

## CLEAN CITIES LEARNING PROGRAM FIRST RESPONDER SAFETY TRAINING OVERVIEW

The Clean Cities Learning Program First Responder Safety Training educates first responders on how to respond safely to a vehicle accident involving alternative fuel and advanced technology vehicles. This comprehensive information is organized into four separate modules to address the primary alternative fuel and advanced technology vehicles used on the road today.

Modules include:

- Biofuels 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 also prepares first responders to deal with the media and respond appropriately and effectively to inquiries related to alternative fuel and advanced technology vehicle accidents.

The Clean Cities Learning Program First Responder Safety Training features useful reference materials, including a workshop booklet and a Quick Reference Guide intended for on-scene use. These materials, along with the comprehensive information presented during the training, provide first responders with the information and preparation necessary to properly respond to incidents and inquiries involving alternative fuel and advanced technology vehicles.



**Toyota Prius HEV.** Source: NAFTC

<sup>1</sup> HybridCars.com, Hybrid Market Dashboard, 2009.

<sup>2</sup> U.S. Energy Information Administration, Alternatives to Traditional Transportation Fuels 2008.

<sup>3</sup> EIA, Annual U.S. Crude Oil Supply & Disposition, 2008.

## INTRODUCTION TO: ELECTRIC DRIVE VEHICLES

The First Responder Safety Training Electric Drive Vehicles module focuses on electric drive technology, as well as the four different types of vehicles that currently feature this technology: battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs). HEVs already have a large presence around the United States today. In fact, from 1999-2009, 1.6 million HEVs were sold, including approximately 290,000 in 2009 alone.<sup>1</sup> Other electric drive vehicle types will become increasingly prevalent in the near future. Full sized BEVs and PHEVs will



**Honda Insight HEV.** Source: National Renewable Energy Laboratory (NREL)  
Photographic Information eXchange (PIX) #2768

be commercially available in Model Year (MY) 2011, with several models of these vehicle types available by MY 2012. As of 2008, approximately 300 hydrogen fuel cell-powered vehicles were in use in the United States, with significant research and development efforts underway to make these vehicles commercially available in more areas of the country.<sup>2</sup>

**Benefits.** Electric drive vehicles are beneficial in many ways.

- **Increases Energy Security.** The United States imports more than 60% of its petroleum. Electricity is produced domestically and distributed via an established infrastructure; BEVs and PHEVs can be charged through equipment installed in residential garages 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.
  - **Reduces Emissions.** Electric drive vehicles reduce or eliminate the harmful pollutants that come from conventional fuel use.
    - o HEVs and PHEVs operating in electric drive mode do so with no harmful emissions.
    - o BEVs produce no emissions at any time.
    - o FCEVs emit only water and heat as byproducts of the fuel cell reaction.

**Training Objective.** The Electric Drive Vehicles module will provide first responders with the information, tools, and resources necessary to prepare for and respond to incidents involving electric drive vehicles.

**Training Components.** The Electric Drive Vehicles module will familiarize first responders with the key properties and characteristics of electricity as a transportation fuel, as well as important safety considerations related to electric drive vehicles, including detailed information about how electric drive vehicles differ from conventional diesel and gasoline vehicles.



**PHEV.** Source: National Renewable Energy Laboratory (NREL) Photographic Information eXchange (PIX) #17152

The training will also include:

1. Review of safety equipment necessary to properly respond to an incident involving an electric drive vehicle.
2. Methods to identify electric drive vehicles at the scene of an accident.
3. Recommended practices for approaching and securing electric drive vehicles.
4. Vehicle extrication procedures specific to electric drive vehicles.
5. Specific information about how to effectively manage an electric drive vehicle fire, battery spill, or leak.

After completing this training, first responders will have the knowledge and skills necessary to confidently and safely confront and handle accidents involving electric drive vehicles.

## BACKGROUND

Alternative fuel and advanced technology vehicles play a critical role in today's efforts to reduce U.S. dependence on petroleum, helping to secure our nation's energy resources through the use of domestic and renewable fuels and fuel-efficient technologies. Additionally, alternative fuel and advanced technology vehicles can assist in reducing harmful emissions, including greenhouse gases such as carbon dioxide (CO<sub>2</sub>), both through the use of cleaner burning fuels as well as emissions reductions that result from decreased fuel use. Reduced dependence on petroleum is important to national security while improved air quality is tied directly to improved human health.

Many resources have been at work to bring the alternative fuel and advanced technology vehicles industry to the place it is today, and education and outreach are extremely important to its continued growth and success. A key element of this education and outreach is training for first responders. The number of alternative fuel and advanced technology vehicles on the road will only increase, and first responders must be properly informed about the ins and outs of the available fuels and technologies. To help ensure their safety and the safety of others, first responders must not only understand how alternative fuel and advanced technology vehicles differ from conventional vehicles but also be familiar with the unique considerations and response procedures surrounding these vehicles.



**Fuel cell bus.** Source: National Renewable Energy Laboratory (NREL) Photographic Information eXchange (PIX) #14393



**PHEV battery charging.** Source: Ford