

# **California Energy Commission (Energy Commission) Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP)**

Summary Report on Regional and Statewide Employment,  
Employer Demand, and Skills Requirements for ARFVTP-Related  
Occupations, including Employer Survey Results

***Labor Market Information Division***

**June 2014**

## ***Table of Contents***

---

Executive Summary .....	1
Statewide Employer Demand and Projected Outlook .....	3
Statewide ARFVTP-Related Employers .....	5
Energy Commission Region 1 (Sacramento, Solano, and Yolo Counties) .....	7
Energy Commission Region 2 (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and Sonoma Counties) .....	10
Energy Commission Region 3 (Imperial, Orange, and San Diego Counties) .....	13
Energy Commission Region 4 (Los Angeles, Riverside, and San Bernardino Counties) .....	16
Energy Commission Region 5 (Kern, Kings, Madera, Merced, San Joaquin, and Tulare Counties) .....	19
Energy Commission Region 6 (Butte, Shasta, and Tehama Counties).....	22
Skills Required for ARFVTP-Related Occupations .....	25
Tasks Performed by ARFVTP-Related Occupations .....	27
Skills Gap Survey Introduction and Methodology .....	31
Skills Gap Survey Results .....	32
Appendix A — Geographic Information System (GIS) Maps of Alternative Fueling Station Locations in California.....	51
Appendix B — Alternative and Renewable Fuels and Vehicle Technology Invitation E-mail and Skills Gap Survey Questionnaire.....	58

---

## Executive Summary

---

This summary report provides updated estimates of regional and statewide employment, employer demand, and skills requirements for occupations related to the Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP) as Phase Two, part of a multi-year contract between the California Employment Development Department (EDD) Labor Market Information Division (LMID) and the Energy Commission. The research focuses on 25 occupations that are relevant to the ARFVTP goals such as occupations requiring less than a four-year degree, using real-time access to online job ads, as well as EDD Long-Term Projections of Employment. The real-time job ads data were extracted from the Conference Board's Help Wanted Online™ (HWOL) analytic software. The regional and statewide Geographic Information System (GIS) maps of alternative fueling station locations has been updated. The LMID also conducted a statewide survey of employers to determine ARFVTP workforce needs and related demand, specifically skills gaps for employers working with alternative fuel vehicles, as well as reported results. The following are key findings based on an analysis of 10-year employment projections, 120 days of job advertisements posted online between November 2013 and March 2014, and some notable survey results:

- The majority of HWOL job ads for the ARFVTP-related occupations is found across all industries and is not specific to ARFVTP-related jobs.
- Greater numbers of ARFVTP-related HWOL job advertisements are concentrated in larger, more populated areas of California, with the most job ads appearing in Los Angeles County and the least in Tehama County.
- Heavy and Tractor-Trailer Truck Drivers, Maintenance and Repair Workers, and Automotive Specialty Technicians had the most HWOL job advertisements in Regions 1, 2, 3, 4, and 6 representing the Sacramento, Bay Area, Southern California, and North Valley regions. However, Heavy and Tractor-Trailer Truck Drivers, Maintenance and Repair Workers, and Electricians had the most HWOL job ads in Region 5, representing the Central Valley region.
- The real-time job ads data gathered from HWOL were consistent with the EDD Long-Term Projections of Employment. Both sources reveal the same ARFVTP-related occupations as those with the most job ads and job openings, respectively.
- In most instances, annual replacement needs projected are greater than new jobs; however, Construction Managers show greater annual new jobs than replacement needs across all regions. Heavy and Tractor-Trailer Truck Drivers show a greater number of new jobs in Region 4 and all occupations in Region 5 indicate that the new jobs projected are greater than replacement needs.
- The majority of workers in ARFVTP-related occupations perform specific tasks related to ARFVTP, while in a few occupations tasks are more general in nature.
- In addition to their normal tasks, all First and Second Responders must be knowledgeable and properly trained in alternative fuel vehicle-related tasks.
- The two most common skills required of the 25 ARFVTP-related occupations are critical thinking and reading comprehension.

## Executive Summary

---

- The need to recycle alternative fuel vehicles is a trend that will generate new tasks for some ARFVTP-related occupations in the future.
- Between 2013 and 2014, the number of electric charging station locations in California increased dramatically, while Regions 2, 3, and 4 saw substantial growth in the total number of alternative fueling stations.
- The biggest challenges employers face in finding qualified candidates are a lack of available certified applicants or no applicants and lack of experience.
- Mechanics and Technicians are the most difficult ARFVTP-related occupations to fill.
- The employable skills most lacking by current employees or applicants in ARFVTP-related firms include problem solving and critical thinking, while the technical skills most lacking are troubleshooting, technology applications, and computers and electronics.
- The hiring strategies used by most employers to locate qualified candidates are advertisements, word of mouth, and company websites.
- The business impacts of having a skills gap are lower productivity and less efficiency.
- Nearly all ARFVTP-related employers offer training for their employees. The most common training methods used are in-house/on-the-job training, private vendor training, and on-line training/self study.
- More than half of employers in the ARFVTP field require a special license or certification. The most common licenses or certifications are Automotive Service Excellence (ASE) certification and a California Commercial Driver License (Class A and/or B).
- Compressed Natural Gas (CNG) and electric charging stations are the alternative fuel and vehicle technologies most frequently used in fleets. Electric, hybrid, and electric-hybrid vehicles are also very common.
- Employers' current and future skills gap concerns include difficulty finding qualified candidates.

## ***Statewide Employer Demand and Projected Outlook***

---

During the 120-day period ending March 7, 2014, HWOL showed Heavy and Tractor-Trailer Truck Drivers having the most ARFVTP-related job advertisements in California (18,524 job ads), followed by Maintenance and Repair Workers (11,296), and Automotive Specialty Technicians\* (4,823). Police and Sheriff's Officers had the largest year-over percentage growth at 55.2 percent, followed by Emergency Medical Technicians and Paramedics (24.9 percent), and Heavy and Tractor-Trailer Truck Drivers (23.0 percent). The HWOL job ads reveal a significant decline in Control and Valve Installers and Repairers, Except Mechanical Door (-51.5 percent), Maintenance Workers, Machinery (-27.9 percent), and Electronics Engineering Technicians (-24.6 percent). Although Automotive Engineering Technicians shows a 100 percent year-over growth and Gas Compressor and Gas Pumping Station Operators (-33.3 percent) and Firefighters (-33.3 percent) indicates a large decline, the employment size of these occupations are extremely small.

Of the 25 ARFVTP-related occupations, Heavy and Tractor-Trailer Truck Drivers show the highest number of projected total jobs in California by the year 2020 (5,100 jobs), followed by Maintenance and Repair Workers (3,510 jobs), and Automotive Specialty Technicians\* (3,070 jobs). The ARFVTP-related occupations with the lowest number of projected total jobs in California by the year 2020 are Biofuels Processing Technicians\* (50 jobs), Automotive Engineering Technicians\* (110 jobs), and Control and Valve Installers and Repairers (110 jobs).

---

\* Projections are not available for this occupation; therefore, the broader occupational group was used.

## Statewide Employer Demand and Projected Outlook

ARFVTP-Related Occupations in California by Employer Demand					
Occupation	HWOL Job Ads Nov. 7, 2012 – Mar. 6, 2013		HWOL Job Ads Nov. 8, 2013 – Mar. 7, 2014		Employment Projections 2010–2020
	Number of Job Ads	Percent Change*	Number of Job Ads	Percent Change*	Total Jobs
Heavy and Tractor-Trailer Truck Drivers	15,592	27.5	18,524	23.0	5,100
Maintenance and Repair Workers, General	11,962	21.1	11,296	-1.4	3,510
Automotive Specialty Technicians <sup>†</sup>	4,398	20.2	4,823	19.0	3,070
Electricians	3,331	35.5	3,153	-3.3	2,010
Construction Managers	3,112	14.0	2,822	0.6	1,220
Bus and Truck Mechanics and Diesel Engine Specialists	2,541	2.4	2,321	-2.0	700
Machinists	2,603	-24.4	2,191	-14.0	950
Electronics Engineering Technicians <sup>†</sup>	2,550	-2.5	1,764	-24.6	570
Industrial Production Managers	1,084	-6.5	1,074	8.2	590
Electrical and Electronic Equipment Assemblers	1,006	-24.1	961	-11.1	580
Emergency Medical Technicians and Paramedics	681	17.8	852	24.9	990
Electrical Engineering Technicians <sup>†</sup>	320	6.7	215	-23.8	570
Compliance Officers	148	2.1	127	-3.1	720
Agricultural Technicians <sup>†</sup>	121	0.0	101	-12.2	130
Police and Sheriff's Patrol Officers	28	16.7	45	55.2	2,670
Control and Valve Installers and Repairers, Except Mechanical Door	75	-5.1	32	-51.5	110
Maintenance Workers, Machinery	37	-9.8	31	-27.9	140
Gas Compressor and Gas Pumping Station Operators	14	100.0	8	-33.3	N/A
Firefighters	3	N/A	2	-33.3	1,140
Automotive Engineering Technicians <sup>†</sup>	1	N/A	2	100.0	110
Biofuels Processing Technicians <sup>†</sup>	1	-83.3	0	N/A	50

Sources: The Conference Board Help Wanted Online™ data series; California Employment Development Department, Projections of Employment 2010–2020. Total jobs are the sum of new jobs and replacement needs.

Note: Only those occupations with HWOL data are included in the table. Fuel Cell Technicians and Biomass Plant Technicians have no HWOL data available. Automotive Specialty Technicians is a subset of Automotive Service Technicians and Mechanics, while Automotive Engineering Technicians is a specialty of Mechanical Engineering Technicians. The HWOL data is shown for the specialty occupations, but not the broad occupations.

\* As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

† Projections are not available for this occupation; therefore, the broader occupational group was used.

## Statewide ARFVTP-Related Employers

The businesses listed in the table below represent only a fraction of those that are involved with Alternative and Renewable Fuel and Vehicle Technology throughout California. This same technology can be found throughout other businesses such as biotechnology companies, automotive service centers, automotive manufacturers, and fuel cell manufacturers. These companies may advertise job openings through online job boards, network with others in the field, or receive applications and resumes submitted directly to them.

Employer	Fuel Type/Technology	Web Address
Aemetis	Ethanol	<a href="http://www.aemetis.com">www.aemetis.com</a>
Americal Biodiesel (Community Fuels)	Biofuel	<a href="http://www.communityfuels.com">www.communityfuels.com</a>
Battery M.D., Inc.	Electric, hybrid, and fuel cell vehicle products	<a href="http://www.batterymd.com">www.batterymd.com</a>
Blue Sky Biofuels	Biodiesel	<a href="http://www.blueskybiofuels.com">www.blueskybiofuels.com</a>
Calgren Renewable Fuels	Ethanol	<a href="http://www.calgren.com">www.calgren.com</a>
ChargePoint	Electric vehicle charging stations	<a href="http://www.chargepoint.com">www.chargepoint.com</a>
Clipper Creek	Electric vehicle charging stations	<a href="http://www.clippercreek.com">www.clippercreek.com</a>
Efficient Drivetrains, Inc.	Electric and hybrid vehicle products	<a href="http://www.efficientdrivetrains.com">www.efficientdrivetrains.com</a>
Electric Vehicles International	Battery electric vehicles and range extended electric vehicles	<a href="http://www.evi-usa.com">www.evi-usa.com</a>
EV Connect	Electric vehicle charging stations	<a href="http://www.evconnect.com">www.evconnect.com</a>
EVAOS	Electric vehicle add-on systems	<a href="http://www.evaos.com">www.evaos.com</a>
GreenLine Fuel Corporation	Compressed Natural Gas	<a href="http://www.greenlinefuel.com">www.greenlinefuel.com</a>
Hydrogen Frontier	Hydrogen Fuel	<a href="http://www.hydrogenfrontier.com">www.hydrogenfrontier.com</a>
Mission Motor Company	Electric vehicle products	<a href="http://ridemission.com">http://ridemission.com</a>

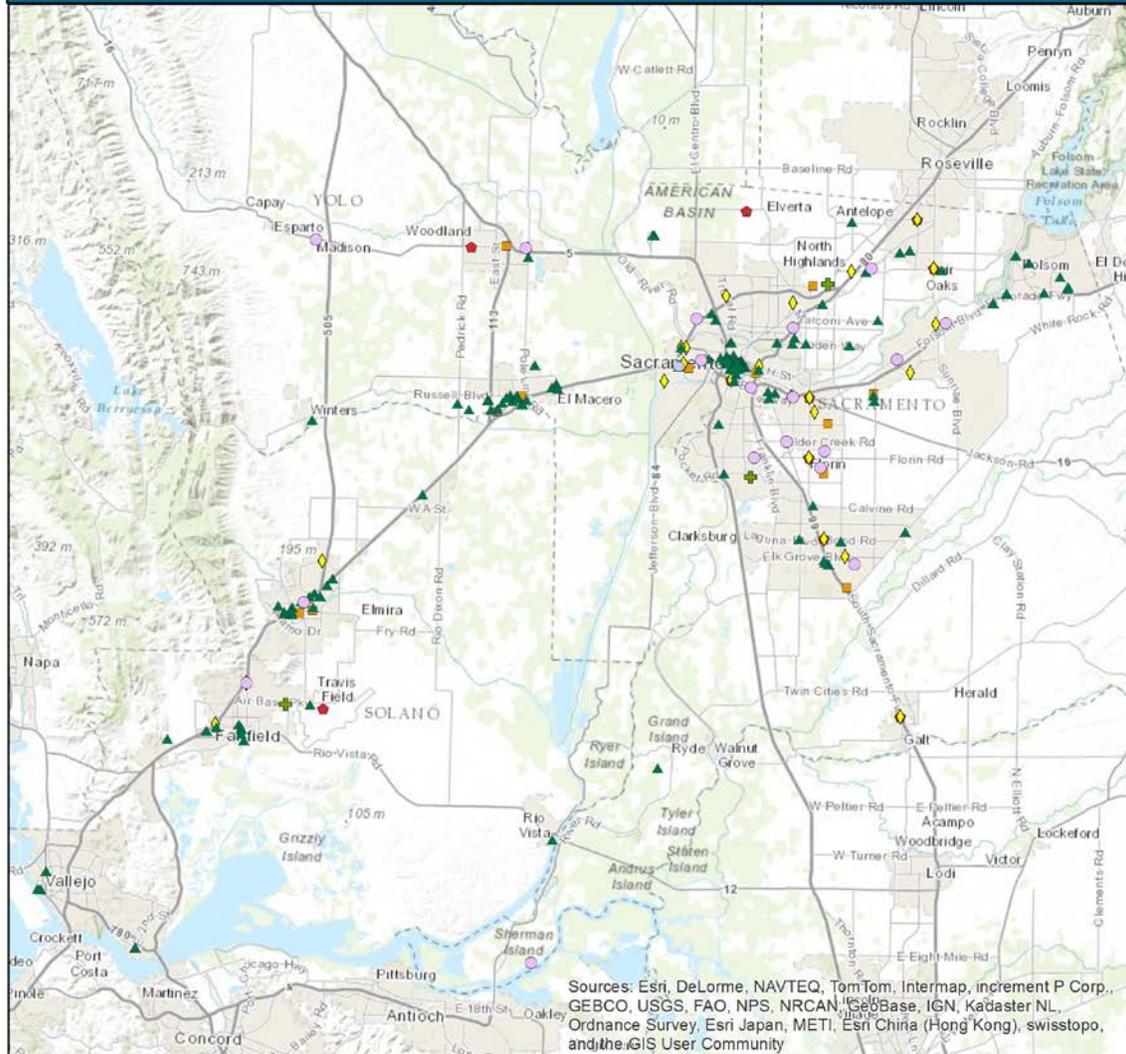
## Statewide ARFVTP-Related Employers

Employer	Fuel Type/Technology	Web Address
Motiv Power Systems	Vehicle electric power train control systems	<a href="http://motivps.com">http://motivps.com</a>
New Leaf Biofuel	Biodiesel	<a href="http://www.newleafbiofuel.com">www.newleafbiofuel.com</a>
Pearson Fuels	Biodiesel, Ethanol (E85), Hydrogen, Natural Gas, Liquefied Petroleum Gas (Propane)	<a href="http://www.pearsonfuels.com">www.pearsonfuels.com</a>
Propel	Biodiesel and Flex Fuel E85	<a href="http://www.propelfuels.com">www.propelfuels.com</a>
Sapphire Energy	Renewable Fuel	<a href="http://www.sapphireenergy.com">www.sapphireenergy.com</a>
SiGNa Chemistry, Inc.	Hydrogen fuel	<a href="http://signachem.com">http://signachem.com</a>
Springboard Biodiesel	Biodiesel processors	<a href="http://www.springboardbiodiesel.com">www.springboardbiodiesel.com</a>
Tesla Motors	Electric vehicles	<a href="http://www.teslamotors.com">www.teslamotors.com</a>
TransPower	Vehicle electric power systems	<a href="http://www.transpowerusa.com">www.transpowerusa.com</a>
Yokayo Biofuels	Biodiesel	<a href="http://www.ybiofuels.org">www.ybiofuels.org</a>

*Note: These links are provided for your convenience and do not constitute an endorsement by the EDD.*

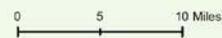
# Energy Commission Region 1 (Sacramento, Solano, and Yolo Counties)

## Region 1 Alternative Fueling Station Locations



### Fuel Type

- Biodiesel
- Compressed Natural Gas
- ▲ Electric Charging Station
- ◆ Ethanol 85
- Hydrogen Fueling Station
- Liquefied Natural Gas
- Liquefied Petroleum Gas (Propane)



Data source:  
DOE – Energy Efficiency and Renewable Energy  
[http://www.afdc.energy.gov/data\\_download](http://www.afdc.energy.gov/data_download)  
Alternative fueling stations locations (viewed 2/19/14)

Cartography by:  
State of California  
Employment Development Department  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)  
April 2014

## Energy Commission Region 1

According to HWOL, Sacramento County accounted for the largest share of ARFVTP-related job advertisements during 2013-2014 with 1,989 job ads, but decreased 8.7 percent from the previous year. There was a large increase (20.9 percent) in Solano County and a decrease (7.1 percent) in job advertisements in Yolo County.

Region 1: ARFVTP-Related HWOL Job Advertisements by County				
County	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change <sup>*</sup>	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change <sup>*</sup>
Sacramento	2,120	31.2	1,989	-8.7
Solano	492	-1.2	618	20.9
Yolo	281	4.1	273	-7.1

Source: The Conference Board Help Wanted Online™ data series.

During 2013-2014, Heavy and Tractor-Trailer Truck Drivers and Maintenance and Repair Workers represent the occupations that displayed the most ARFVTP-related job advertisements with 1,197 and 623 job ads, respectively. Two occupations show a percentage growth from the previous year, Industrial Production Managers (76.9 percent) and Automotive Specialty Technicians (51.3 percent), while the remaining occupations all reveal a decline. However, most of the occupations show small numbers of total job ads (less than 200).

Region 1: Top 10 ARFVTP-Related HWOL Job Advertisements				
Occupation	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change <sup>*</sup>	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change <sup>*</sup>
Heavy and Tractor-Trailer Truck Drivers	1,166	36.2	1,197	-2.0
Maintenance and Repair Workers, General	604	23.0	623	-1.6
Automotive Specialty Technicians	216	-5.3	339	51.3
Bus and Truck Mechanics and Diesel Engine Specialists	208	31.6	196	-9.3
Electricians	170	4.9	156	-12.8
Construction Managers	186	12.0	146	-20.2
Electronics Engineering Technicians	149	62.0	59	-56.3
Industrial Production Managers	34	-30.6	46	76.9
Machinists	55	-38.9	38	-30.9
Emergency Medical Technicians and Paramedics	23	15.0	23	-17.9

Source: The Conference Board Help Wanted Online™ data series.

<sup>\*</sup> As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

## Energy Commission Region 1

Of the top 10 occupations with the most HWOL job advertisements, Heavy and Tractor-Trailer Truck Drivers displays the largest long-term projected numerical growth in Region 1 with 1,540 ARFVTP-related jobs (18.0 percent), followed by Automotive Specialty Technicians\* with 1,120 jobs (21.8 percent), and Maintenance and Repair Workers with 960 jobs (14.2 percent). Emergency Medical Technicians and Paramedics show the largest long-term projected percentage job growth at 33.3 percent.

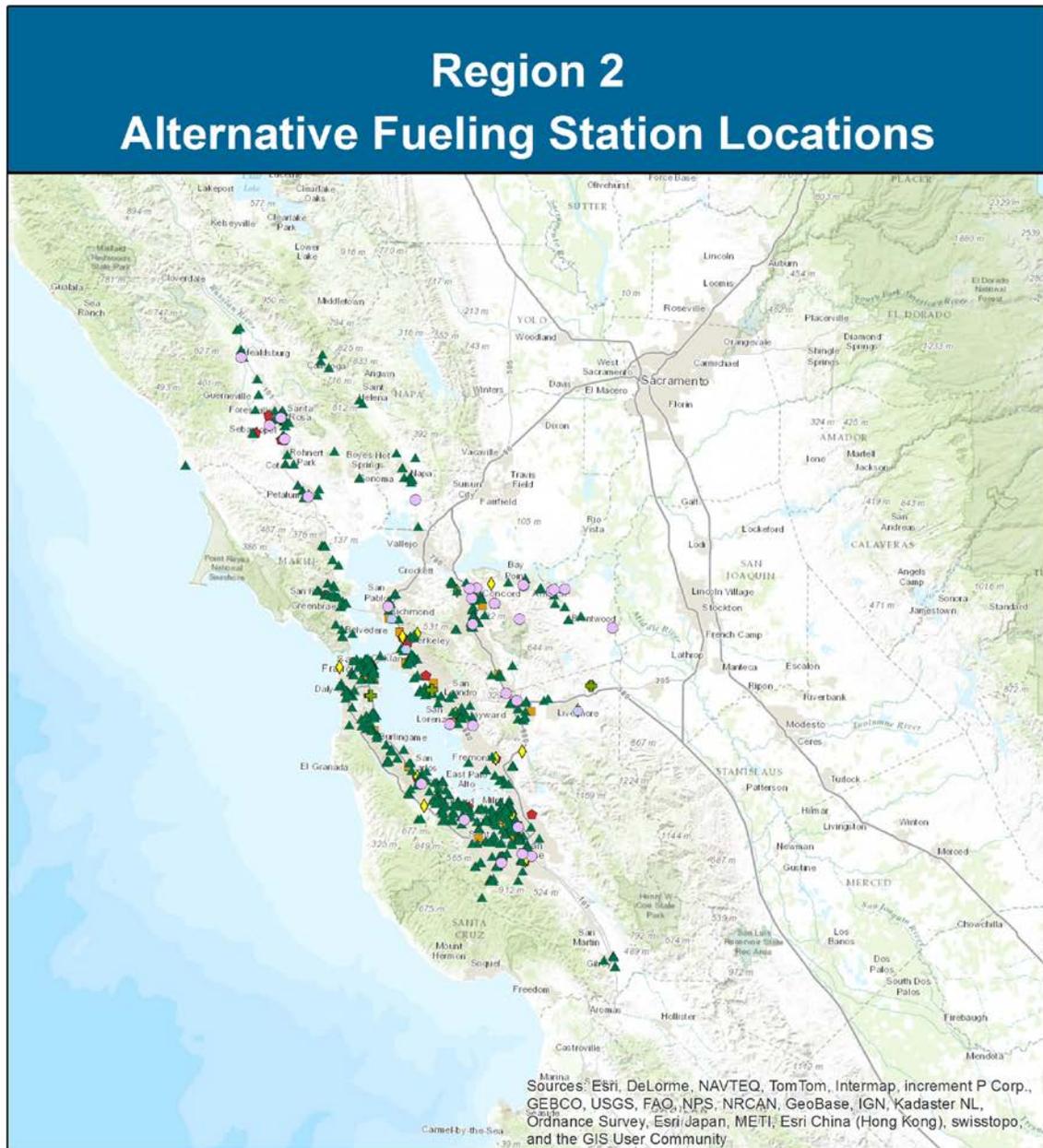
Region 1 Top 10 ARFVTP-Related Occupations with the Most HWOL Job Advertisements Long-Term Employment Projections							
Occupation	Employment		Numerical Change	Percent Change	Annual		
	2010	2020			New Jobs	Replacement Needs	Total Jobs
Heavy and Tractor-Trailer Truck Drivers	8,540	10,080	1,540	18.0	154	170	324
Maintenance and Repair Workers, General	6,740	7,700	960	14.2	97	124	221
Automotive Specialty Technicians*	5,140	6,260	1,120	21.8	113	133	246
Bus and Truck Mechanics and Diesel Engine Specialists	1,370	1,550	180	13.1	17	30	47
Electricians	3,060	3,350	290	9.5	29	83	112
Construction Managers	4,650	5,300	650	14.0	65	30	95
Electronics Engineering Technicians*	720	790	70	9.7	7	14	21
Industrial Production Managers	640	700	60	9.4	6	15	21
Machinists	950	1,030	80	8.4	8	18	26
Emergency Medical Technicians and Paramedics	990	1,320	330	33.3	32	20	52

Source: California Employment Development Department, Projections of Employment 2010–2020.

Notes: Employment projections for the Sacramento-Arden Arcade-Roseville Metropolitan Statistical Area (MSA) were used, which also include Placer and El Dorado counties. Replacement needs estimate the number of job openings created when workers permanently leave an occupation and need to be replaced. Total jobs are the sum of new jobs and replacement needs.

\* Projections are not available for this occupation; therefore, the broader occupational group was used.

# Energy Commission Region 2 (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and Sonoma Counties)



**Fuel Type**

- ◆ Biodiesel
- Compressed Natural Gas
- ▲ Electric Charging Station
- ◇ Ethanol 85
- Hydrogen Fueling Station
- ⊕ Liquefied Natural Gas
- Liquefied Petroleum Gas (Propane)

0 15 30 Miles

Data source:  
DOE – Energy Efficiency and Renewable Energy  
[http://www.afdc.energy.gov/data\\_download](http://www.afdc.energy.gov/data_download)  
Alternative fueling stations locations (viewed 2/19/14)

Cartography by:  
State of California  
Employment Development Department  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)  
April 2014

## Energy Commission Region 2

According to HWOL, Alameda and Santa Clara counties indicate the largest number of ARFVTP-related job ads at 2,880 and 2,293, respectively, during 2013-2014. San Francisco County accounted for the largest percentage growth of 24.3 percent, followed by Napa County at 21.8 percent. Contra Costa, Sonoma, Marin, and Alameda counties shows slight to moderate declines.

Region 2: ARFVTP-Related HWOL Job Advertisements by County				
County	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Alameda	2,892	26.4	2,880	-1.7
Santa Clara	2,244	5.9	2,293	0.2
San Francisco	1,612	28.7	2,023	24.3
Contra Costa	1,155	20.8	1,022	-14.0
San Mateo	643	0.2	764	12.7
Sonoma	662	32.4	621	-8.5
Marin	191	24.8	186	-5.6
Napa	117	20.6	151	21.8

Source: The Conference Board Help Wanted Online™ data series.

For the 2013-2014 period, Maintenance and Repair Workers and Heavy and Tractor-Trailer Truck Drivers have the largest number of ARFVTP-related job advertisements at 2,543 and 2,289, respectively. Automotive Specialty Technicians show the largest percentage increase at 22.5 percent, while Electricians show a moderate decline (-18.0 percent).

Region 2: Top 10 ARFVTP-Related HWOL Job Advertisements				
Occupation	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Maintenance and Repair Workers, General	2,672	42.3	2,543	-5.5
Heavy and Tractor-Trailer Truck Drivers	2,009	29.9	2,289	7.5
Automotive Specialty Technicians	948	17.0	1,205	22.5
Construction Managers	856	12.3	905	5.4
Electricians	735	39.7	612	-18.0
Electronics Engineering Technicians	669	-10.7	592	-10.4
Machinists	424	-10.7	501	13.6
Bus and Truck Mechanics and Diesel Engine Specialists	351	-6.9	383	5.8
Industrial Production Managers	299	-8.6	332	14.5
Electrical and Electronic Equipment Assemblers	236	-23.1	248	2.1

Source: The Conference Board Help Wanted Online™ data series.

\* As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

## Energy Commission Region 2

In Region 2, long-term employment projections show strong ARFVTP-related job growth for Maintenance and Repair Workers, Heavy and Tractor-Trailer Truck Drivers, Automotive Specialty Technicians\*, Construction Managers, and Electricians. All five occupations are projected to grow by more than 2,000 jobs, with four of these five occupations showing growth of more than 2,500 jobs.

Region 2 Top 10 ARFVTP-Related Occupations with the Most HWOL Job Advertisements Long-Term Employment Projections							
Occupation	Employment		Numerical Change	Percent Change	Annual		
	2010	2020			New Jobs	Replacement Needs	Total Jobs
Maintenance and Repair Workers, General	22,900	26,180	3,280	14.3	328	421	749
Heavy and Tractor-Trailer Truck Drivers	17,070	20,020	2,950	17.3	295	341	636
Automotive Specialty Technicians*	13,670	16,200	2,530	18.5	253	353	606
Construction Managers	14,800	17,000	2,200	14.9	219	97	316
Electricians	10,650	13,180	2,530	23.8	253	287	540
Electronics Engineering Technicians	6,420	7,270	850	13.2	85	123	208
Machinists	5,240	5,920	680	13.0	67	96	163
Bus and Truck Mechanics and Diesel Engine Specialists	2,460	2,850	390	15.9	39	54	93
Industrial Production Managers	4,400	5,090	690	15.7	71	103	174
Electrical and Electronic Equipment Assemblers	7,360	8,790	1,430	19.4	143	105	248

Source: California Employment Development Department, Projections of Employment 2010–2020.

Notes: Projections for the San Jose-Santa Clara-Sunnyvale MSA were used, which also includes San Benito County. Replacement needs estimate the number of job openings created when workers permanently leave an occupation and need to be replaced. Total jobs are the sum of new jobs and replacement needs.

\* Projections are not available for this occupation; therefore, the broader occupational group was used.



## Energy Commission Region 3

According to HWOL, Orange County shows 3,703 ARFVTP-related job advertisements during 2013-2014 reflecting an 11.3 percent increase from the previous year. San Diego shows a comparable number of job ads (3,603), but with an 11.4 percent decrease. Imperial County indicates a substantial growth in job ads; however, there are significantly fewer ARFVTP-related job ads in Imperial County (less than 200) compared to Orange County and San Diego County.

Region 3: ARFVTP-Related HWOL Job Advertisements by County				
County	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Orange	3,261	-1.8	3,703	11.3
San Diego	4,023	6.3	3,603	-11.4
Imperial	156	15.6	197	24.7

Source: The Conference Board Help Wanted Online™ data series.

During 2013-2014, Maintenance and Repair Workers and Heavy and Tractor-Trailer Truck Drivers shows the largest number of ARFVTP-related job advertisements at 1,894 and 1,729, respectively. Heavy and Tractor-Trailer Truck Drivers have the largest percentage growth of 17.1 percent, followed by Automotive Specialty Technicians at 12.0 percent. Electronics Engineering Technicians, Machinists, and Electrical and Electronic Equipment Assemblers continue to show a decline.

Region 3: Top 10 ARFVTP-Related HWOL Job Advertisements				
Occupation	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Maintenance and Repair Workers, General	1,933	14.2	1,894	-4.4
Heavy and Tractor-Trailer Truck Drivers	1,399	19.2	1,729	17.1
Automotive Specialty Technicians	766	10.2	895	12.0
Construction Managers	554	1.7	578	5.5
Machinists	681	-24.3	559	-16.2
Electricians	550	39.6	515	-6.9
Electronics Engineering Technicians	602	-21.1	420	-25.9
Electrical and Electronic Equipment Assemblers	321	-5.0	277	-15.3
Bus and Truck Mechanics and Diesel Engine Specialists	239	-16.1	257	5.8
Industrial Production Managers	174	-28.1	175	2.3

Source: The Conference Board Help Wanted Online™ data series.

\* As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

## Energy Commission Region 3

Of the top 10 ARFVTP-related occupations with the most HWOL job advertisements, Maintenance and Repair Workers show the largest long-term numerical change in Region 3 with 3,180 more ARFVTP-related jobs projected, followed by Heavy and Tractor-Trailer Truck Drivers with 1,620 jobs, and Automotive Specialty Technicians\* with 1,410 jobs. These three occupations account for more than 60 percent of the total projected jobs increase among the top 10 ARFVTP-related occupations.

Region 3 Top 10 ARFVTP-Related Occupations with the Most HWOL Job Advertisements Long-Term Employment Projections							
Occupation	Employment		Numerical Change	Percent Change	Annual		
	2010	2020			New Jobs	Replacement Needs	Total Jobs
Maintenance and Repair Workers, General	22,330	25,510	3,180	14.2	318	411	729
Heavy and Tractor-Trailer Truck Drivers	12,250	13,870	1,620	13.2	162	244	406
Automotive Specialty Technicians*	12,160	13,570	1,410	11.6	141	315	456
Construction Managers	14,980	15,970	990	6.6	112	97	209
Machinists	8,870	9,210	340	3.8	35	163	198
Electricians	9,850	11,240	1,390	14.1	139	265	404
Electronics Engineering Technicians*	5,110	5,750	640	12.5	65	97	162
Electrical and Electronic Equipment Assemblers	5,770	6,130	360	6.2	36	83	119
Bus and Truck Mechanics and Diesel Engine Specialists	2,650	2,850	200	7.5	20	58	78
Industrial Production Managers	3,660	3,900	240	6.6	25	86	111

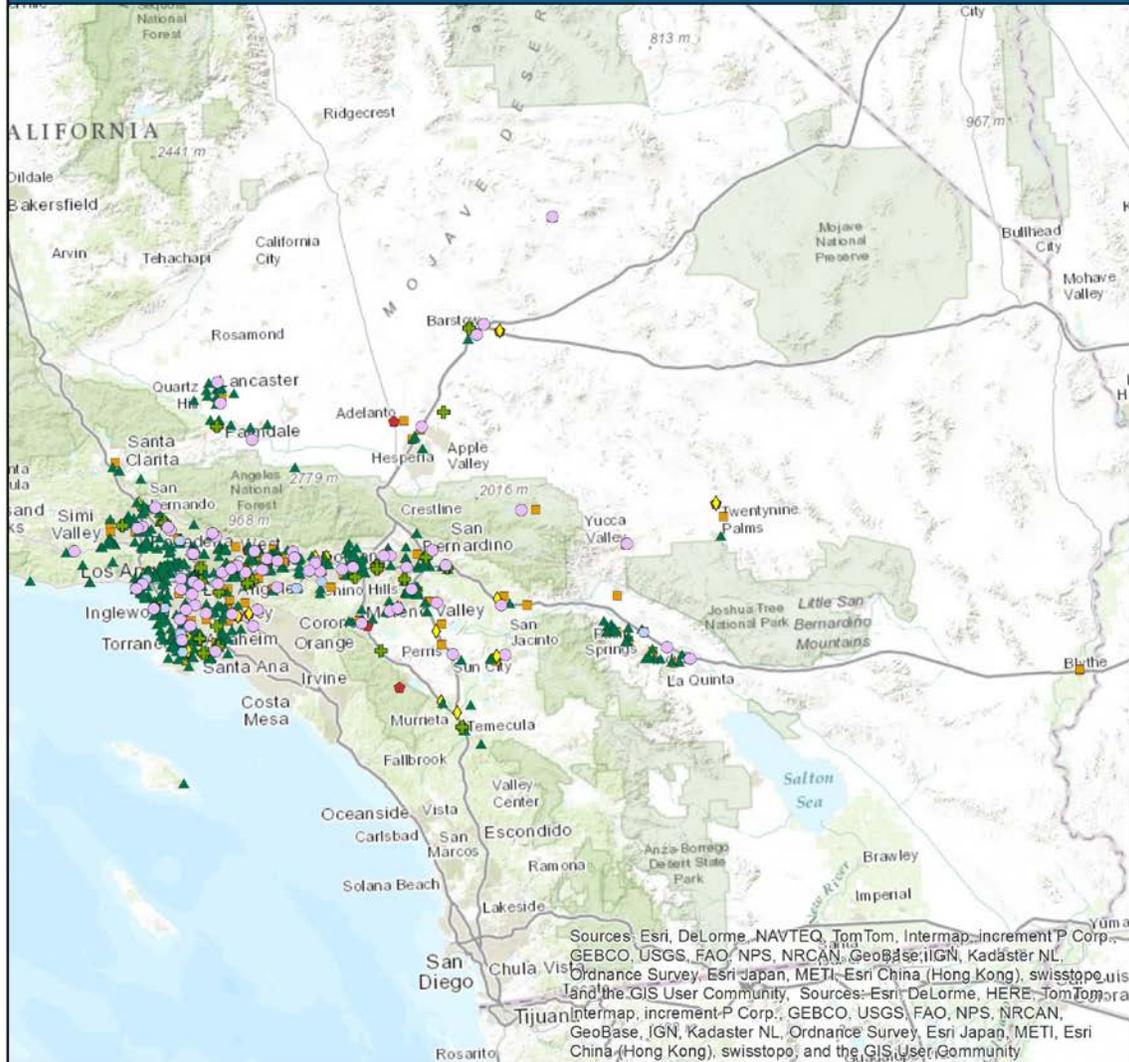
Source: California Employment Development Department, Projections of Employment 2010–2020.

Notes: Replacement needs estimate the number of job openings created when workers permanently leave an occupation and need to be replaced. Total jobs are the sum of new jobs and replacement needs.

\* Projections are not available for this occupation; therefore, the broader occupational group was used.

# Energy Commission Region 4 (Los Angeles, Riverside, and San Bernardino Counties)

## Region 4 Alternative Fueling Station Locations



**Fuel Type**

- ◆ Biodiesel
- Compressed Natural Gas
- ▲ Electric Charging Station
- ◇ Ethanol 85
- Hydrogen Fueling Station
- ⊕ Liquefied Natural Gas
- Liquefied Petroleum Gas (Propane)




0 25 50 Miles

Data source:  
DOE – Energy Efficiency and Renewable Energy  
[http://www.afdc.energy.gov/data\\_download](http://www.afdc.energy.gov/data_download)  
Alternative fueling stations locations (viewed 2/19/14)

Cartography by:  
State of California  
Employment Development Department  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)  
March 2014

## Energy Commission Region 4

According to HWOL, Los Angeles County shows the largest number of ARFVTP-related job advertisements (8,994 job ads) during 2013-2014 reflecting a 0.3 percent increase from the previous year. Riverside County displays a large number of job ads (2,778) and a significant percentage growth of 27.1 percent, while San Bernardino County shows ARFVTP-related job ads at 2,377 with an increase of 13.3 percent from the previous year.

Region 4: ARFVTP-Related HWOL Job Advertisements by County				
County	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Los Angeles	8,730	6.0	8,994	0.3
Riverside	2,119	-4.9	2,778	27.1
San Bernardino	2,089	-6.6	2,377	13.3

Source: The Conference Board Help Wanted Online™ data series.

During 2013-2014, Heavy and Tractor-Trailer Truck Drivers shows the most ARFVTP-related job ads (5,803), followed by Maintenance and Repair Workers (2,879). Emergency Medical Technicians and Paramedics landed in the top 10 in 2014 with a percentage growth of 50.3 percent. Heavy and Tractor-Trailer Truck Drivers and Automotive Specialty Technicians show an over-the-year increase of 31.7 percent and 17.8 percent, respectively. Both Machinists and Electronics Engineering Technicians continue to show a decline of over 30 percent.

Region 4: Top 10 ARFVTP-Related HWOL Job Advertisements				
Occupation	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Heavy and Tractor-Trailer Truck Drivers	4,246	10.0	5,803	31.7
Maintenance and Repair Workers, General	2,948	1.2	2,879	-4.6
Automotive Specialty Technicians	1,048	4.1	1,278	17.8
Electricians	876	39.3	844	-6.2
Construction Managers	799	5.0	822	2.9
Bus and Truck Mechanics and Diesel Engine Specialists	735	0.4	687	-9.5
Machinists	858	-25.6	591	-32.1
Electronics Engineering Technicians	512	-15.2	348	-31.9
Industrial Production Managers	310	-14.1	291	-1.0
Emergency Medical Technicians and Paramedics	Data not available (Occupation not in Top 10)		272	50.3

Source: The Conference Board Help Wanted Online™ data series.

\* As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

## Energy Commission Region 4

In Region 4, Heavy and Tractor-Trailer Truck Drivers show the largest long-term projected ARFVTP-related job growth with an expected increase of 11,840 jobs along with the highest percentage change (22.8 percent), followed by Maintenance and Repair Workers with 4,770 jobs (13.1 percent) and Automotive Specialty Technicians\* with 3,240 more jobs (14.0 percent) projected by the year 2020. Bus and Truck Mechanics and Diesel Engine Specialists (18.3 percent) and Machinists (17.2 percent) also indicates significant projected long-term job growth.

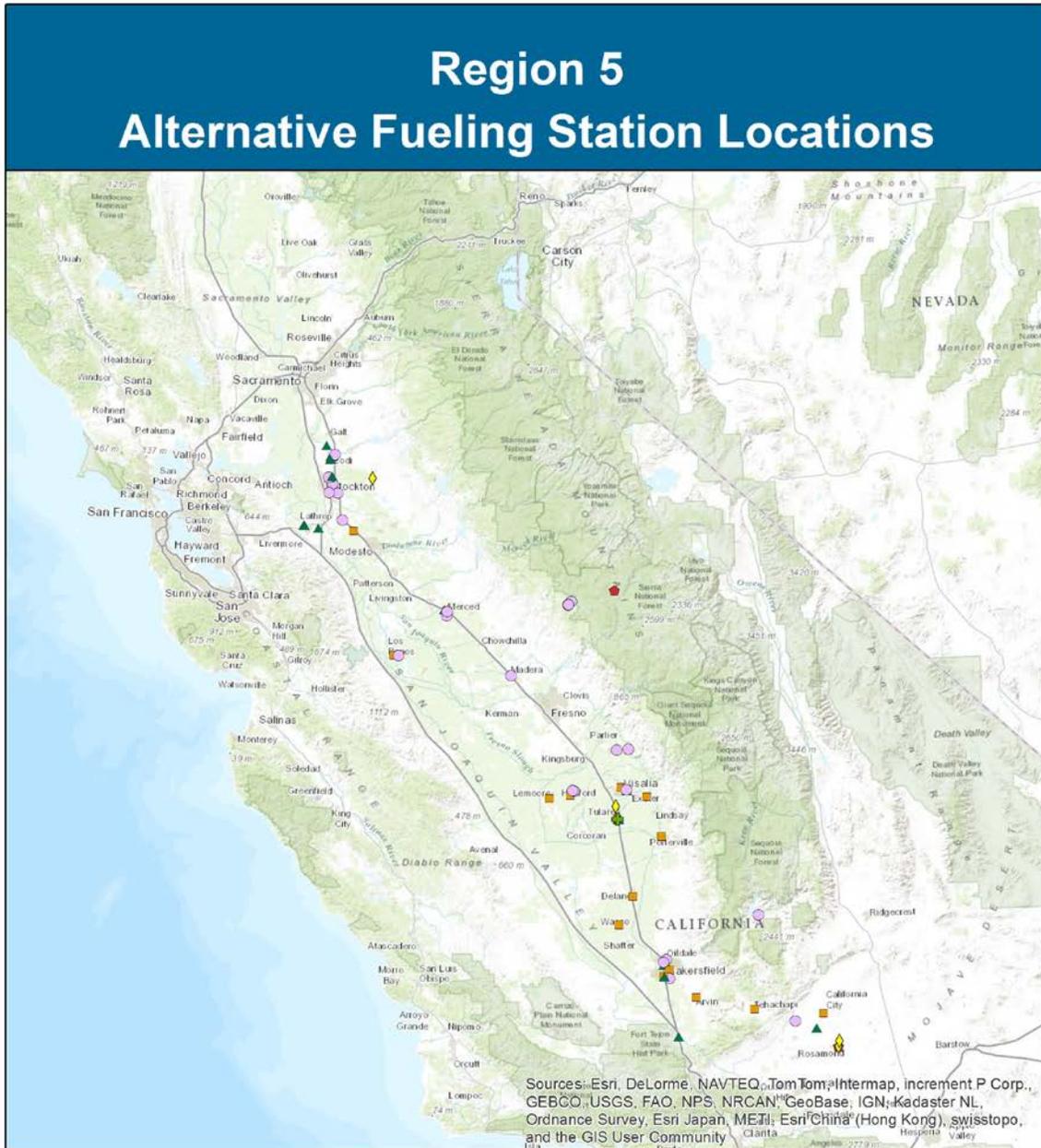
Region 4 Top 10 ARFVTP-Related Occupations with the Most HWOL Job Advertisements Long-Term Employment Projections							
Occupation	Employment		Numerical Change	Percent Change	Annual		
	2010	2020			New Jobs	Replacement Needs	Total Jobs
Heavy and Tractor-Trailer Truck Drivers	51,960	63,800	11,840	22.8	1,184	1,033	2,217
Maintenance and Repair Workers, General	36,310	41,080	4,770	13.1	478	668	1,146
Automotive Specialty Technicians*	23,140	26,380	3,240	14.0	324	598	922
Electricians	14,310	15,880	1,570	11.0	157	386	543
Construction Managers	15,830	17,700	1,870	11.8	187	102	289
Bus and Truck Mechanics and Diesel Engine Specialists	7,830	9,260	1,430	18.3	143	170	313
Machinists	11,620	13,620	2,000	17.2	200	214	414
Electronics Engineering Technicians*	5,000	5,320	320	6.4	33	96	129
Industrial Production Managers	5,830	6,390	560	9.6	56	137	193
Emergency Medical Technicians and Paramedics	5,360	7,690	2,330	43.5	232	107	339

Source: California Employment Development Department, Projections of Employment 2010–2020.

Notes: Replacement needs estimate the number of job openings created when workers permanently leave an occupation and need to be replaced. Total jobs are the sum of new jobs and replacement needs.

\* Projections are not available for this occupation; therefore, the broader occupational group was used.

# Energy Commission Region 5 (Kern, Kings, Madera, Merced, San Joaquin, and Tulare Counties)



### Fuel Type

- ◆ Biodiesel
- Compressed Natural Gas
- ▲ Electric Charging Station
- ◇ Ethanol 85
- Hydrogen Fueling Station
- ✚ Liquefied Natural Gas
- Liquefied Petroleum Gas (Propane)

Data source:  
DOE – Energy Efficiency and Renewable Energy  
[http://www.afdc.energy.gov/data\\_download](http://www.afdc.energy.gov/data_download)  
Alternative fueling stations locations (viewed 2/19/14)

Cartography by:  
State of California  
Employment Development Department  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)  
April 2014

## Energy Commission Region 5

According to HWOL, the number of ARFVTP-related job advertisements increased across all counties in Region 5 for 2013-2014, with nearly 2,000 job ads each in San Joaquin and Kern counties, followed by Tulare and Merced with 713 and 394 jobs advertised, respectively. Kings and Madera counties shows the smallest number of ARFVTP-related job ads; however, Madera County continues to indicate a marked year-over increase of 50.5 percent.

Region 5: ARFVTP-Related HWOL Job Advertisements by County				
County	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
San Joaquin	1,418	12.5	1,996	34.2
Kern	1,514	7.3	1,933	17.5
Tulare	523	14.7	713	32.0
Merced	300	2.4	394	27.9
Kings	148	5.0	227	48.4
Madera	104	57.6	167	50.5

Source: The Conference Board Help Wanted Online™ data series.

During the 2013-2014 period, Heavy and Tractor-Trailer Truck Drivers has the most ARFVTP-related job advertisements (3,079), followed by Maintenance and Repair Workers (915). Machinists and Emergency Medical Technicians and Paramedics has the largest percentage change of 63.1 and 53.0, respectively, although the total job ads for both occupations are modest (about 100). Construction Managers show a moderate decline of 16.1 percent.

Region 5: Top 10 ARFVTP-Related HWOL Job Advertisements				
Occupation	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Heavy and Tractor-Trailer Truck Drivers	2,026	24.8	3,079	41.4
Maintenance and Repair Workers, General	842	1.8	915	4.5
Electricians	255	8.5	355	35.0
Bus and Truck Mechanics and Diesel Engine Specialists	282	-9.0	327	7.2
Automotive Specialty Technicians	188	8.7	257	26.6
Electronics Engineering Technicians	87	-29.8	111	24.7
Machinists	67	-51.4	106	63.1
Emergency Medical Technicians and Paramedics	66	135.7	101	53.0
Construction Managers	82	1.2	73	-16.1
Industrial Production Managers	43	59.3	44	4.8

Source: The Conference Board Help Wanted Online™ data series.

\* As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

## Energy Commission Region 5

In Region 5, Heavy and Tractor-Trailer Truck Drivers show the largest long-term projected ARFVTP-related job growth with an increase of 3,930 jobs, followed by Maintenance and Repair Workers with 1,240 jobs and Automotive Specialty Technicians\* with 800 jobs projected. Occupations with the highest projected percentage job growth include Emergency Medical Technicians and Paramedics (31.7 percent), Heavy and Tractor-Trailer Truck Drivers (26.0 percent), and Industrial Production Managers (21.8 percent).

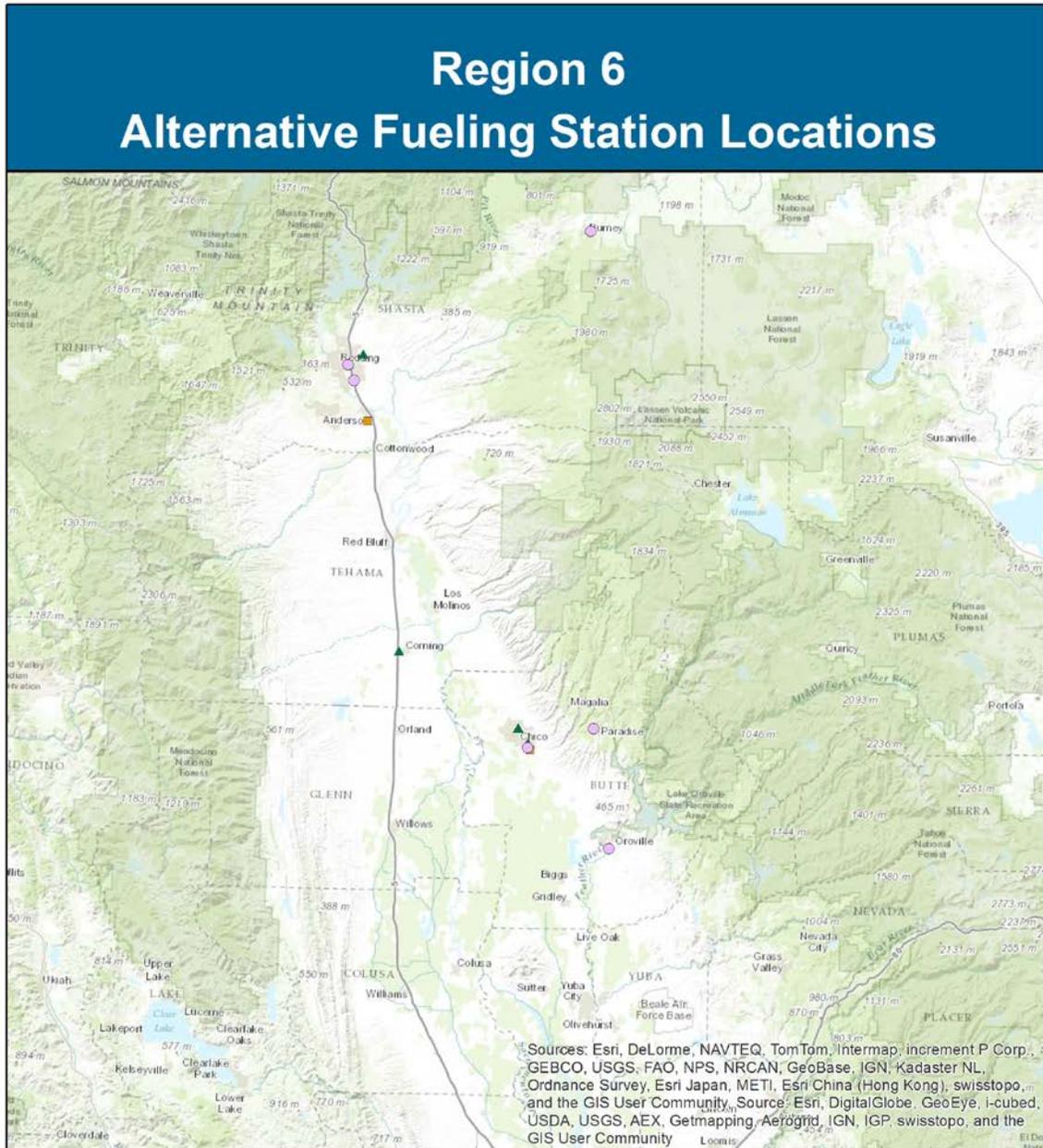
Region 5 Top 10 ARFVTP-Related Occupations with the Most HWOL Job Advertisements Long-Term Employment Projections							
Occupation	Employment		Numerical Change	Percent Change	Annual		
	2010	2020			New Jobs	Replacement Needs	Total Jobs
Heavy and Tractor-Trailer Truck Drivers	15,140	19,070	3,930	26.0	694	286	980
Maintenance and Repair Workers, General	7,320	8,560	1,240	16.9	261	89	350
Electricians	3,430	4,070	640	18.7	157	93	250
Bus and Truck Mechanics and Diesel Engine Specialists	1,620	1,950	330	20.4	67	37	104
Automotive Specialty Technicians*	3,850	4,650	800	20.8	178	96	274
Electronics Engineering Technicians*	830	840	10	1.2	17	15	32
Machinists	920	1,040	120	13.0	29	17	46
Emergency Medical Technicians and Paramedics	600	790	190	31.7	32	13	45
Construction Managers	2,580	3,070	490	19.0	65	17	82
Industrial Production Managers	870	1,060	190	21.8	40	23	63

Source: California Employment Development Department, Projections of Employment 2010–2020.

Notes: Replacement needs estimate the number of job openings created when workers permanently leave an occupation and need to be replaced. Total jobs are the sum of new jobs and replacement needs.

\* Projections are not available for this occupation; therefore, the broader occupational group was used.

# Energy Commission Region 6 (Butte, Shasta, and Tehama Counties)



### Fuel Type

- Compressed Natural Gas
- ▲ Electric Charging Station
- Liquefied Petroleum Gas

Data source:  
DOE – Energy Efficiency and Renewable Energy  
[http://www.afdc.energy.gov/data\\_download](http://www.afdc.energy.gov/data_download)  
Alternative fueling stations locations (viewed 2/19/14)

Cartography by:  
State of California  
Employment Development Department  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)  
April 2014

## Energy Commission Region 6

According to HWOL, Shasta and Butte counties show the most ARFVTP-related job advertisements at 468 and 384, respectively, while Tehama County represents a much smaller number of job ads (48) during 2013-2014. ARFVTP-related job ads grew by 13.3 percent in Shasta County, while there was a significant decline in Tehama County of 41.5 percent.

Region 6: ARFVTP-Related HWOL Job Advertisements by County				
County	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Shasta	397	28.9	468	13.3
Butte	376	40.3	384	-3.0
Tehama	79	61.2	48	-41.5

Source: The Conference Board Help Wanted Online™ data series.

Heavy and Tractor-Trailer Truck Drivers and Maintenance and Repair Workers show the most ARFVTP-related job ads with 486 and 163, respectively, during 2013-2014. Automotive Specialty Technicians has the largest growth of job ads of 57.5 percent. Two occupations appearing in the top 10 in 2014 with strong growth rates are Electrical and Electronic Equipment Assemblers (175.0 percent) and Electronics Engineering Technicians (33.3 percent), although these occupations represent a small number of ARFVTP-related job ads (about 10 or less). Machinists has a significant decline in the number of job ads (-57.7 percent).

Region 6: Top 10 ARFVTP-Related HWOL Job Advertisements				
Occupation	Number of Job Ads Nov. 7, 2012 – Mar. 6, 2013	Percent Change*	Number of Job Ads Nov. 8, 2013 – Mar. 7, 2014	Percent Change*
Heavy and Tractor-Trailer Truck Drivers	442	44.9	486	3.0
Maintenance and Repair Workers, General	181	47.2	163	-13.3
Automotive Specialty Technicians	37	-27.5	63	57.5
Bus and Truck Mechanics and Diesel Engine Specialists	65	25.0	62	-3.1
Electricians	49	63.3	50	N/A
Emergency Medical Technicians and Paramedics	23	53.3	27	22.7
Construction Managers	13	62.5	14	27.3
Machinists	26	36.8	11	-57.7
Electrical and Electronic Equipment Assemblers	Data not available (Occupation not in Top 10)		11	175.0
Electronics Engineering Technicians	Data not available (Occupation not in Top 10)		4	33.3

Source: The Conference Board Help Wanted Online™ data series.

\* As compared to the same 120-day period from the previous year. Due to the HWOL annual revision, there may be some discrepancies from the previous year's data for comparison purposes.

## Energy Commission Region 6

In Region 6, Heavy and Tractor-Trailer Truck Drivers show the largest long-term projected ARFVTP-related job increase of 370 jobs (18.6 percent) growth, followed by Automotive Specialty Technicians with an increase of 210 jobs (21.2 percent) and Maintenance and Repair Workers with 190 jobs (12.3 percent) projected.

Region 6 Top 10 ARFVTP-Related Occupations with the Most HWOL Job Advertisements Long-Term Employment Projections							
Occupation	Employment		Numerical Change	Percent Change	Annual		
	2010	2020			New Jobs	Replacement Needs	Total Jobs
Heavy and Tractor-Trailer Truck Drivers	1,990	2,360	370	18.6	39	40	79
Maintenance and Repair Workers, General	1,550	1,740	190	12.3	20	28	48
Automotive Specialty Technicians*	990	1,200	210	21.2	20	26	46
Bus and Truck Mechanics and Diesel Engine Specialists	200	240	40	20.0	4	4	8
Electricians	470	540	70	14.9	7	13	20
Emergency Medical Technicians and Paramedics†	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Construction Managers	470	500	30	6.4	5	2	7
Machinists	90	100	10	11.1	2	2	4
Electrical and Electronic Equipment Assemblers	80	80	0	0.0	0	1	1
Electronics Engineering Technicians*	30	30	0	0.0	0	1	1

Source: California Employment Development Department, Projections of Employment 2010–2020.

Notes: Projections for the North Valley Region were used, which also includes Glenn and Colusa counties. Replacement needs estimate the number of job openings created when workers permanently leave an occupation and need to be replaced. Total jobs are the sum of new jobs and replacement needs.

\* Projections are not available for this occupation; therefore, the broader occupational group was used.

† Due to the size of the region, an estimate of employment could not be provided.

## ***Skills Required for ARFVTP-Related Occupations***

---

This section examines the typical skills requirements for the 25 ARFVTP-related occupations and highlights the top five skills required for each occupation. Critical thinking is the most common skill required with 17 of the 25 ARFVTP-related occupations listing this as one of their top five skills, followed by reading comprehension with 14 ARFVTP-related occupations requiring this skill. Furthermore, 11 ARFVTP-related occupations require the skills of operation monitoring and repairing. Other commonly required skills include active listening, equipment maintenance, monitoring, and operation and control. The skills identified for each occupation are from the U.S. Department of Labor Occupational Information Network (O\*NET) skills database. Definitions of each of the skills are available at [www.onetonline.org/skills](http://www.onetonline.org/skills).

It should be noted that while certain skills requirements are shared by ARFVTP-related occupations, the level or extent of each skill will vary by occupation. For example, critical thinking is one of the top five skills required for both biomass plant technicians and compliance officers; however, compliance officers need a much higher level of critical thinking.

# Skills Required for ARFVTP-Related Occupations

## Top 5 Skills by Occupation

Alternative and Renewable Fuels and Technology Related Occupations	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Judgment & Decision Making	Learning Strategies	Mgmt of Financial Resources	Mgmt of Personnel Resources	Monitoring	Operation and Control	Operation Monitoring	Persuasion	Quality Control Analysis	Reading Comprehension	Repairing	Science	Social Perceptiveness	Speaking	Time Management	Troubleshooting	Writing
Agricultural Technicians		•	•		•											•							•
Automotive Engineering Technicians		•			•										•	•							•
Automotive Service Technicians and Mechanics						•						•	•				•					•	
Automotive Specialty Technicians		•	•		•								•				•						
Biofuels Processing Technicians					•	•						•	•				•						
Biomass Plant Technicians					•	•						•	•				•						
Bus and Truck Mechanics and Diesel Engine Specialists					•	•									•		•					•	
Compliance Officers					•		•									•				•			•
Construction Managers				•					•	•	•			•									
Control and Valve Installers and Repairers						•	•						•		•		•						
Electrical and Electronic Equipment Assemblers				•	•						•		•			•							
Electrical Engineering Technicians					•						•		•		•	•							
Electricians				•				•							•		•					•	
Electronics Engineering Technicians			•		•											•						•	•
Emergency Medical Technicians and Paramedics	•			•	•											•				•			
Firefighters				•	•		•				•					•							
Fuel Cell Technicians		•			•											•		•					•
Gas Compressor and Gas Pumping Station Operators											•	•	•			•	•						
Heavy and Tractor-Trailer Truck Drivers		•										•	•				•			•			
Industrial Production Managers				•			•			•	•										•		
Machinists					•						•	•	•			•							
Maintenance and Repair Workers, General					•	•										•	•					•	
Maintenance Workers, Machinery						•						•	•				•					•	
Mechanical Engineering Technicians		•			•										•	•							•
Police and Sheriff's Patrol Officers		•			•											•			•	•			

Source: U.S. Department of Labor Occupational Information Network (O\*NET) at <http://online.onetcenter.org>.

## Tasks Performed by ARFVTP-Related Occupations

Below are examples of ARFVTP-related tasks performed by the occupations featured in this report. They were gathered from O\*NET, job ads, and other research. Some occupations working with alternative fuel technology vehicles, such as Control and Valve Installers and Repairers, Electronics Engineering Technicians, and Maintenance and Repair Workers, do not perform any new or modified tasks other than those who work on older fossil fuel technology vehicles. As alternative fuel vehicle technology advances and its popularity increases with consumers, the tasks performed by these workers may become more specialized. In addition, as the number of aging alternative fuel vehicles on the road increases, so will the need for recycling these vehicles. The main procedures for this emerging type of work are Shutdown/Isolate Fuel System, Defueling, and Removing components. Each type of alternative fuel vehicle will require its own specialized tasks for recycling.

Agricultural Technicians	<ul style="list-style-type: none"> <li>• Study existing and potential feedstocks to determine which plants can be best used to produce alternative vehicle fuel.</li> <li>• Determine optimum time of year and location to grow and cultivate various feedstocks for fuel production.</li> <li>• Estimate waste products that will be generated in the production of biofuel feedstocks.</li> </ul>
Automotive Engineering Technicians	<ul style="list-style-type: none"> <li>• Analyze performance of vehicles or components that have been redesigned to increase fuel efficiency, such as camless or dual-clutch engines or alternative types of air-conditioning systems.</li> <li>• Improve fuel efficiency by testing vehicles or components that use lighter materials, such as aluminum, magnesium alloy, or plastic.</li> <li>• Test performance of vehicles that use alternative fuels, for example, alcohol blends, natural gas, liquefied petroleum gas, biodiesel, nanodiesel, or alternative power methods such as hydrogen fuel cells.</li> </ul>
Automotive Service Technicians and Mechanics	<ul style="list-style-type: none"> <li>• Troubleshoot motor generators and hybrid inverters.</li> <li>• Remove and replace hybrid batteries following proper safety precautions.</li> <li>• Diagnose system malfunctions in alternative fuel vehicles.</li> <li>• Inspect, maintain, and repair vehicles that use alternative fuels such as ethanol, propane, or electricity.</li> <li>• Convert gas vehicles to electric.</li> </ul>
Automotive Specialty Technicians	<ul style="list-style-type: none"> <li>• Conduct visual inspections of compressed natural gas fuel systems to identify cracks, gouges, abrasions, discoloration, broken fibers, loose brackets, damaged gaskets, or other problems.</li> <li>• Diagnose and repair regenerative braking systems or hydraulic systems in hybrid vehicles.</li> <li>• Diagnose and replace or repair engine management systems or related sensors for flexible fuel vehicles (FFVs).</li> <li>• Inspect propane or natural gas high-pressure tanks, piping, or pressure regulators.</li> <li>• Convert fuel systems from gasoline to butane gas, ethanol, methane, or other alternative or biofuel systems.</li> <li>• Service or repair biodiesel, butane gas, ethanol, methane, or other alternative or biofuel systems or internal combustion engine systems for</li> </ul>

\* *Safety Booklet*, Clean Cities Learning Program.

hybrid electric vehicles.

## ***Tasks Performed by ARFVTP-Related Occupations***

Biofuels Processing Technicians	<ul style="list-style-type: none"><li>• Operate chemical processing equipment for the production and extraction of biofuel products and secondary by-products.</li><li>• Operate valves, pumps, engines, or generators to control and adjust biofuel production.</li><li>• Assess the quality of biofuel additives for reprocessing.</li><li>• Measure, monitor, and record raw biofuel feedstock and process data.</li><li>• Monitor batch, continuous flow, or hybrid biofuel production processes.</li><li>• Monitor stored biofuel products or secondary by-products until reused or transferred to users.</li><li>• Preprocess feedstock in preparation for physical, chemical, or biological fuel production processes.</li><li>• Monitor and perform quality control functions on biofuel processing.</li><li>• Operate biofuel plant computer control systems.</li></ul>
Biomass Plant Technicians	<ul style="list-style-type: none"><li>• Operate valves, pumps, engines, or generators to control and adjust production of biofuel or biomass-fueled power.</li><li>• Inspect biomass power plant or processing equipment and record or report damage or mechanical problems.</li><li>• Measure, monitor, and assess quality of raw biomass feedstock.</li><li>• Process raw materials in biochemical production.</li><li>• Monitor daily use of chemicals, fuels, water, and power plant control systems at biomass plants.</li><li>• Operate auxiliary equipment in biomass plants such as air compressors, circulating water systems, boiler feed water treatment systems, waste water systems, and generator cooling systems.</li></ul>
Bus and Truck Mechanics and Diesel Engine Specialists	<ul style="list-style-type: none"><li>• Rebuild gas or diesel engines to make them more fuel efficient.</li><li>• Repair diesel-powered passenger vehicles or vehicles powered by biodiesel, hybrid-electric, fuel cells, gasoline, or propane.</li><li>• Maintain engines running on alternate fuel, such as compressed natural gas, liquefied natural gas, or propane.</li><li>• Maintain and overhaul the mechanics, electronics, and electrical system for natural gas and propane buses.</li><li>• Perform diagnosis, repair, and general maintenance of alternative vehicles including natural gas, hybrid, propane, and electric.</li></ul>
Compliance Officers	<ul style="list-style-type: none"><li>• Determine requirements applying to treatment, storage, shipment, or disposal of potentially hazardous production-related waste.</li><li>• Monitor national or international legislation on ozone-depleting substances or global warming.</li><li>• Specialize in regulatory issues related to agriculture such as the post-market regulation of genetically altered crops.</li></ul>
Construction Managers	<ul style="list-style-type: none"><li>• Oversee and direct new construction of biofuel and feedstock processing plants as well as the retrofitting of existing plants.</li><li>• Manage the construction of compressed natural gas or liquefied natural gas process plants and facilities.</li><li>• Inspect alternative fueling station designs for compliance.</li></ul>

## Tasks Performed by ARFVTP-Related Occupations

Electrical and Electronic Equipment Assemblers	<ul style="list-style-type: none"> <li>• Assemble electric vehicle parts and motors following both written and verbal instructions.</li> <li>• Assemble battery modules for electric vehicles.</li> <li>• Evaluate battery module assembly processes and equipment for quality improvement.</li> <li>• Assemble electric vehicle electronics.</li> </ul>
Electrical Engineering Technicians	<ul style="list-style-type: none"> <li>• Assist with building or testing electrical components of electric-drive vehicles or prototype vehicles.</li> <li>• Assist in the preparation of designs and specifications for biofuel plant electrical systems and substations.</li> <li>• Work on industrial equipment in biofuel plant operations.</li> <li>• Participate in developing engineering specifications, design verification test plans for electrical vehicle systems and electromechanical modules and components.</li> <li>• Provide assistance with integration for electronics and harness packaging in prototype electrical vehicles and during early production phase.</li> </ul>
Electricians	<ul style="list-style-type: none"> <li>• Assess customer's wiring and panel needs for electric vehicle charging stations in single-family homes, multi-family units, and non-residential buildings.</li> <li>• Obtain proper permits for the installation of electric vehicle charging stations.</li> <li>• Install wiring, electrical panels or sub-panels, and electric vehicle charging equipment.</li> <li>• Arrange for inspections after electric vehicle charging station installation.</li> <li>• Maintain and repair chargers and charging stations.</li> </ul>
First and Second Responders (Emergency Medical Technicians and Paramedics, Firefighters, Police and Sheriff's Patrol Officers, and Heavy and Tractor-Trailer Drivers)	<ul style="list-style-type: none"> <li>• Identify the vehicle fuel type: electric, hybrid, biodiesel, ethanol, natural gas, propane, or hydrogen (vehicle fuel type will be indicated by a badge, dash lights, decal, insignia, label, logo, placard, under hood cables [orange, blue, or both] or components, or Vehicle Identification Number [VIN]).</li> <li>• Recognize the risks and health hazards associated with each alternative vehicle and fuel type.</li> <li>• Assess the surrounding area and survey for hazards such as leaking or escaping fuel, and flammable vapors.</li> <li>• Immobilize the vehicle by chocking the wheels or pulling the valve stems. Then place the vehicle in park, set the parking brake, turn off the vehicle, and remove key. For compressed natural gas vehicles, turn off tank valve. For commercial electric vehicles, look for the high voltage shut-off.</li> <li>• Use proper tools and proper extinguishing agent for each fuel type when working on an alternative fuel vehicle.</li> <li>• Follow proper safety procedures and wear personal protective equipment (PPE) when working with alternative fuel vehicles.</li> <li>• Follow your department's Standard Operating Procedures (SOP).</li> <li>• Need to be aware of additional warnings and safety methods; for example, do not cut, breach, or puncture the orange cables (high voltage cables) or the high-voltage battery pack or components.</li> </ul>

## Tasks Performed by ARFVTP-Related Occupations

Fuel Cell Technicians	<ul style="list-style-type: none"> <li>• Assist in the design and development of fuel cell prototypes.</li> <li>• Assemble fuel cells or fuel cell stacks according to mechanical or electrical assembly documents or schematics.</li> <li>• Calibrate electronic equipment to test components and to validate design concepts.</li> <li>• Collect, document, analyze, and report fuel cell test data using spreadsheets or other computer software.</li> <li>• Install, calibrate, operate, or test emissions analyzers, cell-assist software, fueling systems, air conditioning systems in engine testing systems, or spark ignition (SI) or compression ignition (CI) engines.</li> <li>• Assist in testing the durability of a fuel cell stack within the automotive fuel cell system.</li> </ul>
Gas Compressor and Gas Pumping Station Operators	<ul style="list-style-type: none"> <li>• Monitor performance of gaseous hydrogen systems and equipment and report potential problems.</li> <li>• Draw biofuel samples, adjust rates, and monitor samples.</li> </ul>
Industrial Production Managers	<ul style="list-style-type: none"> <li>• Approve proposals for the acquisition, replacement, or repair of biofuel processing equipment or the implementation of new production processes.</li> <li>• Monitor meters, flow gauges, or other real-time data to ensure proper operation of biofuel production equipment and implement corrective measures as needed.</li> <li>• Shut down and restart biofuel plant or equipment in emergency situations or for equipment maintenance, repairs, or replacement.</li> <li>• Confer with technical and supervisory personnel to report or resolve biofuel plant safety, operational efficiency, and product quality conditions.</li> <li>• Monitor biodiesel processes and utility infrastructure operations.</li> </ul>
Machinists	<ul style="list-style-type: none"> <li>• Repair and rebuild electric vehicle parts and equipment.</li> <li>• Design and fabricate parts for electric vehicles and document the improvements or adjustments.</li> <li>• Produce precision metal parts for electric vehicles.</li> <li>• Assist appropriate staff in producing electric vehicle prototypical parts.</li> </ul>
Maintenance Workers, Machinery	<ul style="list-style-type: none"> <li>• Test, maintain, and repair biofuel plant equipment and other industrial machinery.</li> <li>• Disassemble, repair, and reassemble malfunctioning biofuel plant equipment.</li> </ul>
Mechanical Engineering Technicians	<ul style="list-style-type: none"> <li>• Assist with designing electric vehicle engines, drivetrains, and production and repair machinery.</li> <li>• Assist with the design and execution of innovative thermal, electrical, and mechanical safety test procedures on battery cells, modules, and packs.</li> <li>• Assess structural, thermal, and fluid flow behavior in designs and prototype hardware.</li> <li>• Assist in the design and development of soft- and hard-case cells for automotive applications.</li> <li>• Model, analyze, and optimize cell design and performance based on electrodes.</li> <li>• Work with appropriate staff on fuel cell design changes to improve cell performance, reliability, manufacturability, and cost effectiveness.</li> </ul>

# Skills Gap Survey Introduction and Methodology

## Introduction

The EDD’s Labor Market Information Division (LMID) partnered with the California Energy Commission to conduct a statewide survey of employers involved in the production, manufacturing, support, or use of alternative and renewable fuels and/or vehicle technologies. Between February and May 2014, the LMID contacted 336 employers and used data refinement techniques to filter for ARFVTP employers exclusively. By following this procedure, it was determined that there were 242 ARFVTP employers in the entire target population. The LMID received 121 valid responses to the survey, which represented a 50 percent response rate.

## Purpose of the Survey

The purpose(s) of this survey were to: (1) identify occupations ARFVTP employers had difficulty filling; (2) collect information on any skills gaps employers may be faced with; and (3) to identify the types of alternative fuels ARFVTP employers used in their fleet vehicles.

Identifying occupations that employers are having difficulty filling is important because it can provide insight into the characteristics of ARFVTP-related job vacancies. Skills gap data are helpful because they provide understanding of the mismatch between the needs of the employer and the existing skills of their respective workforce. According to the U.S. Department of Energy, there are more than a dozen alternative fuels in production or under development for use in alternative fuel and advanced technology vehicles. Gathering information pertaining to the types of fuels used by ARFVTP employers enhanced the LMID’s understanding of alternative fuel utilization trends in California.

## Data Collection

The EDD’s LMID used Survey Monkey software to create a survey instrument that would collect information specific to the workforce demands of ARFVTP employers. The California Energy Commission reviewed the survey questions to ensure that the questions addressed their research needs. The data collection methods used for this survey included Internet-based survey software, telephone inquiries, and in-person interviews.

Survey responses were provided by a point of contact within each ARFVTP firm and should reflect the most accurate information available. The total number of responses met or exceeded the threshold necessary for the 95 percent confidence level, with a margin of error of  $\pm 7$  percent. A 95 percent confidence level tells us that if this survey was conducted 100 times among ARFVTP employers, the survey results would accurately reflect the population 95 out of 100 times within the defined margin of error ( $\pm 7$  percent).

## Survey Response Rate

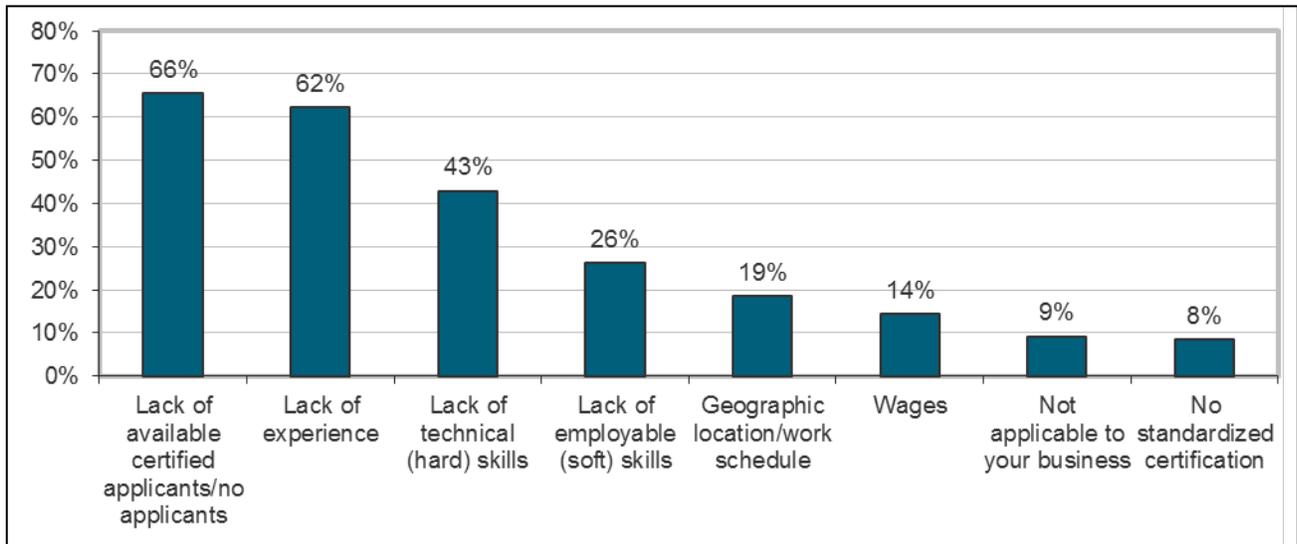
ARFVTP SURVEY RESULTS	
Target Population of California ARFVTP Employers	242
Number of Responses Received	121
Number of Non-responses	121
Response Rate	50%

# Skills Gap Survey Results

## Closed-ended Question Responses

Q3. What makes it challenging to find qualified candidates? Please check all that apply.

- Lack of available certified applicants/no applicants
- Lack of experience
- Lack of technical (hard) skills
- Lack of employable (soft) skills
- Geographic location/work schedule
- Wages
- Not applicable to your business
- No standardized certification

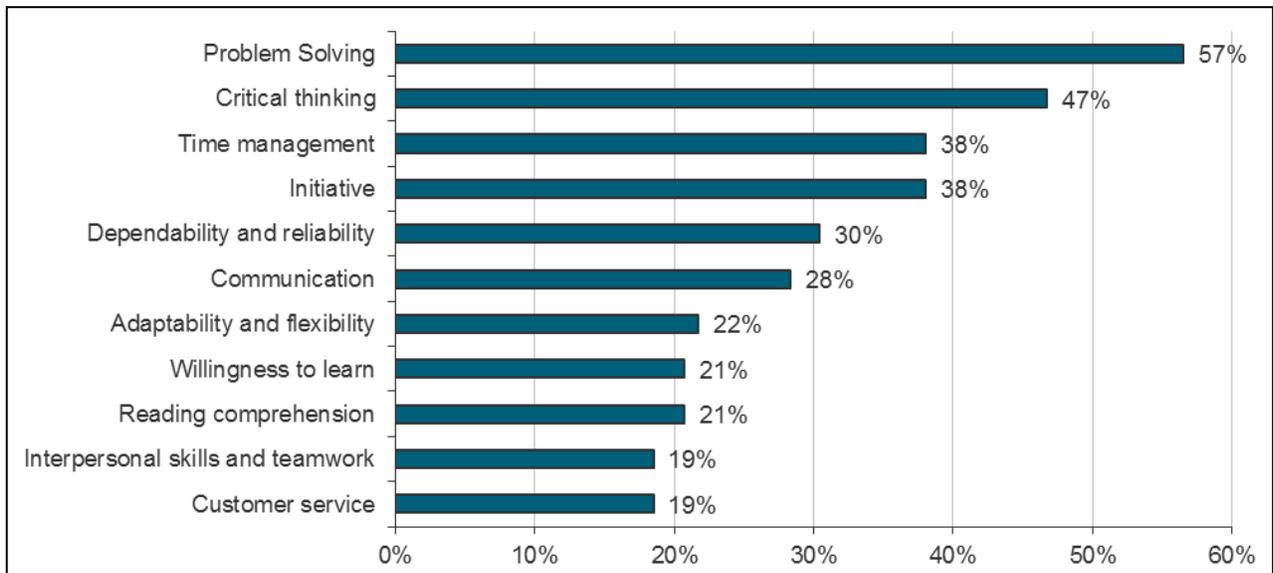


Employers reported that finding qualified candidates is most challenging due to a lack of available certified applicants or no applicants (66 percent), lack of experience (62 percent), and lack of technical skills (43 percent).

## Skills Gap Survey Results

**Q5. What employable skills are lacking by your current employees or applicants? Please check all that apply to your business.**

- |  |  |
|--|--|
| <input type="checkbox"/> Adaptability and flexibility  | <input type="checkbox"/> Initiative                        |
| <input type="checkbox"/> Communication                 | <input type="checkbox"/> Interpersonal skills and teamwork |
| <input type="checkbox"/> Critical thinking             | <input type="checkbox"/> Reading comprehension             |
| <input type="checkbox"/> Problem Solving               | <input type="checkbox"/> Time management                   |
| <input type="checkbox"/> Customer service              | <input type="checkbox"/> Willingness to learn              |
| <input type="checkbox"/> Dependability and reliability |  |

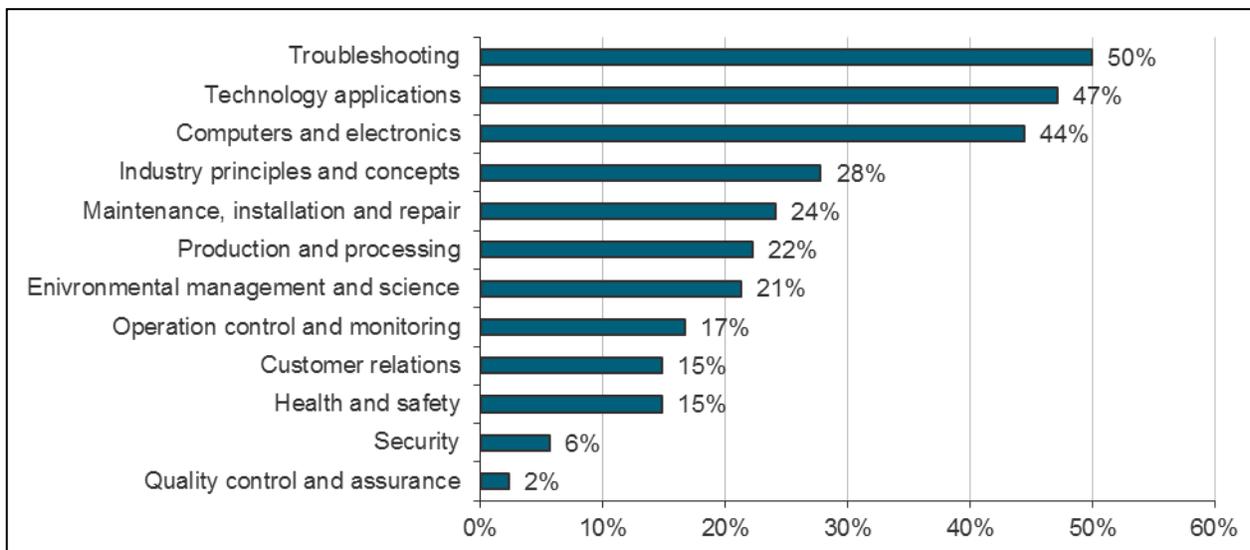


The employable skills most lacking by current employees or applicants in the ARFVTP-related firms surveyed include problem solving (57 percent) and critical thinking (47 percent).

## Skills Gap Survey Results

**Q6. What technical skills are lacking by your current employees or applicants? Please check all that apply to your business.**

- |   |  |
|---|--|
| <input type="checkbox"/> Computers and electronics            | <input type="checkbox"/> Production and processing             |
| <input type="checkbox"/> Customer relations                   | <input type="checkbox"/> Quality control and assurance         |
| <input type="checkbox"/> Health and safety                    | <input type="checkbox"/> Industry principles and concepts      |
| <input type="checkbox"/> Security                             | <input type="checkbox"/> Maintenance, installation, and repair |
| <input type="checkbox"/> Environmental management and science | <input type="checkbox"/> Technology applications               |
| <input type="checkbox"/> Operation control and monitoring     | <input type="checkbox"/> Troubleshooting                       |

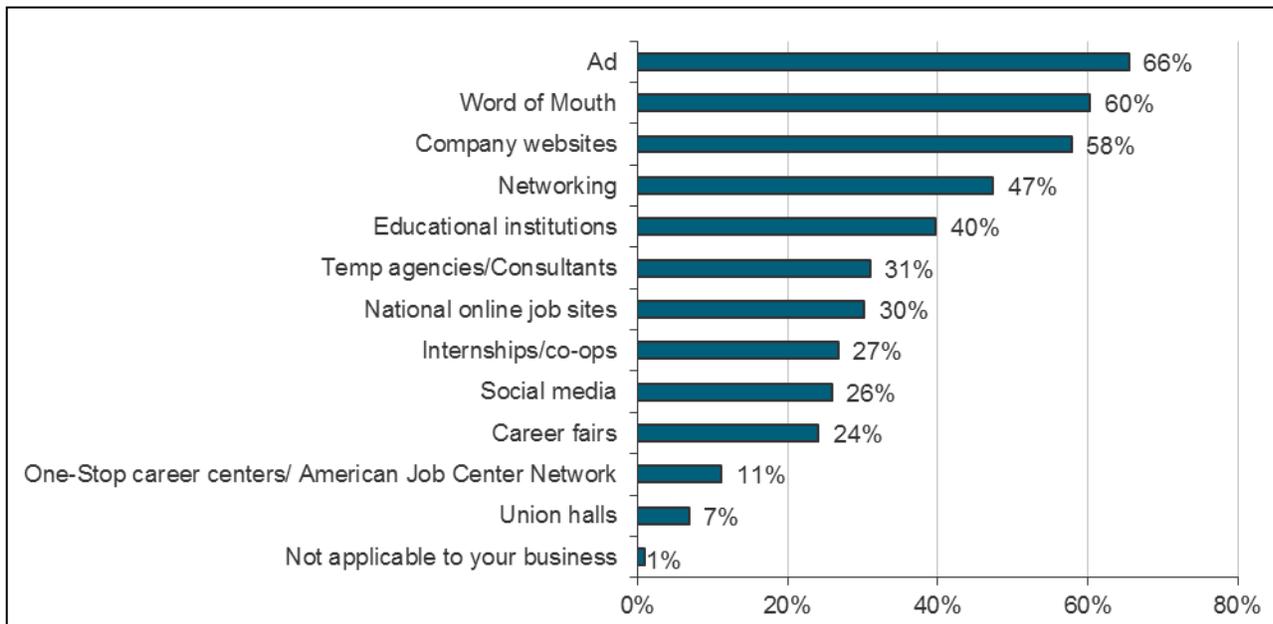


The technical skills most lacking by current employees or applicants in the ARFVTP-related firms surveyed include troubleshooting (50 percent), technology applications (47 percent), and computers and electronics (44 percent).

## Skills Gap Survey Results

**Q7. What hiring strategies is your business currently using to locate qualified candidates? Please check all that apply.**

- |  |  |
|--|--|
| <input type="checkbox"/> Ad  | <input type="checkbox"/> Educational institutions        |
| <input type="checkbox"/> Internships/co-ops                                  | <input type="checkbox"/> Social media                    |
| <input type="checkbox"/> Career fairs  | <input type="checkbox"/> Union halls                     |
| <input type="checkbox"/> Temp agencies/Consultants                           | <input type="checkbox"/> Networking                      |
| <input type="checkbox"/> National online job sites                           | <input type="checkbox"/> Word of Mouth                   |
| <input type="checkbox"/> One-Stop career centers/American Job Center Network | <input type="checkbox"/> Not applicable to your business |
| <input type="checkbox"/> Company websites                                    |  |



Most employers reported using hiring strategies such as advertisements (66 percent), word of mouth (60 percent), and company websites (58 percent), to locate qualified candidates.

## Skills Gap Survey Results

**Q8. What are the business impacts of having a skills gap? Please check all that apply.**

- |  |  |
|--|--|
| <input type="checkbox"/> Lower productivity        | <input type="checkbox"/> Less new product development                      |
| <input type="checkbox"/> Less profitable           | <input type="checkbox"/> Harder to compete                                 |
| <input type="checkbox"/> Challenges to recruitment | <input type="checkbox"/> Higher expenses                                   |
| <input type="checkbox"/> Less efficiency           | <input type="checkbox"/> Missed opportunities                              |
| <input type="checkbox"/> Unable to expand or grow  | <input type="checkbox"/> Not applicable to our business/not sure of impact |



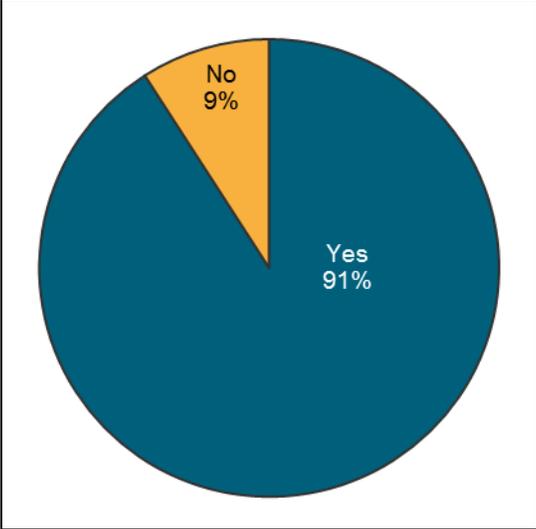
Most ARFVTP-related employers indicated that the business impacts of having a skills gap are lower productivity (67 percent) and less efficiency (63 percent).

# Skills Gap Survey Results

---

**Q9. Does your firm offer training for employees?**

- Yes
- No, please skip to Question 13

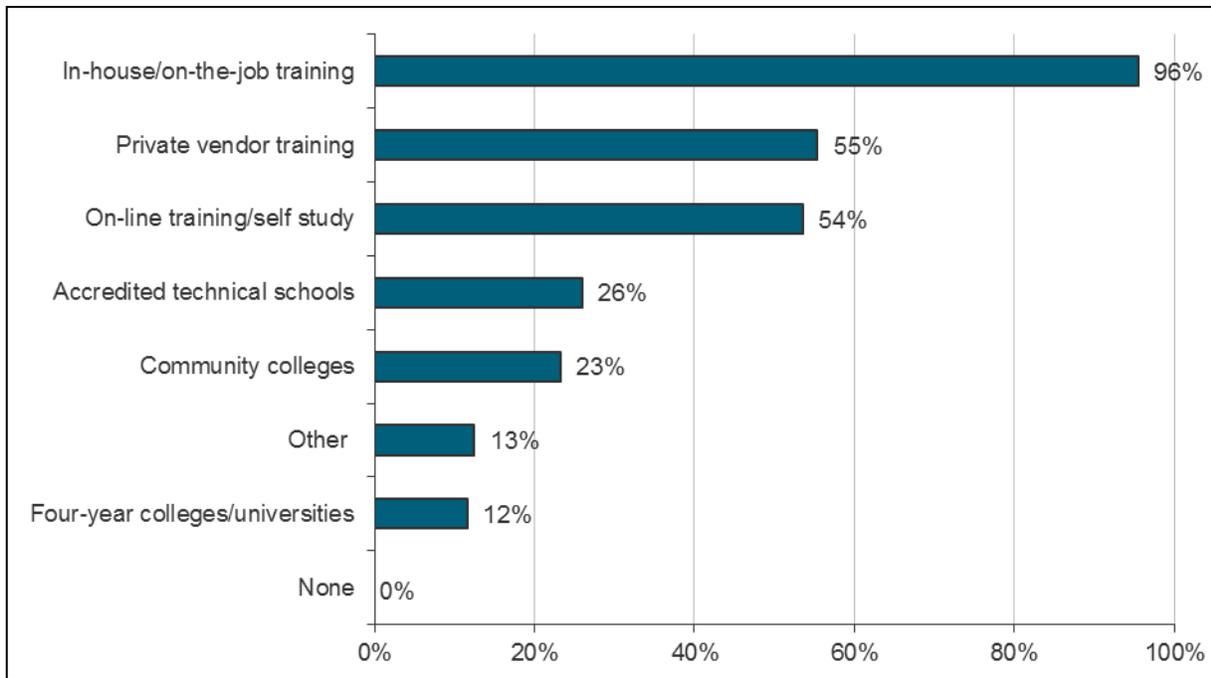


The survey findings show that 91 percent of employers who responded offer training for their employees, while 9 percent do not provide training.

## Skills Gap Survey Results

**Q10. Please check the method(s) you currently use to train your employees in the skills they are lacking.**

- In-house/on-the-job training
- On-line training/self study
- Private vendor training
- Accredited technical schools
- Community colleges
- Four-year colleges/universities
- None



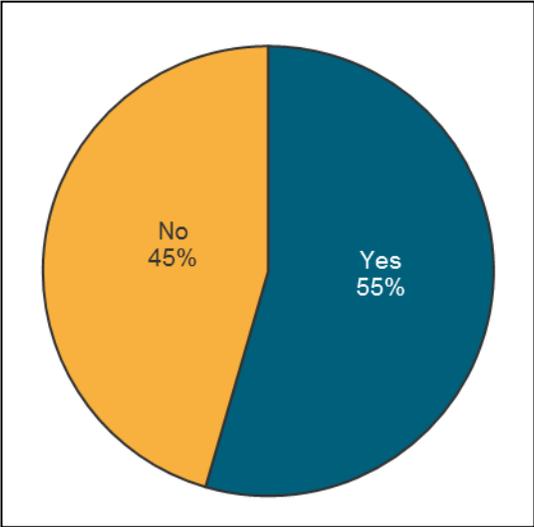
Most employers who provide training to their employees do so through in-house/on-the-job training (96 percent), private vendor training (55 percent), and on-line training/self study (54 percent).

# Skills Gap Survey Results

---

**Q11. Do your employees require a special license or certification to work in the industry?**

- Yes
- No, please skip to Question 13

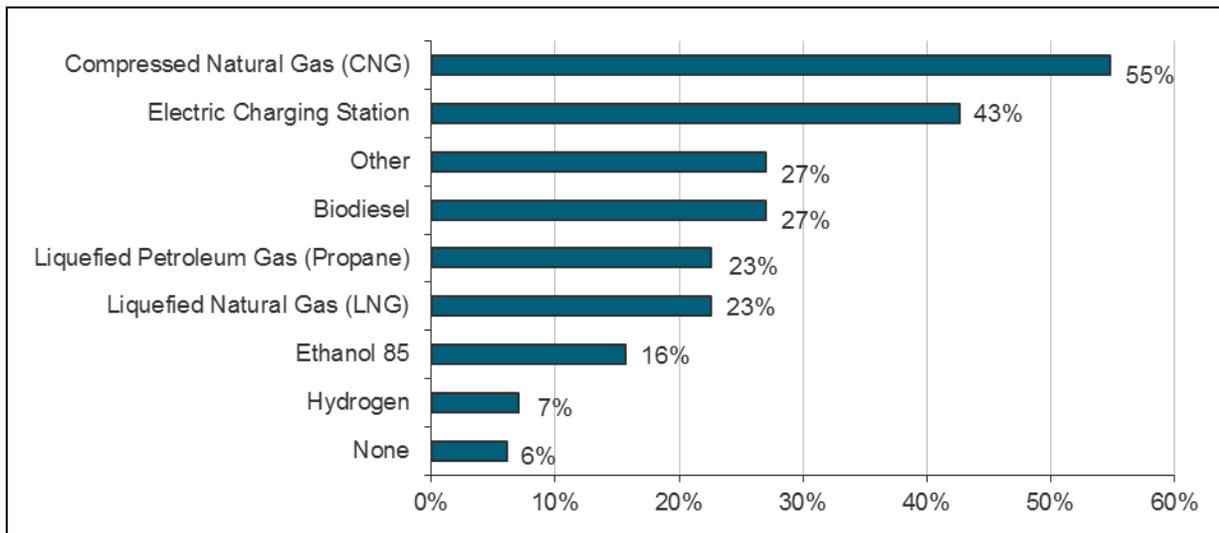


Employers surveyed indicated that 55 percent require a special license or certification to work in the industry, while 45 percent do not.

## Skills Gap Survey Results

**Q13. What types of alternative fuel do your fleet vehicles use? Please check all that apply to your business.**

- |   |  |
|---|--|
| <input type="checkbox"/> Biodiesel                    | <input type="checkbox"/> Liquefied Natural Gas (LNG)       |
| <input type="checkbox"/> Compressed Natural Gas (CNG) | <input type="checkbox"/> Liquefied Petroleum Gas (Propane) |
| <input type="checkbox"/> Electric Charging Station    | <input type="checkbox"/> Other                             |
| <input type="checkbox"/> Ethanol 85                   | <input type="checkbox"/> None                              |
| <input type="checkbox"/> Hydrogen                     |  |



Employers indicated that the alternative fuel and vehicle technology most used by their fleet vehicles are compressed natural gas (CNG) (55 percent) and electric charging stations (43 percent).

## Skills Gap Survey Results

### Open-ended Question Responses\*

**Q4. Please list all job openings for Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP)-related occupations that you are having difficulty hiring.**

ARFVTP Related Occupations	Frequency
Account Executive	1
Administrative Assistant	1
Applications Engineers	1
Assistant Technician	1
Auto Mechanic	2
Automotive Mechanic Bus-Truck	1
Battery Pack Remanufacturing Technician	1
Battery Technician	1
Biodiesel Fuel Production Technician	1
Business Development Rep	1
Certified [Company] CNG Technician	1
Certified [Manufacturer] Propane Fuel System Tech	1
Certified Technicians	1
Chemical Engineer	1
Chemical, Electrical & Mechanical Engineers	1
CNG Mechanics	1
Compressor Technician	1
Control Engineer w/ Automotive Experience	1
Design Engineer	1
Diesel Mechanics	1
Draftsman	1
Drivers	1
Drivers or Shop Workers (to pick up grease for fuel)	1
Electric Engineers	3
Embedded Software Engineer w/Simulink Experience	1
Embedded Software Test Engineer - Experience w/Misra Standards	1
Engine Research & Analysis Engineer	1
Engineers-operation Locomotives	1
Entry-level Alternative Fuel Vehicle Technicians	1
Equipment Mechanic	1
EV Wiring Tech	1
Field Applications Engineers	1
Fleet Maintenance Mechanics	1
Garage Assistant	1
General Mechanics	1
General Technicians - Do Maintenance Work on Vehicles	1
Group/Sight Supervisors	1
Heavy Duty Truck Mechanic	1

\* To protect confidentiality, the Labor Market Information Division (LMID) researchers eliminated any potentially identifying information from respondent comments. All comments were minimally edited to correct major misspelling and grammatical errors.

## Skills Gap Survey Results

ARFVTP Related Occupations (continued)	Frequency
Heavy Equipment Mechanic	2
Heavy Equipment Mechanics and Service Workers	1
Hybrid Technical Mechanics	1
Hydrogen Technician	1
Inside Sales Manager	1
Journeyman Electrician - EVSE Installers	1
Lab Testing	1
Lead Technician (Lead Master Technician)	1
Leased Owner Operators	1
Light and Medium Duty Technicians	1
Light Manufacturing and Assembly	1
Maintenance Clerk	1
Maintenance Machinist	1
Market Advisor	1
Material Handlers	1
Mechanic	7
Mechanic Technician	1
Mechanical Engineer	1
Not currently hiring but have some trouble with hiring Master Fleet Technician when we do.	1
Oil Refiners	1
Operation Management Waste Water Engineer	1
Parts Acquisition Person	1
Plant Manager	1
Plant Operators	1
Process Engineer	1
Procurement and Logistics Manager	1
Production Manager	1
Production Staff	1
QC Engineer	1
Qualified Operator - Commercial Driver of CNG Trucks	1
Radio/Camera Techs	1
Sales	2
Senior Maintenance Technicians	1
Senior Mechanical Engineer	1
Service Technician	3
Service Technicians to Repair Electrical Vehicles	1
Service Worker II & III	1
Software Engineer	3
Software Programmer	1
Staff Manufacturing Engineers	1
Supply Chain Manager	1
System Operators	1
Systems/Support Technicians	1
Technical Service Representatives	1

## Skills Gap Survey Results

ARFVTP Related Occupations (continued)	Frequency
Technician	4
Technician/Mechanic	1
Truck Driver	2
Truck Mechanics	1
Utility - Fueller	1
Vehicle Technician	1
Warehouse Worker	1
Welding Fabrication Engineers	1

The survey findings indicate that job openings for Mechanics and Technicians are the ARFVTP-related occupations that are most difficult to fill.

### Q5. What employable skills are lacking by your current employees or applicants?

List additional employable skills that were not provided in the above question:

Employable Skills	Frequency
2 years driving experience required	1
Ability to work alone after training	1
Ability to work in a small company/start up environment	1
Access to technical data from the supplier - battery technology/software	1
Alternative Fuel Vehicle Maintenance Training	1
Applicants lack all of these skills, but current employees have them all	1
Good attitude, enjoy the work, want to be on career path	1
Lack of initiative applies to the applicants, not the current employees	1
Lack of training; programs out there don't give training, maybe it is an accessibility issue since certain training is offered only in the day when the employees work, and they can't attend.	1
Microsoft Word, Excel	1
Our employees do not lack skills because we train them in house and send them to school.	1
None	1
None of the Above	1
None of the checked items is truly terrible, it's just where I would improve average levels	1
None of these apply	1
Not a cultural fit	1
Organizational skills	1
Problem Solving will be important in the future.	1
Read, write, and follow directions	1
Recognizing productivity relative to profitability	1
Science and math skills. Understanding of system interactions in a chemical engineering & heat transfer and fluid flow process.	1
Strong work ethic	1
Technical skills	1
When English is not the first language of workers, it causes problems for them when they take the ASE tests.	1

## Skills Gap Survey Results

### Q6. What technical skills are lacking by your current employees or applicants?

List additional technical skills that were not provided in the above question:

Technical Skills	Frequency
Biodiesel is a niche market, so almost by definition there will not be a wide group of experienced professionals to choose between. However, what I need is access to fast, capable, motivated learners; able to take the scientific principles learned in the classroom, or in other jobs, and apply them to biodiesel.	1
None	2
Note: The response of computers above this refers to Excel and Word.	1
Need 3 D printing skills, solid modeling, solid works	1
Microsoft Word, Excel	1
Applicants lack all of these skills, but current employees have them all	1
We have electric hybrid buses and diesel, these are new technologies.	1
Having folks with educational degrees - i.e. Engineering degree recommended	1
Hybrid vehicle systems Alternative fuels	1
Port experience	1

### Q7. What hiring strategies is your business currently using to locate qualified candidates?

Other (please specify)

Hiring Strategies	Frequency
Craigslist	1
Craigslist, AWFd, other free resources	1
EdJoin	2
Employer finds out who are top workers and calls them to offer job	1
Hiring is administered by HR. We don't have any control.	1
In person contacts, referrals from employees	1
Municipal Equipment Maintenance Association (MEMA)	1
Online recruiting, word of mouth	1
Recruiters at truck stops/anywhere trucks are	1
We first post job openings on our internal website and then list job openings on our public website.	1
Trained existing technicians to work on alternative fuel vehicles	1
Used these in the past, currently no openings	1

Some employers reported using hiring strategies such as EDJOIN and Craigslist to locate qualified candidates.

## Skills Gap Survey Results

---

**Q10. Please check the method(s) you currently use to train your employees in the skills they are lacking.**

**Other (please specify)**

<b>Training Methods</b>	<b>Frequency</b>
ASE training	1
Company trainers who teach equipment specific classroom training sessions	1
Deutz training school in Atlanta, Georgia	1
Educational reimbursement for higher education	1
Factory training	1
Job Shadowing	1
Municipal Equipment Maintenance Association (MEMA) grand-funded training	1
OEM hosted technical training	1
SCRTTC	1
Soon Rio Hondo College	1
Staying current on industry news and sharing with other employees	1
The manufacturer of their equipment trains the employees.	1
UTI (Universal Technical Institute)	1
VTT training for bus drivers	1

## Skills Gap Survey Results

Q12. Please list the most important licenses/certifications that are critical to your business in the fields below:

Licenses/Certifications	Frequency
[Company] Certification	3
8 ASE Certifications required	1
Air Conditioning	1
Air Conditioning 608 Certification	1
ASE Master Certification	1
Automotive Certifications	2
Automotive Service Excellence (ASE) Certification	17
BAR Smog Check Program License	1
Brake Inspector	1
Bus License	1
CA Fire Mechanic Certification	1
CA Smog Certification	4
CAD Certification	1
California Community College Diesel Technology Certification	1
CalOSHA Fork Lift Certification	1
CA Driver License	1
Certified Diesel Mechanics	1
Certified Locomotive Electricians or Certified Signal Systems Electricians	1
Class A Driver License	5
Class A Driver License with Hazardous Tank Endorsement	1
Class A or B Driver License	1
Class B Driver License	3
Class B Endorsement License for Driving Passengers	1
Class B, with Air Brake and Tank Endorsement	1
Class C Driver License	1
CNG Fueling System Certification	1
CNG Tank Inspection Certification	1
Commercial Class B License with a Passenger Endorsement & Air Brake Endorsement	1
Commercial Driver License	10
Commercial Class B Driver License	4
Commercial Class A, B Driver License	1
Commercial Class A Driver License	1
Commercial Driver License with Endorsements	1
Composite Fabrication Certification	1
Compressed Natural Gas Inspector License	1
Department of Energy	1
DMV License	1
Engineering Degree	1
EPA & East Bay MUD Safety Program	1
EPA Certification for A/C	1
Federal Railroad Association Certification	1
Fluid Power Society (FPS)	1

## Skills Gap Survey Results

Licenses/Certifications (continued)	Frequency
Forklift License	1
Haz Mat Certification	1
HazMat Shipping and Receiving	1
Health and Safety (in-house training)	1
Heavy Duty Certification	1
Higher educational degrees	1
HVAC Systems	1
In-house Shop Engineer Certification	1
Journeyman Electrician	1
Locomotive Engineers & Conductors	1
Manufacturer Certifications	6
MBA	1
Motorcycle License (everything they fix, they have to be able to drive)	1
Motorcycle Salesperson License (M1)	1
Operations Management Waste Water Engineer	1
OSHA Industrial Safety Courses	1
PE License (Professional Engineers License)	1
PMP	1
Roush Propane Certification	1
School Bus Certificate	1
Solid Works certification	1
Stormwater Drains	1
Tank Tester Certification	1
Tank Vehicle Endorsement	1
Title 22 Waste Generator	1
Transportation Worker Identification Card - from Homeland Security	1
Vehicle Sales License	2
Waste Management	1
Welding Certifications	2

Of those firms who require a special license or certification, employers reported that Automotive Service Excellence (ASE) certification and a California Commercial driver license (Class A and/or B) were the most critical for their business needs.

## Skills Gap Survey Results

Q13. What types of alternative fuel do your fleet vehicles use?

Other (please specify)

Types of Alternative Fuel Used	Frequency
Battery	1
Diesel-Electric	2
Digital Gasoline Engine which improves gasoline efficiency	1
Electric	14
Electric & Battery-Operated [Company] Carts (over 200) that plug into wall outlets	1
Electric Charging Station for Forklift	1
Electric Charging Station onsite, but not in use	1
Electric Vehicle, Hybrid	2
Electric, Hybrid-Electric	1
Feedstock Oil. After it settles they filter it and run through the system for biofuel.	1
Hybrid Electric Vehicles	5
Hybrid, Clean Diesel	1
Hybrids	5
Hybrids, in the near future will have LPG	1
Hybrids, Propane & Electric Forklifts, Electric Golf Carts	1
Hydrogen-electric vehicles	1
Low Sulfur Diesel	1
Renewable Natural Gas	1
Synthetic Fuels	1
We use chicken waste and convert it to (CNG) Compressed Natural Gas and reusable waste water. We currently are the only company that PG&E will purchase CNG gas from because PG&E knows where the gas comes from.	1
"Leading manufacturer and packager of CNG compressors, refueling equipment and systems for the natural gas vehicle (NGV) market" (from website).	1
We do not have vehicles, we are distributors of alternative fuels.	1
We have diesel and Electric Hybrid busses.	1
We are the operators of fuel stations and have a need for technicians that would work on the fuel stations vs the vehicles. We also operate a landfill gas to LNG production facility in Livermore, CA.	1

Employers indicated that other alternative fuel and vehicle technology most used in their fleets are electric, hybrid, and electric-hybrid vehicles.

## Skills Gap Survey Results

Q14. Is there anything else you would like to include about your current and future skills gap concerns?

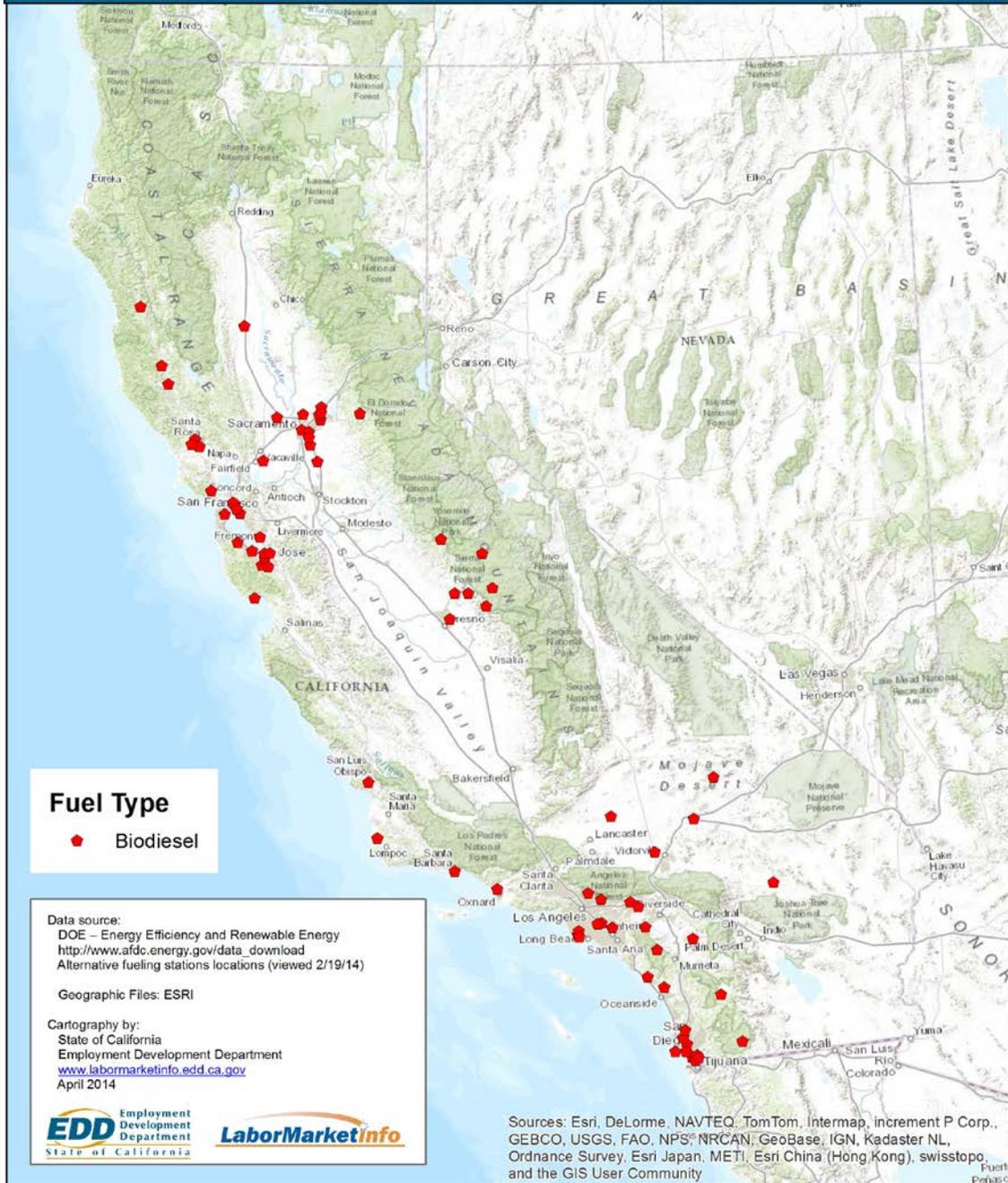
Labor Skills Gap Concerns	Frequency
Lack of skilled labor has become an obstacle to growth. We cannot grow our business without reliable and qualified employees.	1
Q3 - N/A because we usually move them up within our company. Starting them as a car cashier, then moving them up, eventually to Technician. We also provide training to move up.	1
Can find applicants that meet qualifications, but seems they don't want to work as much as generations before, only want to stay a couple of years, not long-term candidates.	1
Hard to find workers with Compressed Natural Gas (CNG) engine and drive train system experience	1
My challenge in hiring / recruiting has been in finding qualified process operations technicians vs. assembly line production people. We are not an assembly line. We also need applicants with good Math & Science background as well as good communication, troubleshooting, and computer skills. If we start with these, it takes about a year for an employee to come up to speed. In the past I have had > 100 applicants for postings and >98% lacked the basic skills needed for the position. The schools need to do better at math and science.	1
Related to Q3 - passing the drug test and having a desire to work	1
None	1
Hard to find qualified applicants	1
There are few automotive oriented people in San Diego.	1
Have the most difficulty in finding people who know Compressed Natural Gas and know how to diagnose CNG electrical systems. Vehicles are not reliable because they are not fixed.	1
We like to promote but people must have the skills to do so.	1
More colleges should offer a core curriculum in the Energy Industry. The gap is in experience and college core curriculum in the Energy Industry.	1
Want to see more STEM skills, Composite fabrication. Because of the lack of STEM skills, jobs are going overseas to India and China where they have the skills.	1
Baby boomers are retiring, would need to replace with younger workers who are exposed to the newer technologies.	1
Many current employees are nearing retirement age.	1
Concern with reading comprehension and dependability with the lower level staff (entry level)	1
No	4
Concern with hiring younger people that don't have the skills and older people that have the skills but physically challenged	1
The biggest challenge is keeping up with technology. Grants help with free training.	1
We receive credits from Congress, which Congress has rescinded. Drives up cost. Congress needs to get their act together because we need to be a more green-friendly country.	1
Has 290 light duty vehicles and 150 Class A Trucks	1
For Q. 3, it was hard to find people who wanted to do the work (pick up grease). It is a smelly job.	1

## Skills Gap Survey Results

Labor Skills Gap Concerns (continued)	Frequency
We currently have two plants and are in the process of building more. Will need more qualified Waste Water Engineers.	1
Time - more work than we have time	1
Budget tight	1
N/A	1
We don't have problems with our applicants, and employees are highly trained. They are trained overseas by the manufacturer of their equipment.	1
Up to this time, we have not hired anyone for more than 11 years. We are currently posting for 2 new positions. Acc Exec - interfacing w/ customers and providing customer education to switch to natural gas. Market Adv - staff supporting AE. Current skills gap concerns - needing technical skills for current staff and having the recommended educational degree background.	1
Difficult to find good quality applicants, willing to pay, but not if someone doesn't want to work.	1
Please note that this form was filled out by [Company], but pertains to [Company]. [Company] and [Company] are partners on a CEC ARFVT project. [Company] is the technology integrator and the survey questions are more applicable to them rather than [Company].	1

Additional comments provided by employers about their current and future skills gap concerns include difficulty in finding qualified candidates.

## Statewide Distribution of Biodiesel Fueling Station Locations



# Appendix A

## Statewide Distribution of Compressed Natural Gas Fueling Station Locations

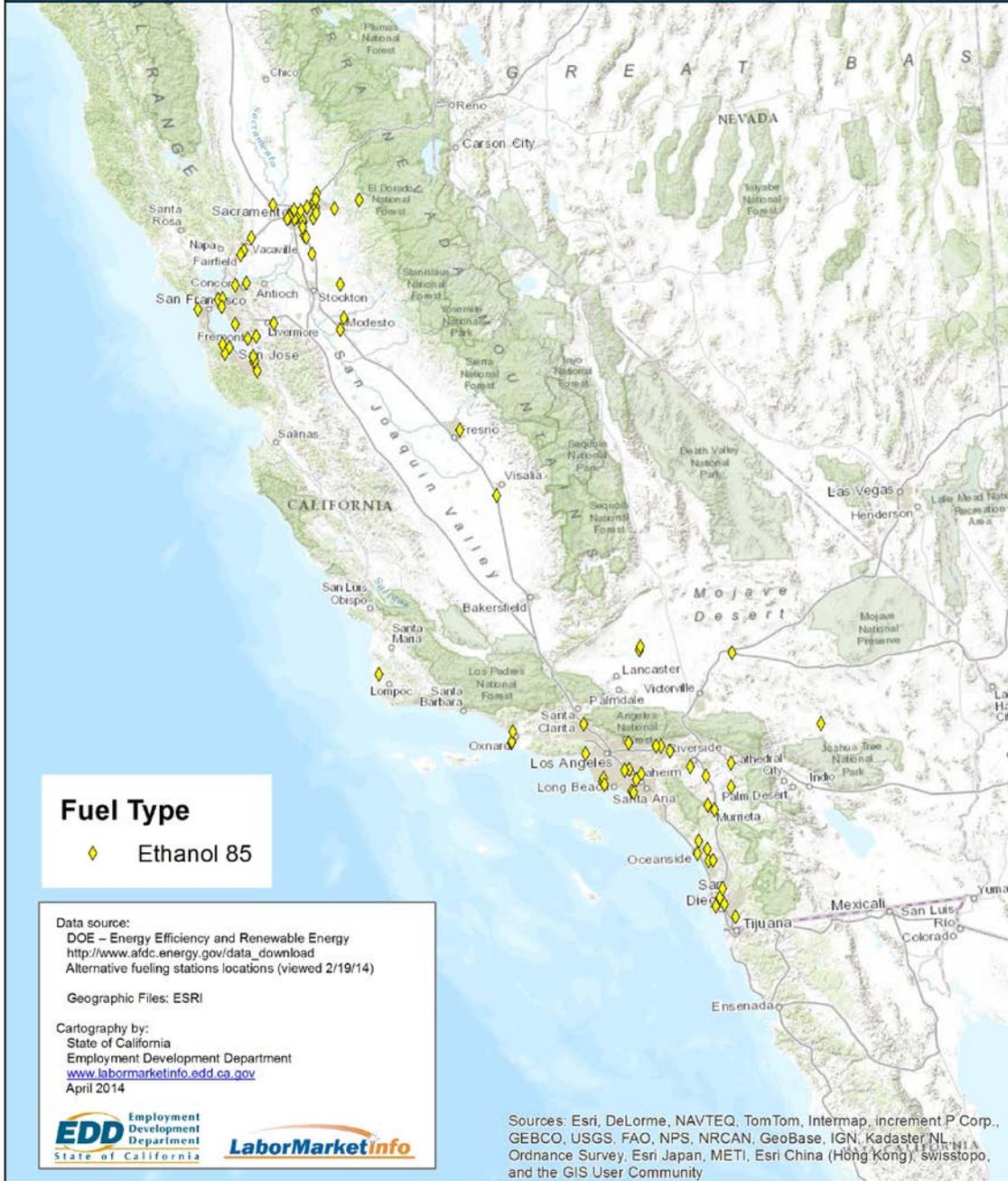


# Appendix A

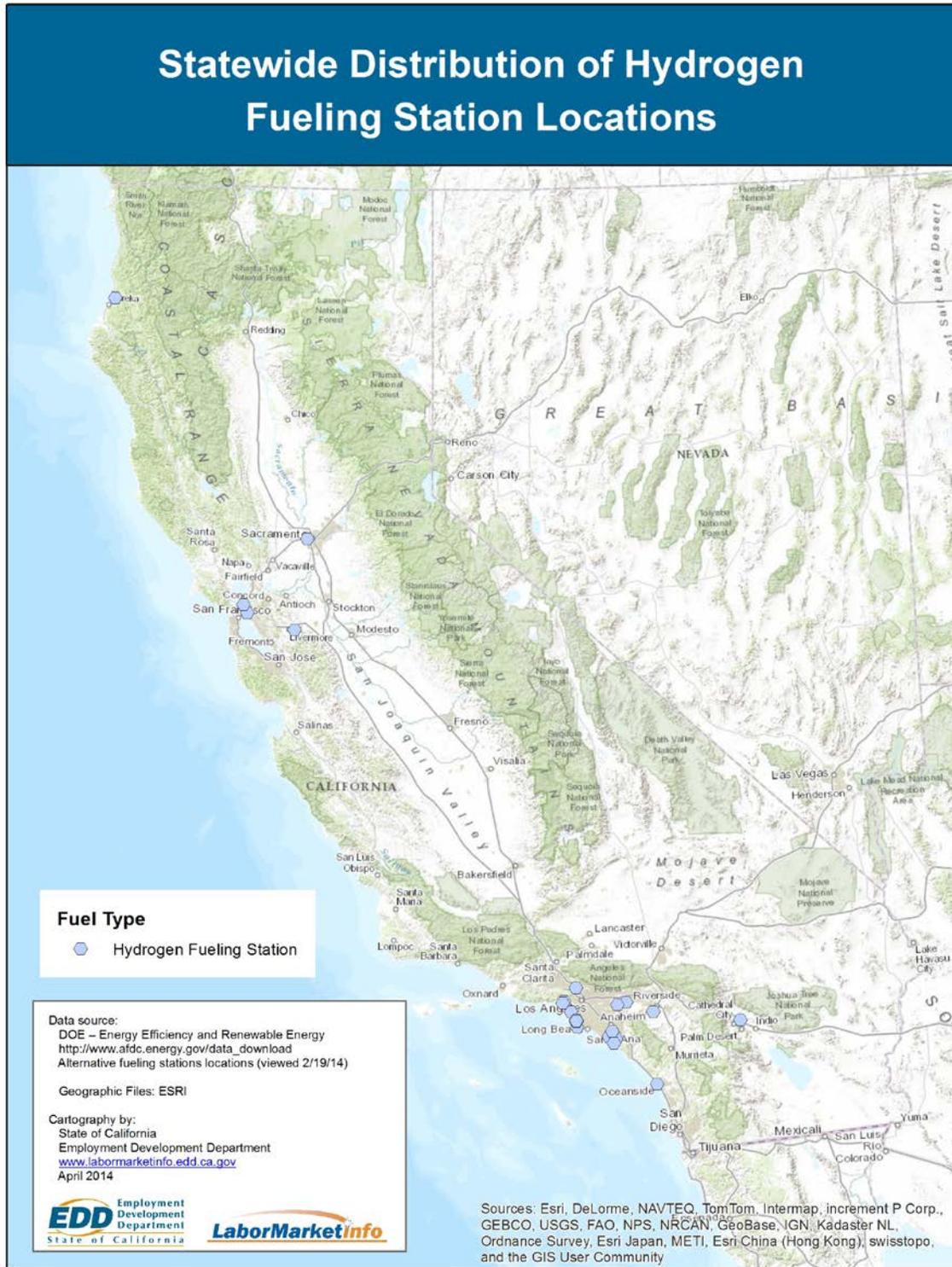


# Appendix A

## Statewide Distribution of Ethanol 85 Fueling Station Locations



# Appendix A

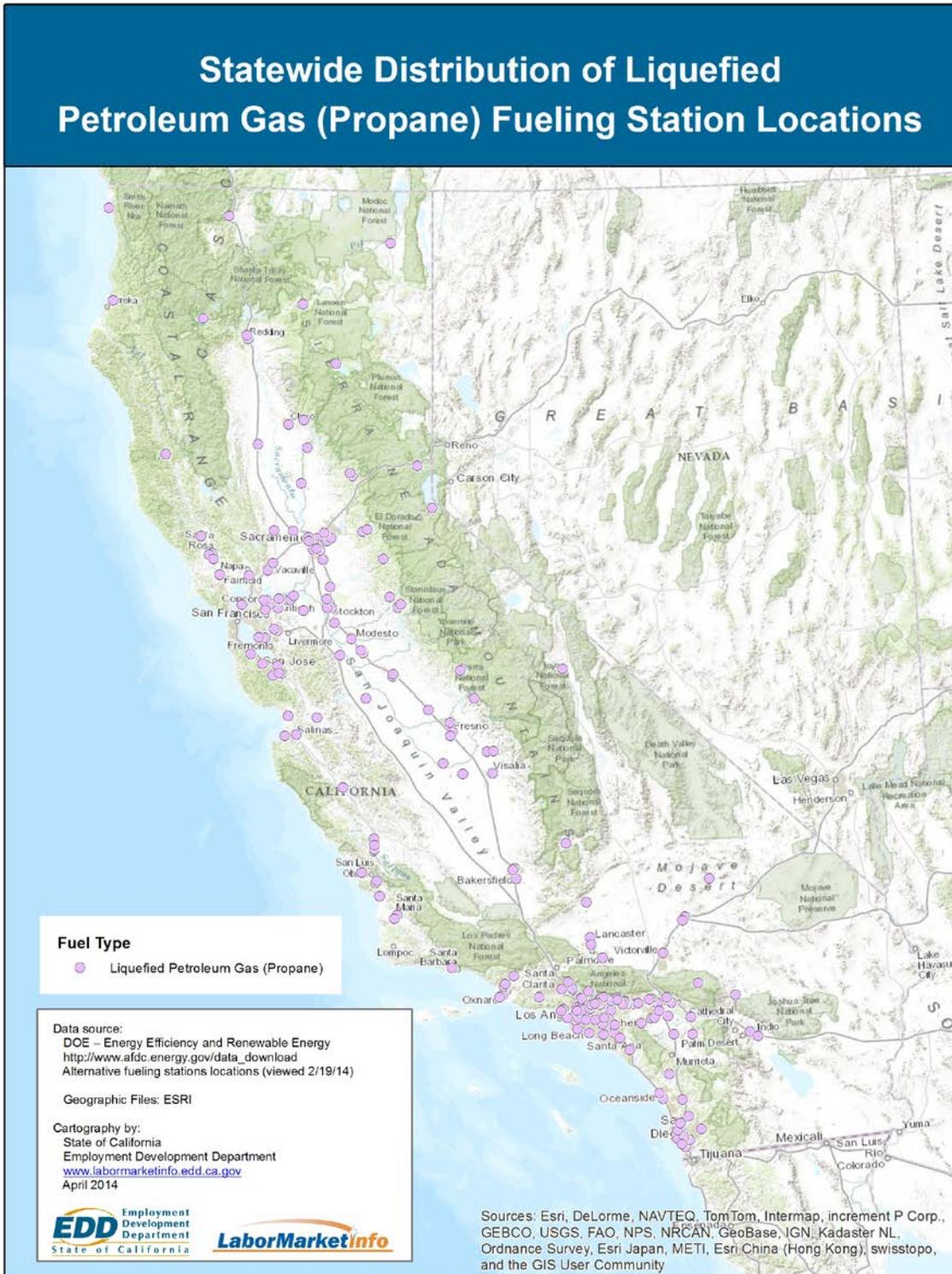


# Appendix A

## Statewide Distribution of Liquefied Natural Gas Fueling Station Locations



# Appendix A



## Appendix B

---

### Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP) Invitation E-mail with Survey Link

Dear California Employer:

The Labor Market Information Division (LMID) of the Employment Development Department (EDD) is partnering with the California Energy Commission to identify clean/green transportation workforce needs and the skills gaps for employers working with alternative fuel vehicles. Our survey results will better prepare the state's labor force to fill future job vacancies and meet the needs of the alternative fuel vehicle industry. This is your chance to give input and help California train the labor force to meet your company's future needs.

We would greatly appreciate it if you would complete the survey within two weeks. The EDD will keep the data confidential. If you have any questions, please forward them to [LMIOccupationalSurvey@edd.ca.gov](mailto:LMIOccupationalSurvey@edd.ca.gov), or contact [Name] at [Phone Number].

Please click on the link below to complete this short survey; it will ask you for your ID number CAXXX:

<https://www.surveymonkey.com/s/ARFVTP2014>

Thank you for your time and participation in completing this important survey and helping the effort to conserve California's energy resources.

If you are interested in the results they will be made available on our website at <http://www.labormarketinfo.edd.ca.gov> in early Fall 2014.

## Appendix B

---

### Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP)

#### Skills Gap Survey Questionnaire

The Labor Market Information Division (LMID) of the Employment Development Department (EDD) is partnering with the California Energy Commission to conduct a statewide survey to identify clean/green transportation workforce needs and the skills gaps for employers working with alternative fuel vehicles. This information will be compiled to help the Energy Commission in workforce development for the clean/green transportation industry.

\*Asterisks are a required field.

**\*1. Please enter your ID number here.**

**\*2. Please fill out the information below:**

**Company Name:**

**3. What makes it challenging to find qualified candidates? Please check all that apply.**

- |   |  |
|---|--|
| <input type="checkbox"/> Lack of available certified applicants/no applicants | <input type="checkbox"/> Geographic location/work schedule |
| <input type="checkbox"/> Lack of experience                                   | <input type="checkbox"/> Wages                             |
| <input type="checkbox"/> Lack of technical (hard) skills                      | <input type="checkbox"/> Not applicable to your business   |
| <input type="checkbox"/> Lack of employable (soft) skills                     | <input type="checkbox"/> No standardized certification     |

**4. Please list all job openings for Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP)-related occupations that you are having difficulty hiring. Leave blank if no openings are available.**

1	<input type="text"/>
2	<input type="text"/>
3	<input type="text"/>
4	<input type="text"/>
5	<input type="text"/>

## Appendix B

---

### 5. What employable skills are lacking by your current employees or applicants? Please check all that apply to your business.

- |  |  |
|--|--|
| <input type="checkbox"/> Adaptability and flexibility  | <input type="checkbox"/> Initiative                        |
| <input type="checkbox"/> Communication                 | <input type="checkbox"/> Interpersonal skills and teamwork |
| <input type="checkbox"/> Critical thinking             | <input type="checkbox"/> Reading comprehension             |
| <input type="checkbox"/> Problem Solving               | <input type="checkbox"/> Time management                   |
| <input type="checkbox"/> Customer service              | <input type="checkbox"/> Willingness to learn              |
| <input type="checkbox"/> Dependability and reliability |  |

List additional employable skills that were not provided in the above question:



### 6. What technical skills are lacking by your current employees or applicants? Please check all that apply to your business.

- |   |  |
|---|--|
| <input type="checkbox"/> Computers and electronics            | <input type="checkbox"/> Production and processing             |
| <input type="checkbox"/> Customer relations                   | <input type="checkbox"/> Quality control and assurance         |
| <input type="checkbox"/> Health and safety                    | <input type="checkbox"/> Industry principles and concepts      |
| <input type="checkbox"/> Security                             | <input type="checkbox"/> Maintenance, installation, and repair |
| <input type="checkbox"/> Environmental management and science | <input type="checkbox"/> Technology applications               |
| <input type="checkbox"/> Operation control and monitoring     | <input type="checkbox"/> Troubleshooting                       |

List additional technical skills that were not provided in the above question:



## Appendix B

---

**7. What hiring strategies is your business currently using to locate qualified candidates? Please check all that apply.**

- |  |  |
|--|--|
| <input type="checkbox"/> Ad  | <input type="checkbox"/> Educational institutions        |
| <input type="checkbox"/> Internships/co-ops                                  | <input type="checkbox"/> Social media                    |
| <input type="checkbox"/> Career fairs  | <input type="checkbox"/> Union halls                     |
| <input type="checkbox"/> Temp agencies/Consultants                           | <input type="checkbox"/> Networking                      |
| <input type="checkbox"/> National online job sites                           | <input type="checkbox"/> Word of Mouth                   |
| <input type="checkbox"/> One-Stop career centers/American Job Center Network | <input type="checkbox"/> Not applicable to your business |
| <input type="checkbox"/> Company websites                                    |  |

Other (please specify)

**8. What are the business impacts of having a skills gap? Please check all that apply.**

- |  |  |
|--|--|
| <input type="checkbox"/> Lower productivity        | <input type="checkbox"/> Less new product development                      |
| <input type="checkbox"/> Less profitable           | <input type="checkbox"/> Harder to compete                                 |
| <input type="checkbox"/> Challenges to recruitment | <input type="checkbox"/> Higher expenses                                   |
| <input type="checkbox"/> Less efficiency           | <input type="checkbox"/> Missed opportunities                              |
| <input type="checkbox"/> Unable to expand or grow  | <input type="checkbox"/> Not applicable to our business/not sure of impact |

**\*9. Does your firm offer training for employees?**

- Yes
- No, please skip to Question 11

**10. Please check the method(s) you currently use to train your employees in the skills they are lacking.**

- In-house/on-the-job training
- On-line training/self study
- Private vendor training
- Accredited technical schools
- Community colleges
- Four-year colleges/universities
- None
- Other (please specify)

## Appendix B

---

**\*11. Do your employees require a special license or certification to work in the industry?**

- Yes
- No, please skip to Question 13

**12. Please list the most important licenses/certifications that are critical to your business in the fields below**

1.

2.

3.

**13. What types of alternative fuel do your fleet vehicles use? Please check all that apply to your business.**

- |   |  |
|---|--|
| <input type="checkbox"/> Biodiesel                    | <input type="checkbox"/> Liquefied Natural Gas (LNG)       |
| <input type="checkbox"/> Compressed Natural Gas (CNG) | <input type="checkbox"/> Liquefied Petroleum Gas (Propane) |
| <input type="checkbox"/> Electric Charging Station    | <input type="checkbox"/> Other                             |
| <input type="checkbox"/> Ethanol 85                   | <input type="checkbox"/> None                              |
| <input type="checkbox"/> Hydrogen                     |  |

Other (please specify)

**14. Is there anything else you would like to include about your current and future skills gap concerns?**

**15. May we contact you if we have questions about your responses?**

**Name:**

**Position:**

**County:**

**Email Address:**

**Phone Number:**



**STATE OF CALIFORNIA**

**LABOR AND WORKFORCE DEVELOPMENT AGENCY**

**EMPLOYMENT DEVELOPMENT DEPARTMENT**

The EDD is an equal opportunity employer/program. Auxiliary aids and services are available upon request to individuals with disabilities. Requests for services, aids, and/or alternate formats need to be made by calling 916-262-2166 (voice). TTY users, please call the California Relay Service at 711.

---