

- In addition, the video can be used as a stand-alone promotional piece that you can
 - Add to your Web site
 - Or post on YouTube and other social media sites

Today's Presentation

- The following mock presentation is based on the 30 minute version of the presentation.
- The presentation is for key decision makers to convince them to support the First Responder Safety Training.

Today's Presentation Cont'd

- The presentation has been developed to:
 - Explain the *Clean Cities Learning Program*
 - Establish the need for alternative fuel and advanced technology vehicles
 - Inform participants about the widespread use of alternative fuel and advanced technology vehicles
 - Establish the importance of education and the need for first responders to be properly trained to respond to accidents involving these vehicles.



Questions?



Clean Cities Learning Program First Responder Safety Awareness Presentation

www.naftc.wvu.edu/cleancitieslearningprogram
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A Program of
West Virginia University

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

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Agenda

- About Clean Cities Learning Program
- First Responder Safety Training
 - Importance
 - Overview of Training
 - Media Component
- Review
- Questions

About the Clean Cities Learning Program

- The www.naftc.wvu.edu/cleancitieslearningprogram is a U.S. DOE Clean Cities grant-funded project developed by the National Alternative Fuels Training Consortium (NAFTC), a program of West Virginia University.
- www.naftc.wvu.edu/cleancitieslearningprogram

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy Clean Cities Program under Award Number DE-EE0001696.

About the U.S. DOE Clean Cities Program

- Clean Cities strives to advance the nation's economic, environmental, and energy security by supporting local decisions to adopt practices that contribute to the reduction of petroleum consumption.
- Clean Cities is part of the U.S. DOE Office of Energy Efficiency and Renewable Energy's Vehicle Technologies Program.

About the U.S. DOE Clean Cities Program

- Clean Cities has a network of approximately 90 volunteer coalitions, which develop public/private partnerships to promote alternative fuels and advanced vehicle technologies, fuel blends, fuel economy, hybrid vehicles, and idle reduction.



- www.cleancities.energy.gov

About the

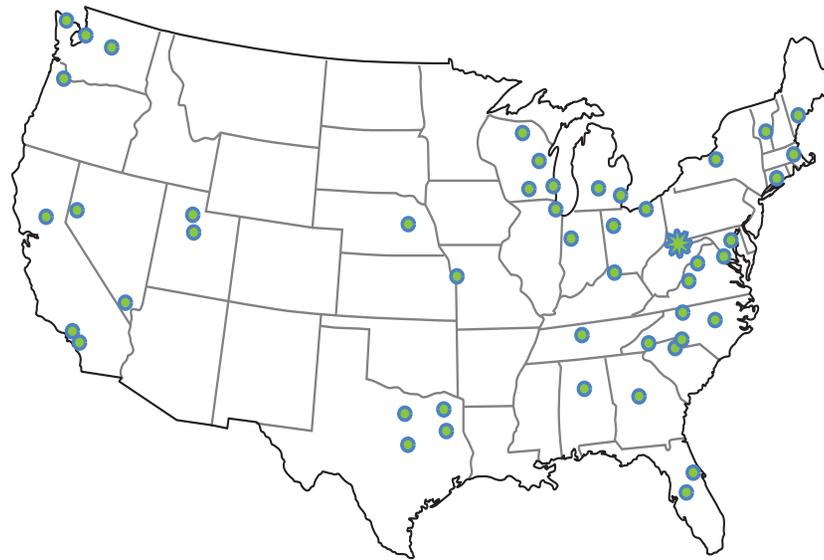
National Alternative Fuels Training Consortium

- The National Alternative Fuels Training Consortium (NAFTC) develops curricula and conducts training on alternative fuel and advanced technology vehicles.
- The NAFTC's mission is to provide the necessary training for implementing the widespread use of alternative fuel and advanced technology vehicles, in an effort to increase our nation's energy security, as well as to improve air quality.

About the

National Alternative Fuels Training Consortium

- A program of West Virginia University, the NAFTC presently consists of 50 National Training Centers, located from Maine to California, and is the only nationwide alternative fuel vehicle (AFV) and advanced technology vehicle training organization in the U.S.



- www.naftc.wvu.edu

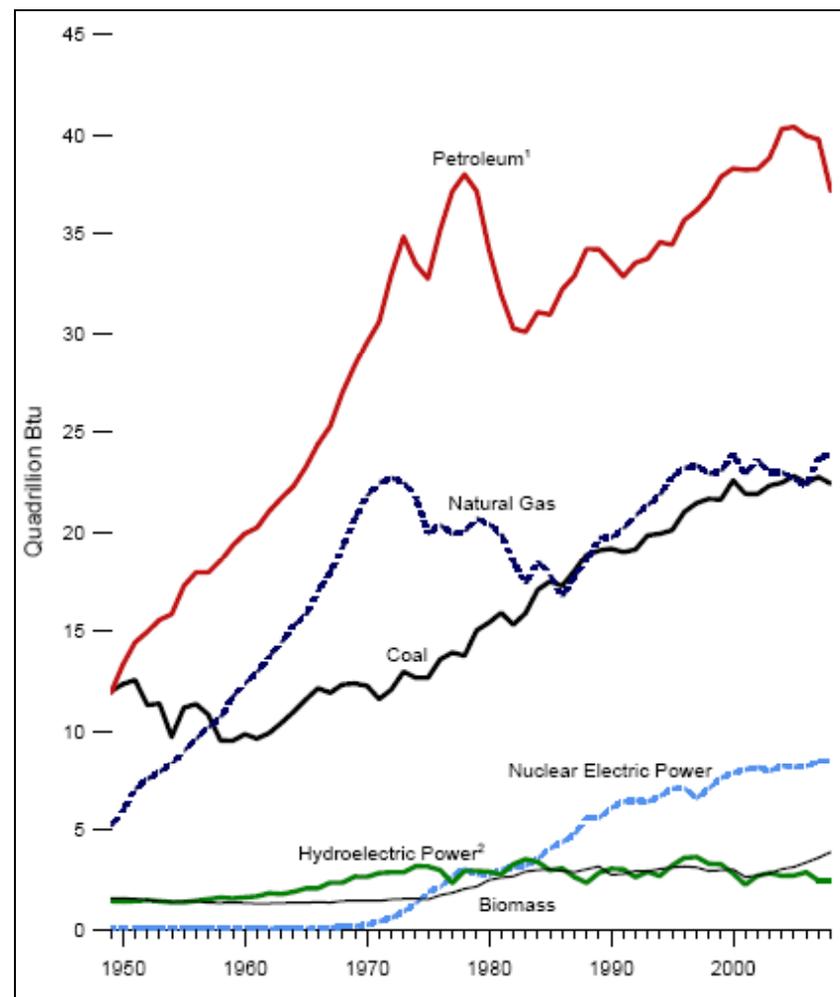
Importance of Alternative Fuels and Advanced Vehicle Technologies

- Alternative fuel and advanced vehicle technologies lessen our dependence on petroleum and help reduce emissions.
- Energy independence and clean air assist in the health and security of individuals and the nation.

Reducing Petroleum Consumption

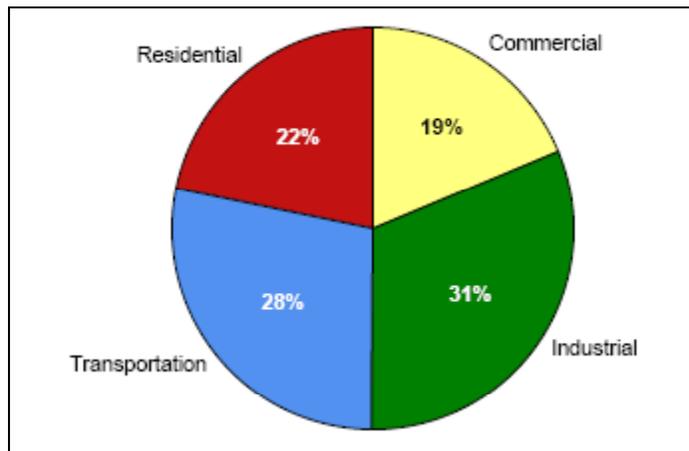
- Petroleum is the most used energy source in the United States.

Primary Energy Consumption by Major Source, 1949-2008. Source: Energy Information Administration (EIA) Annual Energy Review 2008



Reducing Petroleum Consumption

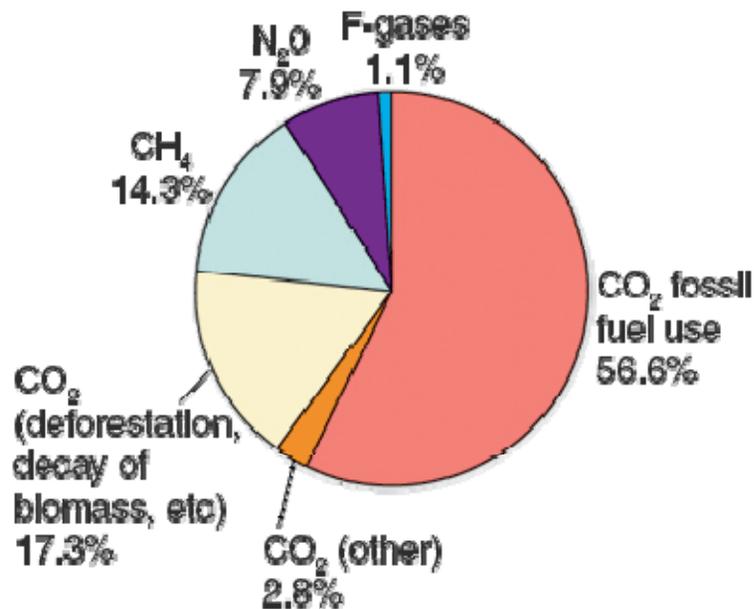
- Transportation accounts for a large portion of U.S. energy consumption.



End-Use Shares of Total Energy Consumption, 2008. Source: EIA Annual Energy Review 2008

Emissions Reductions

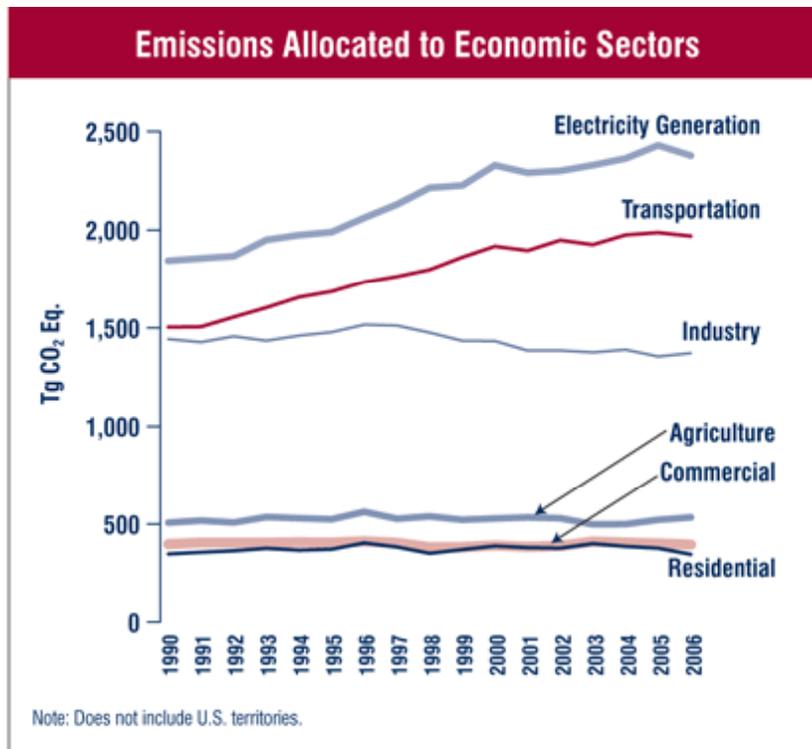
- On a global scale, the use of fossil fuels is the chief contributor of greenhouse gas (GHG) emissions caused by human activity.



Global Anthropogenic Greenhouse Gas Emissions in 2004.
Source: Intergovernmental Panel on Climate Change 4th Assessment Report: Climate Change 2007: Synthesis Report

Emissions Reductions

- Transportation activities account for the second largest portion of U.S. CO₂ emissions.

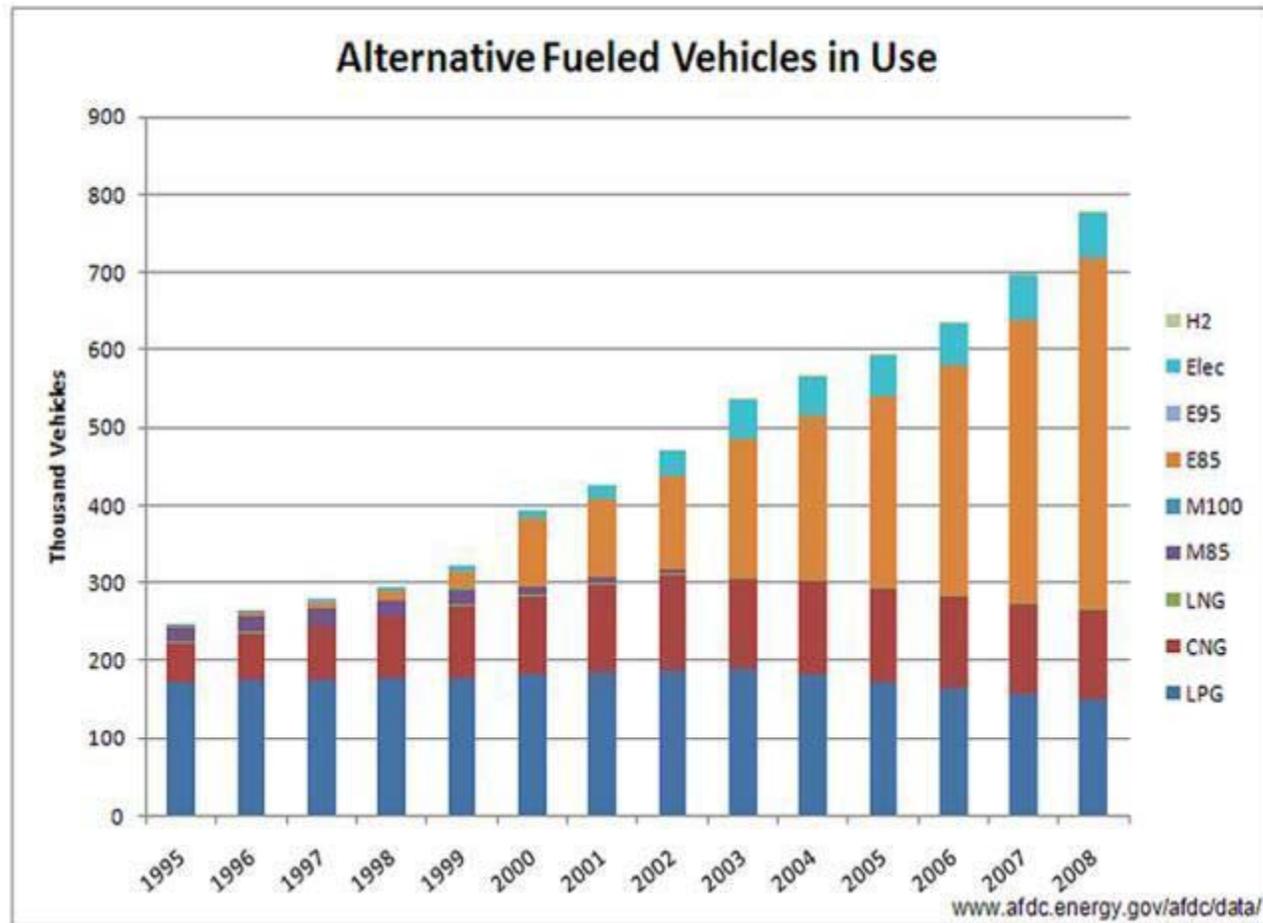


Source: U.S. Environmental Protection Agency Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2006

Forces Driving Alternative Fuel and Advanced Vehicle Technologies

- Federal requirements
 - EPA Act 1992, CAFE
- State and local requirements
- Private initiatives
- Incentives
- Consumer demand

Resulting Trends - AFVs



Consumer Demand Electric Drive Vehicles

- In 2008, J.D. Power forecasted a 7% market share for hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) by 2015.
 - HEVs represented 2.78% of the light-duty market in 2009.



Toyota Prius HEV. Source: NAFTC

Importance of Education and Outreach

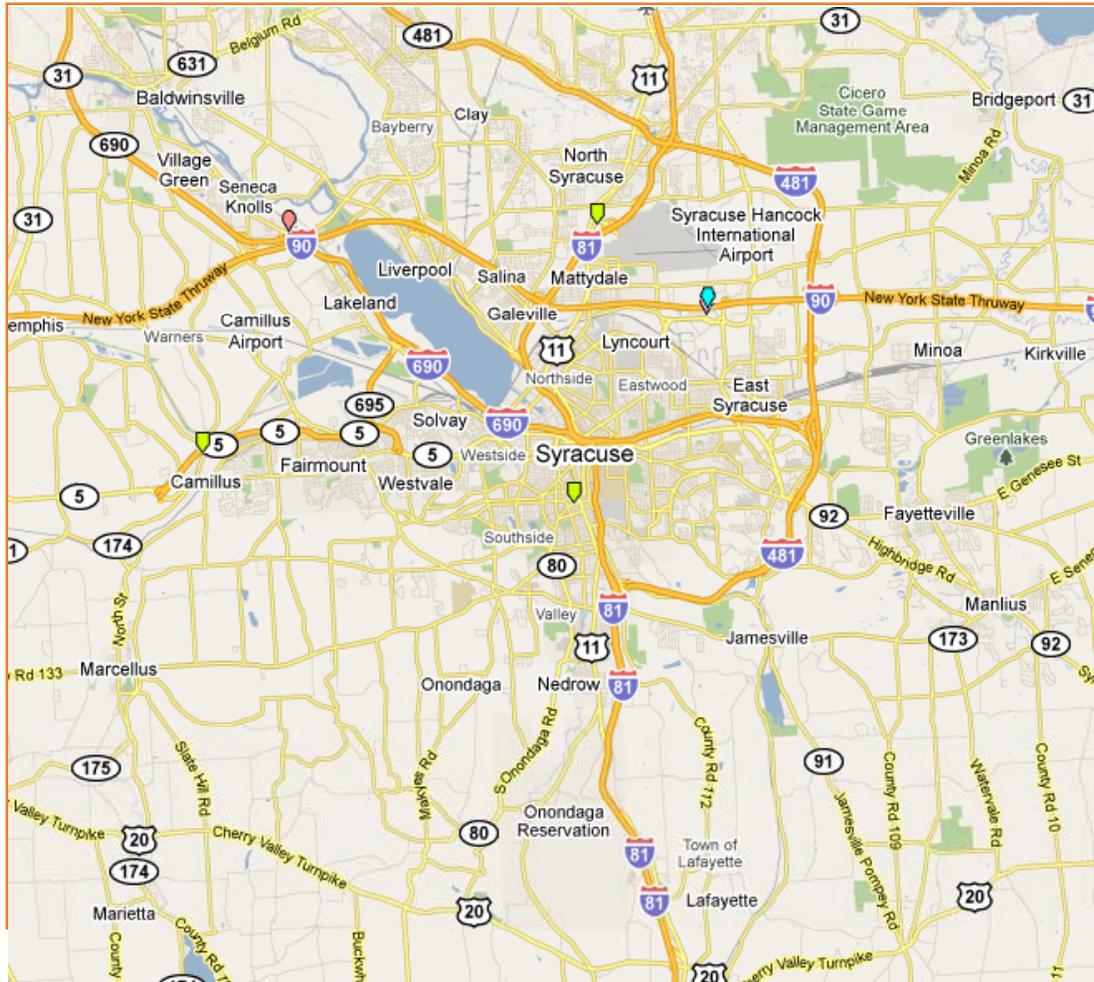
- Many groups/individuals are affected by alternative fuel and advanced vehicle technologies.
 - This includes government officials and first responders.
- All members of this support network must be properly informed.
- Myths and misinformation can spread quickly and have negative effects.

Importance of Education and Outreach

- Education, outreach, and training are critical elements to ensure that everyone is presented with an accurate picture of the industry.
- Proper training will prepare first responders to deal with often unfamiliar vehicles.
- Well-trained first responders = lives saved!

First Responder Safety Training Video

Syracuse, NY



Layers Legend

GIS Layers

- Alternative Fuel Stations
 - Hydrogen
 - Propane
 - Electric
 - Liquefied Natural Gas (LNG)
 - Compressed Natural Gas (CNG)
 - E85
 - Biodiesel

Overview of First Responder Safety Training



Overview of First Responder Safety Training

- **Modules**
 - Biofuels and Biofuel Vehicles
 - Gaseous Fuels and Gaseous Fuel Vehicles
 - Hydrogen and Hydrogen-Powered Vehicles
 - Electric Drive Vehicles

Overview of First Responder Safety Training

- First responders will learn about the following key topics as they relate to alternative fuel and advanced technology vehicles:
 - Key fuel properties and characteristics
 - Vehicle components
 - Identifying vehicles
 - First responder standard operating procedures (SOP)

Key Fuel Properties and Characteristics

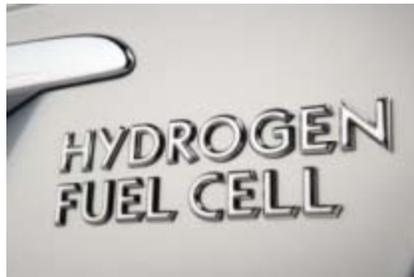
- This training will provide the first responders with specific knowledge about the different fuels used in alternative fuel vehicles
 - Specific fuel properties and characteristics
 - Unique fuel tanks and delivery systems
 - Safety considerations unique to each fuel type
 - Flammability levels of each fuel
 - How to safely respond to an incident in which this fuel is present, as each fuel requires a specific set of standard operating procedures to be followed

Vehicle Components

- Each alternative fuel vehicle has a unique set of components, many of which are unlike those found in conventional vehicles
- These components are located in various locations and are controlled in various ways
- A first responder must know these unique components, how to locate and safely work around these components during an incident/accident

Vehicle Identification

- Emblem/Badges



Hydrogen-powered vehicle badge.
Source: NAFTC



FFV badge.
Source: NAFTC



HEV badge.
Source: NAFTC



Honda Civic GX.
Source: NREL PIX #13670



Propane badge.
Source: NAFTC

Vehicle Identification

- Charge Indicator
- VIN Identification
- Unique Components
- License Plate Confirmation



HEV charge indicator on dash.
Source: NAFTC



Plug-in hybrid receptacle.
Source: Ford

First Responder General Procedures

- Identify the vehicle as an alternative fuel or advanced technology vehicle.
- Approach the vehicle with caution and only with the appropriate training.
- Eliminate all ignition sources.
- Secure and stabilize the vehicle.
- Follow standard operating procedures for specific alternative fuel or advanced technology vehicle .

First Responder Procedures

- Safety Equipment
 - Use of appropriate safety equipment
 - High Voltage Gloves
 - Face shields
 - Etc.



Structural fire fighter protective clothing.
Source: DOE

First Responder Safety Training Materials

- Workshop booklets
 - Biofuels, Gaseous Fuels, Hydrogen, and Electric Drive
- Quick Reference Guide
 - For on-scene use



First Responder Media Training

- Special Component



Importance of Media Training

- First responders must be prepared to respond appropriately to media inquiries related to alternative fuel and advanced technology vehicle accidents.
- Negative or incorrect statements can have severe consequences.

Media Training Overview

- During the interview the first responder should:
 - Get their succinct message across.
 - Be informative, not conversational.
 - Be brief.
 - Don't go off the record.
- Dealing with difficult situations
- Possible questions and recommended answers for each fuel/technology



Summary: First Responder Safety

- U.S. DOE Clean Cities Learning Program includes First Responder Safety Training.
- Importance of support for the use of alternative fuel and advanced technology vehicles in your area; leads to energy security for our country.
- Importance of training – safety for first responders and passengers.

Summary: First Responder Safety

- Training is modularized:
 - Biofuels and Biofuel Vehicles
 - Gaseous Fuels and Gaseous Fuel Vehicles
 - Hydrogen and Hydrogen-Powered Vehicles
 - Electric Drive Vehicles
- Media component
- Making key decision makers aware of training.

To Request Training

Visit the
Clean Cities Learning Program at
www.naftc.wvu.edu/cleancitieslearningprogram
to request the
First Responder Safety Training.

Contact Information/Questions

Questions?

- *Presenter's Name*
 - *Phone number*
 - *Email address*



**Thank you for your time
and support!**