

Labor Market Analysis for Program Recommendation:
 0946.00/ Environmental Control Technology (HVAC)
 (Refrigerator Service Technician)
 (Air Conditioning and Heating Technician)

Orange County Center of Excellence, October 2023



Summary

Program LMI Endorsement	Endorsed: All LMI Criteria Met <input checked="" type="checkbox"/>	Endorsed: Some LMI Criteria Met <input type="checkbox"/>	Not LMI Endorsed <input type="checkbox"/>
Program LMI Endorsement Criteria			
	Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>
Supply Gap:	Comments: There is projected to be 1,439 annual job openings throughout Los Angeles and Orange counties for <i>heating, air conditioning, and refrigeration mechanics and installers</i> , which is more than the 972 awards conferred by educational institutions .		
	Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>
Living Wage: (Entry-Level, 25 th)	Comments: All annual job openings for <i>heating, air conditioning, and refrigeration mechanics and installers</i> have entry-level hourly wages above the OC living wage of \$20.63 .		
	Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>
Education:	Comments: The typical entry-level education for <i>heating, air conditioning, and refrigeration mechanics and installers</i> is a postsecondary nondegree award. Additionally, 44% of workers in the field have completed some college or an associate degree as their highest level of education .		
Emerging Occupation(s)			
	Yes <input type="checkbox"/>		No <input checked="" type="checkbox"/>
Comments: N/A			

The Orange County Center of Excellence for Labor Market Research (OC COE) prepared this report to determine whether there is a supply gap in the Los Angeles/Orange County regional labor market related to one middle-skill occupation::

- Heating, Air Conditioning, and Refrigeration Mechanics and Installers (49-9021)

Based on the available data, there appears to be a supply gap for *heating, air conditioning, and refrigeration mechanics and installers* and typical education requirements for these occupations align with a community college education. In addition, all annual openings for this occupation have entry-level wages above the living wage. **Therefore, due to all of the regional labor market criteria being met, the COE endorses this proposed program.**

Exhibit 1 lists the occupational demand, supply, typical entry-level education, and educational attainment for the occupations included in this report.

Exhibit 1: Labor Market Endorsement Summary

Occupation (SOC)	Demand (Annual Openings)	Supply (CC and Non-CC)	Entry-Level Hourly Earnings (25 th Percentile)	Typical Entry-Level Education	Community College Educational Attainment
Heating, Air Conditioning, and Refrigeration Mechanics and Installers (49-9021)	LA: 921 OC: 519	LA: 623 OC: 349	OC: \$23.80	Postsecondary Nondegree Award	44%
Total	1,439	972	N/A	N/A	N/A

Demand:

- The number of jobs related to *heating, air conditioning, and refrigeration mechanics and installers* are projected to increase 7% through 2027, equating to 1,439 annual job openings.
- The hourly entry-level wage for *heating, air conditioning, and refrigeration mechanics and installers* is \$23.80 in Orange County, which is above the living wage of \$20.63.
- There were 2,895 online job postings for *heating, air conditioning, and refrigeration mechanics and installers* over the past 12 months. The highest number of postings were for HVAC service technicians, HVAC installers, mechanics, and commercial or HVAC refrigeration service technicians.
- The typical entry-level education for *heating, air conditioning, and refrigeration mechanics and installers* is a postsecondary nondegree award.
- Approximately 44% of workers in the field have completed some college or an associate degree as their highest level of educational attainment.

Supply:

- There was an average of 324 awards conferred by 7 community colleges in Los Angeles and Orange Counties from 2019 to 2022.
- Non-community college institutions conferred an average of 648 awards from 2019 to 2021.
- Orange County community college students that exited environmental control technology programs in the 2020-21 academic year had a median annual wage of \$47,588 after exiting the program and 57% attained the regional living wage.
- Throughout Orange County, 94% of environmental control technology students that exited their program in 2019-20 reported that they are working in a job closely related to their field of study.

Demand

Occupational Projections:

Exhibit 2 shows the annual percent change in jobs for *heating, air conditioning, and refrigeration mechanics and installers* from 2017 through 2027. Though there was a 7% decline across all occupations from 2019 to 2020 due to the COVID-19 pandemic, employment for *heating, air conditioning, and refrigeration mechanics and installers* did not experience a decline until the following year, with a 2% decrease from 2020 to 2021. Employment in the occupation increased considerably in 2022 and is projected to grow at a similar rate to all occupations through 2027.

Exhibit 2: Annual Percent Change in Jobs for Heating, Air Conditioning, and Refrigeration Mechanics and Installers, 2017-2027

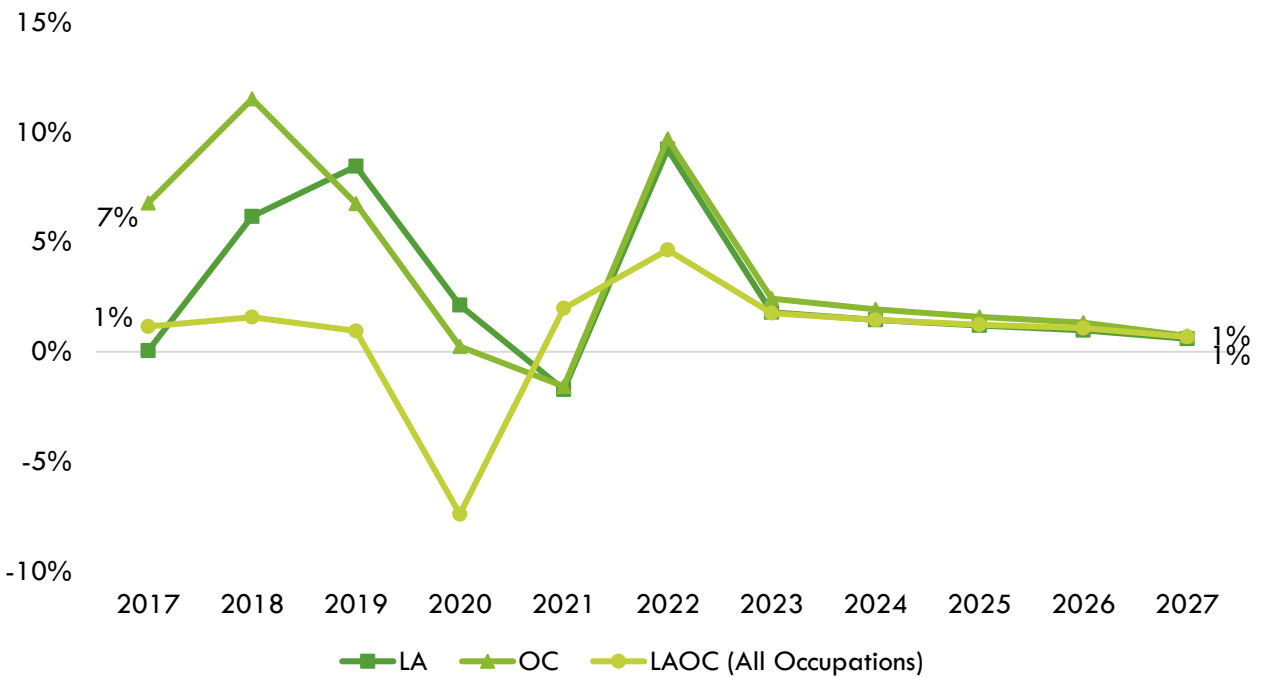


Exhibit 3 shows the five-year occupational demand projections for *heating, air conditioning, and refrigeration mechanics and installers*. In Los Angeles/Orange County, the number of jobs related to this occupation is projected to increase by 7% through 2027. There is projected to be 1,439 jobs available annually.

Exhibit 3: Occupational Demand in Los Angeles and Orange Counties¹

Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	Annual Openings
Los Angeles	8,431	8,950	519	6%	921
Orange	4,537	4,910	374	8%	519
Total	12,968	13,860	892	7%	1,439

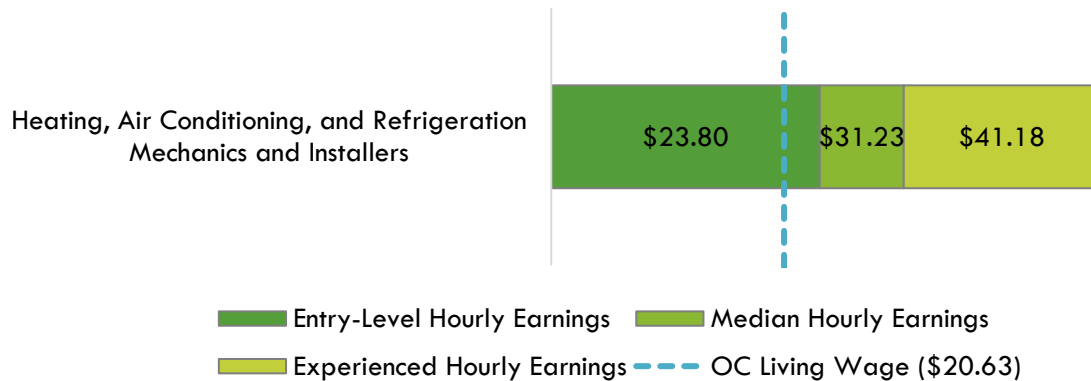
¹ Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Wages:

The labor market endorsement in this report considers the entry-level hourly wages for *heating, air conditioning, and refrigeration mechanics and installers* in Orange County as they relate to the county's living wage. Los Angeles County wages are included below in order to provide a complete analysis of the LA/OC region.

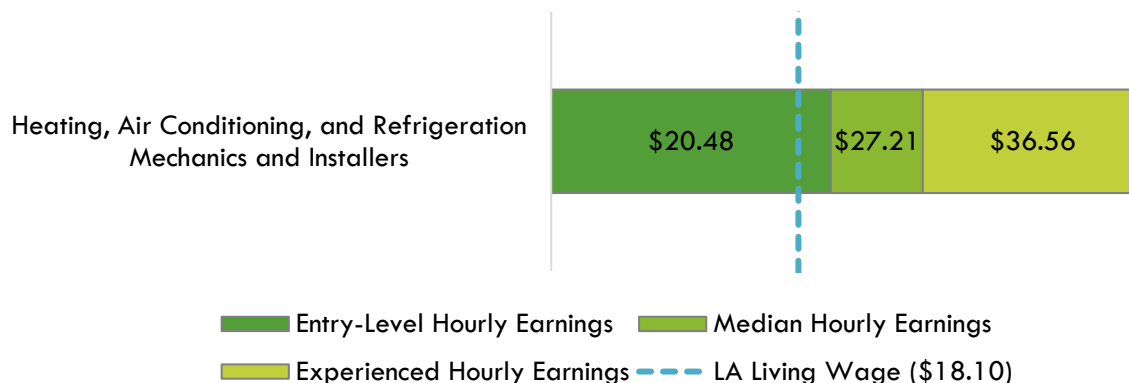
The typical entry-level hourly earnings for *heating, air conditioning, and refrigeration mechanics and installers* are \$23.80, which is above the living wage for one adult in Orange County (\$20.63). Orange County's average wage (\$35.26) is also above the average statewide wage of \$32.30 for this occupation. Exhibit 4 shows the wage range for *heating, air conditioning, and refrigeration mechanics and installers* in Orange County and how it compares to the regional living wage.

Exhibit 4: Wages by Occupation in Orange County



The typical entry-level hourly earnings for *heating, air conditioning, and refrigeration mechanics and installers* are \$20.48, which is above the living wage for one adult in Los Angeles County (\$18.10). Los Angeles County's average wage (\$31.44) is slightly below the average statewide wage of \$32.30 for this occupation. Exhibit 5 shows the wage range for *heating, air conditioning, and refrigeration mechanics and installers* in Los Angeles County and how it compares to the regional living wage.

Exhibit 5: Wages by Occupation in Los Angeles County



Job Postings:

Important Online Job Postings Data Note: Online job postings data is sourced from Lightcast, a labor market analytics firm that scrapes, collects, and organizes data from online job boards such as LinkedIn, Indeed, Glassdoor, Monster, GovernmentJobs.com, and thousands more. Lightcast uses natural language processing (NLP) to determine the related company, industry, occupation, and other information for each job posting. However, NLP has limitations that include understanding contextual words of phrases; determining differences in words that can be used as nouns, verbs, and/or adjectives; and misspellings or grammatical errors.² For these reasons, job postings could be assigned to the wrong employer, industry, or occupation within Lightcast’s database.

Additionally, there are several limitations when analyzing job postings. A single job posting may not represent a single job opening, as employers may be creating a pool of candidates for future openings or hiring for multiple positions with a single posting. Additionally, not all jobs are posted online, and jobs may be filled through other methods such as internal promotion, word-of-mouth advertising, physical job boards, or a variety of other channels.

There were 2,895 online job postings related to heating, air conditioning, and refrigeration mechanics and installers listed in the past 12 months. Exhibit 6 shows the number of job postings for this occupation.

Exhibit 6: Number of Job Postings by Occupation (n=2,895)

Occupation	Job Postings	Percentage of Job Postings
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2,895	100%

The top employers in the region for heating, air conditioning, and refrigeration mechanics and installers, by number of job postings, are shown in Exhibit 7.

Exhibit 7: Top Employers by Number of Job Postings (n=2,895)

Employer	Job Postings	Percentage of Job Postings
Coolsys	167	6%
GPAC	108	4%
Transdev	87	3%
EMCOR Group	75	3%
Aerotek	69	2%
Randstad	62	2%
Sunbelt Rentals	26	1%
Lumen Technologies	24	1%
Hellotech	23	1%
White Mechanical	23	1%

The top specialized, soft, and computer skills for heating, air conditioning, and refrigeration mechanics and installers listed by those most frequently mentioned in job postings (denoted in parentheses) are shown in Exhibit 8.

² K. R. Chowdhary, Fundamentals of Artificial Intelligence (Basingstoke: Springer Nature, 2020), <https://link.springer.com/book/10.1007/978-81-322-3972-7>.

Exhibit 8: Top Skills by Number of Job Postings (n=2,895)

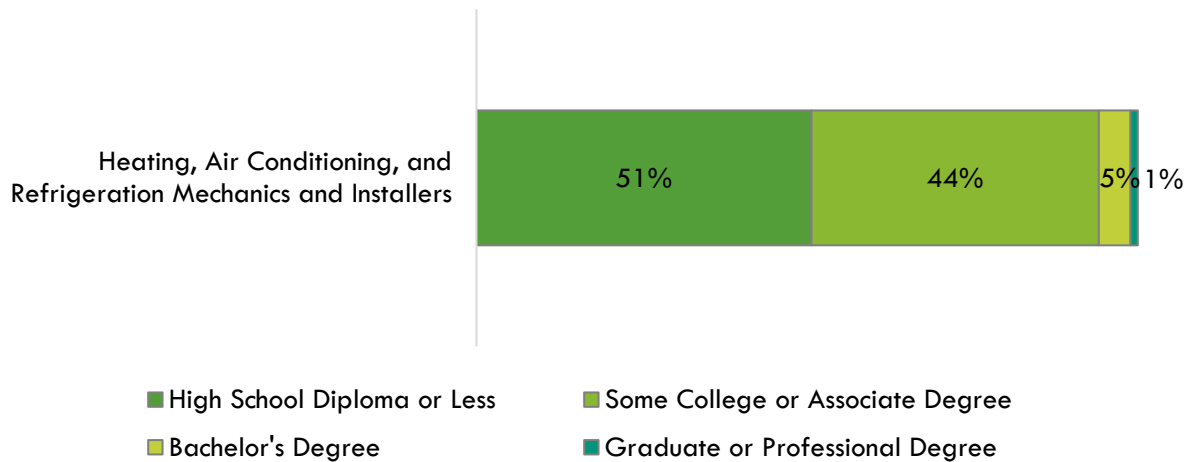
Top Specialized Skills	Top Soft Skills	Top Computer Skills
HVAC (2,530)	Troubleshooting (Problem Solving) (1,026)	Microsoft Outlook (192)
Preventive Maintenance (525)	Communications (893)	Microsoft Office (136)
Plumbing (498)	Customer Service (782)	Microsoft Excel (127)
Boilers (388)	Good Driving Record (600)	Airflow (69)
Ventilation (353)	Management (417)	Microsoft Word (59)
Hand Tools (304)	Lifting Ability (385)	Inventory Control Systems (36)
Refrigeration (274)	Computer Literacy (365)	Microsoft Windows (35)
Ice Machines (267)	Problem Solving (344)	Operating Systems (33)
Electrical Systems (257)	Operations (340)	Microsoft PowerPoint (26)
Furnaces (255)	Mechanical Aptitude (328)	AutoCAD (25)

Educational Attainment:

The Bureau of Labor Statistics (BLS) lists a postsecondary nondegree award as the typical entry-level education for *heating, air conditioning, and refrigeration mechanics and installers*. The national-level educational attainment data indicates 44% of workers in the field have completed some college or associate degree as their highest level of education. Exhibit 9 shows the educational attainment for *heating, air conditioning, and refrigeration mechanics and installers*.

Of the 42% of cumulative job postings for *heating, air conditioning, and refrigeration mechanics and installers* that listed a minimum education requirement in Los Angeles/Orange County, 89% (1,069) requested a high school diploma or an associate degree and 11% (128) requested a bachelor's degree.

Exhibit 9: National-level Educational Attainment for Occupations



Educational Supply

Community College Supply:

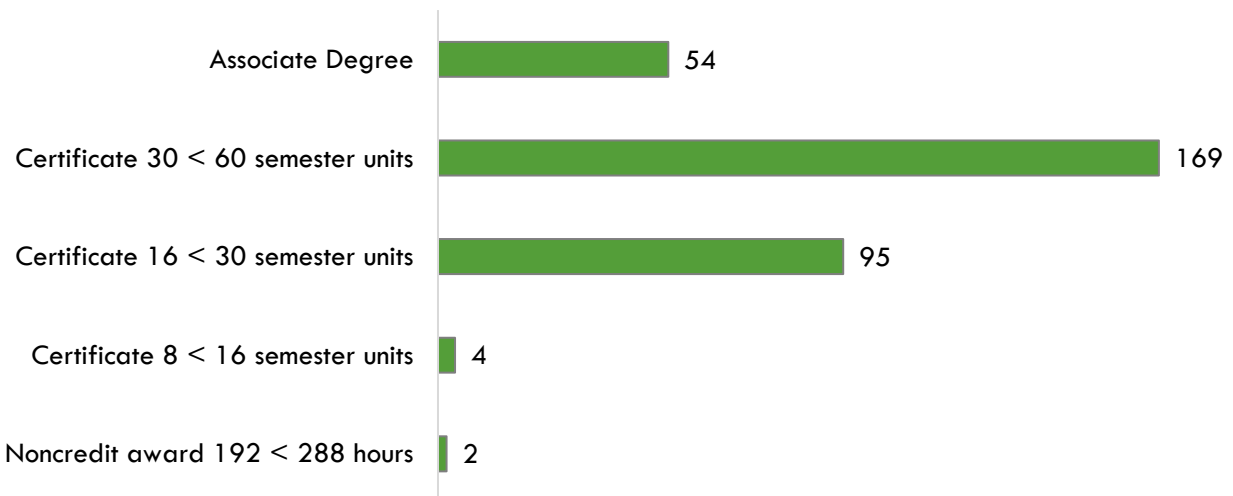
Exhibit 10 shows the three-year average number of awards conferred by community colleges in the related TOP code: Environmental Control Technology (HVAC) (0946.00). The colleges with the most completions in the region are Cypress, L.A. Trade, and Orange Coast. Over the past 12 months, there were no other related program recommendation requests from regional community colleges.

Exhibit 10: Regional Community College Awards (Certificates and Degrees), 2019-2022

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
0946.00	Environmental Control Technology (HVAC)	Citrus	4	2	0	2
		Compton	18	2	5	9
		El Camino	80	5	45	44
		LA Trade	72	63	80	72
		Mt San Antonio	35	30	55	40
		LA Total	209	102	185	167
		Cypress	84	128	125	112
		Orange Coast	50	41	44	45
		OC Total	134	169	169	157
		Supply Total/Average			343	271

Exhibit 11 shows the annual average community college awards by type from 2019-20 through 2021-22. Of the 324 awards, 52% (169) were for certificates between 30 and less than 60 semester units, 29% (95) were for certificates between 16 and less than 30 semester units, and 17% (54) were for associate degrees.

Exhibit 11: Annual Average Community College Awards by Type, 2019-2022



Community College Student Outcomes:

Exhibit 12 shows the Strong Workforce Program (SWP) metrics for environmental control technology programs in Coast Community College District (CCCD), the Orange County Region, and California. Of the 381 environmental control technology students in the 2020-21 academic year, 48% (182) attended an CCCD college.

Additionally, CCCD students that exited environmental control technology programs in the 2020-21 academic year had higher median annual earnings (\$55,882) compared to all environmental control technology students statewide (\$47,082). All (100%) CCCD environmental control technology students reported working in a job closely related to their field of study, higher than the statewide average of 72%, and 74% of CCCD students attained the living wage.

Exhibit 12: Environmental Control Technology (0946.00) Strong Workforce Program Metrics, 2020-21³

SWP Metric	CCCD	OC Region	California
SWP Students	182	381	3,455
SWP Students Who Earned 9 or More Career Education Units in the District in a Single Year	35%	40%	36%
SWP Students Who Completed a Noncredit CTE or Workforce Preparation Course	Insufficient Data	Insufficient Data	87%
SWP Students Who Earned a Degree or Certificate or Attained Apprenticeship Journey Status	32	61	739
SWP Students Who Transferred to a Four-Year Postsecondary Institution (2019-20)	Insufficient Data	Insufficient Data	18
SWP Students with a Job Closely Related to Their Field of Study (2019-20)	100%	94%	72%
Median Annual Earnings for SWP Exiting Students	\$55,882 (\$26.87)	\$47,588 (\$22.88)	\$47,082 (\$22.64)
Median Change in Earnings for SWP Exiting Students	24%	26%	20%
SWP Exiting Students Who Attained the Living Wage	74%	57%	66%

³ All SWP metrics are for 2020-21 unless otherwise noted.

Non-Community College Supply:

For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for *heating, air conditioning, and refrigeration mechanics and installers*. Exhibit 13 shows the annual and two-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Code: Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician (47.0201). Due to different data collection periods, the most recent two-year period of available data is presented, from 2020 to 2021. Between 2020 and 2021, non-community colleges in the region conferred an average of 648 awards annually in related training programs.

Exhibit 13: Regional Non-Community College Awards, 2020-2021

CIP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2-Year Award Average
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician	Baldwin Park Adult & Community Education	14	11	12
		Brownson Technical School	13	142	78
		Capstone College	36	20	28
		Hacienda La Puente Adult Education	0	23	12
		InterCoast Colleges-Santa Ana	2	0	1
		InterCoast Colleges-West Covina	28	16	22
		San Joaquin Valley College-Lancaster	18	18	18
		UEI College-Gardena	115	88	102
		United Education Institute-Encino	96	113	104
		United Education Institute-Garden Grove	94	132	113
		United Education Institute-Huntington Park Campus	103	118	110
		United Education Institute-West Covina	58	38	48
Supply Total/Average			577	719	648

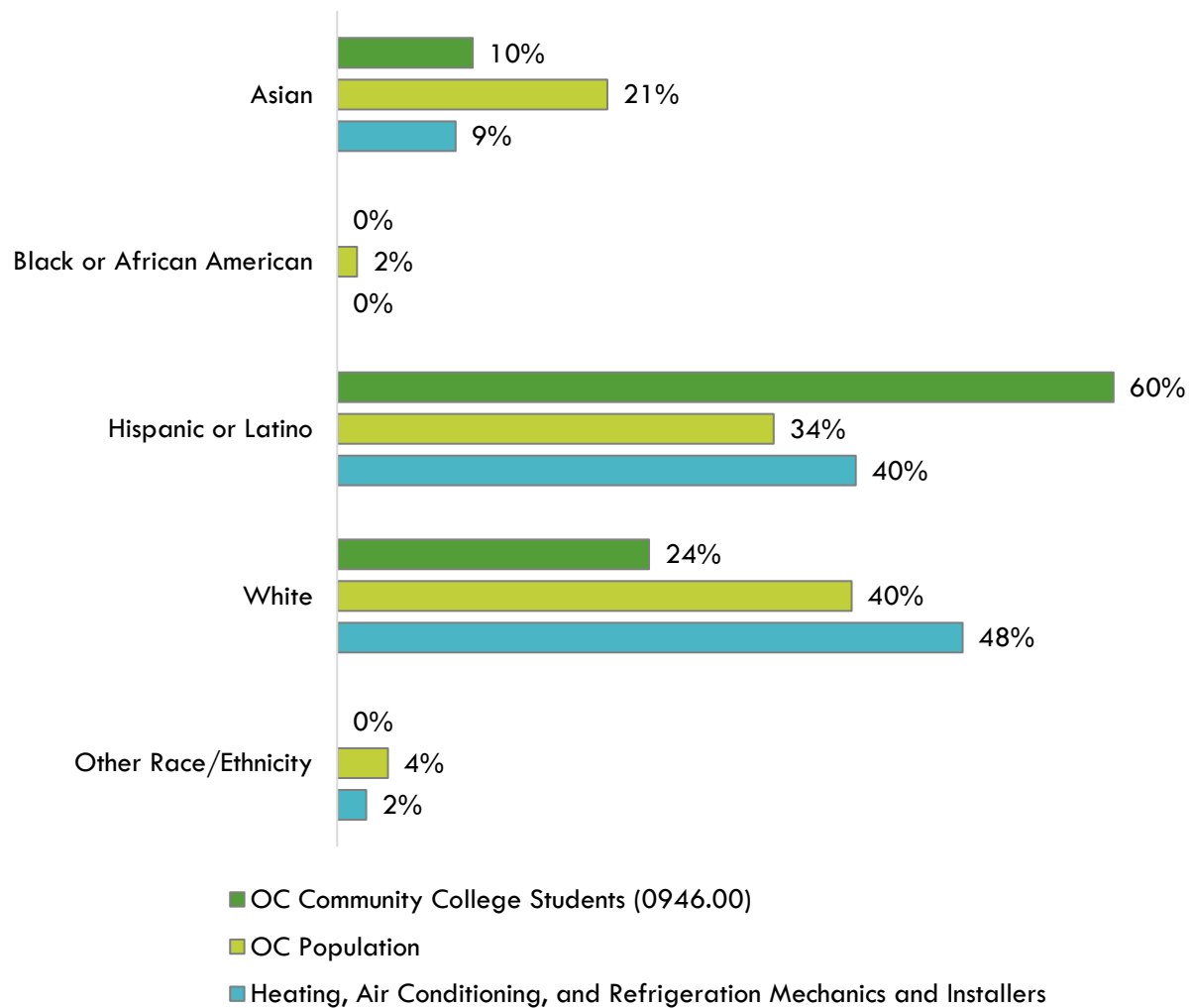
Regional Demographics

This section analyzes demographic data for Orange County community college students enrolled in environmental control technology programs compared to the OC population, as well occupational data, for the purpose of identifying potential diversity and equity issues that can be addressed by community college programs.

Ethnicity:

Exhibit 14 shows the ethnicity of Orange County community college students enrolled in environmental control technology programs compared to the overall Orange County population, as well as for workers employed as *heating, air conditioning, and refrigeration mechanics and installers*. White (48%) workers comprise the largest group of *heating, air conditioning, and refrigeration mechanics and installers*, higher than their representation among the population (40%) or environmental control technology students (24%). Hispanic or Latino workers are the next largest group of *heating, air conditioning, and refrigeration mechanics and installers* at 40%, higher than their representation in the population (34%) but considerably lower than the number of Hispanic or Latino environmental control technology students (60%).

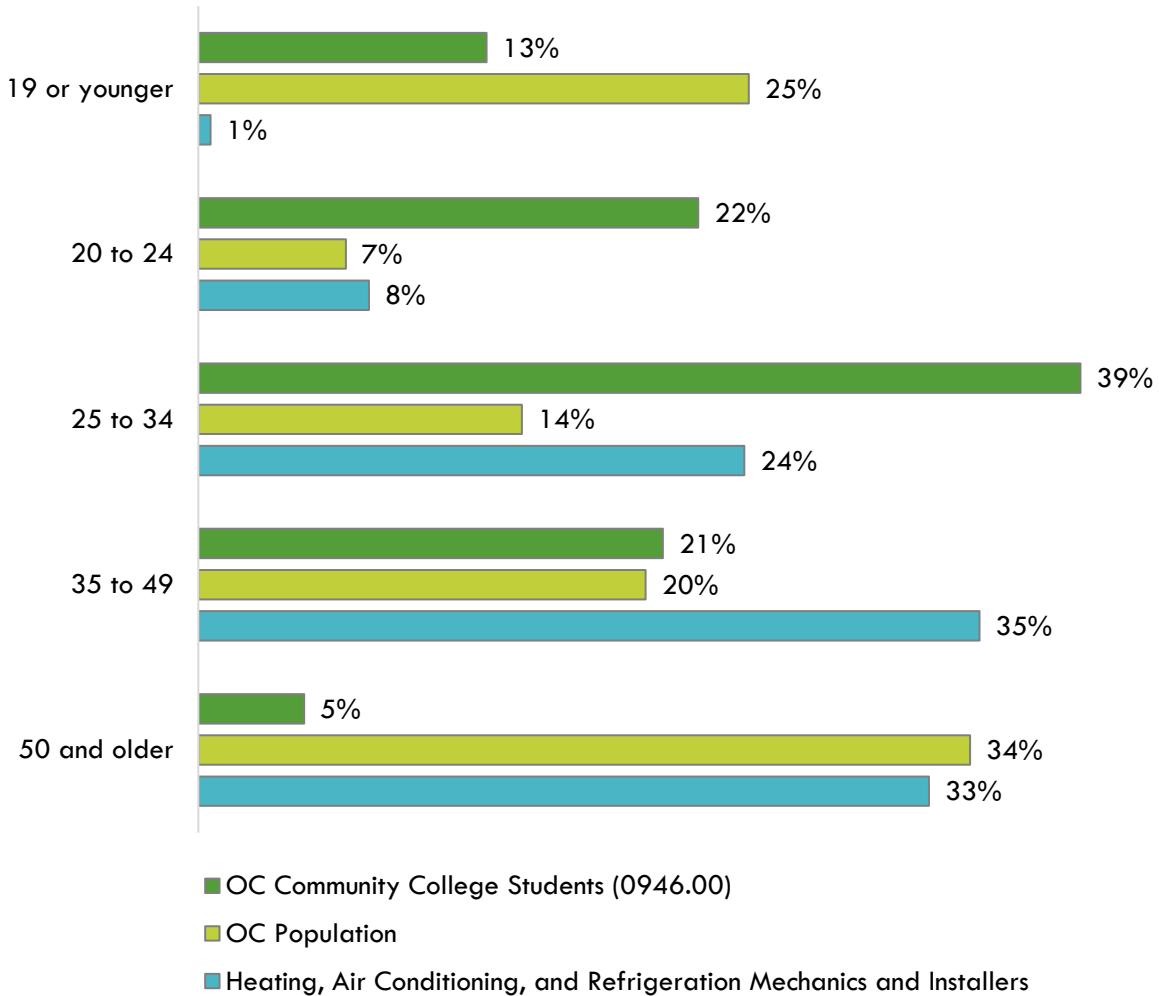
Exhibit 14: Program and County Demographics by Ethnicity



Age:

Exhibit 14 shows the age of Orange County community college students enrolled in environmental control technology programs compared to the overall Orange County population, as well as *heating, air conditioning, and refrigeration mechanics and installers*. More than two-thirds (68%) of *heating, air conditioning, and refrigeration mechanics and installers* are aged 35 years or older, considerably more than the population (54%). Environmental control technology students are largely younger, with nearly two-thirds (62%) of students aged 20 to 34 years.

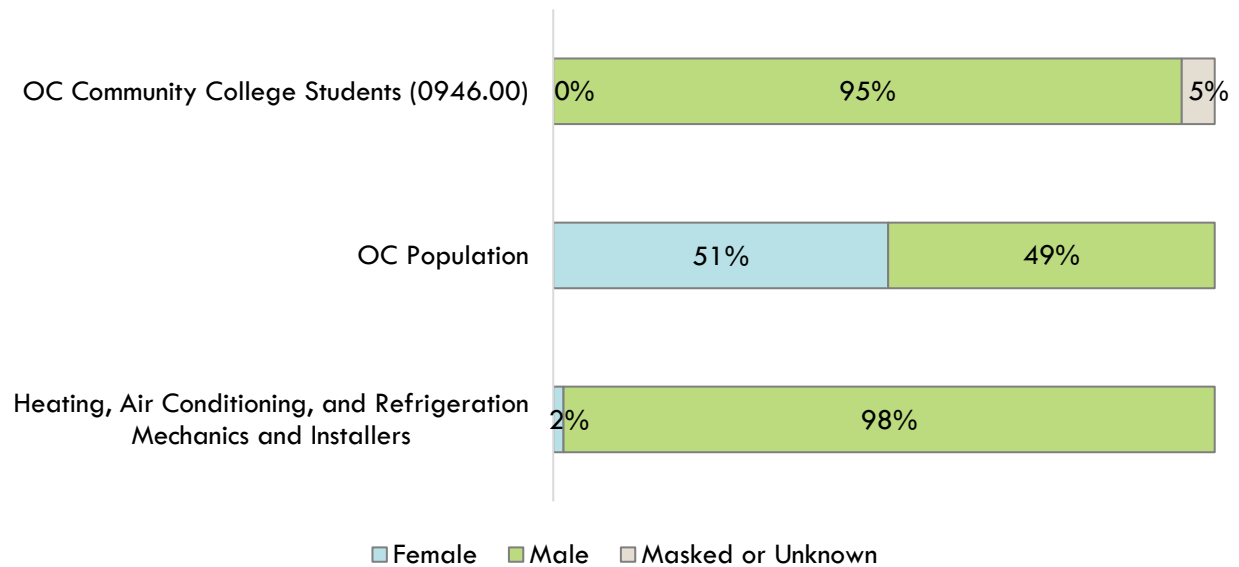
Exhibit 14: Program and County Demographics by Age



Sex:

Exhibit 15 shows the sex of Orange County community college students enrolled in environmental control technology programs compared to the overall Orange County population as well as *heating, air conditioning, and refrigeration mechanics and installers*. While women and men are almost evenly represented among the population, men comprise almost all *heating, air conditioning, and refrigeration mechanics and installers* (98%) as well as environmental control technology students (95%).

Exhibit 15: Program and County Demographics by Sex



Appendix A: Methodology

The OC COE prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Lightcast, a labor market analytics firm that consolidates data from the California Employment Development Department (EDD), U.S. Bureau of Labor Statistics (BLS) and other government agencies. Program supply data is drawn from two systems: Taxonomy of Programs (TOP) and Classification of Instructional Programs (CIP).

Using a TOP-SOC crosswalk, the OC COE identified middle-skill jobs for which programs within these TOP codes train. Middle-skill jobs include:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

The OC COE determined labor market supply for an occupation or SOC code by analyzing the number of program completers or awards in a related TOP or CIP code. The COE developed a "supply table" with this information, which is the source of the program supply data for this report. TOP code data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP code data comes from the Integrated Postsecondary Education Data System (nces.ed.gov/ipeds/use-the-data), also known as IPEDS. TOP is a system of numerical codes used at the state level to collect and report information on California community college programs and courses throughout the state that have similar outcomes. CIP codes are a taxonomy of academic disciplines at institutions of higher education in the United States and Canada. Institutions outside of the California Community College system do not use TOP codes in their reporting systems.

Data included in this analysis represent the labor market demand for relevant positions most closely related to the proposed program as expressed by the requesting college in consultation with the OC COE. Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study which can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.

All representations have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. The most recent data available at the time of the analysis was examined; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.

Appendix B: Data Sources

Data Type	Source
Occupational Projections, Wages, and Job Postings	<p>Traditional labor market information data is sourced from Lightcast, a labor market analytics firm. Lightcast occupational employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment Statistics and the American Community Survey. For more information, see https://lightcast.io/</p>
Living Wage	<p>The living wage is derived from the Insight Center's California Family Needs Calculator, which measures the income necessary for an individual of family to afford basic expenses. The data assesses the cost of housing, food, child care, health care, transportation, and taxes. For more information, see: https://insightccd.org/family-needs-calculator/</p> <p>The living wage for one adult in Orange County is \$20.63 per hour (\$42,910.40 annually). This figure is used by the CCCCCO to calculate the percentage of students that attained the regional living wage.</p>
Typical Education and Training Requirements, and Educational Attainment	<p>The Bureau of Labor Statistics (BLS) provides information about education and training requirements for hundreds of occupations. BLS uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which BLS publishes projections data. For more information, see https://www.bls.gov/emp/documentation/education/tech.htm</p>
Emerging Occupation Descriptions, Additional Education Requirements, and Employer Preferences	<p>The O*NET database includes information on skills, abilities, knowledges, work activities, and interests associated with occupations. For more information, see https://www.onetonline.org/help/online/</p>
Educational Supply	<p>The CCCCCO Data Mart provides information about students, courses, student services, outcomes and faculty and staff. For more information, see: https://datamart.cccco.edu</p> <p>The National Center for Education Statistics (NCES) Integrated Postsecondary Integrated Data System (IPEDS) collects data on the number of postsecondary awards earned (completions). For more information, see https://nces.ed.gov/ipeds/use-the-data/survey-components/7/completions</p>
Student Metrics and Demographics	<p>LaunchBoard, a statewide data system supported by the California Community Colleges Chancellor's Office and hosted by Cal-PASS Plus, provides data on progress, success, employment, and earnings outcomes for California community college students. For more information, see: https://www.calpassplus.org/LaunchBoard/Home.aspx</p>
Population and Occupation Demographics	<p>The Census Bureau's American Community Survey (ACS) is the premier source for detailed population and housing information. For more information, see: https://www.census.gov/programs-surveys/acs</p> <p>Data is sourced from IPUMS USA, a database providing access to ACS and other Census Bureau data products. For more information, see: https://usa.ipums.org/usa/about.shtml</p>

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