C·O·E

CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

BUILDING AND FACILITIES MAINTENANCE WORKERS EMPLOYER SURVEY ANALYSIS

FOR BAY AREA, CENTRAL VALLEY/MOTHER LODE, AND SOUTH CENTRAL COAST REGIONS

June 2020

Centers of Excellence for Labor Market Research
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COVID-19 Statement:

This report includes employment projection data by EMSI. EMSI's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

EXECUTIVE SUMMARY

Through a collaboration with the California Community Colleges Energy, Construction, and Utilities (ECU) Sector and the University of California San Diego Extension, the Centers of Excellence for Labor Market Research (COE) conducted an employer survey to determine hiring preferences and challenges facing businesses that employ building and facilities maintenance (BFM) workers. The COE surveyed 639 businesses in three regions across California: the San Francisco Bay Area (327 businesses), Central/Mother Lode (219), and the South Central Coast (93). The Centers of Excellence determined that a 2% increase in employer demand for BFM workers across the three regions in the coming year is plausible. This conclusion was ascertained using a combination of Central Valley/Mother Lode and South Central Coast survey data, Bay Area Burning Glass job postings data, and EMSI projections data.

Key findings:

Projected Job Growth—2% increase in employer demand for BFM workers across the three regions in the coming year is plausible.

Retirements—60% of employers expect one or more full-time BFM worker(s) and 49% expect one or more part-time BFM worker(s) to retire within the next five years.

Education and training—Most businesses, 76.4%, require at least a high school diploma, and 83.5% require one year of work experience for BFM workers.

In-demand skills—Technical skills ranked as very important by employers include electrical repair, plumbing, HVAC, and energy efficiency and consumption. Roughly 96% or more of employers indicated the following soft skills as very important for BFM workers: teamwork, customer service, critical thinking and decision-making, and effective communication.

In-demand certifications—Almost three out of four employers, 72%, indicated certifications are important for BFM workers. Electrician certification, construction certification, and HVAC certification were the most important certifications identified by employers.

Difficulty hiring—63% of employers indicated there is not a sufficient pool of qualified BFM candidates outside of the company from which to hire, and 79% of employers indicated difficulty filling positions with qualified lower-level workers from within their companies. More than 50% of employers indicated BFM candidates don't have enough work experience, and 37% said candidates lacked the desired level of educational attainment.

The study's analysis resulted in several recommendations for tailoring BFM education to meet employer needs. Community colleges should consider creating work-based learning courses that combine in-class learning with hands-on internship experiences. This is based on the survey finding that 67% of employers seek BFM job candidates from community colleges, and 86% of employers are interested in establishing internships for students. Community colleges should also consider creating pipelines with placement agencies to expedite the hiring process for program graduates who are qualified for BFM positions, especially since a majority of businesses, 67%, use third-party placement agencies.

INTRODUCTION

The Centers of Excellence for Labor Market Research (COE) partnered with California Community Colleges Energy, Construction, and Utilities (ECU) Sector Directors covering three regions and the University of California San Diego Extension (UCSD) to conduct a survey of businesses that employ building and facilities maintenance (BFM) workers to determine the appropriate community college response for training these workers. The survey focused on three regions across California: the San Francisco Bay Area, Central Valley/Mother Lode, and the South Central Coast.

The Centers of Excellence were unable to identify specific data for BFM (building and facilities maintenance) workers because this occupation does not have a SOC code, but was identified as a sub-set of the broader Maintenance and Repair Workers, General (49-9071) occupation. Therefore, this employer survey was also conducted to determine the current and projected demand for BFM workers, the technical, soft skills and certifications required for these workers and additional information outlined in the research objectives below.

BFM workers include anyone responsible for the renovation and repair of buildings and associated systems, construction of additions, installation of new equipment, and repair of existing equipment. Typical tasks for these workers include plumbing work, painting, floor repair and upkeep, electrical repairs, and heating and air conditioning system maintenance.

From May to June of 2019, 639 businesses across the three regions completed a phone survey about their hiring practices related to BFM workers. Findings and analysis from employer responses serve as the basis for this report. More information on the study's methodology is in Appendix A.

The research objectives for the employer survey were to document:

1. The demand for BFM workers by regional California businesses.
2. The technical skills, soft skills, and certifications that are important to employers when hiring BFM workers.
3. The work experience and educational attainment levels that employers are seeking when hiring BFM workers.
4. Employers' difficulty in finding qualified BFM job candidates.
5. Employers' interest in both hiring community college graduates and in offering internships to students.

The Centers of Excellence determined that a 2% increase in employer demand for BFM workers across the three regions in the coming year is plausible. This conclusion was ascertained using a combination of Central Valley/Mother Lode and South Central Coast survey data, Bay Area Burning Glass job postings data, and EMSI projections data. The COE also determined that BFM workers comprise 24% of the occupation Maintenance and Repair Workers, General (SOC 49-9071). Employer responses from the survey provide valuable data about the skills, education, work experience, and certifications they prefer when hiring BFM workers. With this information, colleges can move forward with creating curriculum. This report also provides important information about the workforce challenges employers are facing, as they seek qualified candidates to do the critical work that they require.

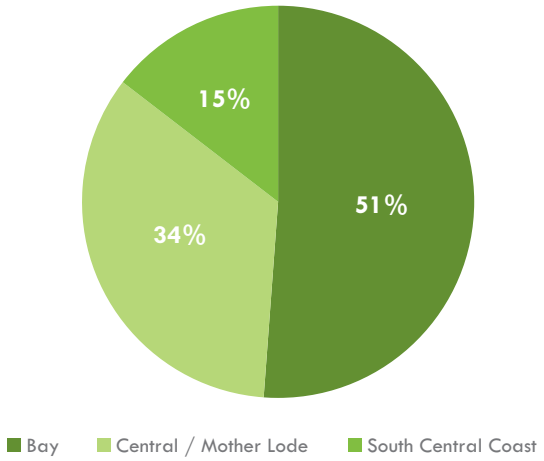
For context, it is important to view this report as part of a larger effort by the California Community Colleges Energy, Construction, and Utilities (ECU) Sector Team. A statewide program has been designed with faculty involvement and validated by industry, to prepare students for entry-level and mid-level facilities management occupations across all industries. The demand for facility managers is driven by California's economy and an aging workforce. For every one applicant, there are 30 openings for facility manager jobs.[1] BFM workers fall within the facilities management pathway and represent an occupation for which community colleges can offer training. To date, several community colleges in the state such as Chaffey College, West Los Angeles College, and College of San Mateo have started to offer facilities management curriculum. A number of other colleges are working on launching this pathway to prepare students and current BFM workers.

[1] https://foundation.ifma.org/wp-content/uploads/2020/03/Contract-Education-Helps-Elevate-Fundamental-Skills-of-Googles-Facility-Managers-UpSkill-California.pdf

EMPLOYER CHARACTERISTICS

Businesses in the three regions, which represent the California Community Colleges (CCC) macro-regions, provided responses to survey questions regarding their hiring practices of BFM workers. In total, 327 businesses in the Bay Area participated, 219 in the Central Valley/Mother Lode region, and 93 in the South Central Coast region. Bay Area respondents comprised 51% of survey participants (Exhibit 1). (See Appendix B for total numbers of businesses surveyed by county.)

Exhibit 1. Regional distribution of survey participants (n=639)



The surveyed businesses represent these top industries: hospital/healthcare (12%), hotel/resort (12%), real estate (10%), and wholesale (10%). Exhibit 2 displays the businesses by industry.

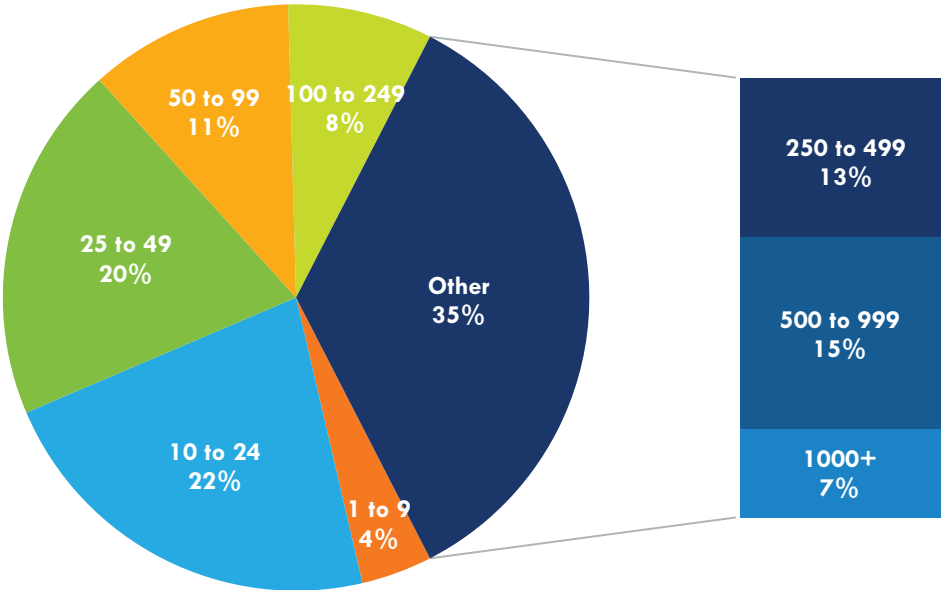
Exhibit 2. Employer industry sector self-identification (n=634)

Business Type	# of Respondents	% of Total Respondents
Hospital/Healthcare	76	12%
Hotel/Resort	73	12%
Real Estate	66	10%
Wholesale	63	10%
Education Institution	59	9%
Restaurants/Food Services	60	9%
Retail	56	9%
Transportation/Shipping	42	7%
Banks/Credit Unions	29	5%
Manufacturing	31	5%
Technology	31	5%
Business Support Services	19	3%
Utilities (Electric/Gas/Telecom)	15	2%
Government	9	1%
Other	5	1%
TOTAL	**634**	**100%**

CURRENT EMPLOYMENT

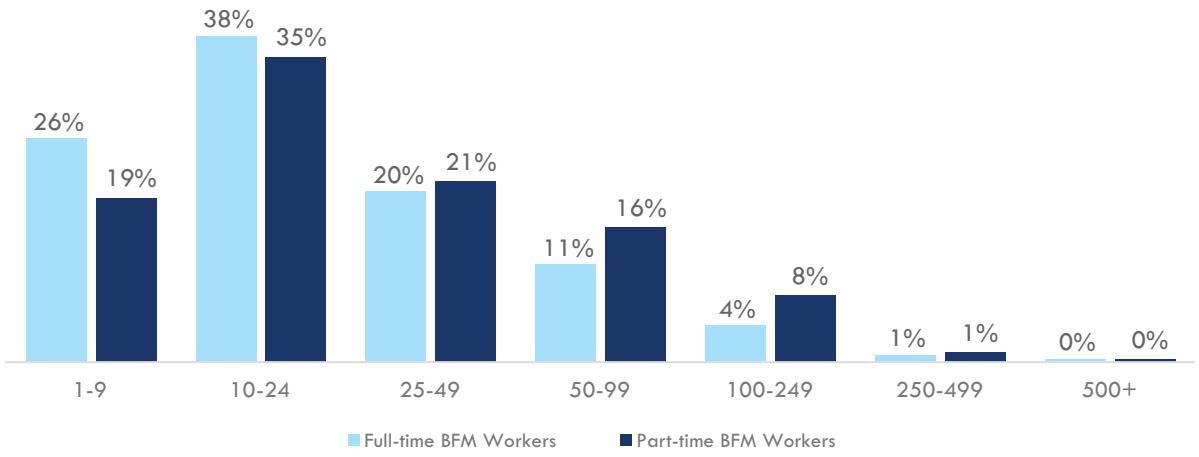
Businesses were asked about the total number of all their employees. Nearly 60% of the businesses surveyed have fewer than 99 total employees, with 46% having fewer than 49 employees (Exhibit 3). Approximately 20% reported having 100 to 499 employees and the remaining 20% have 500 to 1000+ workers.

Exhibit 3. Business size by number of employees (n=639)



In addition, businesses reported on the number of full-time and part-time BFM workers they employ. The majority of businesses, 64%, employ up to 24 full-time BFM workers and approximately half of the businesses, 54%, employ up to 24 part-time BFM workers (Exhibit 4). Over 15% of businesses employ 50 or more full-time BFM workers. A higher percentage, 25% of businesses, employ 50 or more part-time workers.

Exhibit 4. Number of BFM workers per business, full-time (n=638) and part-time (n=636)



FUTURE EMPLOYMENT

Businesses were asked about future projections for employing BFM workers. The Centers of Excellence determined that a 2% increase in demand for BFM workers across the three regions in the coming year is possible (please note that this finding was determined prior to the economic disruption caused by the Covid-19 pandemic). This conclusion was ascertained using a combination of the Central Valley/Mother Lode and South Central Coast survey data, Bay Area Burning Glass job posting data, and EMSI projections data that indicate 24% of workers fall under the Standard Occupational Classification System title and code Maintenance and Repair Workers, General (49-9071).

Businesses were also asked about anticipated retirements of BFM workers (Exhibit 5). Only 14% of businesses indicated that they expect one or more full-time worker(s) to retire within one year, compared to 9% of employers who expect one or more part-time worker(s) to retire. The percentage of employers anticipating retirements in the next three years doubled, with 31% indicating they expect one or more full-time worker retirements and 20% responding they expect one or more part-time worker retirements. The percent of employers anticipating retirements in the next five years was quadruple the one-year retirements percentage: 60% of employers expect full-time worker retirements in the next five years, and 49% expect part-time worker retirements.

Retirements in one year

A total of 91 employers, representing 14% of respondents, expect at least one full-time employee retirement within one year. Of this group, 8% expect only one retirement within one year, and 2% indicated two retirements. Regarding part-time retirements, 55 employers, or 9% of respondents, expect at least one part-time employee retirement. Of this group, 3% expect only one retirement within one year, 1% indicated two, 1% indicated three, and 1% indicated four retirements.

Retirements in three years

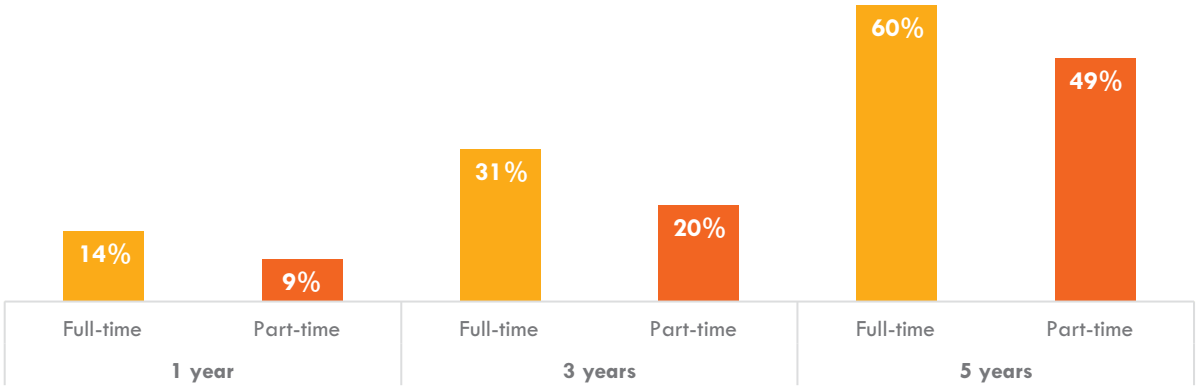
A total of 197 employers, representing 31% of respondents, expect at least one full-time employee retirement within three years. Of this group, 12% indicated only one retirement within three years, 7% indicated two, 5% indicated three, and 2% indicated seven retirements. Regarding part-time retirements, 125 employers, or 20% of respondents, indicated at least one part-time employee retirement. Of this group, 8% indicated only one retirement within three years, 4% indicated two, and 3% indicated three retirements.

Retirements in five years

A total of 385 employers, representing 60% of respondents, expect at least one full-time employee retirement in the next five years. Of this group, 14% indicated only one retirement within five years, 8% indicated two, 11% indicated three, 3% indicated four, 7% indicated five, and 6% indicated seven retirements. Regarding part-time retirements, 316 employers, or 49% of respondents, indicated at least one part-time employee retirement. Of this group, 17% indicated only one retirement within five years, 7% indicated two, 10% indicated three, and 4% indicated five retirements.

FUTURE EMPLOYMENT

Exhibit 5. Percent of employers anticipating retirements for full-time (n=637) and part-time workers (n=638)



Based on the survey findings, 315 full-time workers and 199 part-time workers are expected to retire within one year representing 2% and 1% of all workers respectively. By comparison, 1,854 full-time workers and 1,150 part-time workers are expected to retire within five years representing 9% and 4% of all workers respectively.

Exhibit 6. Anticipated number of retirements of full-time (n=637) and part-time workers (n=638) in the next one, three, and five years

Full-time				Part-time			
Total Current Employees (All Employers)	Retirements			Total Current Employees (All Employers)	Retirements		
	Timeframe	Number	Percent		Timeframe	Number	Percent
20,900	One-Year	315	1.5%	28,313	One-Year	199	0.7%
	Three-Years	623	3%		Three-Years	377	1.3%
	Five-Years	1,854	8.9%		Five-Years	1,150	4.1%

REQUIRED EDUCATION AND WORK EXPERIENCE

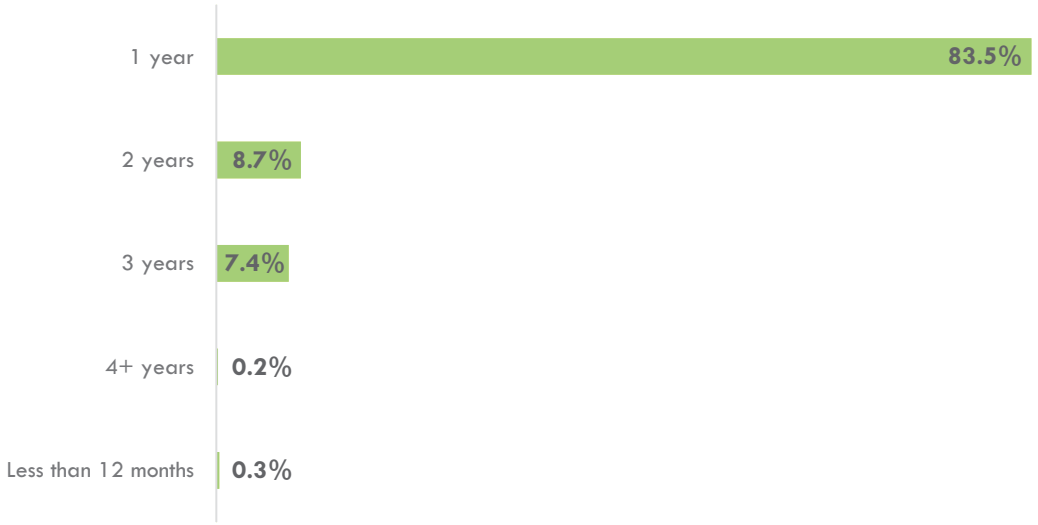
When hiring BFM workers, 75% of businesses require at least a high school diploma, and 17% require some college, but no degree (Exhibit 7). Appendix C shows secondary data on required levels of education and work experience from Burning Glass, an aggregator of job postings, and EMSI, a software platform providing labor market analytics. This data is consistent with employer survey responses.

Exhibit 7. Required education levels for BFM workers by number of surveyed employers (n=635)

Education Level	# of Respondents	% of Total Respondents
High School	476	75%
Some College, No Degree	108	17%
Postsecondary Certificate	41	6.5%
Less than High School	9	1.4%
Four-year Degree	1	0.2%
TOTAL	**635**	**100%**

More than 83% of employers require one year of work experience for BFM workers (Exhibit 8). Only a small percentage of employers require more than one year. For example, about 9% of respondents said they require two years, and 7% said they require three years. Those requesting more than four years accounted for only 0.2% of respondents.

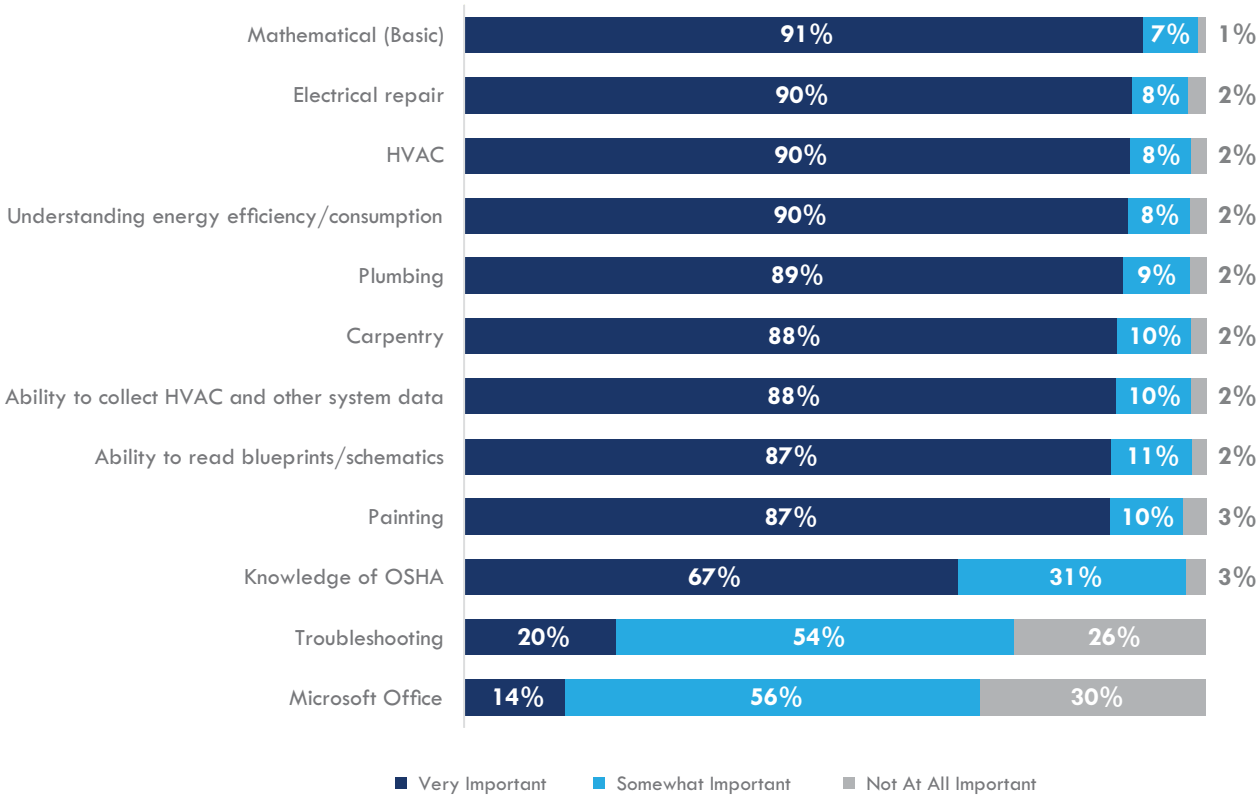
Exhibit 8. Percentage of employers requiring one to four years of work experience for BFM workers (n=635)



TECHNICAL AND SOFT SKILLS

Businesses were asked to rate the importance of 12 different technical skills they look for when hiring BFM workers. The following charts show employer responses for each technical skill, with skills ranked by the highest percentage of employers rating the skill as very important. Nine out of 12 of these skills were rated as very important by at least 87% of employers (Exhibit 9). Very important skills include mathematical (basic), electrical repair, HVAC, and understanding energy efficiency and consumption. (In the following charts, the n value varies because a different number of survey participants responded to each question about a particular skill.)

Exhibit 9. Technical skills ranked by importance (n=631-634)



Survey responses were then separated into two groups based on education level—very important skills for workers with up to a high school education compared to workers with more than a high school education. The ranking of technical skills for BFM workers with less than or equal to a high school education is shown in Exhibit 10. The ranking of technical skills for BFM workers with more than a high school education is displayed in Exhibit 11.

TECHNICAL AND SOFT SKILLS

Exhibit 10. Importance of technical skills for BFM workers with up to a high school education (n=481-485)

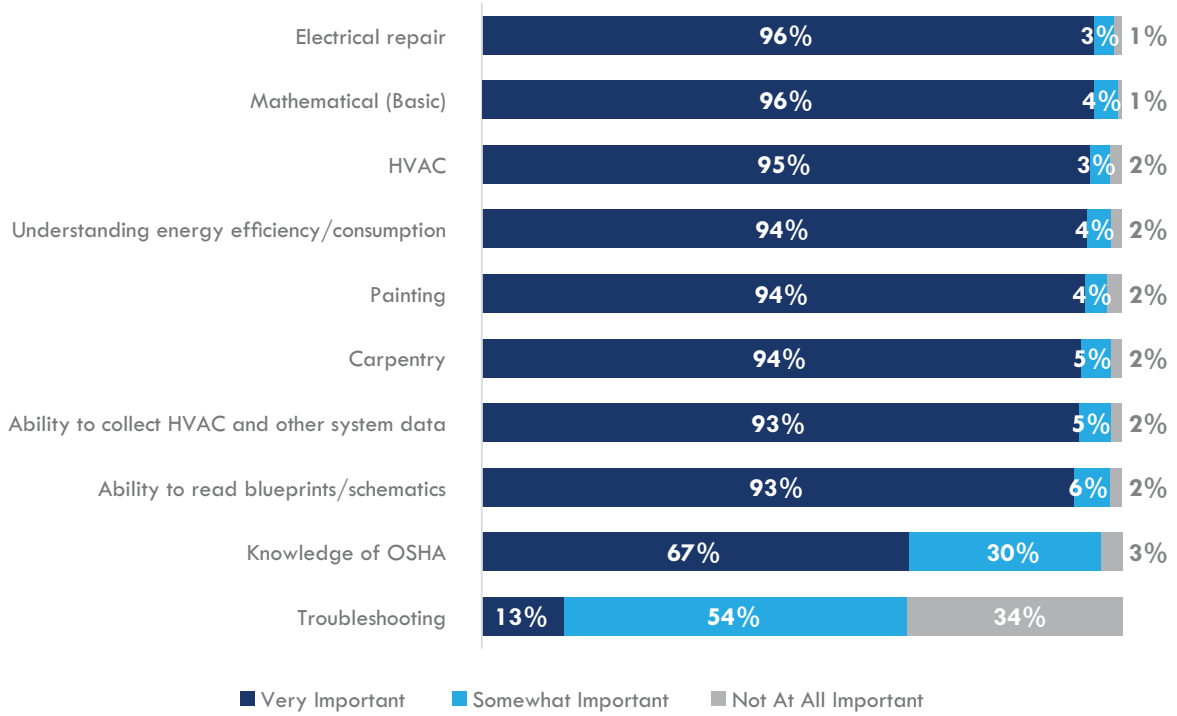
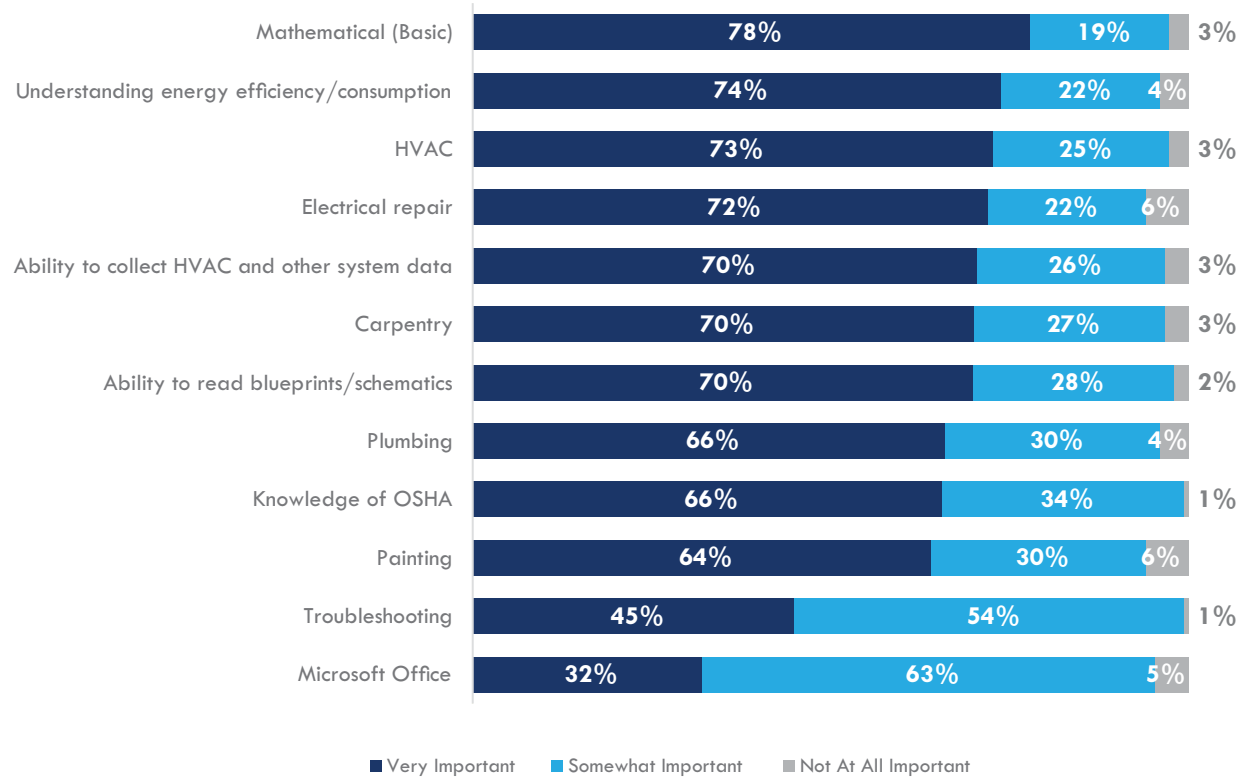


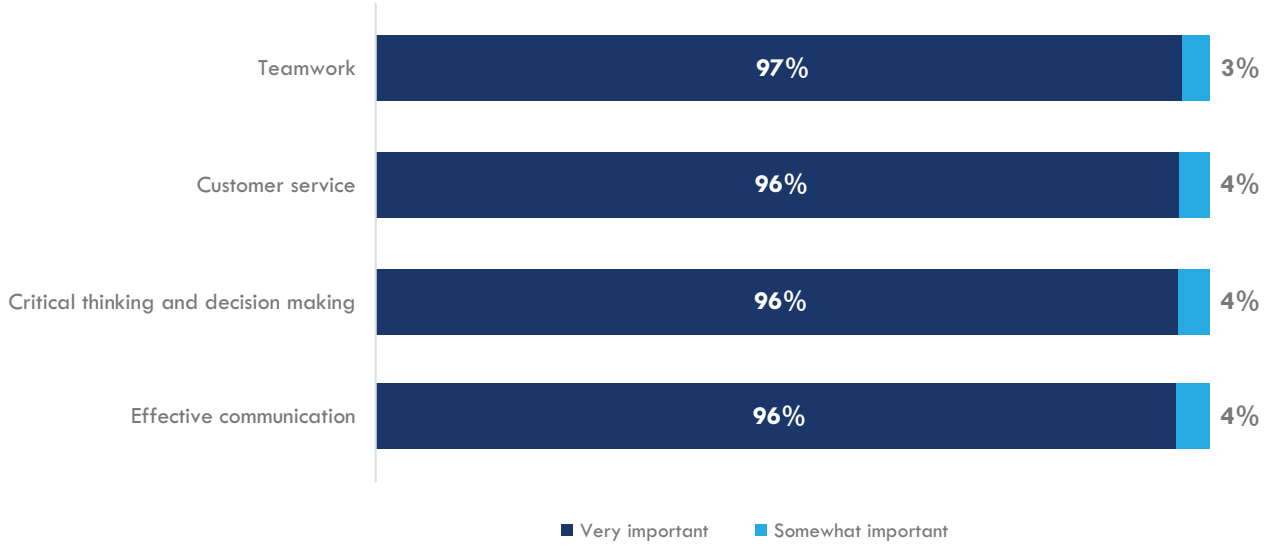
Exhibit 11. Importance of technical skills for BFM workers with more than a high school education (n=148-150)



TECHNICAL AND SOFT SKILLS

In addition to technical skills, soft skills are also important for employees. Consequently, employers were asked to rate the importance of four different soft skills when hiring BFM workers (Exhibit 12). While teamwork was rated as the most important (97% identified this skill as very important), the other three soft skills—customer service, critical thinking and decision making, and effective communication—were rated just as highly (96% identified these skills as very important). Consequently, all four soft skills should be considered important to businesses hiring BFM workers.

Exhibit 12. Importance of soft skills ranked by surveyed employers (n=636-637)



In-demand skills from secondary data sources

In order to get a broader perspective on skills in demand by employers, Burning Glass and EMSI data for the three regions was analyzed for the occupation most closely related to BFM workers—Maintenance and Repair Workers, General (SOC 49-9071).

There are two types of skills in Burning Glass and EMSI Profile Analytics job posting data. However, the two types of skills from each of these sources are defined differently. The two skill types for EMSI are hard and common skills. For Burning Glass, the two skill types are baseline and specialized skills. Baseline skills are often correlated with soft skills. Specialized skills are often correlated with technical skills.

Analysis of all three data sources (the survey conducted by COE, Burning Glass, and EMSI) revealed that there is overlap across all of them. There were 13,951 Burning Glass job postings between August 1, 2019 and January 31, 2020 for the SOC code 49-9071.

The top 12 specialized skills are shown in Exhibit 13, and include repair, plumbing, and HVAC. Five of these specialized skills—repair, plumbing, HVAC, painting, and carpentry—reflect technical skills identified by survey respondents and one (customer service) reflects soft skills identified by survey respondents. Appendices D, E, and F further analyze and compare skills from secondary data sources (Burning Glass and EMSI) with survey responses.

TECHNICAL AND SOFT SKILLS

Exhibit 13. Top specialized skills in Burning Glass job postings (n=13,951)

Specialized Skills	Job Postings	
	Number	Percent
Repair	9,301	67%
Plumbing	5,583	40%
HVAC	3,734	27%
Painting	3,604	26%
Carpentry	2,915	21%
Predictive / Preventative Maintenance	2,455	18%
Cleaning	2,457	18%
Customer Service	2,400	17%
Scheduling	1,475	11%
Hand Tools	1,476	11%
Power Tools	1,409	10%
Lifting Ability	1,378	10%

The top 12 baseline skills from Burning Glass are shown in Exhibit 14, and include communication skills, troubleshooting, and preventive maintenance. One of the top baseline skills (troubleshooting) reflects technical skills identified by survey respondents, and another two (communication and teamwork/collaboration) reflect soft skills identified by survey respondents.

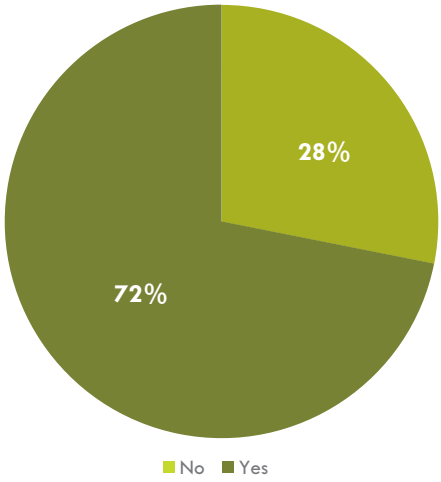
Exhibit 14. Top baseline skills in Burning Glass job postings (n=13,951)

Baseline Skills	Job Postings	
	Number	Percent
Communication Skills	4,065	29%
Troubleshooting	4,054	29%
Preventive Maintenance	4,039	29%
Physical Abilities	3,791	27%
Computer Literacy	2,359	17%
Problem Solving	2,060	15%
Organizational Skills	2,044	15%
English	1,934	14%
Detail-Oriented	1,886	14%
Teamwork / Collaboration	1,725	12%
Microsoft Office	1,475	11%
Writing	1,273	9%

CERTIFICATIONS

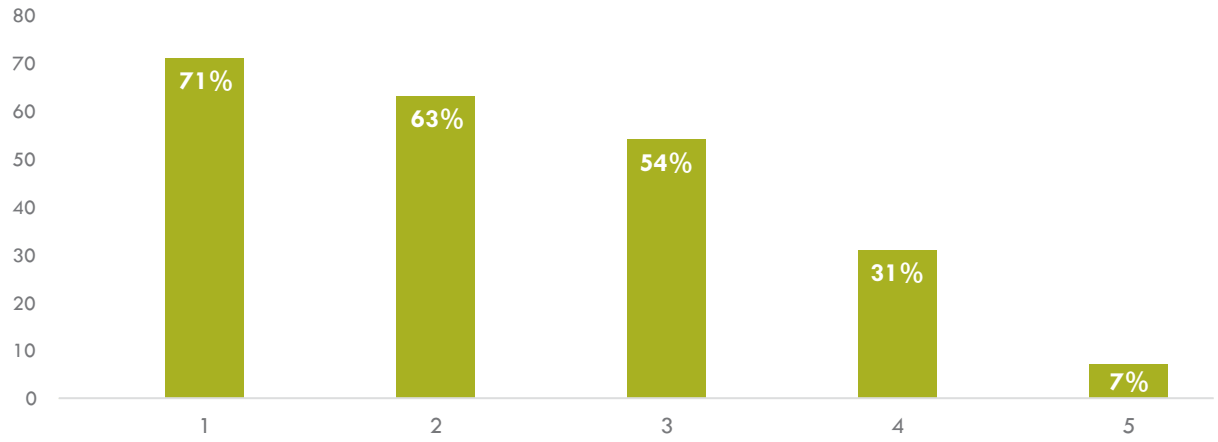
Some skills have a high enough level of importance that they merit a nationally recognized certification, such as an electrician or HVAC certification. Employers were asked if there are any certifications that are desirable for BFM workers. Of the 633 employers who answered the question, 72% felt that certifications were desirable (Exhibit 15).

Exhibit 15. Importance of certifications among surveyed businesses (n=633)



Of the 639 survey respondents, 455, or 71%, listed at least one certification preferred for a BFM worker, 63% listed two, 54% listed three, 31% listed four, and 7% listed five certifications (Exhibit 16).

Exhibit 16. Number of certifications desired by surveyed employers (n=639)



Employers were also asked to list (in an open-ended format) the required or preferred certifications by order of importance. Exhibit 17 shows employer responses. The top four categories for these certifications are: electrician (391 respondents), construction (378), HVAC (268), and plumbing (170). These certifications correlate to the technical skills that the majority of employers indicated were very important: electrical repair (90% of respondents), HVAC (89%), plumbing (89%), and carpentry (88%).

CERTIFICATIONS

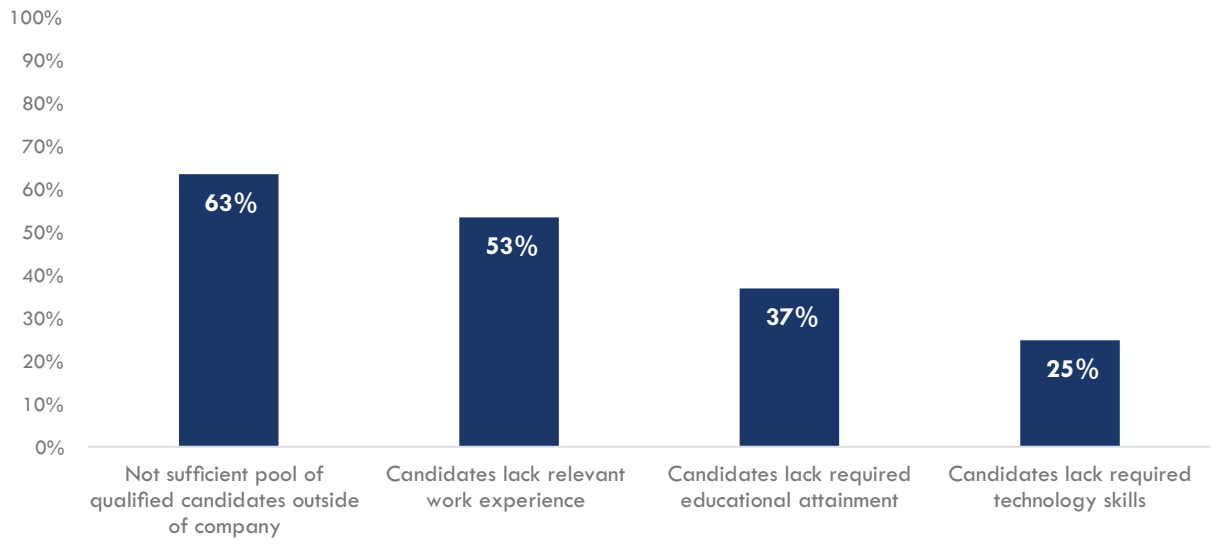
Exhibit 17. Required or preferred certifications identified by surveyed employers (n=639)

Certification	# of Respondents
Electrician	391
Construction	378
HVAC	268
Plumbing	170
Carpentry/Carpenter	87
Refrigeration	77
CDL/driver's license	21
Flooring	13
Ceiling	5
Gas safety	5
Roofing	4
Safety	2
Certified Maintenance Employee	2
Painting	2
BOMA-SMA (Building Owners and Managers Association-Systems Maintenance Administrator)	1
C36-Plumbing	1
Certified Building Operator	1
Certified Industrial Maintenance Mechanic	1
Certified Master Technician	1
Computer science	1
Communications	1
Community college	1
CPR (Cardiopulmonary Resuscitation)	1
CSLB (Contractors State License Board)	1
General Medical	1
IFMA-FMP (International Facility Management Association-Facility Management Professional)	1
Journeyman license	1
OSHA (Occupational Safety & Health Administration)	1
Pharmaceutical	1
Real estate license	1
Residential property managers	1
Solar panels	1
Trade school	1
Other	2
TOTAL	**1,446**

DIFFICULTY HIRING

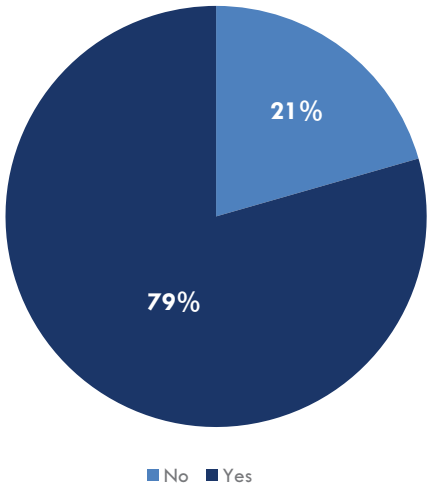
Employers were asked about the challenges they encounter when hiring BFM workers. Respondents identified four challenges when surveyed. The highest percentage of employers, 63%, selected an insufficient pool of qualified candidates outside the company (Exhibit 18). More than 50% of employers said candidates lacked relevant work experience, and 37% said candidates lacked the required educational attainment. A lack of required technology skills was reported by 25% of employers as a challenge. By far the greatest challenges employers faced are an insufficient pool of qualified candidates and candidates without relevant work experience.

Exhibit 18. Challenges in hiring BFM workers (n=638)



Overall, 79% of respondents reported experiencing difficulty hiring from within, indicating a shortage of qualified workers in lower-level positions who could be upskilled for BFM positions (Exhibit 19).

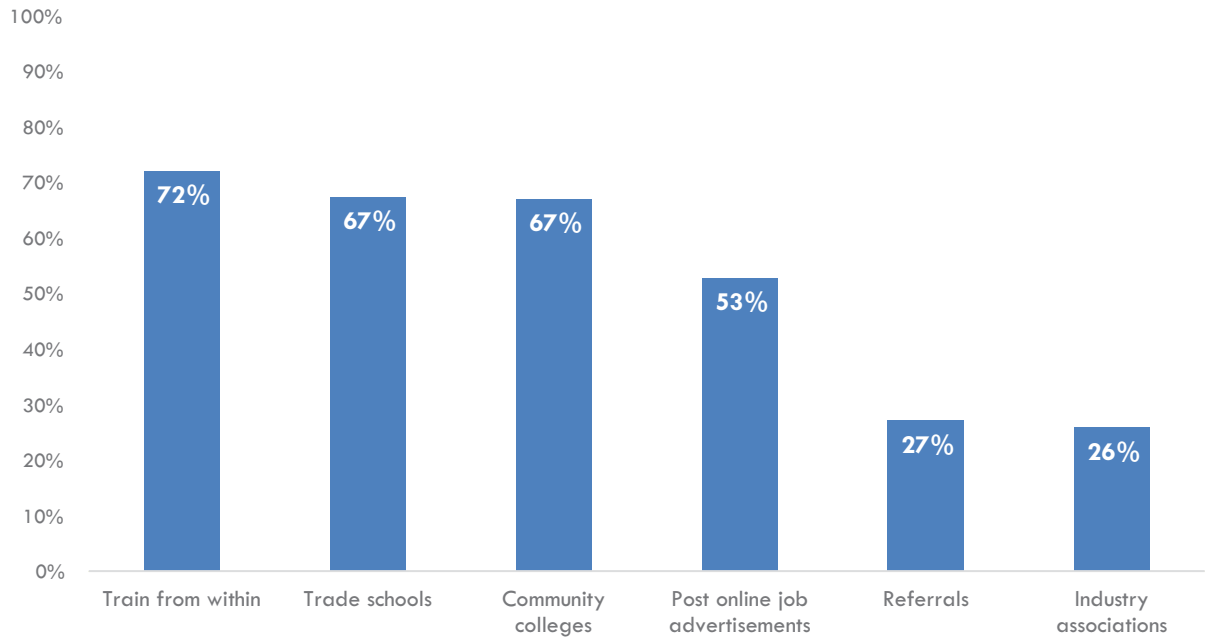
Exhibit 19. Difficulty hiring from within (n=638)



DIFFICULTY HIRING

Businesses shared their methods for recruiting qualified candidates. Most businesses, 72%, train from within, and 67% of businesses indicate that they recruit equally from trade schools and community colleges. Posting online job advertisements was reported as a recruitment strategy for 53% of the businesses. Only 27% of businesses reported making use of referrals and 26% industry associations (Exhibit 20).

Exhibit 20. How surveyed employers recruit qualified candidates (n=639)



Employers were asked about what their first choice would be for a recruitment source (Exhibit 21). Most employers, 460 respondents, selected training from within, and 149 respondents chose posting online job advertisements.

Exhibit 21. Sources of BFM hiring for employers

Recruitment Source	# of Respondents	% of Respondents	Recruitment Source as First Choice
Train from within	460	72%	460 picked this as their first choice
Post Online Job Advertisements	337	53%	149 picked as their first choice
Industry Associations	165	26%	15 picked this as their first choice
Referrals	173	27%	9 picked this as their first choice
Community Colleges	428	67%	6 picked this as their first choice
Trade Schools	430	67%	No one picked this as their first choice

DIFFICULTY HIRING

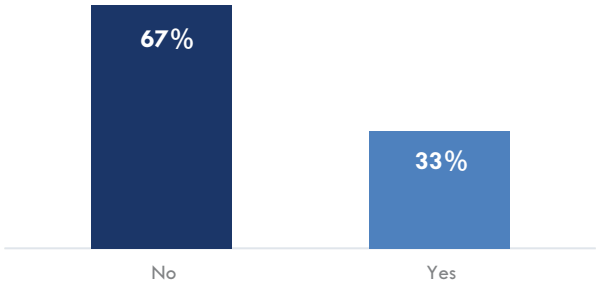
Note that there were 67 staffing agencies that provided survey responses: five were from the Bay Area, 39 were from the Central Valley/Mother Lode region, and 28 were from the South Central Coast (Exhibit 22). Looking at the overall number of responses, the percentage of staffing agencies providing responses for employers in the Central Valley/Mother Lode region represents nearly one-fifth of the total. This percentage jumps to one-third for the South Central Coast region. This results in a biased response in the Central Valley/Mother Lode and South Central Coast regions for the question that asks about the use of staffing agencies for finding employees. However, this is not the case with the Bay Area for which 2% of the overall responses were provided by staffing agencies. Altogether, staffing agencies that provided responses for employers representing 11% of total responses.

Exhibit 22. Survey respondents identified as staffing agencies

COE Region	Respondents	Staffing Agencies	
	Number	Number	Percent
Bay Area	327	5	2%
Central Valley	219	39	18%
South Central Coast	93	28	30%
TOTAL	**639**	**72**	**11%**

As part of the survey, businesses were asked separately if they utilized staffing agencies, and 67% responded that they did, while 33% indicated they do not use staffing agencies (Exhibit 23).

Exhibit 23. Use of staffing agencies by surveyed employers



PARTNERSHIP OPPORTUNITIES FOR COMMUNITY COLLEGES

Employers were asked to select community college partnership opportunities from a provided list that also included an open-ended "other" option. Of the 609 employers who were interested in one or more of the options, 86% selected internships for students and 57% selected serving on an advisory board (Exhibit 24). Only three employers selected the "other" options, and these responses included "recruit interns" and "piloting a facilities maintenance program in a community college/developing a certificate program for graduates".

Exhibit 24. Interest among surveyed businesses in pursuing community college partnerships (n=609)

Community College Partnership Opportunity	Respondents	
	Number	Percent
Internships	526	86%
Serving on an Advisory Board	348	57%
Guest Speaking	112	18%
Hosting Field Trips	76	12%
None of These	30	5%
Other	3	0%

CONCLUSION AND RECOMMENDATIONS

In partnership with the California Community Colleges Energy, Construction, and Utilities (ECU) Sector and the UC San Diego Extension, the Centers of Excellence conducted a survey of 639 businesses to determine how community colleges can calibrate their programs to train BFM workers to meet employer demand. The survey focused on three regions in California: the San Francisco Bay Area, Central Valley/Mother Lode, and South Central Coast.

Using survey results, the study examined technical and soft skills, educational attainment, work experience, and certifications that are of most value to employers hiring BFM workers. This study also provides insights into the workforce challenges and hiring difficulties that employers are encountering.

The Centers of Excellence determined that a 2% increase in demand for BFM workers across the three regions in the coming year is plausible. This conclusion was ascertained using a combination of Central Valley/Mother Lode and South Central Coast survey data, Bay Area Burning Glass job postings data, and EMSI projections data.

Based on the survey results, the most common businesses employing BFM workers serve the hospital/healthcare, hotel/resort, real estate, and wholesale industry sectors. Most are small businesses, with about 60% employing fewer than 99 employees. Nearly 65% employ up to 24 full-time BFM workers and 54% employ up to 24 part-time BFM workers.

Upcoming retirements pose a challenge for businesses with BFM workers. As shown in Appendix G, the BFM workforce is an aging workforce, with a substantial proportion of workers age 55 or older. A total of 385 surveyed employers, about 60% of respondents, expect at least one full-time employee retirement in the next five years. In the next five years, 1,854 full-time workers could retire from the surveyed businesses, representing nearly 9% of all workers, and 1,150 part-time workers are expected to retire from surveyed businesses, approximately 4% of all workers.

When hiring BFM workers, 75% of businesses require at least a high school diploma, and 83.5% of employers require one year of work experience. Additionally, certifications are valuable to employers; 72% felt that certifications were desirable. The top four categories for certifications are: electrician, construction, HVAC, and plumbing.

The study also examined hiring challenges facing employers. Regarding external recruitment and hiring, more than 60% of surveyed employers said there is an insufficient pool of qualified candidates. More than 50% of employers said candidates lacked relevant work experience, and 37% said candidates lacked the required educational attainment. Nearly 80% of employers reported difficulty hiring from within. These reported challenges indicate that the community colleges could provide a critical role in educating and training BFM workers to meet the qualification requirements of employers. Moreover, 67% of employers said they use community colleges for worker recruitment.

Recommendations and next steps:

- Survey responses show that very important skills across all education levels are mathematical (basic), electrical repair, HVAC, and understanding energy efficiency and consumption. When educational attainment was analyzed further, these same technical skills were the most valued by employers for workers with more than a high school education. Soft skills highly valued by employers include teamwork, customer service, critical thinking and decision making, and effective communication. In developing coursework, the community colleges should ensure these technical and soft skills are integrated into the curriculum.
- Evaluation of the survey data revealed that 67% of employers recruit BFM job candidates from community colleges, and 86% of employers are interested in establishing internships for students. These findings communicate opportunities for community colleges to provide BFM students work-based learning with hands-on internship experiences.
- Work-based learning courses may formalize a community college pipeline to expedite the hiring process for companies. In fact, 88% of employers said they were interested in partnering with the community college for internships, and 78% were interested in serving on an industry advisory group.
- Of the businesses surveyed, 67%, use third-party placement agencies. Community colleges should consider creating pipelines with placement agencies to expedite the hiring process for program graduates qualified for BFM positions.

APPENDIX A: METHODOLOGY

Building & Facilities Maintenance Workers Studies: Project Overview

The Centers of Excellence for Labor Market Research (COE) partnered with California Community Colleges Energy, Construction, and Utilities (ECU) Sector Directors covering three regions and the University of California San Diego Extension (UCSD) to conduct a survey of businesses that employ building and facilities maintenance (BFM) workers to determine the appropriate community college response for training these workers. The survey focused on three regions across California: the San Francisco Bay Area, Central Valley/Mother Lode, and the South Central Coast.

Data Collection Methodology from UCSD

Primary data was collected with a survey instrument developed by UCSD. Secondary data was collected by UCSD from the Bureau of Labor Statistics, and two labor market research tools—Burning Glass and EMSI. A 25-item survey consisting of forced-choice and open-ended questions was constructed to collect information from regional businesses on hiring practices related to Building and Facilities Maintenance (BFM) Workers. UCSD contracted Bakersfield Market Research to obtain survey responses. This market research company located in Bakersfield, CA specializes in survey response collection and was selected based on reputation, location, and regional connections. Bakersfield Market Research created a list of applicable businesses that employ BFM workers in the region of interest (Central Valley, Bay Area), and developed a script to gain access to company hiring managers and decision makers. Survey responses were collected by phone. A total of n = 312 valid responses were collected in the Central California region which met pre-established quotas by county. A total of n = 337 valid survey responses were collected in the Bay Area region which met pre-established quotas by county. The majority of survey respondents were comfortable having their organization identified for the purposes of this research, but some requested that their company remain anonymous. Survey data and secondary data was analyzed by UCSD.

Projecting BFM Workers: Data Quality Issue

Item 13 on the Central California BFM survey asked the following: "Q13. Please indicate how many full-time and part-time building and facilities maintenance employees your business has currently and will have in the next 12 months." Upon analyzing the data, it became clear that many responses were not realistic, indicating an issue with the data from this item. For example, one respondent said they had 13 FT BFM workers at present and expected to have 5.6FT BFM workers the next year. This would be the equivalent of laying off 57% of their BFM workforce. Did the respondent mean to say they wanted to hire 5.6 more FT BFM workers? That would be the equivalent of a 30% increase in their BFM workforce. Burning Glass projects an annual regional increase of approximately 2% for this occupation.

There are several reasons why respondents may not have been able to provide meaningful data for this item. One is that the item was poorly phrased and/or too complex which led to respondent confusion. It is also possible that survey responses were not recorded correctly. Another highly plausible explanation is that people typically do a poor job of projecting future states—it is very difficult to do. In fact, more than 40 of the 312 Central California survey takers did not even provide a response to the projection question, which suggests they were not able to formulate an estimate.

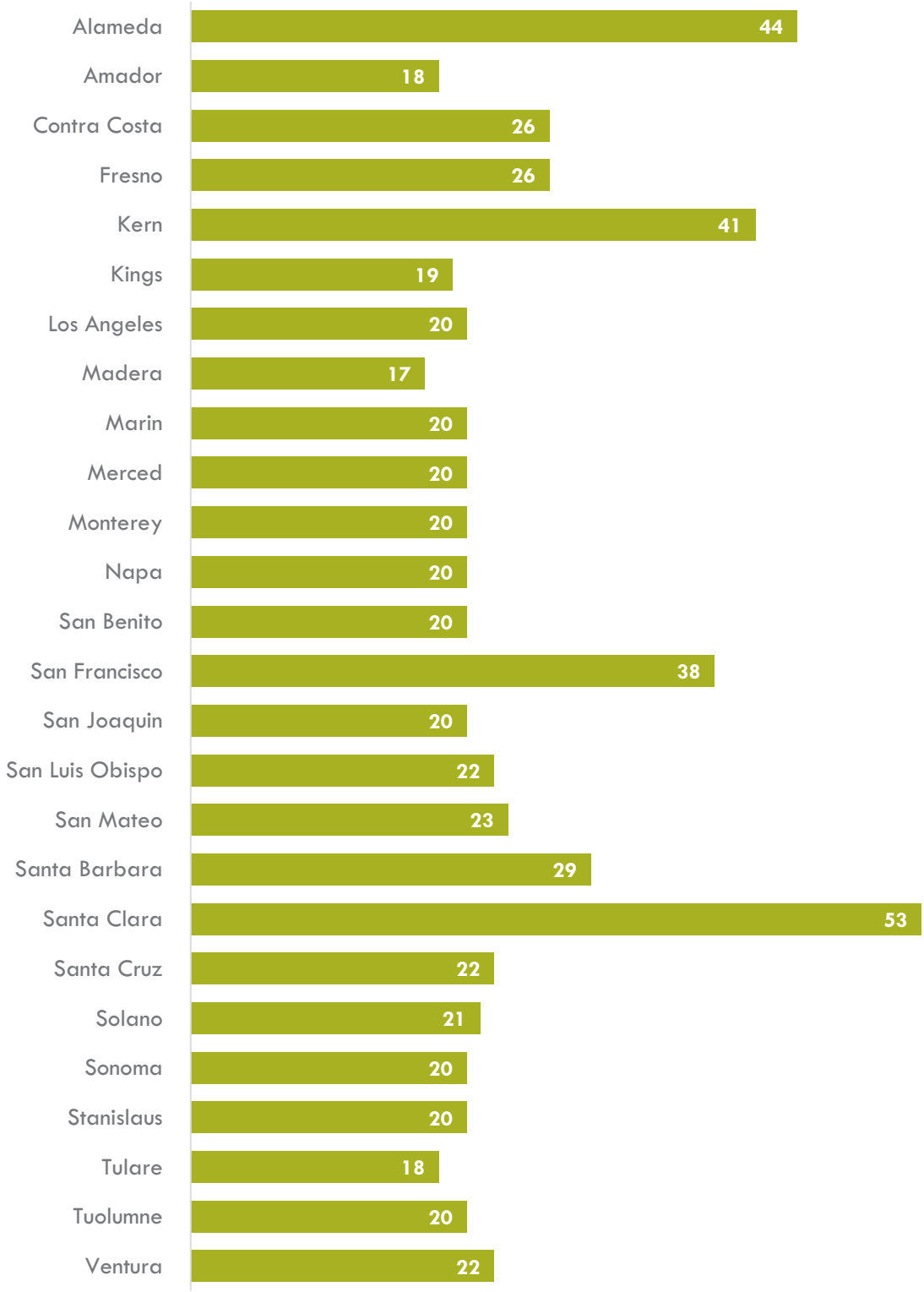
When the research team realized that the Central CA BFM data looked problematic, we modified the survey item in question for the Bay Area project. The question was broken into two separate items, but still asked about full- and part-time employees, and so did maintain a level of complexity. As a result, all of the projections for the Bay Area were in the positive direction (i.e. all responses indicated a projected increase in BFM workers, whereas some of the projections were negative in the Central CA project). This suggests to the research team that rephrasing the item in question for the Bay Area iteration at least partially addressed the math issue (i.e. people were no longer responding incorrectly to the question by stating just the additional number of expected BFM employees, as opposed to the total number), but also that as expected, people are not very good at projecting future states.

For the Central CA report, the research team attempted to apply corrective measures to the data from the one survey item in question. That is, we eliminated responses that did not meet a pre-established criteria for what the team deemed a plausible response. Specifically, we created a ratio of projected to current workers, if the ratio was below the threshold

APPENDIX A: METHODOLOGY

of 0.7, the current and projected scores were summed. The result of this analysis suggested a BFM occupation growth rate between 1% and 3%, consistent with projections from Burning Glass. While the adjusted data is consistent with projections from other sources, the research team has great hesitancy about the using the data from this particular question to inform decision making, because the modified data no longer reflects the full sample surveyed and includes evaluative assumptions. The Bay Area data was not amendable to this modification—when the team attempted to apply the same criteria to the data in question, we found we would need to make too many assumptions about what respondents intended to say, which would introduce bias into the data for this survey question. In summary, the UCSD research team recommends the data related to this one survey item involving projections be discarded. The research team understands the importance of the community voice, but in this instance recommends using established sources (e.g., Burning Glass, Bureau of Labor Statistics) for projecting 12-month growth in the BFM occupation.

APPENDIX B: SURVEYED BUSINESSES BY COUNTY **(n=639)**



APPENDIX C: REQUIRED EDUCATION AND WORK EXPERIENCE

Burning Glass data for education and work experience

According to Burning Glass data; trends are similar to those reported by survey respondents. Jobs required a high school diploma (Exhibit 4, 91%) and at least 0-2 years of experience (Exhibit 6, 56%). Although Burning Glass job postings included some expectation for mid-level experience (Exhibit 4, 39%, 3-5 years of work experience), these jobs likely corresponded to mid-level jobs rather than entry-level positions. Consequently, one year of work experience and a high school diploma seem sufficient for entry-level BFM workers.

Exhibit C1. Education Levels in job postings from Burning Glass

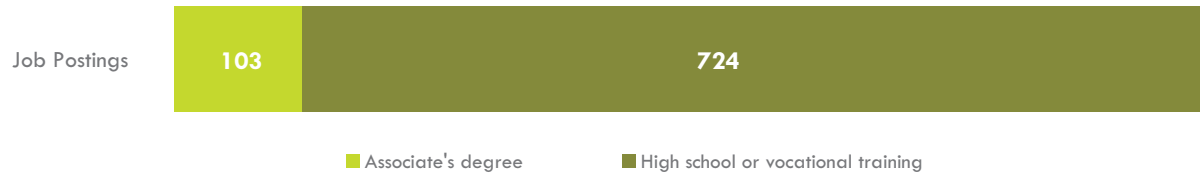


Exhibit C2. Work experience from job postings in Burning Glass

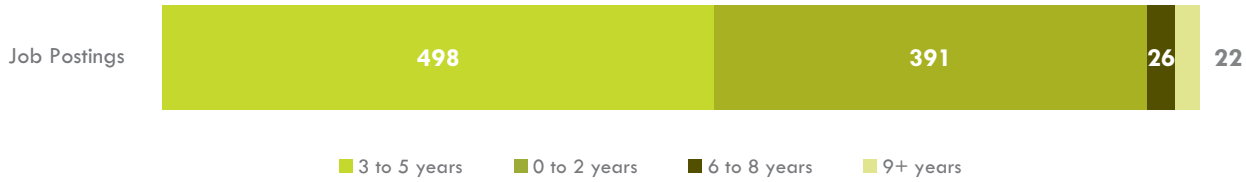


Exhibit C3. Educational attainment from EMSI

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-the-job Training	CPS
Maintenance and Repair Workers, General	High school diploma or equivalent	None	Moderate-term	37.9%

APPENDIX D: EMSI SKILLS COMPARISON, WAGES AND EMPLOYMENT PROJECTIONS

Skills identified through EMSI

When comparing survey responses and EMSI Profile Analytics data for hard skills, similarities were found (Exhibit D1). Job postings frequently requested these skills, such as plumbing (34% of postings), HVAC (28%), carpentry (22%), painting (22%), mechanics (18%), and preventative maintenance (18%). There were 62,485 job postings between September 2016 and December 2019 across the three regions. The top 12 hard and soft skills are similar, but not identical to Burning Glass skills data.

Exhibit D1. Hard skills in EMSI job postings (n=62,485)

Hard Skills	Job Postings	
	Number	Percent
Plumbing	21,154	34%
HVAC	17,313	28%
Carpentry	13,521	22%
Painting	13,438	22%
Mechanics	11,099	18%
Preventive Maintenance	11,004	18%
Power Tool Operation	7,067	11%
Pumps	5,849	9%
Furnishing	5,153	8%
Landscaping	3,936	6%
Hydraulics	3,895	6%
Valves (Piping)	3,880	6%

The top common skill in EMSI job postings is a valid driver's license. Driving is a skill; however, possessing a valid driver's license is a certification as opposed to a skill. This was listed as the seventh most important certification by the employers who responded to the survey.

There also seems to be some definitive factor(s) established by EMSI that allows for two different types of problem solving with one being specifically affiliated with troubleshooting, which is identified as a technical skill in the survey.

The common skills identified from EMSI job postings contain two of the survey's soft skills (customer service and communications). If the second definition of problem solving incorporates critical thinking and decision making, then this would be a third common skill that is reflected among the survey respondents' soft skills (Exhibit D2).

APPENDIX D: EMSI SKILLS COMPARISON, WAGES AND EMPLOYMENT PROJECTIONS

Exhibit D2. Common skills in EMSI job postings (n=62,485)

Common Skills	Job Postings	
	Number	Percent
Valid Driver's License	17,787	28%
Troubleshooting (Problem Solving)	16,355	26%
Operations	13,119	21%
Management	12,678	20%
Customer Service	12,048	19%
Communications	8,993	14%
Construction	6,282	10%
Good Driving Record	6,084	10%
Computer Literacy	6,066	10%
Cleanliness	5,035	8%
Problem Solving	3,872	6%
Written Communication	3,144	5%

Exhibit D3. BFM employment and occupational projections from EMSI

Occupation	2018	2023	5-year Change	5-year % Change	2018-2023 Openings	Annual Openings
Maintenance and Repair Workers, General	62,859	67,298	4,439	6%	35,529	7,106

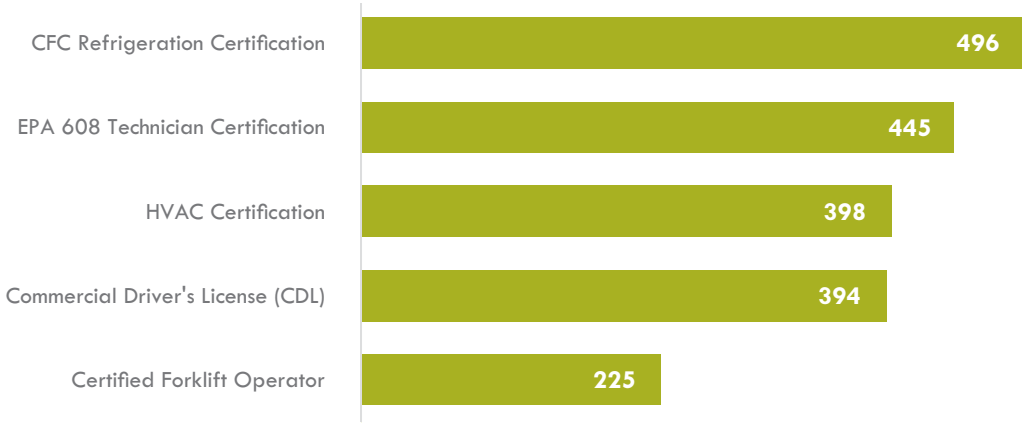
Exhibit D4. BFM wages from EMSI

Occupation	10th Percentile Hourly Earnings	25th Percentile Hourly Earnings	Median Hourly Earnings
Maintenance and Repair Workers, General	High school diploma or equivalent	$15.58	$20.68

Exhibit D5. Most common skills by frequency in EMSI job postings

APPENDIX D: EMSI SKILLS COMPARISON, WAGES AND EMPLOYMENT PROJECTIONS

Exhibit D6. Most common certifications by frequency in EMSI job postings



APPENDIX E: MOST IMPORTANT SKILLS RANKED BY SURVEY RESPONDENTS

The following charts show how specific skills were rated by surveyed employers. The charts are shown in order of those ranked most important.

Exhibit E1. Electrical repair is the No. 1 skill rated by employers (n=638)

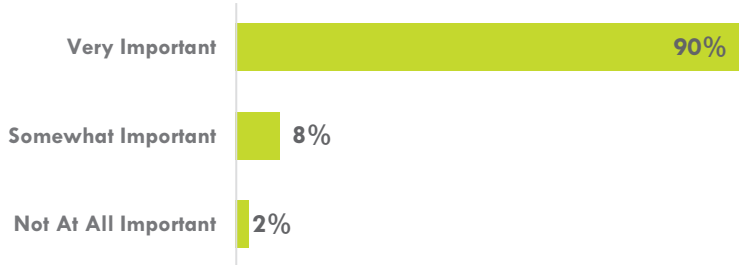


Exhibit E2. Plumbing is the No. 2 skill rated by employers (n=637)

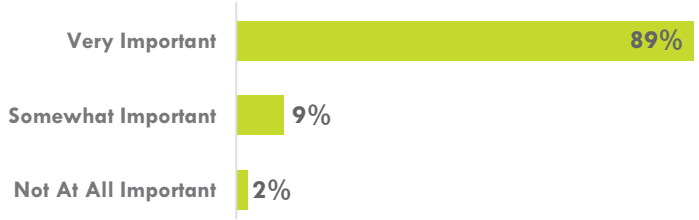


Exhibit E3. HVAC is the No. 3 skill rated by employers (n=638)

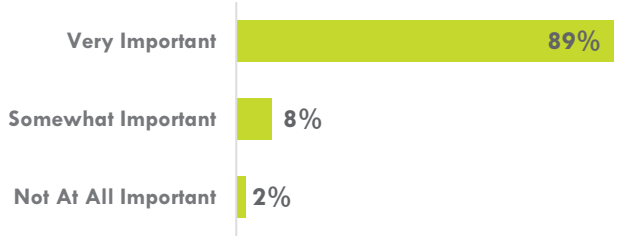
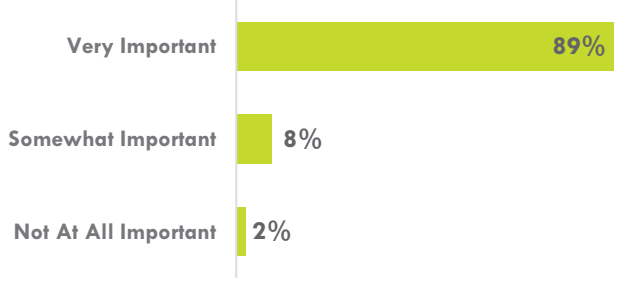


Exhibit E4. Energy efficiency and consumption is the No. 4 skill rated by employers is (n=638)



APPENDIX E: MOST IMPORTANT SKILLS RANKED BY SURVEY RESPONDENTS

Exhibit E5. Data collection for HVAC and other control systems is the No. 5 skill rated by employers (n=638)

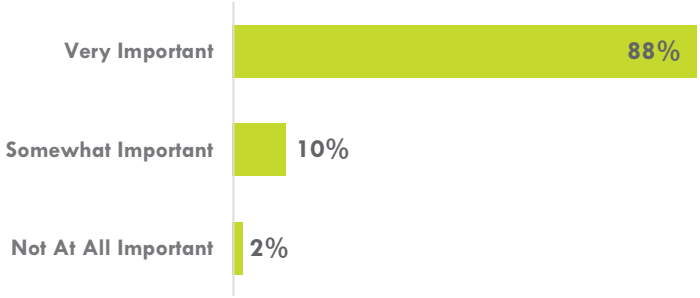


Exhibit E6. Carpentry is the No. 6 skill rated by employers (n=637)

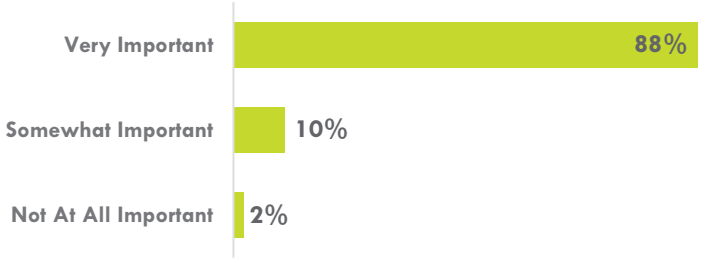


Exhibit E7. Reading blueprints and schematics is the No. 7 skill rated by employers (n=637)

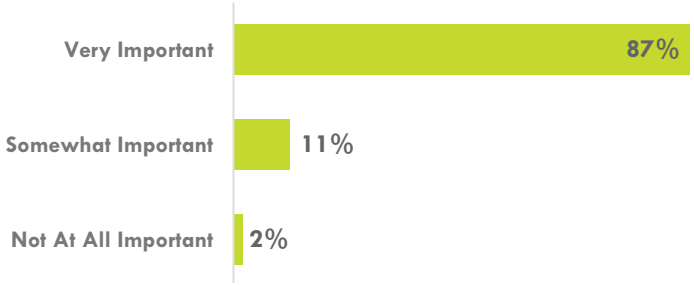
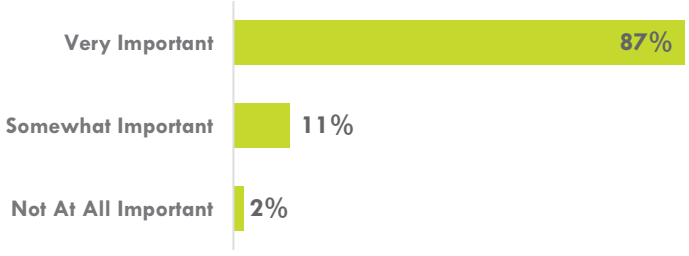


Exhibit E8. Mathematical is the No. 8 skill rated by employers (n=634)



APPENDIX E: MOST IMPORTANT SKILLS RANKED BY SURVEY RESPONDENTS

Exhibit E9. Painting is the No. 9 skill rated by employers (n=639)

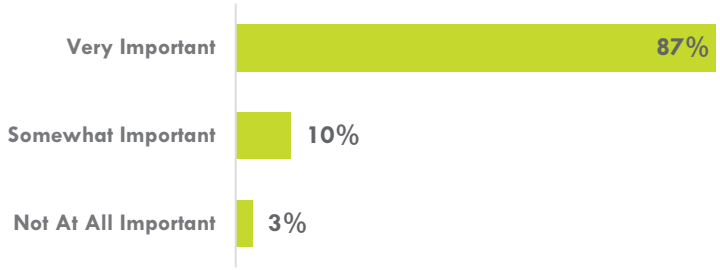


Exhibit E10. Knowledge of OSHA is the No. 10 skill rated by employers (n=637)

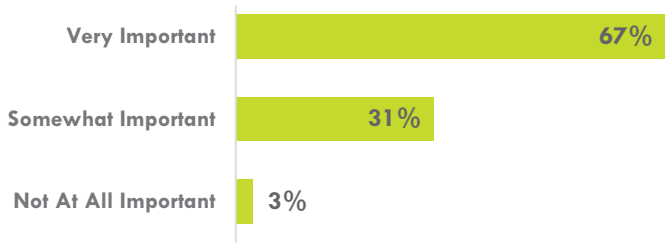


Exhibit E11. Troubleshooting is the No. 11 skill rated by employers (n=635)

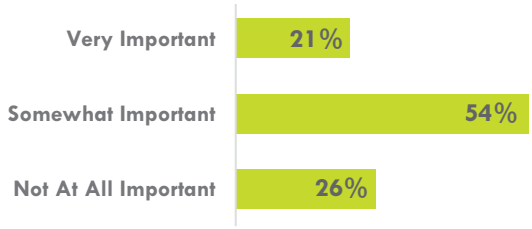
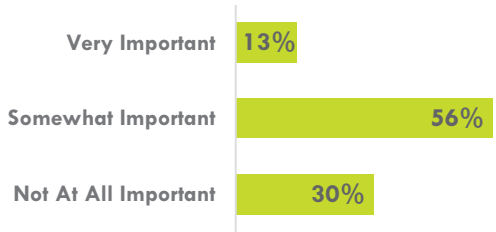


Exhibit E12. Microsoft Office is the No. 12 skill rated by employers (n=638)



APPENDIX F: SKILLS AND CERTIFICATIONS IN BURNING GLASS JOB POSTINGS

Data pertains to SOC tilte and code: Maintenance and Repair Workers, General (SOC 49-9071). Based on an analysis of occupational titles, BFM workers appear to account for 24% of the SOC code.

Exhibit F1. Top job titles in Burning Glass job postings

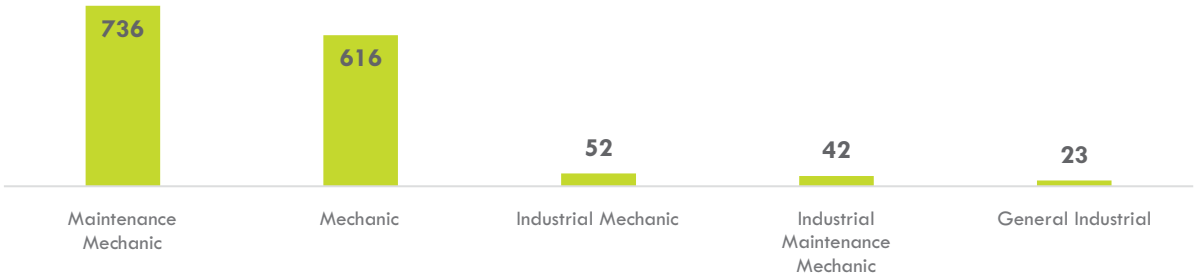


Exhibit F2. Most listed certifications in Burning Glass job postings

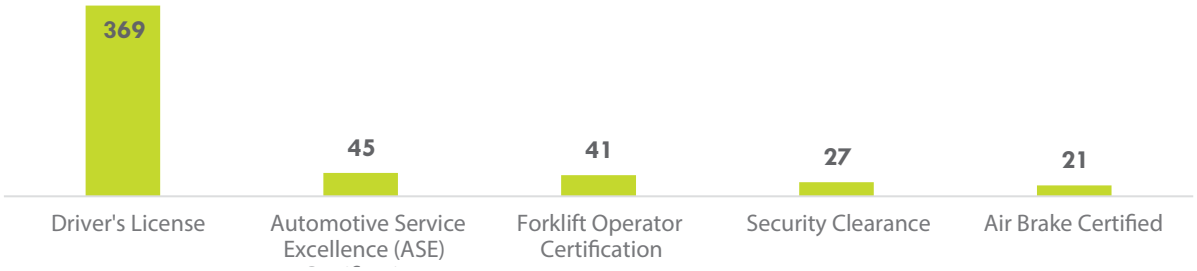
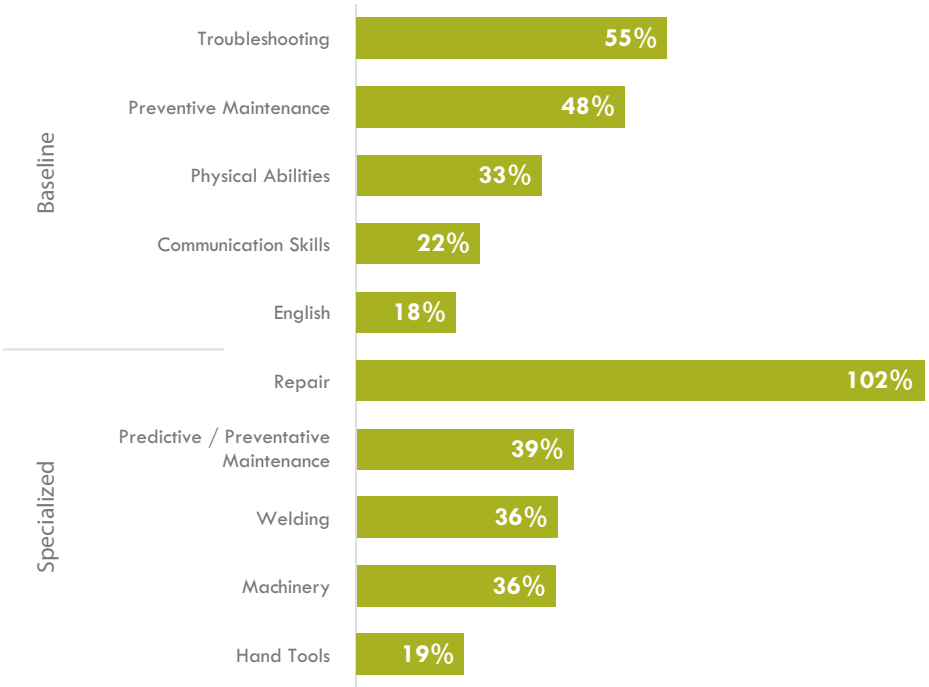


Exhibit F3. Top five listed baseline and specialized skills in Burning Glass job postings



APPENDIX F: SKILLS AND CERTIFICATIONS IN BURNING GLASS JOB POSTINGS

Exhibit F4. Most common software skills in Burning Glass job postings

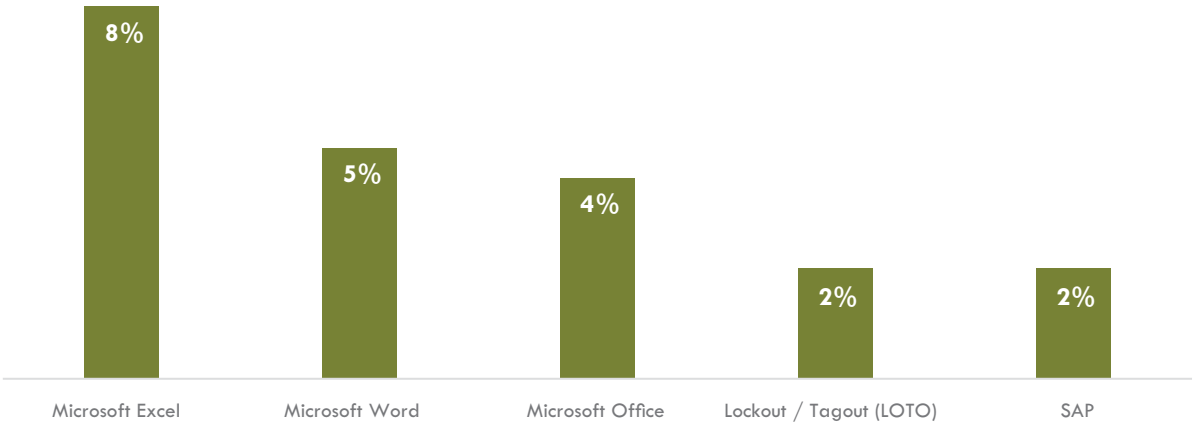
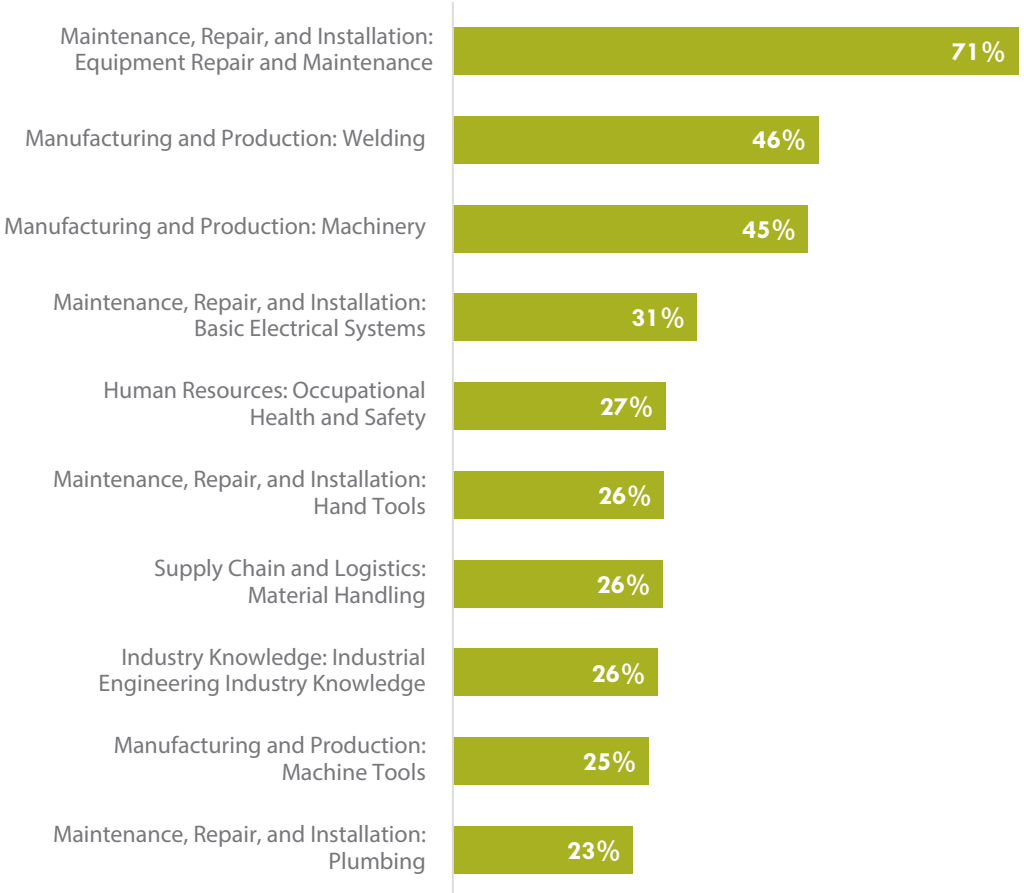


Exhibit F5. Skill projections from Burning Glass job postings



APPENDIX G: WORKER CHARACTERISTICS FROM EMSI

Exhibit G1. Percent of male and female workers in BFM occupations

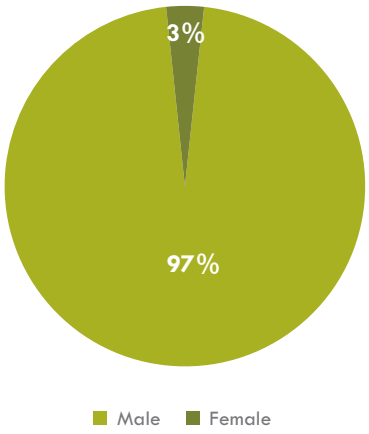


Exhibit G2. Age distribution among BFM workers

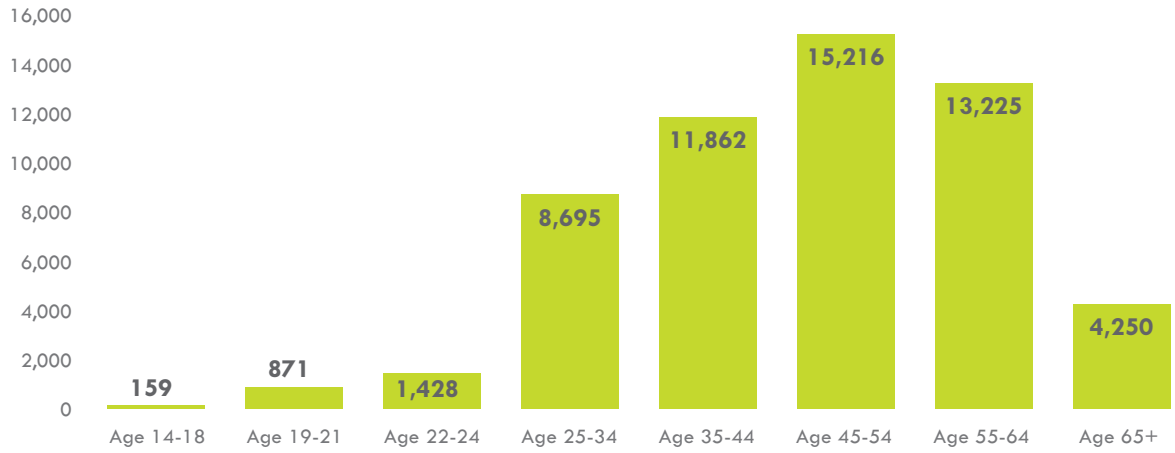
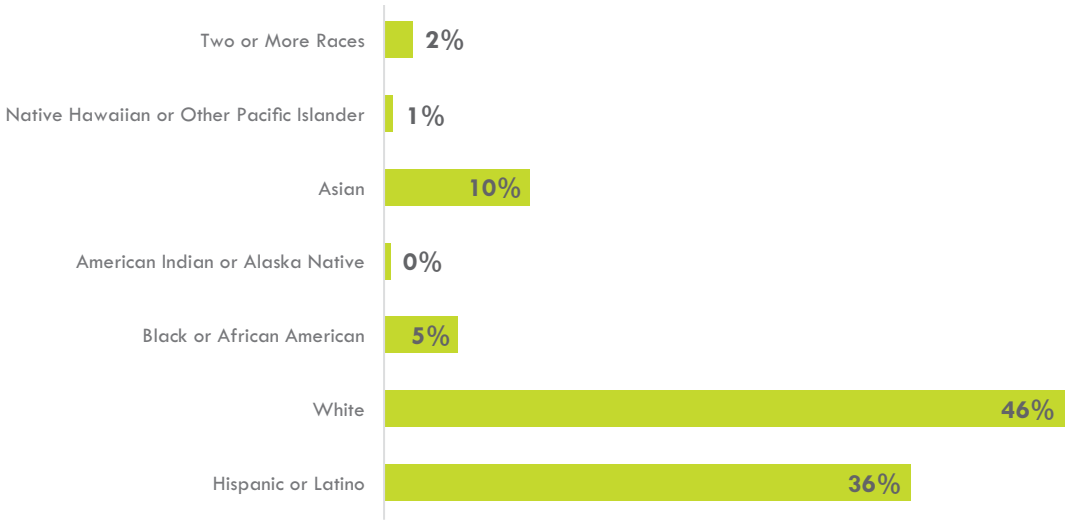


Exhibit G3. BFM worker ethnicity



MORE ABOUT THE CENTERS OF EXCELLENCE

The Centers of Excellence (COE) for Labor Market Research deliver regional workforce research and technical expertise to California Community Colleges for program decision making and resource development. This information has proven valuable to colleges in beginning, revising, or updating economic development and Career Education (CE) programs, strengthening grant applications, assisting in the accreditation process, and in supporting strategic planning efforts.

The Centers of Excellence Initiative is funded in part by the Chancellor's Office, California Community Colleges, Economic and Workforce Development Program. The Centers aspire to be the leading source of regional workforce information and insight for California Community Colleges. More information about the Centers of Excellence is available at **www.coeccc.net**.

Important Disclaimer

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

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