

# Needs Assessment for Alternative Fuel Vehicle Training in California

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PREPARED BY

California Center for Sustainable Energy  
in association with California Clean Cities Coalitions

FOR

Bay Area Air Quality Management District



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# Executive Summary

Federal, state and local government energy and environmental policies have lead California to be at the forefront of AFV deployment, so it is imperative that first responders and fleet technicians know how to handle fuels, fueling and emergencies without harm

This report details the availability of safety and technical training in alternative fuel vehicles (AFVs) for emergency personnel and transportation fleet staff in California and provides recommendations to improve it. AFVs, such as hybrid, electric, natural gas and biofuel vehicles, offer low emissions and fuel cost savings, but also present safety and technical issues unique to their technologies. Federal, state and local government energy and environmental policies have lead California to be at the forefront of AFV deployment, so it is imperative that first responders and fleet technicians know how to handle fuels, fueling and emergencies without harm. Projections of AFV deployment in California show dramatic growth. For example, the California Energy Commission (Energy Commission) expects the state to have more than 1.5 million plug-in vehicles in 2020 and 2.8 million in 2030<sup>1</sup>. California is already home to more hybrid-electric, plug-in electric and CNG vehicles than any other state. Safety and technical training for AFV fleet staff and emergency personnel is essential as this transportation market grows in California.

Under a grant from the U.S. Department of Energy (DOE), the California Center for Sustainable Energy (CCSE) and California Clean Cities Coalitions (Coalitions) conducted this assessment of current and future AFV training needs for first responders and fleet staff for the Bay Area Air Quality Management District (BAAQMD). The project team distributed surveys to California fire chiefs and selected fleet managers, followed by in-depth interviews with key training organizations and industry partners to develop this report's recommendations.

The First Responders Survey results indicate that a significant portion of firefighters still need AFV safety training, with 52% of responding fire departments not offering their staff such training. The main barriers for fire department staff receiving training are lack of funding and time. With the growing number of alternative fuel vehicles and related infrastructure deployed in the state, fire departments need to be prepared better to respond to vehicle or fueling station incidents.

Fleet managers indicated that training is not a barrier to AFV adoption partly because fleets are mandated to switch to AFVs by other policies. AFVs make up around 25% of fleets with managers projecting increases in hybrid, electric and natural gas vehicle use. The timing of when fleets would need trainings varies, however, fleet technicians can benefit the most from AFV training when the fleet purchases a new vehicle and once a vehicle goes out of warranty.

A main barrier to AFV training is planning trainings to fit the work schedules of first responders and fleet technicians. In addition, most trainings are grant

<sup>1</sup> Smith, Charles, Jim McKinney. 2013. 2014–2015 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program Staff Draft. California Energy Commission, Fuels and Transportation Division. Publication Number: CEC-600-2013-003-SD.



funded, so are constrained to the grant's stipulations. Increasing communication among first responders, fleet operators and training organizations will facilitate trainings that are offered at opportune times and cover desired topics. Training organizations and Coalitions can play a greater role in increasing awareness of where and when trainings are offered, as well as providing outreach on the importance of receiving AFV safety and technical training.



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Mandates require many government fleets to adopt AFVs, increasing the need for trained fleet technicians who are capable of servicing these vehicles

## Purpose and Scope

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As a result of recent state and federal environmental policies; growing concern about the environment, air quality and global climate change; and increasing costs of gasoline and diesel, alternative fuel vehicles (AFVs) are becoming increasingly common on California roads. Mandates require many government fleets to adopt AFVs, increasing the need for trained fleet technicians who are capable of servicing these vehicles. In addition, as the number of AFVs increase, so does the need for first responders to be trained and prepared to safely operate around alternative fuels and AFVs.

Safety and technical trainings are essential components to ensure the smooth growth of California's alternative fuel and advanced technology vehicle market. Existing programs and curricula around the state currently train first responders, service technicians, code officials and others on a variety of alternative fuel topics. However, is it not known how well the existing training programs and curricula are meeting the needs overall. Lead by CCSE, California's Clean Cities Coalitions (Coalitions) utilized their unique position as a statewide support network for stakeholders in the AFV market to assess the current training needs of first responders and fleet technicians.

## Background

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### Alternative Fuels

Alternative fuels are essential in California for meeting state and federal policies on air pollution, global warming, and petroleum-reduction targets. They are generated using fewer petroleum-based resources and, in most cases, produce less pollution than gasoline or diesel. They can be produced domestically and from renewable resources, which offers major benefits over importing oil.

There are several types of alternative fuels: biodiesel, ethanol, natural gas, propane and electricity, and each have different mechanical and safety requirements. Biodiesel is processed from vegetable oils and animal fats, while ethanol is produced from corn or sugar crops. Both fuels have similar characteristics to traditional diesel and gasoline. Natural gas and propane are cleaner burning fuels compared to gasoline, producing less greenhouse gases; however, they require sealed, pressurized fuel systems. Hybrids and plug-in electric vehicles use high-voltage battery packs and motors that typically are charged by home infrastructure but also at public charging stations.

## State & Federal Policies

AFV training in California is largely driven by state and federal policies increasing AFV use in the state. The key federal policy that initiated the use of alternative fuels is the Federal Energy Policy Act (EPAAct). EPAAct was enacted in 1992 with goals aimed at reducing the nation's dependence on foreign sources of energy. The act prompted DOE to create Clean Cities Program in 1993 to provide technical and financial resources to EPAAct-regulated fleets and other alternative fuel and AFV adopters. Clean Cities Coalitions (Coalitions) support actions to reduce petroleum use in transportation markets through bringing together public and private sector stakeholders for deployment of alternative fuel vehicles and infrastructure.

Since 1992, several state policies have been enacted to reduce carbon vehicle emissions through setting stricter greenhouse gas (GHG) emission reduction goals. The Global Warming Solutions Act of 2006 (AB 32) was a landmark piece of legislation that requires a statewide reduction in GHG emissions to 1990 levels by 2020. The law gave the California Air Resources Board (ARB) direction to develop policies and plans to reduce GHG emissions. To complement AB 32, in 2007 an executive order established the Low Carbon Fuel Standard (LCFS) mandating a reduction in the carbon intensity of California's transportation fuels by at least 10% by 2020. LCFS will result in lowering the average carbon dioxide emissions from each gallon of transportation fuel sold in the state and increase the availability of lower-carbon fuels. To further reduce GHG emissions, California passed the Sustainable Communities and Climate Protection Act of 2008 (SB 375). Under SB 375, metropolitan planning organizations must develop a sustainable community strategy that integrates transportation, land use and housing policies to meet a regional emissions target. As a result of these policies, AFVs with lower GHG emissions are replacing gasoline and diesel vehicles. In addition to GHG reduction policies that indirectly increase AFV use, California has several policies directly promoting AFVs. For instance, the state has required that automakers sell a certain percentage of zero-emissions vehicles (ZEVs) as part of its broader regulation of automotive emissions. ZEVs are vehicles that emit no tailpipe pollutants such as electric, plug-in hybrid and hydrogen fuel cell vehicles. Under these regulations, ZEVs are projected to make up 15% of new car sales in California by 2025. In addition, California's governor has set a goal of 1.5 million ZEVs on the road by 2025. New diesel emissions regulations also have led to increased numbers of alternative fuel vehicles such as CNG and liquid petroleum gas (LPG or propane) vehicles.

In addition to these regulations, the state has offered substantial support for the adoption of alternative fuels and vehicles. The California Alternative and Renewable Fuel, Vehicle Technology, Clean Air and Carbon Reduction Act of 2007 (AB 118) was designed to provide a dedicated stream of funding to support the development of alternative fuel technologies and the deployment of vehicles to help meet the state's ambitious air quality and GHG emission reduction goals. Funding is administered through ARB and the Energy Commission to a variety of projects.

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Funding made available through various incentive programs for alternative fuel vehicles has encouraged their adoption and is expected to do so in the future. A key funding source is Assembly Bill No. 8, which extended to January 1, 2024, the Carl Moyer Program, the local diesel emission reduction programs under AB 923 and the Alternative and Renewable Fuel and Vehicle Technology Program under AB 118.

These policies have all contributed to the increased numbers of AFVs on the road in California. For example, in 2012 California's share of U.S. total vehicle sales was 34% for plug-in hybrids and 37% for plug-in vehicles.<sup>2</sup> As AFV deployment grows in California, AFV safety and technical training is becoming increasingly important. First responders must be trained appropriately to handle AFV incidents and technicians should be trained to provide proper handling and maintenance.

## Workforce Training

The Energy Commission has provided funding for workforce development and training related to alternative fuels and advanced technologies. The Commission has three interagency agreements with California's workforce training agencies that provide funding for alternative fuel and low-emission vehicle-specific training. The agreements include the Employment Development Department (EDD), California Community Colleges Chancellor's Office (CCCCO) and the Employment Training Panel (ETP). As of October 2013, the three agreements have provided \$23.25 million in training funds.<sup>3</sup>

## Alternative Fuel Training

AFV safety training needs are different throughout the state. For example, it is likely that the training needs of a small, rural fire department are different from those of a large, urban department. Differences also exist across the state due to varying adoption levels of AFVs and the presence of alternative fueling infrastructure. Fleets interested in AFVs also have varying needs based on their vehicle composition.

## Training Barriers to Deployment

There are a number of barriers to the deployment of AFVs in California. One barrier is thought to be the lack of adequate training of first responders, technicians and fleet technicians in alternative fuel vehicle safety and

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<sup>2</sup> Williams, Brett. "California PEV Registration Analysis Thru 2012." UCLA Luskin School of Public Affairs, 27 June 2013. Web. 25 Nov. 2013. <<http://luskin.ucla.edu/blogs/public-policy/california-pev-registration-analysis-thru-2012>>.

<sup>3</sup> Smith, Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program Staff Draft.

maintenance. As the number of alternative fuel vehicles on the road grows, so does the likelihood of an incident involving these vehicles. First responders should receive training to protect themselves and the public during such an incident. In addition, incidents involving AFVs may receive a high level of public scrutiny and an effective response helps to minimize negative attention.

## Past Training Assessments

While some AFV training needs assessments have been done in the past, we are unaware of any that have looked at the varying needs of first responders and fleet technicians throughout the state.

Advanced Transportation Technologies and Energy (ATTE) centers, in partnership with CCCC and the Energy Commission, performed an alternative fuels and AFVs training needs assessment targeting public and private employers in California. The 2010 report assessed training needs over seven broad categories: engine diagnostics and repair, electrical drive systems and battery technologies, high-pressure fuel system analysis, emission systems inspection, first responder safety training, fuel station maintenance and fuel properties.

The Southern California Regional Transit Training Consortium conducts training needs assessments for transit technicians and maintenance managers, but is an assessment localized to Southern California. Two other examples of training needs assessments are a first responder report, published by the International Association of Fire Chiefs, titled *Hydrogen Fuels Training and Education Research and Outreach Demonstration*,<sup>4</sup> and a fleet technician report, *Natural Gas in Transit Fleets: A Review of the Transit Experience*, published by the National Renewable Energy Laboratory.<sup>5</sup>

## Available Training

While effective alternative fuel safety training curricula exist, it is difficult to match the limited training resources with those that need it most. This is complicated further by the lack of a clear understanding of current and projected training needs. This training needs assessment attempts to clarify the current situation in the many regions of the state.

The survey identified three main alternative fuel safety training programs and organizations: California State Fire Service Training and Education Program (FSTEP), National Alternative Fuels Training Consortium (NAFTC) and National Fire Protection Association (NFPA).

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4 SKJ Enterprises, LLC. *Hydrogen Fuels Training and Education Research and Outreach Demonstration*. Association of Fire Chiefs, 2010. Print.

5 Eudy, Leslie. *Natural Gas in Transit Fleets: A Review of the Transit Experience*. Tech. no. NREL/TP-540-31479. Golden: National Renewable Energy Laboratory, 2002. Print.

- FSTEP is a state fire training program with courses dedicated to assisting fire agencies in meeting specific training needs, such as live-fire training and automobile extraction.
- NAFTC is a nationwide AFV and vehicle technology training organization.
- NFPA is an international nonprofit organization working to reduce the dangers of fire and other hazards by providing research, training and education, including electric vehicle safety training.

Although training is available, it is not clear all fleets are having their training needs met. Technician training is offered by community colleges as part of degree and certificate programs as well as on a contract basis. OEMs may offer training to dealer technicians as well as fleet purchasers. The statewide Advanced Transportation & Renewables (ATR) program coordinates ATTE centers that are located at California Community Colleges and provide noteworthy alternative fuel trainings for technicians and first responders. Appendix C contains a listing of the major training organizations along with training resources.

## Past Trainings

Coalitions have been involved with organizing and promoting trainings throughout the state. Within the past two years, Coalitions reported 56 first responder trainings and 108 fleet technical trainings (see Table A).

**Table A – Number of Trainings by Coalitions**

Clean Cities Coalition	Number of Trainings	
	First Responder	Fleets
San Diego	2	0
Silicon Valley	1	7
Sacramento	1	1
Coachella Valley	2	5
Long Beach	14	66
Central Coast	0	0
San Joaquin Valley	8	0
Western Riverside County	18	0
Los Angeles	2	27
East Bay	1	2
Antelope Valley	7	0



Note that Table A does not include all of the regular credit courses offered by community colleges or fire academies. A complete listing of trainings documented by the Coalitions during the past two years is provided in Appendix A. Appendix B contains descriptions on planned trainings reported from training organizations and Coalitions.

## Survey Methods

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Utilizing the state's 13 Coalitions, training needs assessments were distributed to fire departments and fleet managers across the state. The survey was sent to fire department training chiefs and to fleet managers with the goal of obtaining the training history and current needs of the respondents' organizations. The data collection period lasted one month (August 2013). The initial email invitation for the survey was followed by at least one follow-up email invitation and then one phone call to improve the response rate. Appendices D and E contain the First Responders Survey and Fleet Managers Survey questions.

## Summary of Findings

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### First Responders Survey

There were 79 fire department chiefs/training officers across California who completed the First Responders Survey. For Los Angeles County, there were several responses from individual fire departments that were combined to represent the Los Angeles area. Based on the survey responses, 48% of California fire departments offer staff first responder training in AFVs. Of the fire departments that offer such training, the majority of courses covered hybrids, electric and natural gas vehicles.

The majority of trainings were offered in-house by either department or contract trainers covered hybrid and electric vehicles. The majority of respondents also indicated a preference for receiving any necessary future training in-house by a department or contracted trainer. Looking at training satisfaction, 34% of respondents were satisfied or very satisfied with the AFV training received.

When asked about barriers to training staff on AFV safety, 63% of fire chiefs said lack of funding and 45% of fire chiefs said lack of training time were barriers that limited the number of people receiving AFV safety training. Despite the fact that 71% of departments indicated more training is needed, little training is planned due to these barriers.

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## Fleet Managers Survey

Across all fleet types and sizes, the majority of fleet managers indicate that training is not a barrier to adoption of AFV in their fleets

Eighty-five fleet managers across California of varying fleet types and size completed the survey. The fleet types represented in the survey are local and state governments, corporate and schools. The majority of respondents manage local government fleets (55%), 20% manage corporate and school fleets and 16% manage state government fleets.

The overall fleet composition of respondents favors light-duty vehicles at 71% and 29% being heavy-duty vehicles. The majority of local and state government fleets are comprised of light-duty vehicles, while corporate fleets contain about 60% light-duty vehicles and school fleets averaging 50% light-duty and 50% heavy-duty vehicles. The majority of alternative fuel light-duty vehicles currently deployed are hybrids while the majority of heavy-duty vehicles are natural gas.

AFVs, such as hybrid, electric, natural gas and propane, make up at most 25% of existing fleet vehicles. Fleet managers project that future fleets will contain increased numbers of hybrid, electric and natural gas vehicles. Across fleet types and sizes, the fleet managers report the most important training need is for natural gas-fueled vehicles. When asked whether they feel mechanics and first responders should be trained in AFV safety, more than 60% of managers said training for these staff is important or very important. Interestingly, across all fleet types and sizes, the majority of fleet managers indicate that training is not a barrier to adoption of AFV in their fleets.









# Findings from First Responders Survey

This section provides key findings from fire department chiefs and training officers. The First Responders Survey, along with additional findings, is in Appendix D.

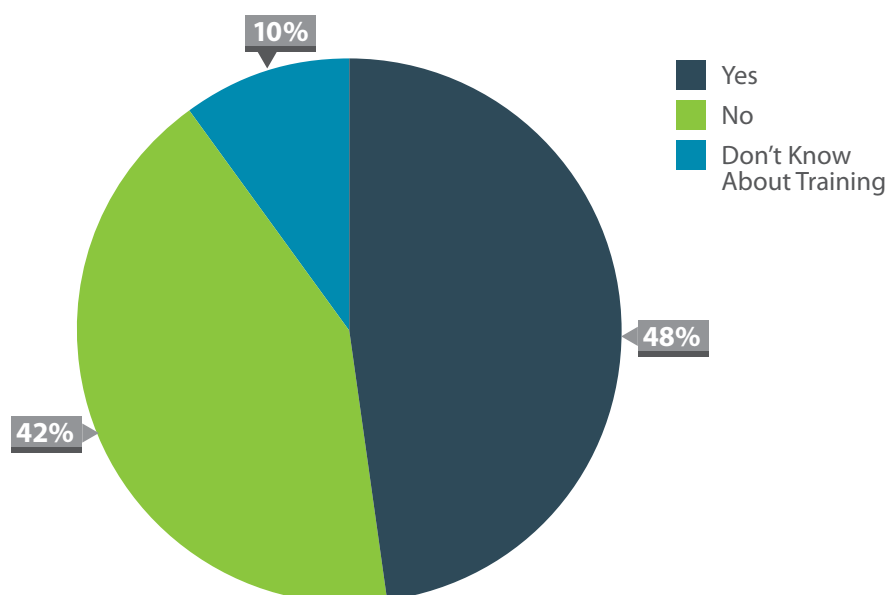
## Survey Coverage

The survey was completed by 79 fire departments across the state. The responses represent approximately 10% of fire departments in the state and 30% of firefighting staff.

## Current Levels of Training

One of the aims of the survey was to look at the current levels of AFV training among fire departments. Of the departments that responded to the survey, 48% indicated that their staff had been offered first responder training for alternative fuels, another 42% said no AFV training was offered to staff and 10% were unaware of AFV training availability (see Figure 1).

**Figure 1: Percentage of Fire Departments Offering AFV Training**



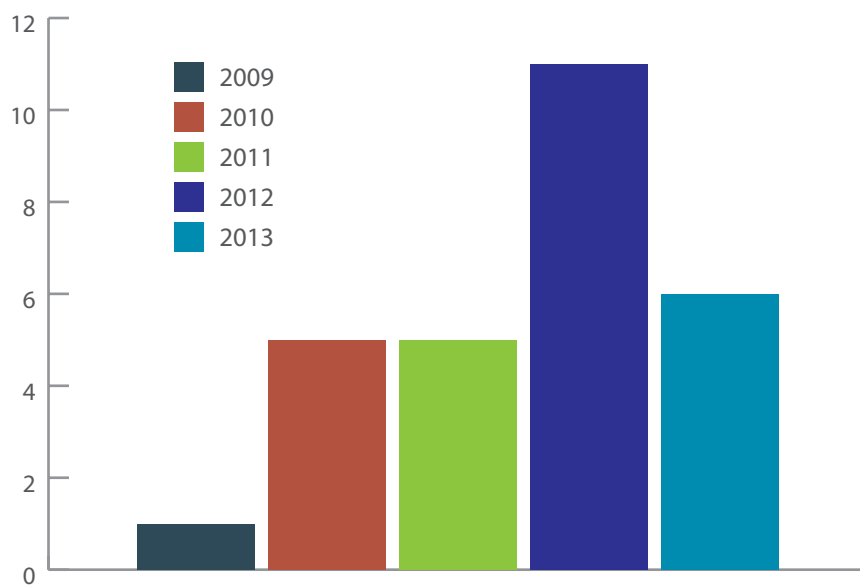
## Type of Training Offered

Over two-thirds of respondents indicate their departments have received first responder trainings for hybrids, electric and natural gas vehicles. Hybrid and electric vehicle training has been offered more often than other alternative fuel types. More than 50% of trainings have covered hybrid or electric vehicles, followed by natural gas (19%), hydrogen/fuel cell (13%), propane (11%) and biofuels (7%).

Fire department personnel receive training in many different settings. While the most commonly held trainings were at the department (67% of trainings), some trainings were held at private training centers (15%) and some were offered online (13%). Less than 3% of respondents indicated that staff is trained at a local community college fire academy.

Alternative fuels trainings were offered as recently as July 2013 and as far back as 2009. Seven respondents could not recall when past trainings were offered or gave no answer. Notably, the number of trainings in 2012 doubled from 2011 and is significantly higher than the number of trainings reported for 2013 (see Figure 2).

**Figure 2: Number of Past Trainings by Year from First Responders Survey Respondents**



## Numbers of Fire Department Trainings and Personnel Trained

Overall, the majority of fire departments have staff trained in hybrid safety. In 50% of fire departments, almost all staff (81% or more) have received hybrid fuel training. Of the 32 survey respondents who said staff has been trained, more than three-quarters indicate their staff has training in other alternative fuel

vehicle safety other than hybrids. The Los Angeles County Fire Department has approximately 3,200 field personnel, and survey responses indicate that roughly 83% to 100% of those 3,200 firefighters have been trained in hybrid vehicle safety.

## Training Satisfaction

Departments receive training in various ways but training is predominantly provided in-house

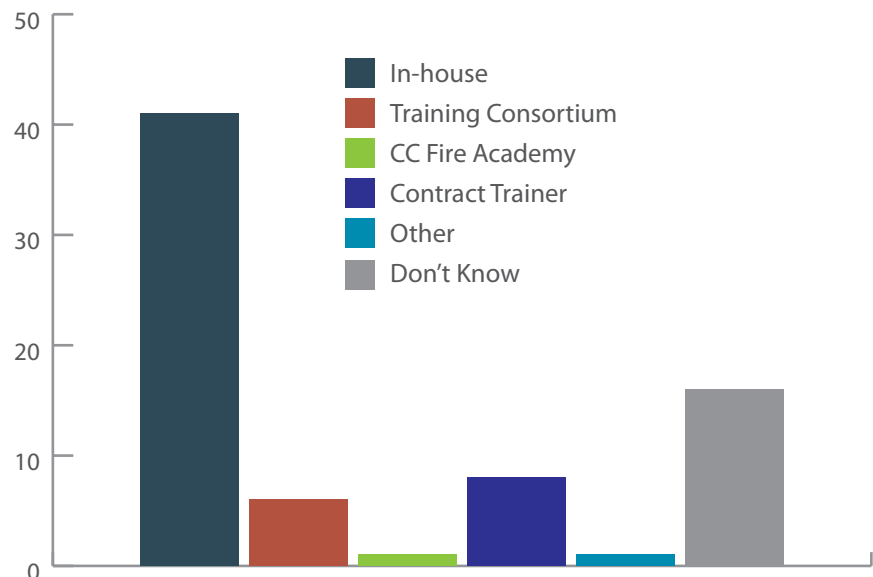
In general, 34% of respondents indicated that they have been satisfied/very satisfied with the AFV training they have received from outside the fire department. For Los Angeles County, over 50% of respondents indicated they have been satisfied/very satisfied with AFV training received from outside of the fire department. However, this question is not applicable to 24% of the total respondents because they receive no training from outside resources.

Fire department chiefs were asked how satisfied they felt their staff was with the training that was offered. The respondents indicated that about 29% of their firefighters have been satisfied and 9% are very satisfied with the AFV training received from outside sources. For Los Angeles County, 43% of respondents indicate their firefighters have been satisfied and 14% very satisfied with the AFV training received from outside sources. About 20% of total respondents said they had no idea how satisfied or dissatisfied staff was with outside training, therefore this may not be a good gauge of the quality of available AFV training.

## Training Methods

As shown in Figure 3, departments receive training in various ways but training is predominantly provided in-house (41%).

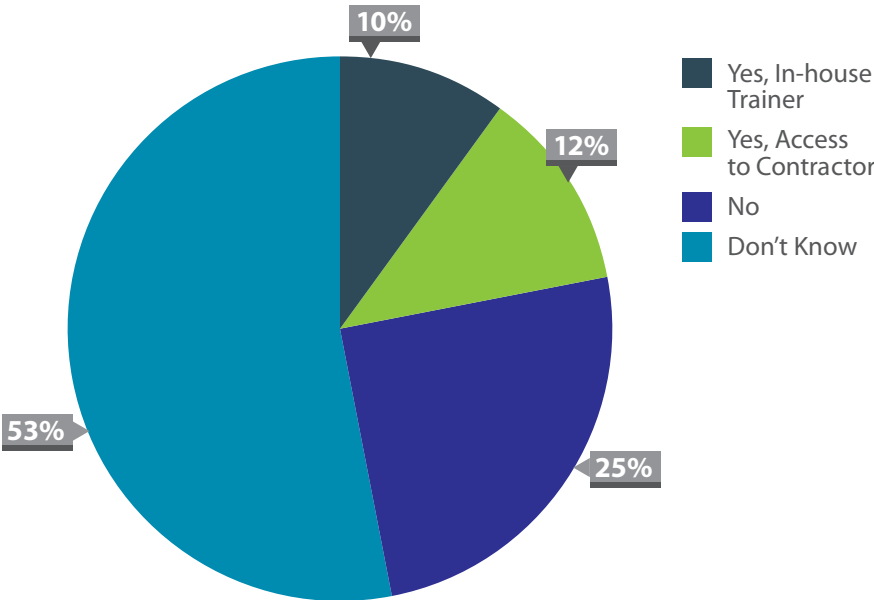
**Figure 3: Training Methods of First Responders Survey Respondents**





Responses from fire department chiefs indicated that the preferred training method is in-house training. Over 50% of respondents indicated they would prefer to receive training in-house by a contractor or department trainer. However, when asked if they knew of an alternative fuel trainer in their area, over half of respondents did not know if there was a trainer in their area (see Figure 4 below).

**Figure 4: Knowledge of an Alternative Fuel Trainer in Area**



Because most trainings are performed in-house, it is important that “train the trainer” opportunities are available. When trainers are trained, they should make sure that individual battalions and companies are aware of new training opportunities.

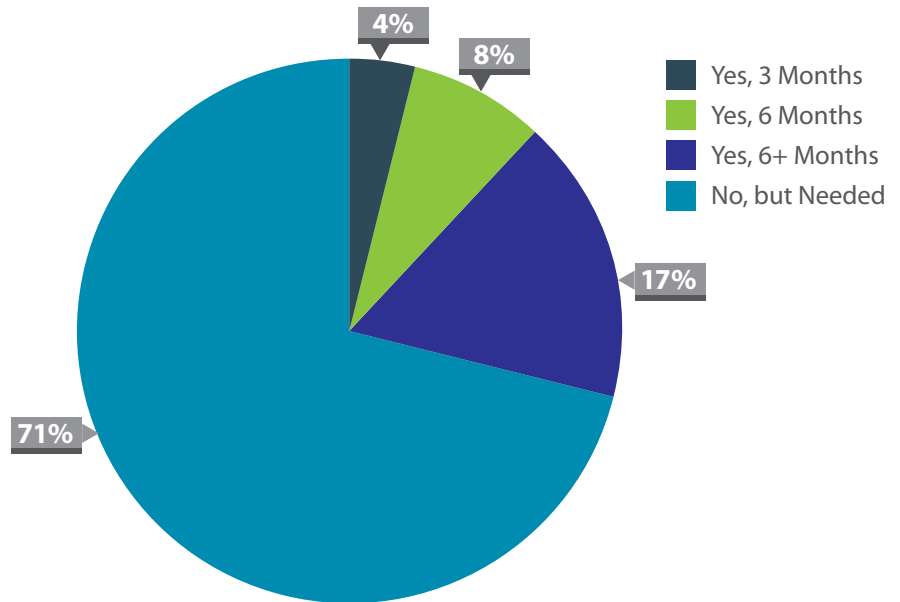
### Curriculum being Used

Various curricula are used in first responder AFV safety training. The F-STEP curriculum is the most often cited curriculum (26%) followed by NAFTC (15%) and NFPA (13%). Of those who mentioned a different curriculum other than the ones listed, they reported using curricula that were department developed from various private sector providers and specifications from manufacturers. Half of respondents did not know what curriculum was used in trainings they had received in the past. This might result from instructors not explicitly stating which curriculum they used.

## Additional Training Plans and Needs

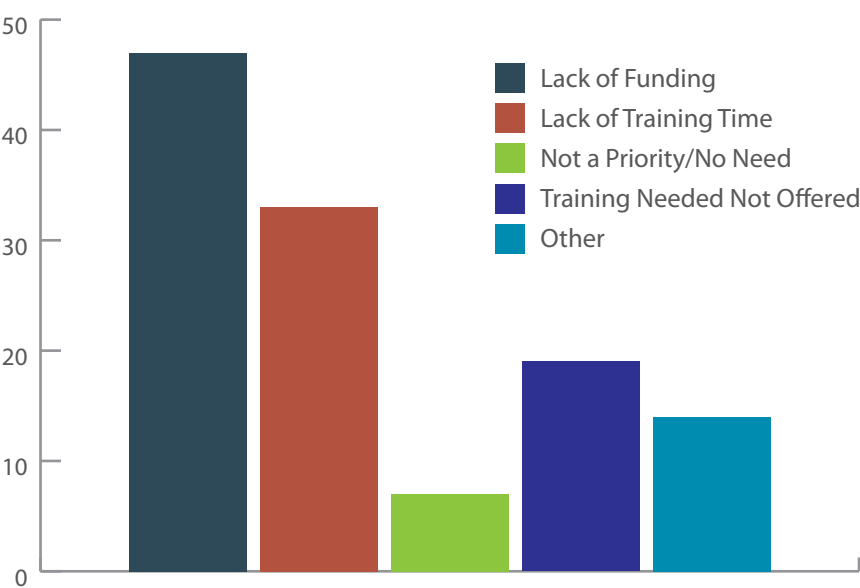
Fire departments realize the need for AFV safety training. While nearly 30% of departments have AFV training scheduled in the near future, some 70% do not have training planned even though they indicated that additional training was needed.

**Figure 5: Planned Additional First Responder Trainings**



The lack of planned trainings is explained largely by the noted barriers to training, namely lack of funding and training time available for staff. Open-ended responses related to lack of training time report that the schedules of firefighters make it difficult to hold trainings or find an available trainer. This is because trainings would need to be offered different times a day or multiple times over several days to insure all staff with varying schedules can attend.

Figure 6: Fire Department Barriers to Training



Training Needed

Fire department chiefs reported the following when asked what alternative fuel training is needed but not currently offered.

- Some 45% of respondents report a continuing need for all types of alternative fuel trainings.
- About 22% report that hybrid and electric trainings are needed.
- Around 15% report needing training in CNG, LNG and flex fuel.

The assessment also highlights the fact that there are other first responders who should receive AFV safety training. More than 60% of respondents felt it was important that paramedics and emergency medical technicians (EMTs) receive first responder AFV training.

# Follow-up Interviews

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Coalitions and CCSE conducted follow-up interviews with individual fire departments, training organizations and industry partners to obtain detailed responses on specific training needs. This section provides insights and conclusions from those interviews.

The following people were interviewed, and their input has shaped report recommendations.

- John Frala, Advanced Transportation and Clean Fuel Technologies Professor, Rio Hondo College, and curriculum writer for NATFC
- Janet Malig, Advanced Transportation and Renewables Director, Cerritos College and Secretary for the Municipal Equipment Maintenance Association (MEMA)
- Eldon Davidson, Director, Center for Advanced Customized Training Solutions, El Camino College
- Jennifer Hamilton, Safety Officer, California Fuel Cell Partnership (FCP)
- Dean Saito, Manager, On Road Mobile Source Strategies, South Coast Air Quality Management District, and main contact for California Natural Gas Vehicle Partnership (CNGVP)
- Greg Newhouse, Advanced Transportation Technology and Energy Program (ATTE) Director, San Diego Miramar College
- Gerald Bernstein, ATR Deputy Sector Navigator, City College of San Francisco
- Don Shellhammer, Vista Fire Department (Retired), and member of California Fire Chiefs Association Southern California Training Officers Section

## Fire Department Chiefs

The majority of trainings are conducted departmentwide in a classroom with a vehicle component. Trainings range from two hours to three days. For the entire department to receive the trainings, many departments divide staff and conduct the same training several times in shifts. Fire departments prefer trainings with vehicles to provide visual and hands-on learning.

## Colleges and Training Organizations

Most firefighters work 24-hour shifts with a rotating schedule so two out of every three days they are off duty. Trainings need to be scheduled carefully so firefighters can attend while not having them work overtime and not during high fire seasons such as summer.

Rio Hondo College is a NAFTC training center offering a variety of first responder trainings. On average, the Rio Hondo College courses have a four-hour classroom component and then a two-hour hands-on vehicle portion.



John Frala reduced the NAFTC curriculum from the original 16 hours to six hours to accommodate firefighters' schedules.

To have effective trainings, a vehicle component with hands-on learning is critical, and stand-alone PowerPoint presentations are insufficient training methods. The classroom portion of training can be conducted at fire departments, but having the vehicle training portion at a training facility is beneficial because facilities already have the space and equipment configured. In addition, using the training facility reduces the costs associated with transporting training vehicles to a different location. Vehicles cannot be driven easily to another site as many are not certified for road use. To accommodate fire departments that cannot get to training facilities yet still provide a vehicle training component, Eldon Davidson at El Camino College proposed the creation of a mobile training lab. The mobile training lab would be equipped with vehicle parts and visual displays for technical hands-on trainings. Given funding and grant opportunities, the mobile training lab could be a cost-effective option for alternative fuel training.

Training facilities acquire funding from two main grant sources: DOE and Employment Training Panel (ETP). The current and foreseeable funding is enough to maintain current training offerings but insufficient to expand or increase training options. ETP is a funding agency created by California Legislature to provide funds for assisting employers in advancing the skills of their workers. However, ETP grants have stipulations that make it difficult for training organizations to schedule and hold trainings, such as requiring a letter of support from labor unions and minimum of 15 students per course. Due to firefighters' schedules, filling trainings with 15 people can be difficult. El Camino College was able to designate alternative fuel trainings as advanced technical skills training courses under the next ETP grant, which will result in a higher per-student funding and allow smaller class sizes or more instructors.

Training courses have had low training attendance because of firefighter work schedules and due to the fact that alternative fuel training competes with firefighters' required courses. As increasing numbers of alternative fuel vehicles come on the road, alternative fuel training may need to become a required course. In 2012, Governor Jerry Brown signed an executive order calling for 1.5 million zero-emission vehicles (ZEV) on California roads by 2025 and outlined steps to accelerate this transition.

Among the ZEVs mention in the executive order are hydrogen fuel cell electric vehicles, and discussions with the California Fuel Cell Partnership (FCP) indicate that hydrogen fuel cell vehicles and infrastructure deployment is expected to increase during 2015-2017. Due to this expected increase in hydrogen vehicles, training organizations should consider holding more hydrogen vehicle and fueling station safety courses. The FCP has web-based educational resources for first responders and has developed curriculum that is vehicle-

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Training facilities are amenable to fire departments' cost and time constraints, so fire departments should communicate to facilities their needs and staff availability

focused involving a one-hour lecture with a hands-on component.<sup>6</sup> FCP is not a training organization but provides the resources to training organizations. Hydrogen fuel cell vehicles can be considered a type of electric vehicle, which is why FCP is working on the creation of a national template for hydrogen training to add to the existing NFPA electric and hybrid program. Along with first responders, FCP stresses the importance of educating permit officials and authorities having jurisdiction (AHJs) in issues related to hydrogen vehicles and infrastructure.

## Recommendations for Fire Departments

The survey shows a need for increased communication between fire department chiefs and their staff. Some 20% of survey respondents had no idea how satisfied or dissatisfied their staff was with outside training. More feedback from staff is needed to assess what outside trainings are the most beneficial and what future trainings are needed. Training facilities are amenable to fire departments' cost and time constraints, so fire departments should communicate to facilities their needs and staff availability. To keep informed on alternative fuels, trainings and funding opportunities, fire departments should regularly check Coalition websites. Appendix G lists all Coalitions and Appendix C has a listing for major California training organizations as well as training resources.

The governor's executive order to have 1.5 million ZEVs by 2025 guarantees increases in alternative fuel use, so fire departments need to make sure firefighters are adequately trained to respond.

## Recommendations for First Responder Training Organizations

The survey results and interviews with fire department chiefs reveal that funding and scheduling are major issues with trainings. Following are key recommendations verified by training providers and alternative fuel industry partners.

## Scheduling Trainings

1. Future trainings may need to be condensed or occur over multiple days to not take up too much of an individual's workday and arranged to accommodate work schedules.

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<sup>6</sup> "Fire and Safety." California Fuel Cell Partnership. N.p., n.d. Web. 26 Nov. 2013. <<http://cafcp.org/toolkits/safety>>.

2. To address time constraints and accommodate varying schedules of firefighters, online trainings may be an option to allow staff to complete training whenever is most convenient. Eldon Davidson at El Camino College affirms that online trainings coupled with hands-on drills with vehicles are viable options for accommodating firefighters' work schedules and in-house training preference while providing useful trainings.
3. If there is a training officer on staff, then increasing the number of in-house trainings may be an option without adding a monetary burden.

## Targeting and Communicating the Importance of AFV Training

1. Fire departments have varying training needs, so identifying training needs and planning training accordingly is important. For example, fire stations near highways have greater need for AFV trainings than rural fire stations. Similarly, hydrogen fuel cell trainings should be offered selectively in areas near hydrogen fuel stations.
2. Because alternative fuel training is not a required firefighter course, training organizations and other alternative fuel stakeholders need to communicate clearly to fire chiefs the value of alternative fuel trainings and be flexible to fire department staff schedules. Keeping fire department staff informed of local and statewide deployment of alternative fuel vehicles and infrastructure can help build the case for training.

## Additional Training Suggestions

1. Utilizing online resources and apps instead of paper will save on training material costs. Rio Hondo College saves around \$250 per course by using electronic materials instead of paper.
2. First responders prefer trainings taught by a fellow first responder. Rio Hondo College and El Camino College have found that trainings are enhanced when a first responder leads the trainings alongside a vehicle expert.
3. There are limited first responder alternative fuel station trainings and as alternative fuel infrastructure increases, training facilities should consider adding fuel station trainings.
4. In addition to firefighter trainings, El Camino College, Rio Hondo College and CNGVP stress the importance of alternative fuel trainings for other first responders such as police and tow truck drivers.
5. Hydrogen fuel cell trainings can be coupled with electric trainings because both are ZEVs and electric vehicles.

# Recommendations for Clean Cities Coalitions

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Coalitions should assist fire departments in locating funding opportunities and direct them to trainers and training facilities

Lack of funding and awareness of trainers are the two major barriers for first responders receiving alternative fuel trainings. Coalitions should assist fire departments in locating funding opportunities and direct them to trainers and training facilities. Fire departments should be kept informed about the nearest training facilities, available trainings and funding opportunities through direct outreach and maintaining up-to-date information on Coalition websites.

Coalitions, along with promoting available trainings, should continue to promote alternative fuels and provide up-to-date information through maintaining regular contact with organizations such as FCP, California Plug-In Electric Vehicle Collaborative and California Natural Gas Vehicle Partnership.

## Training Curriculum

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The three main training curriculum used are NAFTC, F-STEP and NFPA. NAFTC and NFPA are national and international training organizations with curriculums that are not specific to California. Eldon Davidson from El Camino College recommends that training could be improved through a statewide coordinated and approved alternative fuel safety training program, with particulars on what fuel types need to be covered in each region as alternative fuel type use varies by region. For example, Southern California has a need for natural gas safety training, while Northern California has a greater need for trainings on diesel light-duty and hybrid vehicles.

Input from firefighters and El Camino College reveal that the NAFTC curriculum places too much emphasis on alternative fuel theory and not enough on procedural safety measures. NAFTC training curricula should be updated to reflect firefighters' needs through clear, in-depth trainings by fuel type on the procedures to safely handle AFVs for fire prevention, fire suppression and passenger extrication.

John Frala from Rio Hondo College is a curriculum writer for NAFTC with insight on upcoming alternative fuel curricula. The NAFTC natural gas curriculum was updated August 2012, and updated curricula on propane and a new first responder online app are expected to be finalized in early 2014. Curricula are being updated both for technical accuracy and to better meet the needs of trainees.

# Summary of First Responders Survey and Training Recommendations

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## Survey Findings

Fire departments have a lack of awareness about trainings. More than 50% of California fire department chiefs do not know if there is an alternative fuels trainer in their area. Clean Cities Coalitions, trainers and training facilities need to be more active in informing fire departments in their area on the availability of trainers, trainings and workshops in alternative fuel safety. In addition, communication should be increased among fire departments, firefighters and training organizations to ensure firefighters receive satisfactory trainings at convenient times.

Los Angeles County respondents reported higher satisfaction in their training from outside sources than other areas of the state. A deeper look and comparison between Los Angeles County and trainings in other areas will be beneficial to increase training satisfaction in other counties and to insure that firefighters continue to receive effective trainings.

Overall, more training is needed and efforts should be made to increase training opportunities to firefighters, particularly in departments that currently do not offer training. Departments that have been successful could share information on how trainings were funded and structured to meet needs within time and funding constraints.

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Overall, more training is needed and efforts should be made to increase training opportunities to firefighters, particularly in departments that currently do not offer training

## Training Recommendations

Alternative fuel training is not required for firefighters, so fire departments must take the initiative to have their staff trained. Training organizations should emphasize to fire departments the importance of receiving training and how effective, concise and convenient the trainings are. To reach fire departments with a greater need for AFV safety training, organizations should target fire departments in high traffic areas and those near alternative fueling stations. Curricula are being updated so trainings will be shorter while providing essential information with hands-on vehicle segments. If funding is available, training organizations should consider expanding upon training topics to include alternative fueling stations as well as residential and public vehicle charging stations.



Coalitions and training organizations can improve upon keeping fire departments up to date on trainings and alternative fuel vehicle and infrastructure developments. As alternative fuel vehicles and infrastructure increase, fire departments need to make alternative fuel training a higher priority. The Energy Commission reports that from September 2012 to September 2013, PEVs in California increased by 23,000 vehicles, approximately 200%.<sup>7</sup> Alternative fuels will increase due to federal regulations.



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<sup>7</sup> Smith, Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program Staff Draft.



# Findings from Fleet Managers Survey

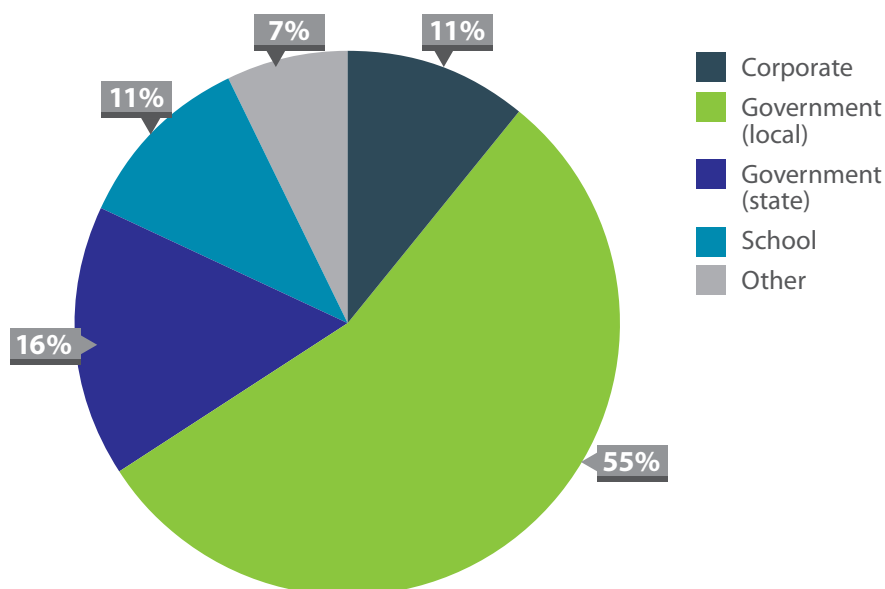
This section provides key findings from the Fleet Managers Survey. Additional survey results, along with the survey questions, are in Appendix E.

## Survey Coverage

Eighty-five respondents throughout California, representing fleets of various types and sizes, completed the survey. The number of fleets that exist in each Clean Cities Coalition is unknown, so it was not feasible to make adjustments to ensure the overall representation of the sample to the entire population of existing fleets. Therefore, it is likely these results may not apply to all existing fleets.

Figure 7 shows the distribution of fleet types for all survey respondents.

**Figure 7: Fleet Managers Survey Responses by Fleet Type**



The majority of fleet manager respondents are from local government (55%) followed by state government (16%). Corporate and school fleets account for 22% of respondents.



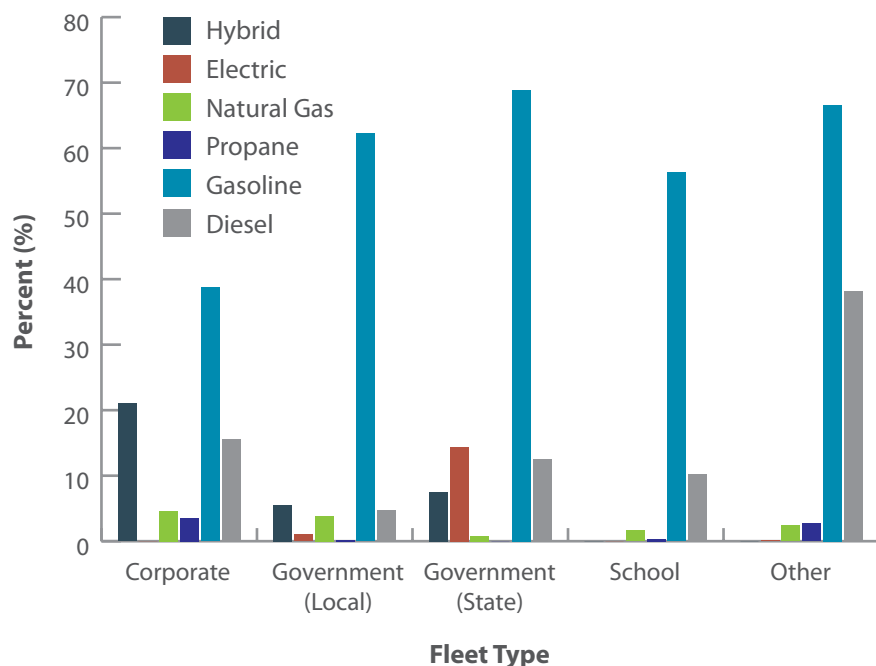
## Vehicle and Fuel Type

On average, 71% of the vehicles in any fleet are light-duty vehicles and 29% are heavy-duty. Corporate fleets are comprised of about 60% light-duty and 40% heavy-duty vehicles. School fleets are on average split 50% light-duty and 50% heavy-duty vehicles. The majority of local and state government fleets are made up of light-duty vehicles. On average, local government fleets have 71% light-duty vehicles and state government fleets have 92%. Of the heavy-duty vehicles, the most prevalent alternative fuel vehicle reported was natural gas. Of the light-duty fleet vehicles, the most prevalent alternative fuel vehicles were hybrids. Bar graphs displaying the number of heavy-duty and light-duty vehicles by fuel type are in Appendix E.

Fleets are primarily comprised of gasoline- and diesel-powered vehicles. Figure 8 shows the percent of vehicle fuel type by each fleet type.

Of the light-duty fleet vehicles, the most prevalent alternative fuel vehicles were hybrids

**Figure 8: Percent of Vehicle Fuel Type by each Fleet Type**



Alternative fuel vehicles, such as hybrid, electric, natural gas and propane, make up at most 25% of responding fleets. In corporate fleets, more than 20% of vehicles are hybrid and nearly 5% are natural gas. State government fleets have the largest proportion of electric vehicles in their fleets with an average of 15% as well as 7.5% hybrid vehicles. Despite the adoption of a large number of alternative fuel vehicles, gasoline-powered vehicles are the predominant fuel type across all fleet types.

Fleet managers across all fuel types identified the highest current training need to be for natural gas-fueled vehicles

### Current Training Needs

Fleet managers across all fuel types identified the highest current training need to be for natural gas-fueled vehicles with state and local government staff expressing a need for hybrid/EV training. In fact, 60% of local government fleet managers said hybrid/EV trainings are either important or the most important training need, reflecting the high level of hybrid adoption in fleets. While government and corporate fleet operators stated no need for propane training, 20% of school officials said propane training is their most important training. Hydrogen fuel cell training needs are ranked as the least important type of training needed primarily due to the lack of hydrogen fuel cell vehicle adoption. Figures 11-14 in Appendix E display this information.

Table B summarizes Figures 12, 13 and 14, showing a ranking of training importance by fuel and vehicle technology.

**Table B: Ranking of Fleet Manager Training Needs by Fleet and Vehicle Technology**

	Corporate	Local Government	State Government	Schools
Natural Gas	Most Important	Most Important	Most Important	Important
Hybrid/EV	Less Important	Important	Most Important	Less Important
Propane	Important	Less Important	Less Important	Most Important
Hydrogen Fuel Cell	Least Important	Least Important	Least Important	Least Important

Based on Table B, the most important training need is for natural gas and the least important training need is for hydrogen fuel cells. Compared to other fleet types, schools place a higher importance for propane training and state governments noted a higher importance for hybrid/EV training.

### Training Needed

In terms of the type of training needed for their fleet mechanics, 66% of fleet managers indicated that mechanical training was important or very important. At the same time, 62% of managers indicated that some type of safety training was important or very important.

The majority of fleet managers (over 65%) indicated that training was not a barrier to adoption of alternative fuel vehicles in their fleets, which does not differ across fleet type. In addition, there is no difference in the perception that training is or is not a barrier to adoption based on the size of the fleet managed.



## Near-future Trends and Training Needs (1–3 years)

Fleet managers project that they will have more hybrid, electric and natural gas vehicles in the near future and that use of hydrogen/fuel cell, propane, ethanol and biodiesel vehicles will either decrease or not change. According to fleet managers, the primary drivers behind any expected changes in fleet composition are changes in clean air regulations, followed by organizational policies to promote alternative fuels and rebates/incentives.

As a result of the projected changes, managers see operation and maintenance training in the following areas becoming more important: hybrid, electric, natural gas and diesel emissions systems (DPF/SCR).

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Fleet managers project that they will have more hybrid, electric and natural gas vehicles in the near future and that use of hydrogen/fuel cell, propane, ethanol and biodiesel vehicles will either decrease or not change



# Follow-up Interviews

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Coalitions conducted follow-up interviews with individual fleet managers and training providers to obtain detailed responses on specific training needs. Fleet managers identified training needs and barriers, while training organizations provided insight on available resources and funding to meet needs and overcome barriers. This section provides conclusions from those follow-up interviews.

The same people that were interviewed in the first responder follow-up interview section were interviewed regarding fleet trainings. In addition, Joe Calavita, who is in charge of ARB's incentive programs for heavy-duty hybrids, was interviewed. Their input has shaped report recommendations.

## Fleet Managers

Technicians mainly obtain training from manufacturers, online, colleges and dealerships. However, fleet managers report that training can be a barrier to AFV adoption because of training costs and time. In addition to the cost of the training itself, there are costs to fleet managers for technician training wages and lost work time. Other barriers are availability of conversion kits, limited number of certified installation mechanics and alternative fuel infrastructure.

AFV adoption barriers vary by the type of alternative fuel, the availability of public infrastructure and the ability to fund fueling stations. For example, when converting to electric vehicles, aside from vehicle costs, there are costs associated with developing charging infrastructure at facilities and additional safety measures. Acquisition costs, limited infrastructure and facility alterations for vehicles are the main reasons some fleets have been slow to convert.

Calavita noted that other barriers to adoption are the risk and fear factors of using new vehicle technology. Vehicles are a costly investment, and fleet operators want to insure the vehicle will fit their needs and that the technology is reliable. CALSTART<sup>8</sup> conducted an Electric Truck (e-truck) User and Industry Survey to understand the primary barriers of the e-truck market in North America. A finding from this survey was a need for better e-truck performance data in real-world usage to validate vehicle concerns such as reliability, range, battery life and maintenance requirements and costs.<sup>9</sup> Performance data can assist fleet managers in making appropriate vehicle purchasing decisions.

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<sup>8</sup> CALSTART is a nonprofit organization in support of a clean transportation industry that provides consulting to spur advanced transportation technologies, fuels and systems.

<sup>9</sup> *Best Fleet Uses, Key Challenges and the Early Business Case for E-Trucks: Findings and Recommendations for the E-Truck Task Force*. Rep. CALSTART, 2012. Web. 26 Nov. 2013. <[http://www.calstart.org/Libraries/E-Truck\\_Task\\_Force\\_Documents/Best\\_Fleet\\_Uses\\_Key\\_Challenges\\_and\\_the\\_Early\\_Business\\_Case\\_for\\_E-Trucks\\_Findings\\_and\\_Recommendations\\_of\\_the\\_E-Truck\\_Task\\_Force.sflb.ashx](http://www.calstart.org/Libraries/E-Truck_Task_Force_Documents/Best_Fleet_Uses_Key_Challenges_and_the_Early_Business_Case_for_E-Trucks_Findings_and_Recommendations_of_the_E-Truck_Task_Force.sflb.ashx)>.

To help address these fears, training organizations and Coalitions could hold drivers panels or publish reviews from fleets currently using AFVs.

## Colleges and Training Organizations

Training providers indicated that the need for additional alternative fuel training varies widely and often depends on when fleets acquire new vehicles.

Janet Malig, Director of Advanced Transportation and Renewables at Cerritos College, reports that while there will always be training needs, training is especially important when vehicles go out of warranty. This is an economic issue because once vehicles are out of warranty it becomes expensive to take them to a dealer for maintenance. When a vehicle is delivered to a fleet, the OEM may give the fleet technician a brief two- to four-hour overview of the vehicle, but once the vehicle is out of warranty, the technician will probably need more detailed vehicle training. Another reason fleet technicians would need training is that the technicians that were trained on the new vehicles may no longer be working for that fleet years later when the vehicles are out of warranty.

Cerritos College works closely with fleet managers to ensure trainings are at the times and locations best suited for their schedules. For example, trainings are offered in the middle of the week or over weekends and held at fleet facilities instead of the college. Two-day trainings that are broken up into smaller segments seem to work well with fleet technicians work schedules. Trainings are publicized online along with targeted flyers sent to fleets and automotive associations such as the Municipal Equipment Maintenance Association (MEMA), Automotive Service Council of California (ASCCA) and California Automotive Teachers. At some colleges, alternative fuel courses are not part of any degree requirement but electives, reducing their attendance and possibly future funding for the course.

Community colleges mainly acquire funding via grants from DOE, California Energy Commission and ETP. These grants are usually for a specific alternative fuel training topic, and often do not allow training organizations to customize trainings for fleets. Greg Newhouse of San Diego Miramar College explained that training organizations establish a training course for a specific grant topic and then reach out to the fleets they are in contact with to sign up technicians for training sessions. This means that fleets may not have a need for the particular training at the time it is offered. Fleets can get customized trainings through contracting with training organizations, but this option can be costly.

Future training funds of around \$1.5 million will be available from the Energy Commission and California Community Colleges Chancellor's Office to be delivered to certain community colleges to ensure training facilities are properly equipped to carry out substantial high-quality vehicle technical trainings.

In addition to community colleges, fleets can acquire trainings from private training companies. These companies can offer more flexible trainings but at a higher cost.

The prominent alternative fuel varies by region. For example, in the Los Angeles region, natural gas is more widely used and there is a high training need for that fuel type, while in the Bay Area, the future training demands are greater for light-duty diesel and hybrid vehicles.

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Alternative fuel technical training is beneficial for fleets to prolong vehicle life, prevent costly vehicle repairs and avoid high dealer maintenance costs once vehicles are out of warranty

## Recommendations for Fleets

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Alternative fuel technical training is beneficial for fleets to prolong vehicle life, prevent costly vehicle repairs and avoid high dealer maintenance costs once vehicles are out of warranty. Outreach and awareness of trainings are largely based on the contacts the training organizing agency has with fleets. Therefore, fleets should locate the nearest college or training organization and communicate their training needs. Training providers may be flexible in pricing and times of courses to fit fleets' individual needs. To reduce training and instructor costs, fleets can join in the same training.

Fleets should utilize Coalitions' resources by checking their websites and remaining in contact with Coalitions to receive information on AFV technologies as well as training and funding opportunities. Appendix G lists all Coalitions, and Appendix C has a listing of major training organizations along with training resources.

## Recommendations for Fleet Training Organizations

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Trainings work best when they provide hands-on components with vehicle and diagnosis software. For training organizations with limited funding, end-of-life vehicles may be acquired from fleets. For instance, the City College of San Francisco has received vehicle donations from taxi companies.

Maintaining good relationships with fleets is crucial for successful training sessions. Training organizations should keep in contact with fleets and manufacturers to know the best times to offer trainings, such as when fleets will have vehicles coming out of warranty or when new vehicle models and technologies are coming out. The length and timing of trainings should take into account fleet technicians' work schedules. Training organizations need

to get feedback from fleets to insure trainings limit work conflicts and do not cause technicians to work overtime.

An example of a training organization that meets the needs of its targeted fleets is the Southern California Regional Transit Training Consortium (SCRTTC). SCRTTC is a not-for-profit consortium comprised of public transportation agencies and academic members with the mission to advance the skills of the Southern California workforce. With direct communication and feedback from transit workers, SCRTTC can provide timely and valuable trainings.

In addition to fleet technicians, independent vehicle servicers, such as garages and mechanics, and vehicle owner-operators, such as taxi and truck drivers, may be in need of AFV training.

## Recommendation for Clean Cities Coalitions

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Beyond alternative fuel-specific training, fleet technicians still require regular training on subjects common to all vehicles, such as electrical, steering and brake systems. Coalitions should continue to work with local fleets to make sure training needs are identified and met.

Several ATTE associated colleges, such as City College of San Francisco, Cerritos College, San Diego Miramar College and Rio Hondo College, agree that Coalitions should play a greater role in alternative fuel trainings through education and outreach on current trainings, funding opportunities and vehicle selection. Following are additional specific recommendations for Coalitions.

- Coalitions should maintain regular communications with training facilities to know what trainings are offered in their region, and Coalitions' websites can post up-to-date training information.
- To assist fleets in receiving funding, Coalitions can have web links to current grants and provide grant writing guidance.
- As more fleets convert to AFVs, they could benefit from guidance on the appropriate alternative fuel type and vehicles to fit their needs. Coalitions can have a role in providing reference tools to assist fleet operators in purchasing the proper AFV. Coalitions could make training more of a priority through working with fleets and training providers to devise training plans for their region.



# Summary of Fleet Managers Survey Findings and Recommendations

## Survey Findings

The leading drivers for AFV adoption are associated with changes in clean air regulations, organizational policies promoting alternative fuels and rebates/incentives. These three factors greatly influence the future composition of fleets and future training needs. Fleet managers project increases in hybrid, electric and natural gas vehicles and see training in those areas as well as in diesel emission systems to be most important. As fleets increase the number of AFVs, specific training for alternative fuel technologies will be increasingly required. Across fleet type and size, the majority of alternative fuel heavy-duty vehicles are natural gas vehicles and the majority of alternative fuel light-duty vehicles are hybrid vehicles.

Based on the findings of this assessment, state and local government fleet staff would benefit the most from additional training focused on hybrid and electric vehicles while trainings for school fleet needs are highest for propane vehicles. Similarly, hybrid vehicle trainings could be targeted toward corporate fleet managers as the survey identified corporate fleets as having the highest percentage of hybrid vehicles. However, fleet training needs are individualized and further discussions with fleet operators may be required to ensure their staff get appropriate training.

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Continued effort is needed to address other barriers to alternative fuel vehicle adoption, such as infrastructure availability, costs and lack of education

More than 60% of survey respondents indicated that further mechanical and safety training is needed and is viewed as important or very important to fleet managers. However, according to this assessment, training is not a barrier to the adoption of AFVs in their fleets, yet gasoline-powered vehicles continue to account for the majority of vehicles across all fleets. Continued effort is needed to address other barriers to alternative fuel vehicle adoption, such as infrastructure availability, costs and lack of education.

In some cases, fleet managers do not require their technicians to get alternative fuel training and do not provide training due to vehicles being serviced by maintenance companies or dealerships. Therefore, alternative fuel training at maintenance companies and dealerships should be considered.

## Training Recommendations

Generally, regardless of AFV fleet composition, technicians will benefit from advanced training in vehicle electric systems. Technical trainings with hands-

on vehicles and diagnostic software learning are most effective. Configuration of software replicating a vehicle diagnostic system that can be operated online will expand training options. With available funds, training organizations could increase trainings for natural gas fuel tank inspections. Community college advance transportation programs have been able to conduct some classes in natural gas cylinder inspection with CSA certification on behalf of SCAQMD, Southern California Gas, and DOE.

When a fleet purchases a new vehicle from a dealership or OEM, the fleet technician receives little to no training on the vehicle. Fleet technical trainings are more valuable to fleets when a new vehicle is purchased or once the vehicle is out of warranty. Training organizations and fleets should maintain close communications so trainings can be scheduled.

Trainings are best organized from one entity that is a neutral party, to avoid any one organization only providing trainings to their contacts and excluding competitor companies. For example, a training grant provided to a fuel company may exclude training technicians from another company selling the same fuel.

## Conclusion

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This report assesses current alternative fuel training needs for first responders and fleet technicians and provides recommendations to improve and increase trainings.

Through surveys and engagement with alternative fuel stakeholders, this assessment highlights that alternative fuel trainings can be improved to better address needs of this transportation sector. Many training organizations are having difficulty filling up training sessions even though the survey results indicate that more than 60% of fleet managers feel mechanic and safety trainings are important and 45% of fire chiefs believe that all types of alternative fuel trainings are still needed. Fire departments and fleets should make alternative fuel training more of a priority, and if funding is a barrier, seek out training grants.

There is a need for more training because 52% of fire departments are not currently offering AFV training to staff. The Fleet Managers Survey indicated that future trainings would be needed to meet expected increases in hybrid, electric, natural gas and propane vehicles. AFV safety training will be progressively important due to the increase in AFV deployment in California from fleet and consumer use. More than 61,000 vehicles in California currently operate on natural gas and LPG, along with more than 40,000 electric vehicles.<sup>10</sup> The number

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Many training organizations are having difficulty filling up training sessions even though the survey results indicate that more than 60% of fleet managers feel mechanic and safety trainings are important and 45% of fire chiefs believe that all types of alternative fuel trainings are still needed

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<sup>10</sup> "Alternative Fuel Vehicles." Consumer Energy Center. California Energy Commission, 2013. Web. 20 Nov. 2013. <<http://www.consumerenergycenter.org/transportation/afvs/index.html>>.

of AFVs is growing rapidly, with the number plug-in electric vehicles increasing by about 200% from September 2012 to September 2013.<sup>11</sup>

Training curricula and course offerings could be modified to better meet fleet and fire department staff needs and work schedules. Online or self-paced courses combined with hands-on components may provide additional flexibility in scheduling. Shortened curricula focusing on the key procedures for first responders could also be used to make sure all first responders get some sort of training.

Training needs for firefighters vary by region, with Southern California having greatest need for natural gas vehicle and fueling station trainings, while Northern California greater needs for hybrid and light-duty diesel trainings. Throughout California, fleet staff training needs vary by fleet type, with the survey results showing the greatest demand for future trainings for hybrid light-duty vehicles and for natural gas heavy-duty vehicles, along with more training on diesel emissions controls. Training organizations should identify what alternative fuels are most prevalent in their region and target trainings to meet the needs of local fleets and fire departments. Some training facilities lack the funds to make the improvements the report identifies, such as increasing the use of demonstration vehicles, diagnosis software and training manuals. Although some grants are available for training organizations, some have specific conditions that make it difficult to customize trainings for fleet staff or first responders.

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### Clean Cities Coalitions play an essential role in providing training information for first responders and fleets statewide

Clean Cities Coalitions play an essential role in providing training information for first responders and fleets statewide. Coalition websites should be a nexus for fire departments and fleets to locate nearby training facilities and learn what training grants are available. As well, Coalitions can provide grant writing guidance and advise fleets on AFV purchases. In addition, Coalitions can facilitate communications between first responders, fleet operators and training organizations.

This report focused on the alternative fuel training needs for firefighters and fleet technicians in California, but it should be noted that widespread training is important as AFVs and infrastructure are increasingly deployed in the state. Many other individuals who may be present during an incident could receive training, such as police, paramedics, EMT and tow truck drivers. Dealership sales staff needs to be familiar with the technology they sell, and independent mechanics will need to become familiar with the vehicles once they leave the dealership system. As well, training for planners and code officials is important as the alternative fuel infrastructure grows in the state. Coalitions and CCSE can continue to work with all these groups to help make the transition to alternative fuels as smooth as possible.

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<sup>11</sup> Smith, Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program Staff Draft.





# Appendix

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Appendix A: Coalition reported first responder and fleet technical trainings during the past two years

Appendix B: Planned Trainings

Appendix C: Training Organizations & Training Resources

Appendix D: First Responders Survey and Additional Findings

Appendix E: Fleet Managers Survey and Additional Findings

Appendix F: Funding Opportunities

Appendix G: California Clean Cities Coalitions



Appendix A: Coalition reported first responder and fleet technical trainings from the past two years

First Responder Training Courses

Coalition	Date	Location	Topic	Number of attendees	Target Audience	Curriculum Used	Funding Amount	Funding Source
San Diego	6/19-6/20/2013	CAL FIRE- San Diego/El Cajon office	NAFTC Train the trainer	20	Region fire trainers	NAFTC		FEMA
Long Beach	6/6/2012	Rio Hondo College	Hybrid Electric/Gaseous Fuels	12	LA County Fire	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	6/20/2013	Rio Hondo College	Hybrid Electric/Gaseous Fuels	11	LA County Fire	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	6/25/2013	Rio Hondo College	Hybrid Electric/Gaseous Fuels	8	LA County Fire	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	9/4/2012	San Bernardino Police	Alt Fueled Vehicles	16	Police Dept	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/4/2013	San Bernardino Fire	Alt Fueled Vehicles	27	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/5/2013	San Bernardino Fire	Alt Fueled Vehicles	17	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/6/2013	San Bernardino Fire	Alt Fueled Vehicles	24	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/7/2013	San Bernardino Fire	Alt Fueled Vehicles	23	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/8/2013	San Bernardino Fire	Alt Fueled Vehicles	14	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/11/2013	San Bernardino Fire	Alt Fueled Vehicles	16	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/13/2013	San Bernardino Fire	Alt Fueled Vehicles	11	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/14/2013	San Bernardino Fire	Alt Fueled Vehicles	17	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	2/15/2013	San Bernardino Fire	Alt Fueled Vehicles	12	County Fire Fighters	NAFTC	758K	ETP Grant with ATTE College, Kern CCD
Long Beach	3/29/2013	El Camino College	Train the Trainer	3	Instructors	NAFTC		El Camino College
Coachella Valley Region	5/13- 5/17/2013	Roy Wilson Training Center	First Responder Safety for Alternative Fuel and Advanced Technology Vehicle training	30-35	Fire personnel	NAFTC		FEMA
Coachella Valley Region	6/13-6/14/2011	College of the Desert in Palm Desert CA	NAFTC Train the trainer	20 -25	First Responder Fire Personnels	NAFTC		Department of Energy Clean Cities Program, conducted by NAFTC
Sacramento	11/19-11/20/2010	Yuba College	NAFTC Train-the-Trainer			NAFTC		
San Joaquin Valley		El Camino College			Bakersfield Fire Dept.	KCCD		
San Joaquin Valley		El Camino College			Coalinga Fire Dept.	KCCD		
San Joaquin Valley		El Camino College			Coalinga Fire Dept.	KCCD		
San Joaquin Valley		El Camino College			Kern County Fire Dept.	KCCD		
San Joaquin Valley		Kern Community College District (KCCD)			Humboldt Bay Fire	KCCD		
San Joaquin Valley		KCCD			Hanford Fire Dept.	KCCD		
San Joaquin Valley		KCCD			Kings County Fire Dept.	KCCD		
San Joaquin Valley		KCCD			Selma Fire Dept.	KCCD		
San Diego			First Responder Safety Training- Alternative Fuel and Advanced Technology Vehicles		Fire personnel in San Diego County	Riverside Community College District (RCCD)		
Western Riverside County			First Responder Safety Training- Alternative Fuel and Advanced Technology Vehicles		Fire personnel in Riverside County	RCCD		
Los Angeles	1/18, 1/19/2011	Pasadena Convention Center	First Responder	80	Fire Fighters/ second responders	NAFTC	7710	Contract course
Los Angeles	2/17, 2/18/2011	Burbank Marriott	First Responder	25	Fire Fighters/ second responders	NAFTC	2500	Contract course
Antelope Valley	12/1/2011	Rio Hondo College	LA County Ride along, First responder	12	Fire Fighters/ second responders	NAFTC		Contract course
Antelope Valley	3/22, 3/23/2012	Rio Hondo College	First Responder/ Second Responder	30	Fire Fighters/ second responders	NAFTC	4200	Contract course

Antelope Valley	4/18, 4/19/2012	Rio Hondo College	First Responder/ Second Responder	25	Fire Fighters/ second responders	NAFTC	4200	Contract course
Antelope Valley	5/10, 5/11/2012	Rio Hondo College	First Responder/ Second Responder	25	Fire Fighters/ second responders	NAFTC	4200	Contract course
Antelope Valley	5/16, 5/17/2012	Rio Hondo College	First Responder/ Second Responder	25	Fire Fighters/ second responders	NAFTC	4200	Contract course
Antelope Valley	6/6, 6/7/2012	Rio Hondo College	First Responder/ Second Responder	25	Fire Fighters/ second responders	NAFTC	4200	Contract course
Antelope Valley	6/20, 6/21/2012	Rio Hondo College	First Responder/ Second Responder	25	Fire Fighters/ second responders	NAFTC	4200	Contract course
East Bay	6/19, 6/20/2012	CAL FIRE- San Diego/El Cajon office	NAFTC Train the trainer	20	Region fire trainers	NAFTC		FEMA

**Technical Training Courses**

Coalition	Date	Location	Topic	Number of attendees	Target Audience	Curriculum Used	Funding Amount	Funding Source
San Diego	9/1/2012	Miramar College ATTE	Cylinder inspection	14	School bus and transit operators			contract course
Silicon Valley		De Anza College, Cupertino	Hybrid Vehicle Training	5	Fleet technicians	Green Transportation Workforce Development Inc.	\$365 per technician (48% of tuition)	Contract with the CEC's Employment Training Panel
Silicon Valley		De Anza College, Cupertino	Electric Vehicle Training	6	Fleet technicians	Green Transportation Workforce Development Inc.	\$365 per technician (48% of tuition)	Contract with the CEC's Employment Training Panel
Silicon Valley		De Anza College, Cupertino	CNG Vehicle Training	6	Fleet technicians	Green Transportation Workforce Development Inc.	\$365 per technician (48% of tuition)	Contract with the CEC's Employment Training Panel
Silicon Valley		BART's Facility, Oakland	Hybrid Vehicle Training	15	Fleet technicians	Green Transportation Workforce Development Inc.	\$365 per technician (48% of tuition)	Contract with the CEC's Employment Training Panel
Silicon Valley	9/11, 9/18, 9/25/2013	Bryant's Auto Electric	Advanced Electric Vehicle Training		Fleet technicians	Green Transportation Workforce Development Inc.	48% of tuition	CEC's Employment Training Panel
Silicon Valley	9/16, 9/23, 9/30/2013	Bryant's Auto Electric	Advanced Hybrid Vehicle Training		Fleet technicians	Green Transportation Workforce Development Inc.	48% of tuition	CEC's Employment Training Panel
Silicon Valley	9/13, 9/20, 9/27/2013	De Anza College	Advanced CNG Vehicle Training		Fleet technicians	Green Transportation Workforce Development Inc.	48% of tuition	CEC's Employment Training Panel
Long Beach	11/-11/2-2012	Cerritos College	Cummins CNG engine/fuel systems	11	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	11/15/2012	Cerritos College	Cummins CNG engine/fuel systems	20	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	11/16-11/17/2012	Cerritos College	Cummins CNG engine/fuel systems	18	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	11/17/2012	City of Beverly Hills	Hybrid Vehicle Maintenance – Prius, Insight, and Focus	10	Municipal Fleets	ATTE/Community College	758K	ETP
Long Beach	2/8-2/9/2012	Long Beach City College	Cummins CNG engine/fuel systems	5	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	2/14-2/15/2012	Long Beach City College	CNG conversions and tank safety	8	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	2/22/2012	Long Beach City College	Cummins CNG engine/fuel systems	15	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	2/23-2/24/2012	Long Beach City College	Cummins CNG engine/fuel systems	10	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	3/6/2012	Gardena Transit	Advanced Electrical	12	Transits	SCRITC	758K	ETP
Long Beach	3/14-3/15	Long Beach City College	Cummins CNG engine/fuel systems	12	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	5/1/2012	City of Santa Ana	Advanced Electrical	6	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	5/8/2012	Cerritos College	Advanced Electrical	7	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	1/24-1/26	Long Beach City College	Liquified Natural Gas LNG	7	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	6/19-6/21	Long Beach City College	Liquified Natural Gas LNG	2	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	11/15/2012	Cerritos College	Electric Vehicle	11	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	4/10/2012	Long Beach City College	Cummins CNG engine/fuel systems	6	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	4/11/2012	Long Beach City College	Cummins CNG engine/fuel systems	9	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	4/18/2012	Long Beach City College	Cummins CNG engine/fuel systems	19	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	4/20/2012	Long Beach City College	Cummins CNG engine/fuel systems	21	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	4/25/2012	Long Beach City College	Cummins CNG engine/fuel systems	16	Municipal and Private Fleets	ATTE/Community College	758K	ETP

[illegible]

Long Beach	3/13/2013	Long Beach City College	Cummins CNG engine/fuel systems	10	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	2/26/2013	Long Beach City College	Cummins CNG engine/fuel systems	16	Municipal and Private Fleets	ATTE/Community College	758K	ETP
Long Beach	3/19/2013	Long Beach City College	Cummins CNG engine/fuel systems	18	Transits	SCR TTC	758K	ETP
Long Beach	3/20/2013	Long Beach City College	Cummins CNG engine/fuel systems	17	Transits	SCR TTC	758K	ETP
Long Beach	3/26/2013	Long Beach City College	Cummins CNG engine/fuel systems	15	Transits	SCR TTC	758K	ETP
Long Beach	3/27/2013	Long Beach City College	Cummins CNG engine/fuel systems	14	Transits	SCR TTC	758K	ETP
Coachella Valley Region	9/5-6/2013	College of the Desert	Natural Gas Cylinder Inspection Course	17	Fleet Managers and Maintenance Personnel	ATTE		South Coast AQMDD, from the DOE ARRA Funds
Coachella Valley Region	4/14/2013	College of the Desert	CNG Cylinder Inspection Training		Technicians	ATTE		This was paid by attendees. \$780 for the class and \$375 for the exam
Coachella Valley Region	2/21/2013	Palm Springs CA	Charging Infrastructure Workshop Zoning and Parking Building codes updates Streamlines approach & inspection Training and education tactics	23	Electrical Engineer, Planners, Management Analyst, Charging station host, Educators, City Manager	ATTE PEV Collaborative		Contract course
Coachella Valley Region	7/17/2012	College of the Desert	California electric Codes and Standards for Electric Vehicles (EV). Site Assessments, Load Calculations, and Safety . EV Permitting. Utility Notification.	25	Government officials, planners, managers, and inspectors; utility staff; contractors; private and public facility owners and managers; other Electric Vehicle industry and related stakeholders	Electric Vehicle Infrastructure Training Program EVITP	Funding Opportunity Number: Project/OWP # 225.SCG01641.03	Contract course  SCAQMD sponsored the EVITP Certified Master Instructor
Sacramento	9/7 - 9/9/2011	TEECO Products, Inc	Alternative Fuel Vehicles Overview and Hands-On Propane Fueling System Review	14	Private- and Public-Sector Fleet Mgr's	Transfer Flow, Inc. Training Materials		CA Energy Commission AB 118 Funds
Los Angeles	1/15/2011	Rio Hondo College	Hybrid Safety Training	25	City Managers/Fleet managers	Rio Hondo College	2500	Contract course
Los Angeles	3/14/2011	Rio Hondo College	First Responder	15	CODA employees	CODA Automotive		IDRC Grant
Los Angeles	4/18/2011	Rio Hondo College	ERG Guide	15	CODA employees	CODA Automotive		IDRC Grant
Los Angeles	5/19/2011	Rio Hondo College	ERG Guide	10	CODA employees	CODA Automotive		IDRC Grant
Los Angeles	6/27 to 7/8/2011	Rio Hondo College	Hydrogen Fuel Cell	80	Various attendees	Rio Hondo College	4000	Contract course
Los Angeles	9/7/2011	Rio Hondo College	EV plug-in Electric Vehicle	25	Industry managers	Rio Hondo College	5400	Contract course
Los Angeles	9/22, 23/2011	Rio Hondo College	EV plug-in Electric Vehicle	25	Industry managers	Rio Hondo College	10800	Contract course
Los Angeles	9/23 to 12/10	Rio Hondo College	CNG/LNG/Hydrogen/Propane	30	Regular semester class	NAFTC		Degree Class
Los Angeles	1/30 to 5/24/2012	Rio Hondo College	EV plug-in Electric Vehicle	30	Regular semester class	NAFTC		Degree Class
Los Angeles	4/4, 5/2012	Rio Hondo College	John Deere CNG	25	John Deere High school technicians	John Deere power systems	5600	Contract course
Los Angeles	4/11, 12/2012	Rio Hondo College	John Deere CNG	25	John Deere High school technicians	John Deere power systems	5600	Contract course
Los Angeles	5/2, 3/2012	Rio Hondo College	John Deere CNG	25	John Deere High school technicians	John Deere power systems	5600	Contract course
Los Angeles	6/1/2012	Rio Hondo College	High Voltage Battery safety	15	CODA employees	Rio Hondo College	4000	IDRC Grant
Los Angeles	7/2 to 6/2012	Maui Dealers Assoc	EV plug-in Electric Vehicle	5	Dealers assoc staff	NAFTC	10500	Contract course
Los Angeles	7/23, 24/2012	Rio Hondo College	Petroleum Reduction Technologies	24	Clean Cities Managers	NAFTC	5600	Contract course
Los Angeles	8/30,31/2012	Rio Hondo College	EV plug-in Electric Vehicle	10	Various attendees	CODA/Rio Hondo	10500	IDRC Grant
Los Angeles	9/7/2012	CODA Lab	EV plug-in Electric Vehicle	10	CODA employees	CODA/Rio Hondo	5600	IDRC Grant



Los Angeles	9/15/2012	Rio Hondo College	High Voltage Battery safety	10	Various attendees	Rio Hondo College	4200	Contract course
Los Angeles	9/17, to 20/2012	John Deere Arkansas	High Voltage Battery safety	15	John Deere technicians	John Deere power systems	5200	Contract course
Los Angeles	10/9,10/2012	Rio Hondo College	High Voltage Battery safety	20	John Deere technicians	John Deere power systems	5600	Contract course
Los Angeles	10/19,20/2012	Cerritos College	EV plug-in Electric Vehicle	20	Various attendees	Rio Hondo College		Contract course
Los Angeles	11/11,12/2012	Rio Hondo College	Petroleum Reduction Technologies	20	Clean Cities Managers	NAFTC	5600	Contract course
Los Angeles	1/16/2013	OCTA	Honda GX CNG	30	OCTA Employees	Honda	7710	Contract course
Los Angeles	3/13/2012	Honda Corp	Plug-in FIT	25	Honda employees	Honda		Contract course
Los Angeles	4/15 to 19/2013	Morgan Town	EV plug-in Electric Vehicle	15	Various attendees	NAFTC	2500	Contract course
Los Angeles	6/14,15/2013	Rio Hondo College	EV plug-in Electric Vehicle	25	ASSCA shop owners	NAFTC	2500	Contract course
Los Angeles	7/26,27/2013	Rio Hondo College	EV plug-in Electric Vehicle	30	ASSCA shop owners	NAFTC	5200	Contract course
Los Angeles	8/13,14,15/2013	Rio Hondo College	EV plug-in Electric Vehicle	25	California Auto teachers	NAFTC	2500	Contract course
East Bay	5/8 & 5/9 2012	City of Fairfield	Hybrid technician training	25	all fleets	Snap-On		EBCCC sponsored
East Bay	8/2 & 8/3, 2011	City of Sacramento	LPG technician training	40	all fleets	TSTC/CleanFuel		ARRA grant, EBCCC sponsored

## **Appendix B: Planned Trainings**

California Clean Cities Coalitions reported on planned or available trainings for the upcoming year, however, many trainings are still being planned. Appendix C has a listing of major training facilities for fleet technicians and first responders. Neither the list below nor appendix C is exhaustive.

### First Responder and Technical Training

NAFTC has five training centers throughout California at El Camino College, Fresno City College, Modesto Junior College, Rio Hondo Community College and Yuba College. These locations offer first responder and technical trainings year-round.

### First Responder Trainings

The Economic Development/Contract Training Department of Riverside Community College District (RCCD) has training sessions planned through June 2014 for fire agencies in Southern California on First Responder Safety Training-Alternative Fuel and Advanced Technology Vehicles.

The California Department of Forestry and Fire Protection (CalFire), Office of the State Fire Marshal State Fire Training has four hybrid training courses covering incident management, fire prevention and firefighting. These trainings are currently planning for October and December 2013 at the Allan Hancock College in Santa Maria, California.

Previous trainings have been funded by DOE and FEMA grants, and further grants may be available in the future.

### Fleet Trainings

The Advanced Transportation Renewables Program (ATR) formerly ATTE, offered through California Community Colleges Economic and Workforce Development program, links industry needs with technical trainings. ATR centers include City College of San Francisco, Cerritos Community College, College of the Desert and San Diego Community College. ATR centers and other community colleges offer alternative fuel technical trainings for fleet managers and technicians in addition to regular credit courses.

The Southern California Regional Transit Training Consortium (SCR TTC) offers technical alternative fuel and vehicle trainings to meet the needs of transit agency staff. Currently planned trainings have been scheduled from October 2013 to February 2014 on the topics of hybrid vehicle safety and maintenance.

The Los Angeles Community College District offers first responder and technical trainings on hybrids, electric, fuel cell/hydrogen, CNG and biofuel vehicles and related technologies. Trainings are scheduled and catered to the recipients.

The Green Transportation Workforce Development (GTWD) offers technical training courses at De Anza College in Cupertino, Calif., on the topics of electric, hybrid and CNG vehicle technologies.

The Natural Gas Vehicle Institute (NGVi) is an Automotive Service Excellence (ASE) Accredited national training and consulting company providing technician and fleet operations training for natural gas vehicles. NGVi offers public and in-house vehicle and fueling station trainings. Trainings cover the complete vehicle from engine, fuel system and emission control technology.

Cummins Westport, a heavy-duty natural gas engine manufacturer, offers online engine service trainings as well as online materials and videos on fueling systems, maintenance and facility upgrades.

## Appendix C: Training Organizations and Training Resources

These lists are not all-inclusive

### Training Organizations

Name	Website
Natural Gas Vehicle Institute (NGVi)	<a href="http://www.ngvi.com/training.html">http://www.ngvi.com/training.html</a>
National Automotive Technicians Education Foundation (NATEF)	<a href="http://www.natef.org/">http://www.natef.org/</a>
Clean Vehicle Education Foundation (CVEF)	<a href="http://www.cleanvehicle.org">http://www.cleanvehicle.org</a>
National Alternative Fuel Training Consortium (NAFTC)	<a href="http://www.naftc.wvu.edu">http://www.naftc.wvu.edu</a>
Miramar College	<a href="http://www.sdmiramar.edu">http://www.sdmiramar.edu</a>
Rio Hondo College	<a href="http://riohondo.edu">http://riohondo.edu</a>
Long Beach City College	<a href="http://www.lbcc.edu">http://www.lbcc.edu</a>
El Camino College	<a href="http://www.elcamino.edu">http://www.elcamino.edu</a>
Kern Community College District	<a href="http://kccd.edu">http://kccd.edu</a>
Riverside Community College District	<a href="http://rccd.edu">http://rccd.edu</a>
Los Angeles Community College District	<a href="http://laccd.edu">http://laccd.edu</a>
Los Angeles Trade- Technical College	<a href="http://www.lattc.edu">http://www.lattc.edu</a>
Cerritos College	<a href="http://www.cerritos.edu">http://www.cerritos.edu</a>
College of the Desert	<a href="http://www.collegeofthedesert.edu">http://www.collegeofthedesert.edu</a>
American River College	<a href="http://www.arc.losrios.edu">http://www.arc.losrios.edu</a>
Sacramento City College	<a href="http://www.scc.losrios.edu">http://www.scc.losrios.edu</a>
Southern California Regional Transit Training Consortium	<a href="http://www.scrttc.com/">http://www.scrttc.com/</a>
Cal Fire: Office of the State Fire Marshal	<a href="http://osfm.fire.ca.gov/training/alternativefuelvehicles.php">http://osfm.fire.ca.gov/training/alternativefuelvehicles.php</a>

## **Alternative Fuels Training Resources and Materials**

The following is a listing of key public training resources on alternative fuels.

### **Books, reference guides, phone and tablet apps**

- NFPA's Electric Vehicle Safety Training Project  
<http://www.evsafetytraining.org/Training.aspx>
- CalFire's Alternative Fuel Vehicle Training Resources  
<http://osfm.fire.ca.gov/training/alternativefuelvehicles.php>
  - Student manuals and handouts and instructor information
- CalFire Emergency Response Guide to Alternative Fuel Vehicles (June 2009)  
<http://osfm.fire.ca.gov/training/pdf/alternativefuelvehicles/Altfuelintroduction.pdf>
- US DOE's Clean Cities Program Training Videos  
<http://www.youtube.com/cleancitiestv>
- NAFTC First Responder Quick Reference Guide 2012  
<http://www.afvsafetytraining.com/qrg.html>
- California Fuel Cell Partnership Fire and Safety Toolkit contain the following:  
<http://cafcp.org/toolkits/safety>
  - Emergency Responses Guides
  - How to respond to a fuel cell electric vehicle incident
  - First responder web-based course

### **Programs**

- DRIVE CA's Alternative & Renewable Fuel & Vehicle Technology Program  
<http://www.energy.ca.gov/drive/>

## Appendix D: First Responders Survey and Additional Findings

### First Responders Survey

#### Introduction:

*This survey is being conducted by the California Clean Cities Coalitions in order to better understand the alternative fuels training needs in the state. Specifically, the survey is aimed at the training needs of first responders.*

*Imagine a scenario where a Class 8 tractor fueled by liquefied natural gas has crashed into a Nissan Leaf electric vehicle on the interstate. Your crew is first on the scene. Do you know how to keep everyone safe? Are you familiar with the safety procedures for alternative fuels?*

As the number of alternative fuel vehicles in California increases, so does the importance of training for first responders' on alternatives fuels also increase. *Our mission is to make sure all first responders are adequately trained for situations like this. You can help us achieve our mission by filling out the following survey.*

This survey has been designed to be completed by department training officers in consultation with others involved with training and will take approximately 15 minutes to complete. The answers you share will be confidential and results will only be presented in aggregate without any identifying information.

*After we run our surveys we will follow up with some departments via phone to get any additional information that's needed.*

#### A. Demographic Information

*In order to make it easier to follow up with you in the future, please provide the following information.*

1. Your Name: \_\_\_\_\_
2. Your position title: \_\_\_\_\_
3. Contact information:
  - a. Phone Number: \_\_\_\_\_
  - b. Email address: \_\_\_\_\_
4. What is the number of uniformed staff at your department? \_\_\_\_\_
5. What county is your department located in?

#### B. Training

6. Has your staff been offered first responder training for alternative fuels?
  - a. Yes



- b. No
  - c. Don't know
- (If No/Don't Know – skip to question 10)*

7. What curriculum is used in the alternative fuel training your department has received? (select all that apply)
- a. NAFTC
  - b. NFPA
  - c. California FSTEP
  - d. Other \_\_\_\_\_
  - e. Don't know
8. Which alternative fuel types were covered as part of the training? (select all that apply)
- a. Hybrid
  - b. Electric
  - c. Natural Gas
  - d. Propane
  - e. Hydrogen/Fuel Cell
  - f. Biofuels
  - g. Other \_\_\_\_\_
9. Who offered this training and when was the most recent training held?
- a. Training offered by: \_\_\_\_\_
  - b. Month/Year of most recent training: \_\_\_\_\_
10. Where was this training held?
- a. At the department
  - b. At the local community college (specify) \_\_\_\_\_
  - c. At a private training center
  - d. Online training module
  - e. Other \_\_\_\_\_
11. How many members of your department have received training in alternative fuel safety?
- a. \_\_\_\_ Hybrids
  - b. \_\_\_\_ All other alternative fuel vehicle types
12. How satisfied have you been with the alternative fuel vehicle safety training your staff has received from outside the department?
- a. Very Unsatisfied
  - b. Dissatisfied
  - c. Neutral
  - d. Satisfied
  - e. Very Satisfied
  - f. Not Applicable
  - g. Don't know

h. Comments:

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13. How satisfied have your firefighters been with the alternative fuel vehicle safety training they have received from outside the department?

- a. Very Dissatisfied
- b. Dissatisfied
- c. Neutral
- d. Satisfied
- e. Very Satisfied
- f. Not Applicable
- g. Don't know
- h. Comments:

14. Are additional trainings planned?

- a. Yes, in the next three (3) months
- b. Yes, in the next six (6) months
- c. No, but additional trainings are need
- d. No, additional trainings are not needed

15. How does your department usually receive training?

- a. Dedicated in-house trainer
- b. Department part of a training consortia
- c. Community college fire academy
- d. Contract trainers
- e. Other \_\_\_\_\_
- f. I don't know

16. Is there an alternative fuels trainer in your area?

- a. Yes, there is a qualified trainer available in my department or training center
- b. Yes, we have access to a qualified contract trainer
- c. No
- d. Don't know

17. Which type of reference materials does your department keep on hand for auto extraction (select all that apply)

- a. Tablet- or smartphone-based quick response guide
- b. Paper-based quick response guide
- c. Paper reference materials
- d. Other \_\_\_\_\_

18. Which of the following barriers limit the number of people receiving alternative fuel vehicle response safety training? (select all that apply)

- a. Lack of funding
- b. Lack of training time available
- c. Not a priority/No need for this type of training
- d. The alternative fuel training we need is not being offered
- e. Other \_\_\_\_\_

19. Please describe the type(s) of alternative fuel training needed that is not currently offered.

20. How would you prefer your department to receive this training?

- a. In-house training by department-based trainer
- b. In-house training by contract trainer
- c. At a regional training center (i.e. Community College)
- d. Online
- e. No preference
- f. Other \_\_\_\_\_

21. Which of the following parties do you feel should also receive training on alternative vehicle safety? (1 = feel strongly they **should not** need training, 2= feel they probably should not receive training, 3= Neutral, 4= Feel they probably should receive training, 5 = feel strongly they **should** receive training)

- |                      |   |   |   |   |   |
|----------------------|---|---|---|---|---|
| a. Police            | 1 | 2 | 3 | 4 | 5 |
| b. Paramedics/EMT    | 1 | 2 | 3 | 4 | 5 |
| c. Tow-truck drivers | 1 | 2 | 3 | 4 | 5 |
| d. Other _____       |   |   |   |   |   |

22. Please use the space below to offer any additional comments or concerns you may have related to alternative fuel vehicle safety training.

*That completes the survey. Thank you for your assistance. You may be contacted via email or telephone over the next few weeks for a brief follow up.*

## First Responders Survey Additional Findings

### Survey Coverage

Table C shows the number of fire department staff represented in the First Responders Survey by Coalition. Table C shows the number and percentage of responses by Clean Cities Coalition region.

**Table C:** Number of Fire Department Staff Represented in the First Responders Survey by Coalition

Coalition	Number of Staff
San Joaquin Valley	273
Central Coast	1060
San Diego	2132
Silicon Valley	811
East Bay	437
Western Riverside	1747
Los Angeles	3661
Sacramento	425
Southern California	608
San Francisco	1400
Coachella	52
Long Beach	350

**Table D:** Number and Percentage of First Responder Survey Responses by Coalition region

Coalition	Responses	Percent
San Joaquin Valley	9	11.25
Central Coast	11	13.75
San Diego	13	16.25
Silicon Valley	4	5
East Bay	5	6.25
Western Riverside	3	3.75
Los Angeles	10*	13.75
Sacramento	13	16.25
Southern California	8	10
San Francisco	1	1.25
Coachella	1	1.25
Long Beach	1	1.25

*\*Note there were multiple responses entered for various agencies and fire departments in particular seven for Los Angeles County. Seven of ten responses for Los Angeles do not represent separate entities; the other three fire departments represented in the Los Angeles coalition are City of Los Angeles, Redondo Beach, and Arcadia. Responses for Los Angeles County are grouped and analyzed as a single response.*

Table E below breaks down the percentage of fire departments offering alternative fuel training by Clean Cities Coalition.

**Table E:** Percentage of AFV Training Offered at Fire Departments by Coalition

Coalition	Yes	No	Don't Know
Central Coast	36%	45%	18%
Coachella	100%	0%	0%
East Bay	60%	20%	20%
Long Beach	100%	0%	0%
Los Angeles	75%	25%	0%
San Joaquin Valley	11%	67%	22%
Sacramento	31%	69%	0%
San Diego	77%	15%	8%
San Francisco	100%	0%	0%
Silicon Valley	50%	25%	25%
Southern California	36%	64%	0%
Western Riverside	33%	67%	0%



## Appendix E: Fleet Managers Survey and Additional Findings

### Fleet Managers Survey

#### Introduction:

*State and local mandates are requiring fleets to adopt more and more alternative fuel and zero emissions vehicles. Are your mechanics trained and equipped to maintain these different types of vehicles?*

*This survey is being conducted by the California Clean Cities Coalitions in order to gain an understanding of the alternative fuel vehicle (AFV) training needs and to reduce the barriers to deployment of AFVs. Our mission is to make sure fleet mechanics have the training they need to safely work on AFVs. As fleet managers are ideally positioned to be able to identify unmet AFV training needs, you can help us achieve our mission by filling out the following survey.*

*This survey has been designed to be completed by fleet managers of all types and will take approximately 15 minutes to complete. The answers you share will be confidential and results will only be presented in aggregate without any identifying information.*

*After we run our surveys we will follow up with some fleets via phone to get any additional information that's needed.*

#### Demographic Information

*In order to make it easier to follow up with you in the future, please provide the following information.*

1. Organization name: \_\_\_\_\_
2. Your name: \_\_\_\_\_
3. Phone number: \_\_\_\_\_
4. Email address: \_\_\_\_\_

**A. Your Fleet**

5. What type of fleet do you manage?
- a. Corporate Fleet
  - b. Government – Local
  - c. Government – State
  - d. School District
  - e. General/Other
6. How many **heavy duty** vehicles (over 14,000 pounds GVW) do you currently have in your fleet?  
\_\_\_\_\_
7. Please indicate the number of **heavy duty** vehicles (over 14,000 pounds GVW) you have in each of the fuel categories below:
- a. \_\_\_\_ Hybrid
  - b. \_\_\_\_ Electric
  - c. \_\_\_\_ Natural Gas
  - d. \_\_\_\_ Propane
  - e. \_\_\_\_ Hydrogen/Fuel Cell
  - f. \_\_\_\_ Gasoline
  - g. \_\_\_\_ Diesel
  - h. \_\_\_\_ Other \_\_\_\_\_
8. How many **light duty** vehicles (less than 14,000 pounds GVW) do you have in your fleet? \_\_\_\_\_
9. Please indicate the number of **light duty** vehicles (less than 14,000 pounds GVW) you have in each of the fuel categories below:
- a. \_\_\_\_ Hybrid
  - b. \_\_\_\_ Electric
  - c. \_\_\_\_ Natural Gas
  - d. \_\_\_\_ Propane
  - e. \_\_\_\_ Hydrogen/Fuel Cell
  - f. \_\_\_\_ Gasoline
  - g. \_\_\_\_ Diesel
  - h. \_\_\_\_ Other \_\_\_\_\_

**B. Current training needs**

10. Based upon the vehicles in your fleet, what are your alternative fuel-related training needs at present?

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11. Please indicate your fleet's training needs by each category listed below.

1 = Least Important, 5 = Most Important

a. Hybrid/Electric	1	2	3	4	5	N/A
b. Natural Gas	1	2	3	4	5	N/A
c. Propane	1	2	3	4	5	N/A
d. Hydrogen/Fuel Cell	1	2	3	4	5	N/A
e. Diesel Emissions Systems(DPF/SCR)	1	2	3	4	5	N/A

12. Is training a barrier to the adoption of alternative fuel vehicles into your fleet?

- a. ☐ Yes
- b. ☐ No
- c. ☐ Don't know

**C. Training needs in near future** – *Training needs can change with the changing composition of a fleet. We now have a few questions to ask about what changes are projected for your fleet in the next one (1) to three (3) years and how you expect they will affect your training needs.*

13. In the next 1-3 years, how do you expect alternative fuel vehicles to change the makeup of your fleet?

1 = Smaller portion, 2 = No change, 3 = Larger portion

a. Hybrid/Electric	1	2	3	N/A
b. Natural Gas	1	2	3	N/A
c. Propane	1	2	3	N/A
d. Hydrogen/Fuel Cell	1	2	3	N/A
e. Biodiesel	1	2	3	N/A
f. Ethanol	1	2	3	N/A

14. What other changes, if any, do you project for your fleet in the immediate future (1-3 years)?

15. How will your fleet's training needs change in response to the expected changes to your fleet composition?

1 = Become Less Important, 3 = No change, 5 = Become More Important

a. Hybrid/Electric	1	2	3	4	5	N/A
b. Natural Gas	1	2	3	4	5	N/A
c. Propane	1	2	3	4	5	N/A
d. Hydrogen/Fuel Cell	1	2	3	4	5	N/A
e. Biodiesel	1	2	3	4	5	N/A
f. Ethanol	1	2	3	4	5	N/A
g. Diesel Emissions Systems (DPF/SCR)	1	2	3	4	5	N/A

16. What are any other training implications of these projected moves?

17. What factor(s) or outside influence(s) is/are influencing your projection of your fleet changes?  
(select all that apply)

- a. Economy poised to grow – will lead to more hiring and increase fleet size.
- b. Economy expected to contract- leading to fewer jobs and smaller fleet
- c. Clean air regulations/government mandates will force purchase of clean vehicles
- d. Organizational policy promoting move to more efficient and/or alternative fuel vehicles
- e. Rebate/incentive programs
- f. Other \_\_\_\_\_

18. Please describe below any other current (or projected) training needs of your fleet:

19. How important is it that your fleet mechanics receive **mechanical training** related to alternative fuel vehicles?

- a. Not important – would not send staff if training offered
- b. Somewhat important – would consider sending staff if training offered
- c. Important – would send staff if training offered
- d. Very Important – have been searching for this type of opportunity

20. How important is it that your fleet mechanics receive **emergency response safety training** related to alternative fuel vehicles?

- a. Not important – would not send staff if training offered
- b. Somewhat important – would consider sending staff if training offered
- c. Important – would send staff if training offered
- d. Very Important – have been searching for this type of opportunity

*That completes the survey. Thank you for your assistance. You may be contacted via email or telephone over the next few weeks for a brief follow up.*

## Fleet Managers Survey Additional Findings

### Survey Coverage

Table F below shows the number and percentage of responses by Clean Cities Coalition region.

**Table F: Fleet Manager Survey Responses by Clean Cities Coalition region**

Clean Cities Coalition	Responses	Percent
Central Coast	13	15.29
Coachella	5	5.88
East Bay	6	7.06
Long Beach	3	3.53
Los Angeles	6	7.06
Sacramento	14	16.47
San Diego	6	7.06
San Francisco	3	3.53
San Joaquin Valley	4	4.71
Silicon Valley	10	11.76
Southern California	8	9.41
Western Riverside	7	8.24

### Fleet Size and Groups

Fleet sizes range from one vehicle to over 6,000 though the majority of fleets are small with the median sized fleet having only 87 vehicles. Any fleet with over 1,200 vehicles is in the top 10% of fleet size. In order to examine the range of fleet sizes, fleets were organized into four size groups: very small, small, mid-size, and large. The very small group pertains to fleets with up to 25 vehicles. The small fleet group includes fleets with at least 26 and no more than 75 vehicles. Mid-size fleet group have at least 76 and no more than 150 vehicles. The large fleet group contains over 151 vehicles. Table F below shows responses by fleet size.

These fleet size groups were broken out based on staffing needs and costs. As vehicles in a fleet increase, more administrators, mechanics, and technicians are needed. The total cost to run a fleet is directly proportional to the total number of vehicles in operation, which drives all fixed and operational costs.



**Table G: Percent Responses by Fleet Group and Size**

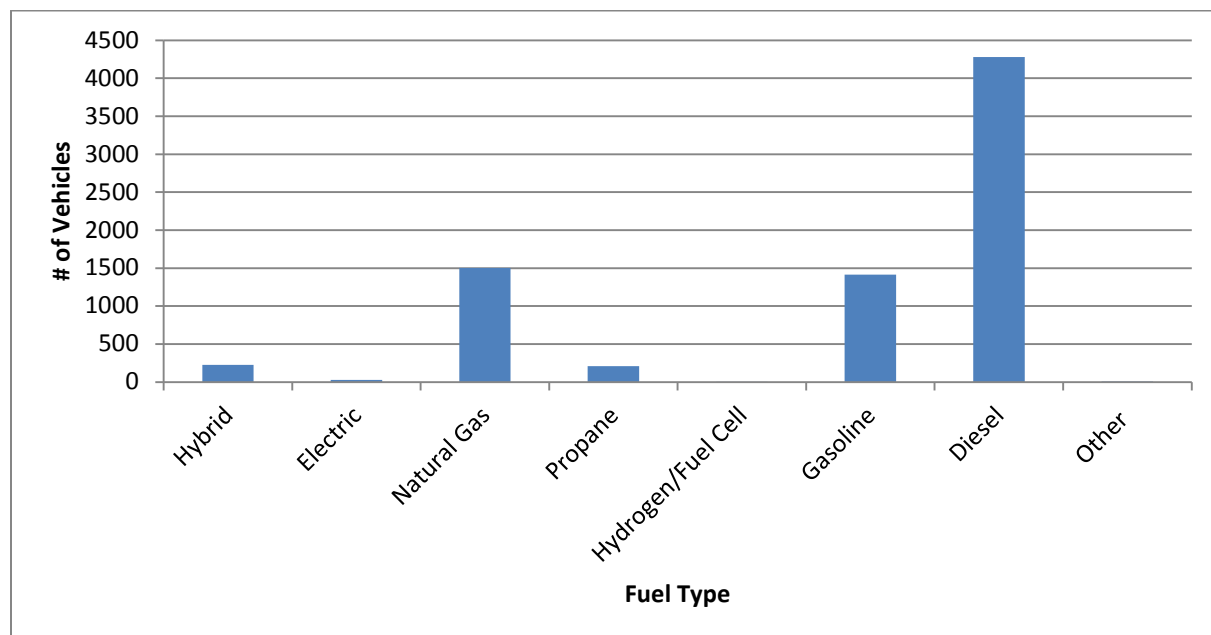
Fleet Group	Fleet Size	Responses	Percent
Very Small	0-25	19	22.35
Small	26 – 75	22	25.88
Mid-Size	76 – 150	6	7.06
Large	151+	38	44.71

When grouping Fleet Type by Fleet Size the average corporate fleet has 26 to 75 vehicles, local government fleets have between 75 to 150 vehicles, and state government and school fleets are on average small (26-75 vehicles).

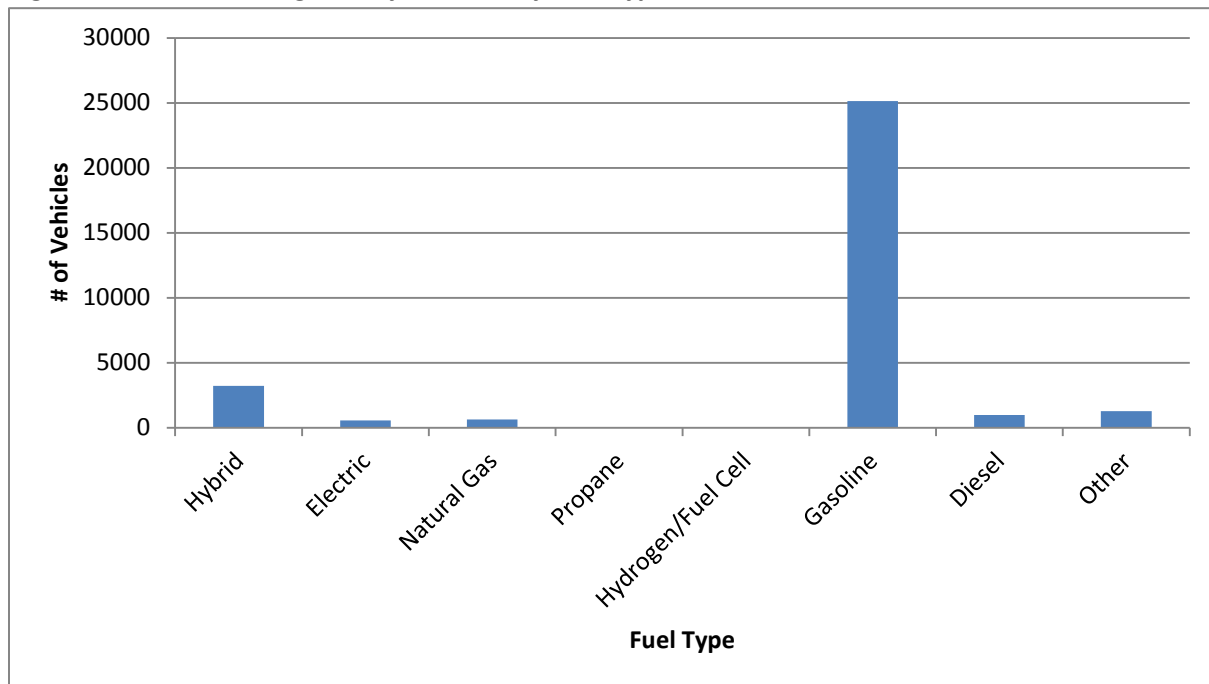
Corporate fleets, which only account for 10% of the sample, range from 5 to 600 vehicles with an average of 115 cars. Half of the corporate fleets have 55 vehicles or fewer and only one fleet has over 200 cars. Local government fleets, which account for over half of the observations in the sample, vary in size most dramatically with between 4 to over 6,000 vehicles. Half of all local government fleets have large dedicated staffing requirements for fleet management due to 50% of fleet having over 200 vehicles. State government fleets accounting for less than half of the responses generally have small fleets whereas half of corporate fleets manage fewer than 51 vehicles. The fleet sizes for schools have an average of 53 vehicles with a minimum of two to a maximum of 195 vehicles.

### Vehicle and Fuel Type

**Figure 9: Number of Heavy-Duty Vehicles by Fuel Type**



**Figure 10: Number of Light-Duty Vehicles by Fuel Type**

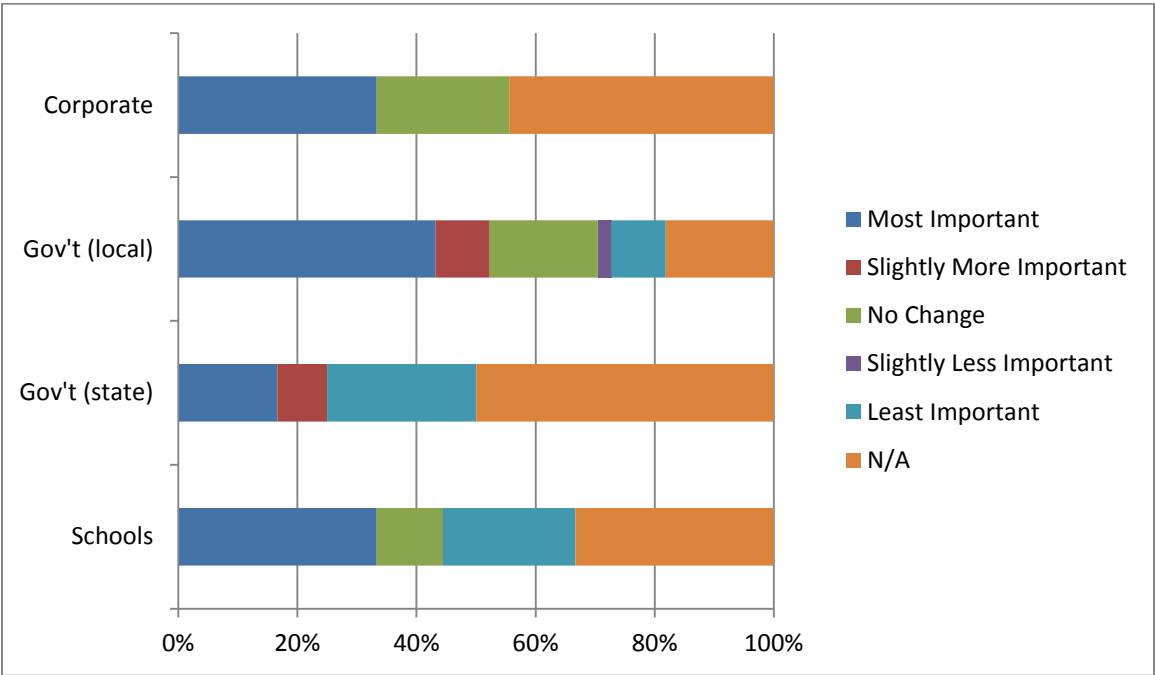


### **Current Training Needs**

The charts below show the importance of training needs by fuel type (natural gas, hybrid/EV, propane, hydrogen/fuel cell) and fleet type (corporate, local government, state government, schools).

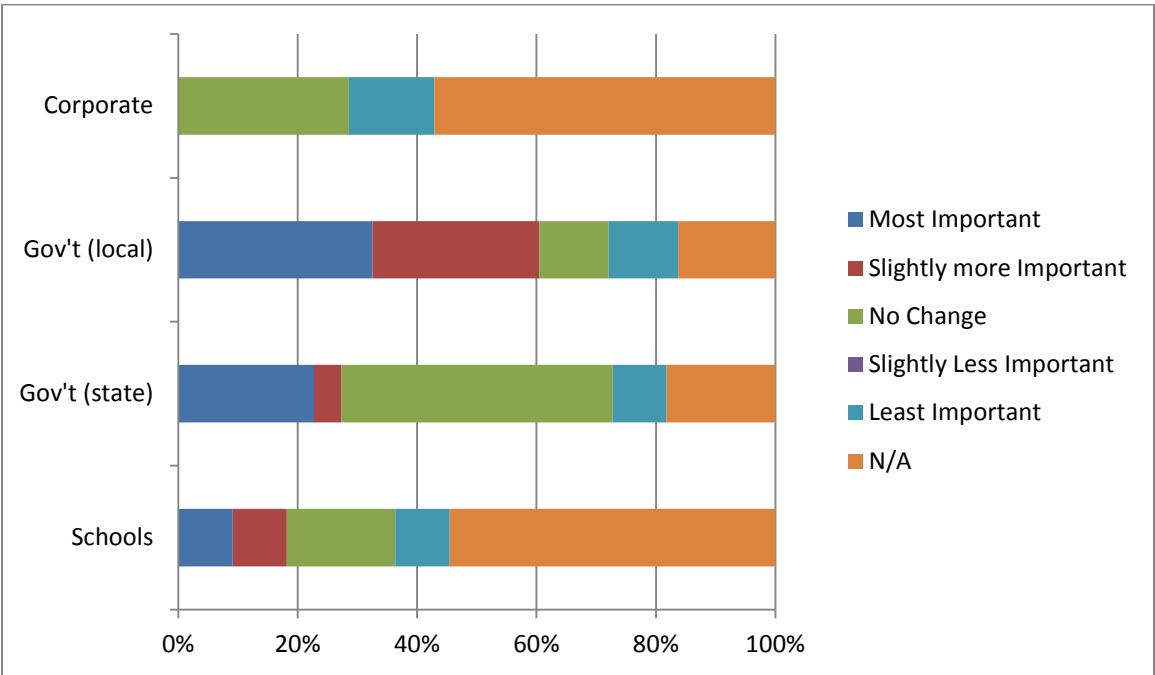
Natural Gas

Figure 11: Importance of Natural Gas Training by Fleet Type



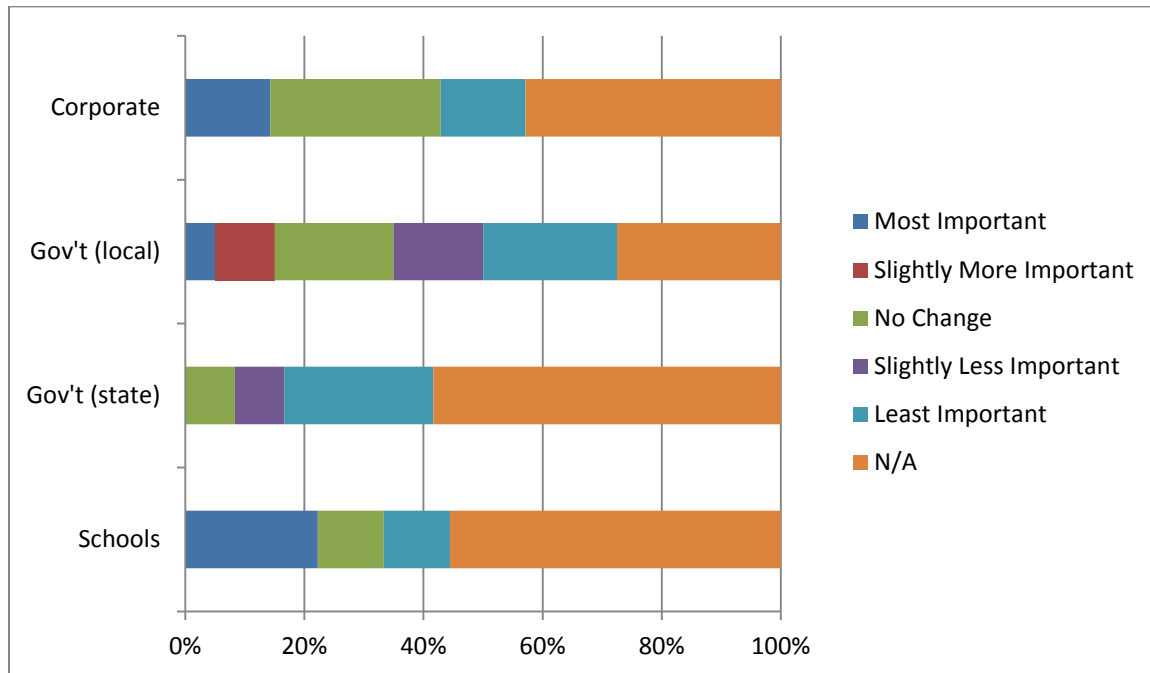
Hybrid and EV

Figure 12: Importance of Hybrid/EV Training by Fleet Type



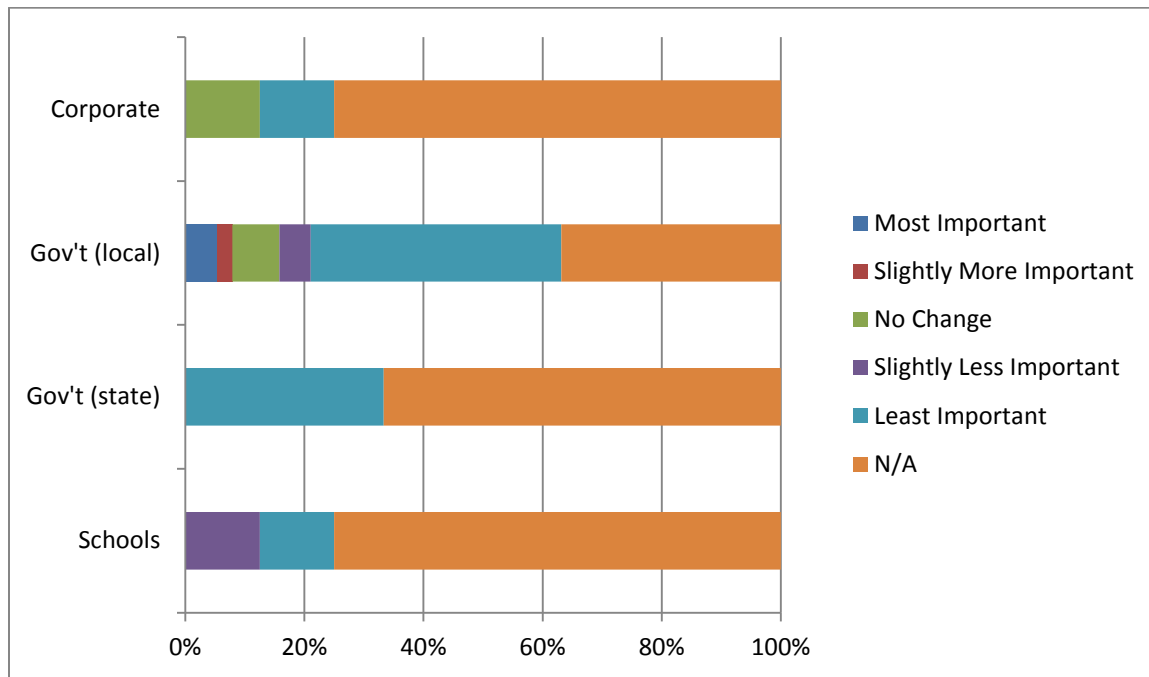
## Propane

Figure 13: Importance of Propane Training by Fleet Type



## Hydrogen Fuel Cell

Figure 14: Importance of Hydrogen/Fuel Cell Training by Fleet Type





## **Appendix F: Funding Opportunities**

### **This list is not all-inclusive**

The following is a listing of main training funding options for first responders, fleets and training organizations.

#### **First Responder and Fleets**

- California Energy Commission
  - Drive CA Alternative & renewable Fuel & Vehicle Technology Program  
[http://www.energy.ca.gov/drive/funding/workforce\\_training.html](http://www.energy.ca.gov/drive/funding/workforce_training.html)

#### **First Responders**

- FEMA Assistance to Fire Fighters Grant Program: <http://www.fema.gov/welcome-assistance-firefighters-grant-program>
- Fire Prevention & Safety Grants
- California Specialized Training Institute
  - Courses that are funded by the Emergency Management Performance Grant (EMPG), provides tuition-free training for CA State/Local First Responders and CA Emergency Management Agencies

<http://www.calema.ca.gov/CSTI/Pages/Grants-for-Training.aspx>

#### **Fleets**

- San Joaquin Valley: Alternative Fuel Vehicle Mechanic Training Program  
<http://www.calema.ca.gov/CSTI/Pages/Grants-for-Training.aspx>
- DOE Energy Efficiency & Renewable Energy (EERE) financial opportunities  
<http://www1.eere.energy.gov/financing/>

#### **Training Organizations**

- Workforce Training
  - Employment Training Panel (ETP) provides funding to employers to assist in upgrading the skills of their workers. <http://www.etp.ca.gov/>
  - Employment Development Department (EDD)

- Workforce Training Development Support
  - California Community Colleges Chancellors Office (CCCCO)
- DOE
  - DE-FOA-0000708: Implementation Initiatives to Advance Alternative Fuel Markets
- CA Energy Commission: 2013-2014 Alternative and Renewable Fuel and Vehicle Technology Program Investment Plan
  - For FY 2013-2014 \$2million for workforce training and development projects

**Appendix G: Californai Clean Cities Coalitions**

<b>Name</b>	<b>Website</b>
Antelope Valley	<a href="http://www.antelopecleancities.com/">http://www.antelopecleancities.com/</a>
Central Coast	<a href="http://www.c-5.org/">http://www.c-5.org/</a>
Coachella Valley	<a href="http://www.c3vr.org/">http://www.c3vr.org/</a>
East Bay	<a href="http://www.cleancitieseastbay.org/">http://www.cleancitieseastbay.org/</a>
Long Beach	<a href="http://www.afdc.energy.gov/cleancities/coalition/long-beach">http://www.afdc.energy.gov/cleancities/coalition/long-beach</a>
Los Angeles	<a href="http://www.environmentla.org/Clean%20Cities/cleancitieshome.htm">http://www.environmentla.org/Clean%20Cities/cleancitieshome.htm</a>
Sacramento	<a href="http://www.cleancitiessacramento.org/">http://www.cleancitiessacramento.org/</a>
San Diego	<a href="http://www.sdcleancities.org/">http://www.sdcleancities.org/</a>
San Franscisco	<a href="http://www.sfenvironment.org/transportation/clean-fuels-vehicles/san-francisco-clean-cities-coalition-sfccc">http://www.sfenvironment.org/transportation/clean-fuels-vehicles/san-francisco-clean-cities-coalition-sfccc</a>
San Joaquin Valley	<a href="http://www.valleycleancities.com/">http://www.valleycleancities.com/</a>
Silicon Valley	<a href="http://www.svcleancities.org/">http://www.svcleancities.org/</a>
Western Riverside	<a href="http://www.afdc.energy.gov/cleancities/coalition/western-riverside">http://www.afdc.energy.gov/cleancities/coalition/western-riverside</a>

