

# First Responder Alternative Fuels Training Toolkit



Source: <http://www.afdc.energy.gov/>

This tool toolkit was developed by [Plug In America](#) in partnership with the [Community Environmental Council](#) and the [Central Coast Clean Cities Coalition](#) as part of a California Energy Commission grant to advance the use of alternative fuels throughout the Central Coast region.

Through a brief overview, this toolkit will familiarize first responders with the various alternative fuel technologies. Additionally, this toolkit will provide resources and guidance in further available trainings and educational materials in the handling of alternative fuel vehicles.



Through the following resources and materials first responder personnel will be able to:

- Identify additional educational opportunities;
- Understand the potential hazards of each technology;
- Understand how to safely approach an incident in which an alternative fuel vehicle is involved.

# Alternative Fuels Overview

## Types of Alternative Fuels

- **Hydrogen:** Can be produced domestically from fossil fuels, nuclear power, or renewable resources, such as hydropower. Hydrogen Fuel Cell Vehicles (HFCVs) leave nothing behind but water, so they don't emit any harmful air pollutants.
- **Electricity:** About 20% of California's electricity comes from renewable energy sources such as wind, geothermal, and solar. As a result, vehicles that are powered by electricity produces 75% fewer greenhouse gas emissions than a comparable gasoline-powered vehicle.
- **Natural Gas:** A fossil fuel that generates less air pollutants and greenhouse gases. CNG costs about 50% less than gasoline or diesel, emits up to 90% fewer emissions than gasoline and\* there's an abundant supply right here in America.
- **BioDiesel:** Biodiesel is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant grease for use in diesel vehicles. Biodiesel blends of 20 percent and below will work in any diesel engine without the need for modifications.
- **Ethanol:** Ethanol is a renewable, domestically produced alcohol fuel made from plant material, such as corn, sugarcane, or grasses. More than 2,300 filling stations in the U.S. sell E85.
- **Propane:** A domestically abundant fossil fuel that generates less harmful air pollutants and greenhouse gases. There are more than 143,000 on-road propane vehicles in the United States. Many are used in fleet applications, such as school buses, shuttles, and police vehicles.

## Electric Vehicles

### BEVs

- Fully electric vehicles, use electricity to power a battery.
- No gasoline, no oil changes, no internal combustion engine
- 70 - 200 mile range



Nissan LEAF

Volkswagen E-Golf



### Chevy Spark EV



### PHEVs

- Run on electricity but as their battery runs out of charge, a gasoline powered engine kicks in.

### Volvo XC90 T8



### BMW X5 xDrive40e





**Chevy Volt**

## Ethanol Vehicles

- E85 can be used in Flexible Fuel Vehicles (FFVs), designed to run on gasoline, E85 or any mixture of the 2
- MPG: Due to ethanol's lower energy content, FFVs operating E85 get roughly 15-30% fewer miles per gallon
- More than 2,300 filling stations in the U.S. sell E85
- FFVs are offered by several vehicle manufacturers

**Ford Focus**



**Chevy Equinox**



**Mercedes Benz GLA 250**



**Dart**

**Dodge**



## BioDiesel Vehicles

- Form of diesel fuel from vegetable oils, animal fats, or recycled grease
- Can be used in pure form (B100) or blended with petroleum diesel (B20)
- Can be used in most diesel engines

## Hydrogen Vehicles

- Used in fuel cell vehicles (FVC) or internal combustion engine (ICE) vehicles
- Unlike FVCs, ICEs produce tailpipe emissions and are less efficient
- A fuel cell is 2-3 times more efficient than an internal combustion engine running on gasoline.



Toyota Mirai



Hyundai Tucson

## CNG Vehicles

- Vehicles available that run on CNG alone or mixed with gasoline
- Fueled at public stations

# The Need for First Responder Training

Due to the ever growing number of publically available alternative fuel vehicles (AVFs) it has become of the utmost importance first responders have the information they need to respond to an incident involving an AFV or fueling equipment. First responders including fire department, paramedic, and police personnel must be properly trained to respond to the scene of an emergency involving an AVF or fueling equipment.

## Multi-Fuel Trainings

### National Fire Protection Agency (NFPA) Alternative Fuel Vehicles Training Program



NFPA®'s self-paced online training Alternative Fuel Vehicles Training Program for Emergency Responders teaches emergency responders how to safely deal with emergency situations involving alternative fuel passenger vehicles, trucks, buses, and commercial fleet vehicles. Upon completing the program, students will receive a certificate for their successful completion. See more at: <http://catalog.nfpa.org/Alternative-Fuel-Vehicles-Training-Program-for-Emergency-Responders-Online-Training-P15552.aspx?icid=D533#sthash.epyPh4xr.GWRMHaqD.dpuf>

NFPA also offers a website specific to electric vehicle training to learn how to safely deal with emergency situations involving electric vehicles and hybrid vehicles.

See more at: <http://www.evsaftytraining.org/>

### National Alternative Fuels Training Consortium (NAFTC)



The National Alternative Fuels Training Consortium (NAFTC) is the only nationwide alternative fuel vehicle and advanced technology vehicle training organization in the United States. The NAFTC develops curricula and disseminates training about alternative fuels, alternative fuel vehicles, and advanced technology vehicle education. NAFTC courses and workshops are offered in both traditional classroom and online learning formats. Participants learn by using educational discussions, videos, and assessments as well as lab and shop activities. Participants of the NAFTC training receive access to state-of-the art curricula, unsurpassed train-the-trainer courses and workshops, timely instructor updates, and professional development training.

See more at: <http://www.naftc.wvu.edu/>

## **NAFTC Clean Cities Learning Program Toolbox**

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 technology vehicles through a targeted education and outreach effort. The NAFTC [Clean Cities Learning Program](#) (CCLP) Toolbox is 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.

Fact Sheets highlighting the various alternative fuel types and safety information can be viewed at the following links:

Biofuels and Biofuel Vehicles:

<http://assets.slate.wvu.edu/resources/527/1287694991.pdf>

Gaseous Fuels and Gaseous Fuel Vehicles:

<http://assets.slate.wvu.edu/resources/527/1287695094.pdf>

Hydrogen and Hydrogen-Powered Vehicles:

<http://assets.slate.wvu.edu/resources/527/1287695095.pdf>

Electric Drive Vehicles:

<http://assets.slate.wvu.edu/resources/527/1287695093.pdf>

## **Office of the State Fire Marshal (OSFM)**

CA State Fire Training (SFT) certification program: OSFM certification standards with state & national certification program standards. See more at:

<http://osfm.fire.ca.gov/training/alternativefuelvehicles.php>

## **Triangle Alternative Fuels First Responder Online Training Modules**

The Triangle Alternative Fuels First Responder Training offers free, self-paced curriculum for the fire and rescue community.

See more at: [http://www.ncdoi.com/OSFM/RPD/PT/Videos\\_Alternative\\_Fuels.aspx](http://www.ncdoi.com/OSFM/RPD/PT/Videos_Alternative_Fuels.aspx)

# Fuel-Specific Training

## **Biodiesel**

The National Hazardous Materials Fusion Center offers a Biodiesel Training Package, which includes various resources for dealing with biodiesel, including instructor guides and participant manuals.

See more at: <http://www.hazmatfc.com/Resources/Training-Packages/Biodiesel-Training-Package>

### **E85/Flex-Fuel**

The Ethanol Emergency Response Coalition has a website devoted to support the safe handling of ethanol and ethanol-blended fuels. The site offers a variety of resources and training guides for ethanol emergency response, including seven learning modules and videos.

See more at: <http://ethanolresponse.com/pages/resources>

### **Electric Vehicles**

The National Fire Protection Agency (NFPA) provides Electric Vehicle Safety Training and resources for electric and hybrid-electric vehicles.

See more in the NFPA Electric Vehicle Emergency Field Guide at:

<http://www.evsafetytraining.org>

### **Hydrogen Fuel Cell First Responder Training**

The California Fuel Cell Partnership and the Pacific Northwest National Laboratory collaborated to develop a national hydrogen safety training resource for emergency responders. The resource provides a single repository of credible and reliable information related to hydrogen and fuel cells that is current and accurate and eliminates duplicative efforts among various training programs.

See more at: <https://h2tools.org/fr/nt>

## **Emergency Response Guides for Alternative Fuel Vehicles**

West Virginia University offers vehicle-specific emergency response guides. Guides are listed by manufacturer and vehicle.

See more at: <http://afvsafetytraining.com/erg.html>