

**August 2018**

# LABOR MARKET ANALYSIS

## **Diesel Technology**



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# SUMMARY

This study conducted by the Central Valley/Mother Lode Center of Excellence examined labor market demand, wages, skills and community college supply for occupations related to diesel technology for Reedley College.

Five occupations were identified: first-line supervisors of mechanics, installers, and repairers (SOC 49-1011); automotive services technicians and mechanics (SOC 49-3023); bus and truck mechanics and diesel engine specialists (SOC 49-3031); farm equipment mechanics and service technicians (SOC 49-3041); and mobile heavy equipment mechanics, except engines (SOC 49-3042).

## KEY FINDINGS:

- **Occupational demand** — In the South Central Valley/Southern Mother Lode subregion, the largest occupation is automotive service technicians and mechanics with 6,042 workers in 2017 and 652 annual openings, followed by first-line supervisors of mechanics, installers, and repairers with 2,925 workers and 298 annual openings.
- **Wages** — The highest paid occupations are first-line supervisors of mechanics, installers, and repairers, followed by mobile heavy equipment mechanics, except engines. The median wages for all five occupations exceed the region's self-sufficiency wage and living wage.
- **Employers** — Top employers in the region include Chrysler, Bridgestone/Firestone, Pep Boys, Penske Automotive Group, and the U.S. Air Force.
- **Job titles** — The most common occupational titles in job postings were automotive service technicians and mechanics and first-line supervisors of mechanics, installers, and repairers. The most common job titles were auto technician and maintenance supervisor.
- **Skills and certifications** — The top baseline skill requirement is communication skills, and the top specialized skill is quality control analysis. The top certification is a driver's license.
- **Education** — Four of the occupations typically require only a high school diploma; however, the education required for automotive service technicians and mechanics is a postsecondary non-degree award.
- **Supply** — Analysis of community college completions in the region shows that on average, 82 degrees and 451 certificates were conferred in the Central Valley/ Mother Lode region each year in programs related to diesel technology. In the subregion, 282 (31 degrees and 251 certificates) were conferred on average each year.

Based on a comparison of occupational demand and community college supply, there is an undersupply of 1,135 trained workers in the subregion and 1,675 trained workers in the region. As a result, the Center of Excellence recommends that Reedley College work with the region's agriculture, water and environmental technologies deputy sector navigator, the college's advisory board and local industry in the expansion of a diesel technology program.

# INTRODUCTION

The Central Valley/Mother Lode Center of Excellence was asked to provide labor market information for Taxonomy of Programs (TOP) code 094700-Diesel Technology. This analysis focuses on the South Central Valley/Southern Mother Lode (SCV/SML) subregion. Occupational demand, supply and wage data for the region are also included for broader applicability and use. Analysis of the program and occupational data related to diesel technology resulted in the identification of five applicable occupations.

The occupational titles and their Standard Occupational Classification (SOC) System codes are:

- First-line supervisors of mechanics, installers, and repairers (SOC 49-1011),
- Automotive service technicians and mechanics (SOC 49-3023),
- Bus and truck mechanics and diesel engine specialists (SOC 49-3031),
- Farm equipment mechanics and service technicians (SOC 49-3041), and
- Mobile heavy equipment mechanics, except engines (SOC 49-3042).

The SOC codes, occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O\*NET OnLine are shown in Exhibit 1.

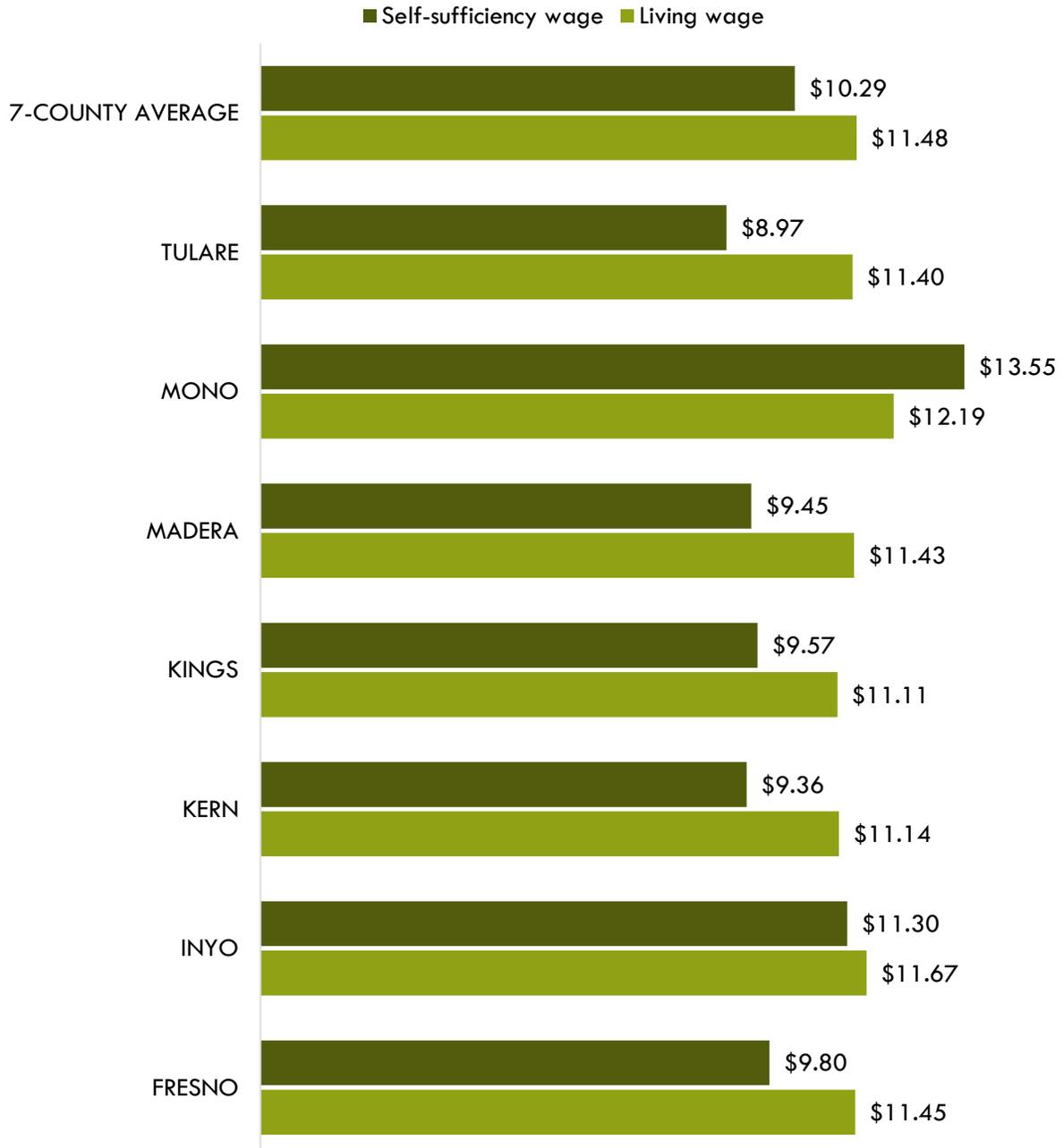
## EXHIBIT 1. Diesel technology-related SOC titles, job descriptions, sample job titles, and knowledge and skills

SOC TITLE (SOC CODE)	DESCRIPTION	SAMPLE JOB TITLES	KNOWLEDGE AND SKILLS
<b>First-line supervisors of mechanics, installers, and repairers</b> (49-1011)	Directly supervise and coordinate the activities of mechanics, installers, and repairers.	Crew Leader, Electrical Foreman, Facilities Manager, Facility Maintenance Supervisor, Maintenance Foreman, Maintenance Manager, Maintenance Planner, Maintenance Supervisor, Production Crew Supervisor, Superintendent	<b>Knowledge</b> <ul style="list-style-type: none"> <li>• Mechanical</li> <li>• Customer service</li> <li>• Administration and management</li> <li>• Public safety and security</li> </ul> <b>Skills</b> <ul style="list-style-type: none"> <li>• Management of personnel resources</li> <li>• Monitoring</li> <li>• Critical thinking</li> <li>• Coordination</li> <li>• Speaking</li> </ul>
<b>Automotive service technicians and mechanics</b> (49-3023)	Repair automobiles, trucks, buses, and other vehicles. Master mechanics repair virtually any part on the vehicle or specialize in the transmission system. Repair only one system or component on a vehicle, such as brakes, suspension, or radiator.	Auto Technician, Automobile Technician, Automotive Service Technician, Automotive Technician, Certified ASE Master Automotive Technician, Master Automotive Technician, Master Technician, Mechanic, Shop Foreman, Truck Technician, A/C Technician, Automobile	<b>Knowledge</b> <ul style="list-style-type: none"> <li>• Mechanical</li> <li>• Engineering and technology</li> <li>• Computers and electronics</li> <li>• Customer and personal service</li> </ul> <b>Skills</b> <ul style="list-style-type: none"> <li>• Equipment maintenance</li> <li>• Repairing</li> </ul>

SOC TITLE (SOC CODE)	DESCRIPTION	SAMPLE JOB TITLES	KNOWLEDGE AND SKILLS
		Mechanic, Automobile Technician, Automotive Technician, Drivability Technician, Heavy Line Technician, Lube Technician, Oil Bay Technician, Quick Service Technician, Service Technician	<ul style="list-style-type: none"> <li>• Troubleshooting</li> <li>• Equipment selection</li> <li>• Quality Control</li> </ul>
<b>Bus and truck mechanics and diesel engine specialists</b> (49-3031)	Diagnose, adjust, repair, or overhaul buses and trucks, or maintain and repair any type of diesel engines. Includes mechanics working primarily with automobile or marine diesel engines.	Bus Mechanic, Diesel Mechanic, Diesel Technician, Fleet Mechanic, General Repair Mechanic, Mechanic, Service Technician, Trailer Mechanic, Transit Mechanic, Truck Mechanic	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Mechanical</li> <li>• Transportation</li> <li>• Customer service</li> <li>• Public safety and security</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Repairing</li> <li>• Troubleshooting</li> <li>• Operation and control</li> <li>• Operation monitoring</li> <li>• Critical thinking</li> </ul>
<b>Farm equipment mechanics and service technicians</b> (49-3041)	Diagnose, adjust, repair, or overhaul farm machinery and vehicles, such as tractors, harvesters, dairy equipment, and irrigation systems.	Agricultural Mechanic, Agricultural Technician, Agriculture Mechanic, Farm Equipment Mechanic, Farm Equipment Service Technician, Field Technician, Mechanic, Service Technician, Tractor Mechanic, Tractor Technician	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Mechanical</li> <li>• Customer service</li> <li>• Computers and electronics</li> <li>• Mathematics</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Equipment maintenance</li> <li>• Repairing</li> <li>• Troubleshooting</li> <li>• Operation and control</li> <li>• Critical thinking</li> </ul>
<b>Mobile heavy equipment mechanics, except engines</b> (49-3042)	Diagnose, adjust, repair, or overhaul mobile mechanical, hydraulic, and pneumatic equipment, such as cranes, bulldozers, graders, and conveyors, used in construction, logging, and surface mining.	Construction Equipment Mechanic, Equipment Mechanic, Equipment Technician, Field Mechanic, Field Service Technician, Field Technician, Heavy Equipment Mechanic, Heavy Equipment Technician, Mechanic, Mobile Heavy Equipment Mechanic	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Mechanical</li> <li>• Customer service</li> <li>• Mathematics</li> <li>• Computers and electronics</li> <li>• Building and construction</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Repair</li> <li>• Troubleshooting</li> <li>• Equipment maintenance</li> <li>• Operation monitoring</li> <li>• Operation and control</li> </ul>

The 2014 average self-sufficiency wage for a single adult in the South Central Valley/Southern Mother Lode (SCV/SML) subregion is \$10.29/hour, and the current average living wage for a single adult is \$11.48/hour. Self-sufficiency and living wage data by county and the overall seven-county average are shown in Exhibit 2. In the wages sections of this report, Pct.10 hourly denotes entry-level wages, and median represents experienced wages.

**EXHIBIT 2. Self-sufficiency and living wages in the SCV/SML subregion**



# OCCUPATIONAL DEMAND

The subregion employed 13,295 diesel technology workers in the five targeted occupations in 2017 in the South Central Valley/Southern Mother Lode subregion (Exhibit 3). The largest occupation is automotive service technicians and mechanics with 6,042 workers in 2017. This occupation is expected to grow by 7% over the next five years, and it has the greatest number of projected annual openings, 652.

The next largest occupation is first-line supervisors of mechanics, installers, and repairers. This occupation has about half the workers as automotive service technicians and mechanics with 2,925 jobs in 2017, but the same growth projection of 7%. Additionally, it has the second largest number of annual openings, 298.

**EXHIBIT 3. Diesel technology employment and occupational demand projections in the SCV/SML subregion**

OCCUPATION	2017 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Automotive service technicians and mechanics	6,042	394	7%	652
First-line supervisors of mechanics, installers, and repairers	2,925	216	7%	298
Bus and truck mechanics and diesel engine specialists	1,679	172	10%	189
Mobile heavy equipment mechanics, except engines	1,520	2	0%	147
Farm equipment mechanics and service technicians	1,128	104	9%	131
<b>TOTAL</b>	<b>13,295</b>	<b>887</b>	<b>7%</b>	<b>1,417</b>

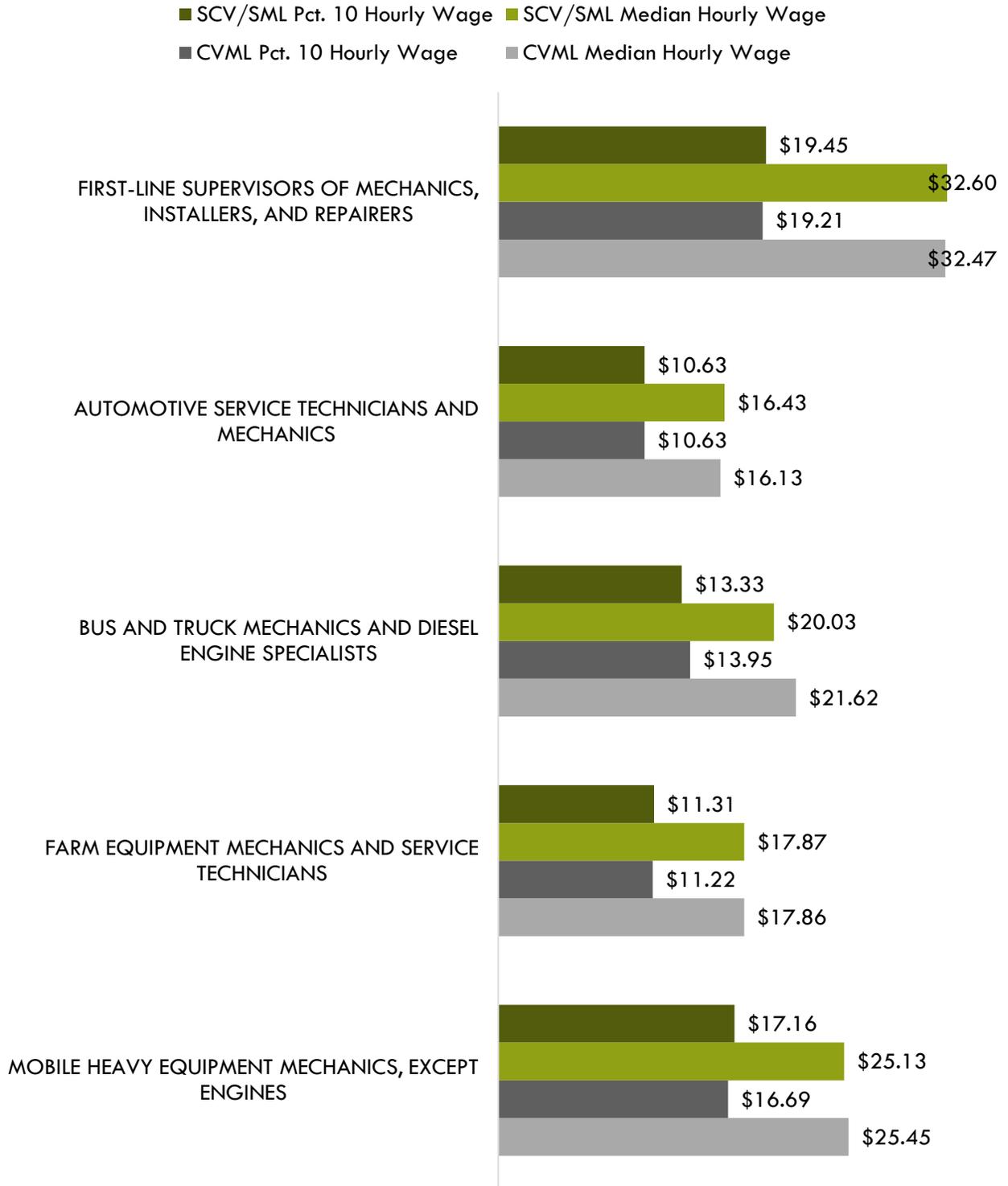
# WAGES

Exhibit 4 compares the entry-level and experienced wages of the five diesel technology occupations. The entry-level wages for all five occupations exceed the average self-sufficiency wage for a single adult in the seven-county subregion, \$10.28/hour.

Entry-level wages for three occupations are higher than the average living wage for a single adult, \$11.48/hour, in the subregion: first-line supervisors of mechanics, installers, and repairers; bus and truck mechanics and diesel engine specialists; and mobile heavy equipment mechanics, except engines. However, the entry-level wages for automotive service technicians and mechanics falls below the average living wage for a single adult.

The median wage for all the listed occupations exceed the average living wage.

**EXHIBIT 4. Entry-level and experienced wage comparison in the region and subregion**



# JOB POSTINGS

There were 1,229 job postings for the five diesel technology occupations in the seven counties of the South Central Valley/Southern Mother Lode subregion from June 2017 through May 2018. The top 10 employers advertising for the 1,229 jobs are listed in Exhibit 5.

**EXHIBIT 5. Top 10 diesel technology employers by number of job postings**

EMPLOYER	JOB POSTINGS
Chrysler	38
Bridgestone/Firestone	28
Pep Boys	25
Penske Automotive Group	20
US Air Force	20
Haliburton	19
TravelCenters of America	18
Sunbelt Rentals Incorporated	17
Lithia Motors Incorporated	16
Waste Management	13

Exhibit 6 shows how one-third of the job postings for the five targeted diesel technology occupations in the subregion had the occupational title “automotive service technicians and mechanics,” with another third as “first-line supervisors of mechanics, installers, and repairers.”

**EXHIBIT 6. Occupational titles related to diesel technology in job postings**

OCCUPATION	JOB POSTINGS
Automotive service technicians and mechanics	475
First-line supervisors of mechanics, installers, and repairers	402
Bus and truck mechanics and diesel engine specialists	206
Mobile heavy equipment mechanics, except engines	136
Farm equipment mechanics and service technicians	10

## JOB TITLES

Analysis of the 1,229 advertised job titles for the five targeted occupations reveals that the top 10 job titles include auto technician, maintenance supervisor, mechanic, and diesel mechanic. Exhibit 7 shows the top 10 job titles among the job postings.

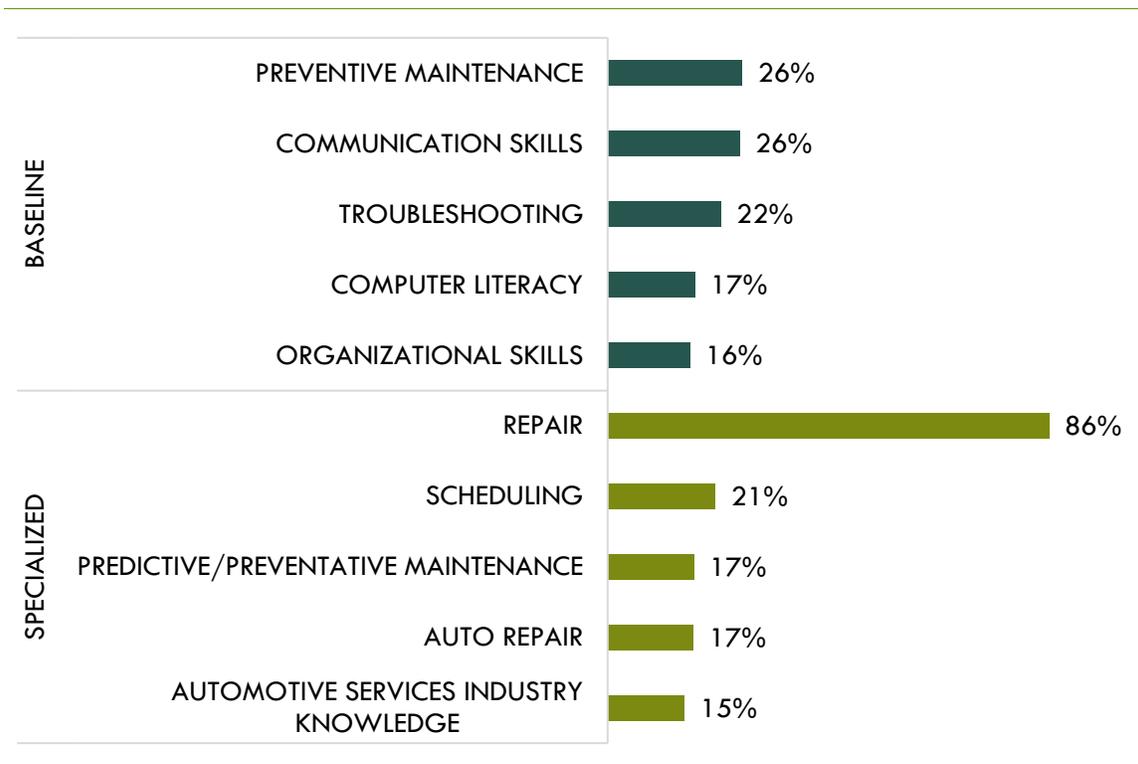
**EXHIBIT 7. Top diesel technology job titles by number of job postings**

TITLE	JOB POSTINGS
Auto Technician	112
Maintenance Supervisor	100
Mechanic	97
Diesel Mechanic	92
Equipment Mechanic	61
Maintenance Manager	59
Diesel Technician	42
Service Technician	34
Auto Mechanic	32
Heavy Equipment Mechanic	29

**SKILLS**

Exhibit 8 depicts the top baseline and specialized skills for the five targeted diesel technology occupations. Approximately 85% of the 1,229 job postings contained skills data. Of the job postings that contain skills data, the three most important baseline skills are preventive maintenance, 26% of job postings, communication skills, 26%, and troubleshooting, 22%. The top three specialized skills are repair, 86% of job postings, scheduling, 21%, and predictive/preventive maintenance, 17%.

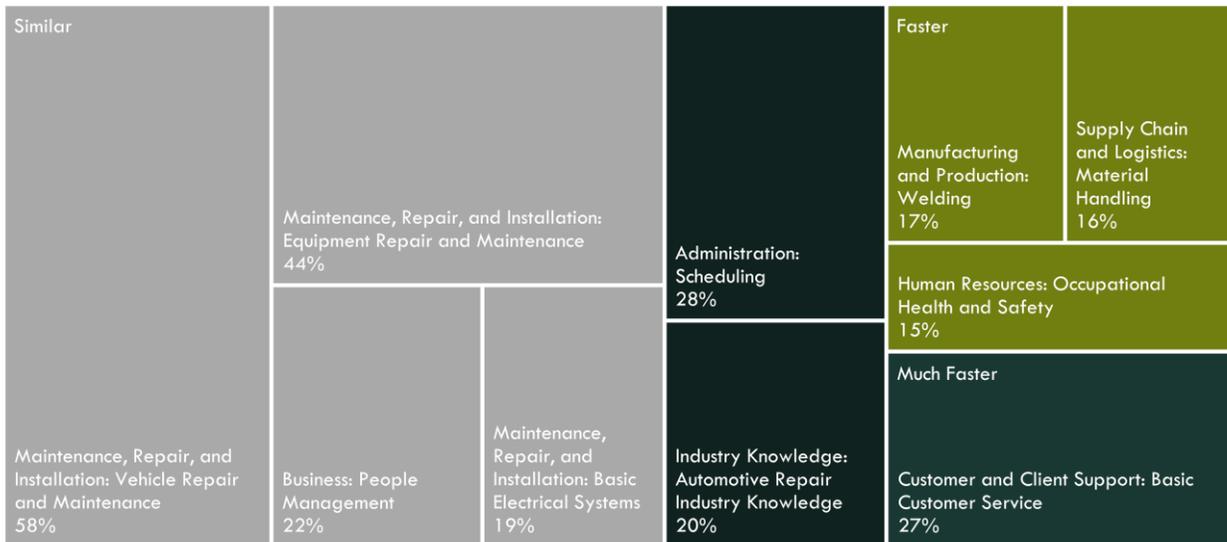
**EXHIBIT 8. Diesel technology baseline and specialized skills**



## SKILL CLUSTER PROJECTIONS

Nearly 800 job postings contained skill cluster projections data. Analysis of this information reveals that each of these postings have more than one skill cluster indicator. An evaluation of the top skill clusters that will have the greatest gains in level of importance shows that the top area is maintenance, repair, and installation: vehicle repair and maintenance, 58%. Other clusters with large gain projections include maintenance, repair, and installation: equipment repair and maintenance (44%), administration: scheduling (28%), customer and client support: basic customer service (27%), and business: people management (22%) (Exhibit 9).

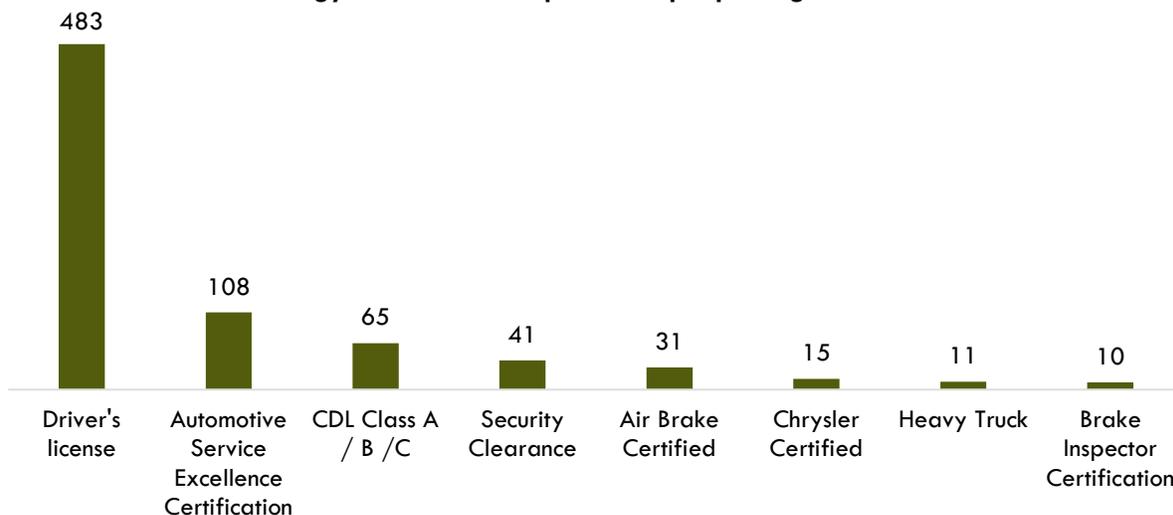
**EXHIBIT 9. Skill cluster projections for diesel technology occupations**



## CERTIFICATIONS

The top certification required by employers is a driver's license. The next two most-requested certifications are Automotive Service Excellence (ASE) and CDL Class A, B, or C (Exhibit 10).

**EXHIBIT 10. Diesel technology certifications requested in job postings**



# EDUCATION, WORK EXPERIENCE AND TRAINING

The typical entry-level education for four of the five diesel technology occupations is a high school diploma with short-term or long-term on-the-job training. The typical entry-level education, however, for automotive service technicians and mechanics is a postsecondary non-degree award.

Four of these five occupations that have a typical entry-level education of a high school diploma qualify as relevant to community colleges due to one or more of the following requirements:

- State of California certification requirements,
- Specialized industry knowledge, and
- Performance of duties that are taught through diesel technology programs offered by local community colleges.

**EXHIBIT 11. Education, work experience, training and Current Population Survey results<sup>1</sup>**

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
First-line supervisors of mechanics, installers, and repairers	High school diploma or equivalent	<5 years	None	43.8%
Automotive service technicians and mechanics	Postsecondary non-degree award	None	Short-term	33.8%
Bus and truck mechanics and diesel engine specialists	High school diploma or equivalent	None	Long-term	37.1%
Farm equipment mechanics and service technicians	High school diploma or equivalent	None	Long-term	37.4%
Mobile heavy equipment mechanics, except engines	High school diploma or equivalent	None	Long-term	37.4%

<sup>1</sup> "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>. Table 1.11 Educational attainment for workers 25 years and older by detailed occupation, 2015-16, Some college, no degree and Associate degree.

# SUPPLY

Analysis of California Community Colleges Chancellor’s Office Curriculum Inventory (COCI) data at the regional level shows the following college program offerings by related Taxonomy of Programs code:

- **Agriculture Power Equipment Technology-011600**—Five colleges offer 24 active programs (six degrees and 18 certificates).
- **Diesel Technology-094700**—One college offer three active programs (one degree, two certificates).
- **Heavy Equipment Maintenance-094720**—One college offers five active programs (two degrees and three certificates).
- **Automotive Technology-094800**— Nine colleges offer 41 active or draft programs (11 degrees, 28 certificates and two unknown).

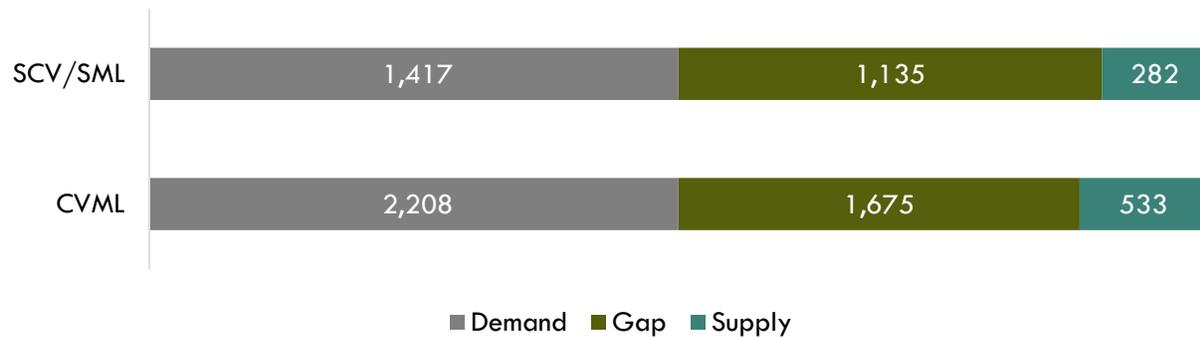
Analysis of diesel-related program completion data for the 2014-17 academic years reveals that, on average, 451 certificates and 82 degrees were conferred in the Central Valley/Mother Lode region each year (Exhibit 12). There were, on average, 251 degrees and 31 certificates conferred in the South Central Valley/Southern Mother Lode subregion each year.

**EXHIBIT 12. Community college supply for diesel technology occupations in the CV/ML region**

TOP TITLE AND CODE	COLLEGE	3-YEAR AVERAGE	
		CERTIFICATES	DEGREES
<b>Agricultural Power Equipment Technology-011600</b>	Merced	42	4
	Modesto Junior	18	4
	Reedley	117	3
	San Joaquin Delta	4	
	Sequoias	1	1
	<b>SUBTOTAL</b>	<b>183</b>	<b>12</b>
<b>Automotive Technology-094800</b>	Bakersfield	54	7
	Columbia	42	2
	Fresno City	14	9
	Merced	14	7
	Modesto Junior	21	2
	Reedley	26	5
	San Joaquin Delta	42	7
	Sequoias	39	6
	<b>SUBTOTAL</b>	<b>253</b>	<b>47</b>
<b>Diesel Technology-094700</b>	San Joaquin Delta	9	1
<b>Heavy Equipment Maintenance-094720</b>	San Joaquin Delta	7	23
<b>TOTAL</b>		<b>451</b>	<b>82</b>

A large gap in supply appears to exist in the region and subregion. In the subregion, there is a shortage of 1,135 trained workers. In the region, the shortage is 1,675 trained workers (Exhibit 13).

### EXHIBIT 13. Diesel technology workforce annual demand and supply in the subregion and region



## CONCLUSION

The entry-level wages for diesel technology occupations exceed the average self-sufficiency wage at the regional and subregional levels, but wages for entry-level automotive service technicians and mechanics fall short of the average living wage for a single adult.

There were 1,229 job postings in from June 2017 to May 2018 for occupations related to diesel technology in the South Central Valley/Southern Mother Lode subregion.

Analysis of skills and certificate requirements in job postings indicates:

- The top baseline skill requirement is preventive maintenance, and the top specialized skill is repair.
- The top certification is a driver's license.

There are nine community colleges in the region offering a total of 73 programs (20 certificate programs, 20 degree programs and two unknown programs). Eight of these colleges are currently contributing to annual workforce supply (451 certificates and 82 degrees) for the identified diesel technology occupations, but there remains an undersupply of trained workers, a shortage of 1,675 in the region and 1,135 in the subregion.

## RECOMMENDATION

It is recommended that Reedley College work with the region's agriculture, water and environmental technologies deputy sector navigator, the college's advisory board and local industry in the expansion of its diesel technology program.

# APPENDIX A: METHODOLOGY & DATA SOURCES

## Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: <a href="http://economicmodeling.com">economicmodeling.com</a> .
Living Wage	A living wage calculator that estimates the cost of living in a specific community or region: <a href="http://livingwage.mit.edu">livingwage.mit.edu</a> .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: <a href="http://www.bls.gov/emp/ep_education_tech.htm">www.bls.gov/emp/ep_education_tech.htm</a> .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division, <a href="http://labormarketinfo.edd.ca.gov">labormarketinfo.edd.ca.gov</a>
Job Posting and Skills Data	Burning Glass, <a href="http://www.burning-glass.com/">http://www.burning-glass.com/</a>
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: <a href="http://www.onetonline.org">www.onetonline.org</a>

## Key Terms and Concepts

**Annual Job Openings:** Annual openings are calculated by dividing the number of years in the projection period by total job openings.

**Education Attainment Level:** The highest education attainment level of workers age 25 years or older.

**Employment Estimate:** The total number of workers currently employed.

**Employment Projections:** Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

**Living Wage:** The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

**Occupation:** An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

**Percent Change:** Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

**Replacements:** Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

**Total Job Openings (New + Replacements):** Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

**Typical Education Requirement:** represents the typical education level most workers need to enter an occupation.

**Typical On-The-Job Training:** indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

**Wages Family Compositions:** The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).