

# Environmental Control Technology (HVAC)

*Inland Empire/Desert Region (Riverside and San Bernardino counties)*

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*This workforce demand report uses state and federal job projection data developed before the economic impact of COVID-19. The COE is monitoring the situation and will provide more information as it becomes available. Please consult with local employers to understand their current employment needs.*

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## Summary

- Community college environmental control technology (HVAC) programs provide the knowledge, skills, and abilities that lead to the community college-level occupation, heating, air conditioning, and refrigeration mechanic and installers.
- Employment is expected to increase by 10% through 2025, with 465 job openings available annually over this period.
- This occupation's median hourly earnings are \$22.89 per hour, below the regional \$24.36 per hour self-sustainable earnings standard for a single adult with one child.
- Regional community colleges have issued 129 awards annually in environmental control technology (HVAC) programs over the last three academic years. Other education providers in the region have issued 312 awards annually in programs related to environmental control technology (HVAC).
- The Centers of Excellence recommends expanding environmental control technology programs. For more information, see the [recommendation section](#).

## Introduction

California Community College environmental control technology (HVAC) (TOP 0946.00) programs prepare students for employment through instruction related to the assembly, installation, operation, maintenance, and repair of air conditioning, heating, and refrigeration systems (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by environmental control technology (HVAC) programs lead to the heating, air conditioning, and refrigeration mechanic and installer occupation.

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

Install or repair heating, central air conditioning, HVAC, or refrigeration systems, including oil burners, hot-air furnaces, and heating stoves.

**Sample job titles:** A/C Tech (Air Conditioning Technician); HVAC Installer (Heating, Ventilation, Air Conditioning Installer); HVAC Mechanic (Heating, Ventilation, Air Conditioning Mechanic); HVAC Specialist (Heating, Ventilation, and Air Conditioning Specialist); Refrigeration Mechanic; Refrigeration Operator; Refrigeration Technician (Refrigeration Tech); Service Technician (Service Tech); Systems Mechanic; Transportation Refrigeration Technician (Transportation Refrigeration Tech)

*Entry-Level Educational Requirement: Postsecondary nondegree award*

*Work Experience Required: None*

*Training Requirement: More than twelve months on-the-job training*

*Incumbent workers with a Community College Award or Some Postsecondary Coursework: 44%*

## Job Counts and Projections

In 2020, there were 4,253 heating, air conditioning, and refrigeration mechanic and installer jobs in the Inland Empire/Desert Region. Employment is projected to increase by 10% through 2025; 465 annual job openings are expected over this period. Exhibit 1 displays the job counts, five-year projected job growth, job openings, and the share of incumbent workers age 55 years and greater in the region.

*Exhibit 1: Five-year projections, 2020-2025*

| 2020 Jobs | 2025 Jobs | 5-Yr %<br>Change<br>(New Jobs) | 5-Yr Openings<br>(New +<br>Replacement Jobs) | Annual Openings<br>(New +<br>Replacement Jobs) | % of workers<br>age 55+ |
|-----------|-----------|--------------------------------|--|--|-------------------------|
| 4,253     | 4,681     | 10%                            | 2,324  | 465  | 19%                     |

Source: Emsi 2021.3

A search of online job advertisements (ads) over the last 12 months for heating, air conditioning, and refrigeration mechanic and installer jobs was conducted to reveal the details about the employers seeking these workers, including the time it takes to fill positions, earnings, and in-demand skills. Over the previous 12 months, 907 job ads for heating, air conditioning, and refrigeration mechanics and installers were posted in the region.

Exhibit 2 shows the number of job ads posted during the last 12 months in the region and the regional and statewide average time to fill this job. On average, regional employers fill online job ads in 32 days, two days shorter than the statewide average time to fill. Time to fill information indicates that regional employers face similar challenges filling open positions as other employers in California.

*Exhibit 2: Job ads and time to fill*

| Job Ads | Regional Average Time to Fill<br>(Days) | Statewide Average Time to Fill<br>(Days) |
|---------|---|--|
| 907     | 32                                      | 34                                       |

Source: Burning Glass – Labor Insights

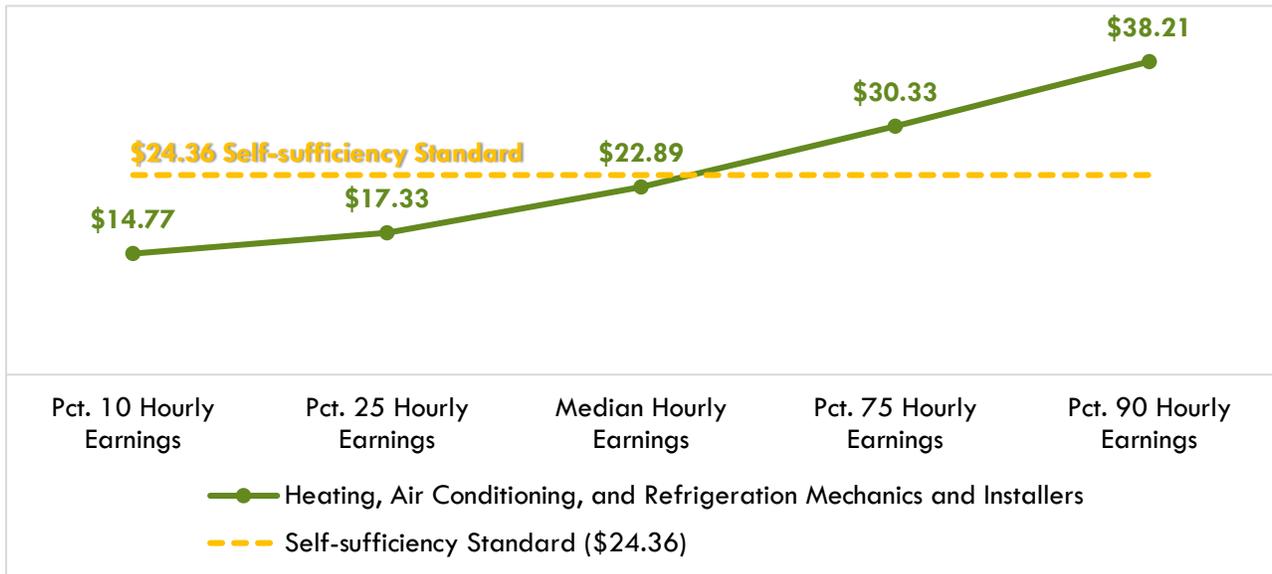
## Earnings and Benefits

Community colleges should ensure their training programs lead to employment opportunities that provide self-sustainable income. The University of Washington estimates that a self-sufficient hourly rate for a single adult with one school-age child is \$24.36 per hour or \$51,452 annually in Riverside County; \$23.73 per hour or

\$50,119 annually in San Bernardino County (Pearce, 2021). For this study, the higher hourly earnings requirement in Riverside County is adopted as the self-sufficiency standard for the two-county region.

Exhibit 3 displays the hourly earnings for heating, air conditioning, and refrigeration mechanics and installers. The hourly earnings for heating, air conditioning, and refrigeration mechanics and installers surpass the regional self-sufficiency standard at the 75<sup>th</sup> percentile, indicating that at least 25% of workers in the field earn a self-sustainable wage.

Exhibit 3: Hourly earnings by percentile



Source: Emsi 2021.3

According to the occupational guides developed by the California Labor Market Information Division, benefits for heating, air conditioning, and refrigeration mechanics and installers may include health and dental insurance, vacation, and retirement plans. For union members, the benefit packages are negotiated in contracts between employers and unions. Self-employed contractors must pay for their own insurance and retirement plans (Detailed Occupational Guides, 2021).

### Advertised Salary from Online Job Ads

Exhibit 4 displays online job ad salary data for heating, air conditioning, and refrigeration mechanics and installers over the last 12 months. Online job ad salary information reveals that employers are willing to pay workers a median annual salary of \$53,000, above the region's \$51,452 annual (\$24.36 hourly) self-sufficiency standard. Consider the salary information with caution since only 48% (437 out of 907) of online job ads for this occupation provided salary information. The salary figures are prorated to reflect full-time, annual earnings status.

Exhibit 4: Advertised salary information

| Number of job ads | Real-Time Salary Information |                      |                      |                    | Median Annual Salary |
|-------------------|------------------------------|----------------------|----------------------|--------------------|----------------------|
|                   | Less than \$35,000           | \$35,000 to \$49,999 | \$50,000 to \$74,999 | More than \$75,000 |                      |
| 437               | 6%                           | 34%                  | 44%                  | 16%                | \$53,000             |

Source: Burning Glass – Labor Insights

## Employers, Skills, Education, Work Experience, and Certifications

Exhibit 5 displays the employers who posted ten or more job ads for heating, air conditioning, refrigeration mechanics, and installers in the region over the last 12 months. Showing employer names provides some insight into where students may find employment after completing a program. Sears posted the most job ads for heating, air conditioning, and refrigeration mechanics and installers in the region, seeking workers to service customers' appliances sold by the department store.

Exhibit 5: Employers posting the most job ads

| Top Employers                       | Job Ads    |
|-------------------------------------|------------|
| Sears                               | 43         |
| San Manuel Casino                   | 26         |
| Semper Solaris                      | 13         |
| Omni Heating and Air Conditioning   | 13         |
| Sunbelt Rentals                     | 12         |
| ARS/Rescue Rooter                   | 12         |
| RKM Heating Air Conditioning        | 11         |
| United Rentals, Inc.                | 10         |
| Ontario Refrigeration Services Inc. | 10         |
| All other employers                 | 757        |
| <b>Total</b>                        | <b>907</b> |

Source: Burning Glass – Labor Insights

Exhibit 6 lists a sample of specialized and employability skills employers' seek when looking for workers to fill heating, air conditioning, and refrigeration mechanic and installer positions. Specialized skills are occupation-specific skills that employers request for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job ads may be utilized to guide curriculum development.

*Exhibit 6: Sample of in-demand skills from employer job ads*

| Specialized skills (n=827)   | Employability skills   |
|--|--|
| <ul style="list-style-type: none"> <li>• Repair</li> <li>• Predictive/Preventative Maintenance</li> <li>• Cleaning</li> <li>• Ventilation</li> <li>• Customer Service</li> </ul> | <ul style="list-style-type: none"> <li>• Physical Abilities</li> <li>• Troubleshooting</li> <li>• Preventative Maintenance</li> <li>• Communication Skills</li> <li>• Organizational Skills</li> </ul> |

Source: Burning Glass – Labor Insights

According to the Bureau of Labor Statistics, approximately 44% of incumbent workers in this field hold a community college-level of educational attainment; "some college, no degree" and an "associate degree." The vast majority (99%) of the job ads for heating, air conditioning, and refrigeration mechanics and installers sought candidates with a high school diploma or vocational training. Exhibit 7 displays the typical entry-level education, educational attainment, and minimum advertised education requirements for heating, air conditioning, and refrigeration mechanics and installers.

*Exhibit 7: Typical entry-level education, educational attainment, and minimum advertised education requirements*

| Typical Entry-Level Education Requirement | CC-Level Educational Attainment* | Real-Time Minimum Advertised Education Requirement |                                    |                  |                             |
|---|----------------------------------|--|------------------------------------|------------------|-----------------------------|
|   |                                  | Number of Job Ads                                  | High school or vocational training | Associate degree | Bachelor's degree or higher |
| Postsecondary nondegree award             | 44%                              | 536  | 99%                                | 1%               | -                           |

Source: Emsi 2021.3, Burning Glass – Labor Insights

\*Percentage of incumbent workers with a Community College Award or Some Postsecondary Coursework

Exhibit 8 displays the work experience typically required and the real-time work experience requirements from employer job ads for heating, air conditioning, and refrigeration mechanics and installers. Most employers sought workers with three to five years of work experience.

*Exhibit 8: Work experience required and real-time work experience requirements*

| Work Experience Typically Required | Number of job ads | Real-Time Work Experience |             |          |
|------------------------------------|-------------------|---------------------------|-------------|----------|
|                                    |                   | 0 – 2 years               | 3 – 5 years | 6+ years |
| None                               | 575               | 41%                       | 51%         | 8%       |

Source: Emsi 2021.3, Burning Glass – Labor Insights

Exhibit 9 displays the certifications most frequently requested or required by employers in job postings for heating, air conditioning, and refrigeration mechanics and installers in the region over the last 12 months. Approximately 27% (244 ads) of employer job ads sought candidates with an Environmental Protection Agency (EPA) certification. Section 608 of the Clean Air Act requires that technicians who maintain service,

repair, or dispose of equipment that could release refrigerants into the atmosphere must be certified (EPA, 2021). For more information regarding this certification, please visit the EPA website (EPA, 2021).

*Exhibit 9: Certifications most frequently required by employers*

| Certification (n=636)                               | Job Ads |
|---|---------|
| Driver's License                                    | 522     |
| Environmental Protection Agency (EPA) Certification | 244     |
| North American Technician Excellence (NATE)         | 56      |

Source: Burning Glass – Labor Insights

## Student Completions and Programs Outcomes

Exhibit 10 displays completion data for environmental control technology (HVAC) (0946.00) programs in the region. Over the last three academic years, from 2017 to 2020, regional colleges have issued 129 awards annually from environmental control technology (HVAC) programs. The student completion and outcome methodology are available on page 10.

*Exhibit 10: 2017-20, Annual average community college awards for environmental control technology (HVAC) programs in the region*

| TOP 0946.00 – Environmental Control Technology (HVAC) | Associate Degree | Certificate requiring 30 to <60-semester units | Certificate requiring 18 to <30-semester units | Certificate requiring 16 to <30-semester units | Certificate requiring 6 to <18-semester units | Total CC Annual Average Awards, Academic Years 2017-20 |
|---|------------------|--|--|--|---|--|
| Desert  | 6                | -  | 33   | 14   | 10  | 62   |
| Riverside   | 6                | -  | 24   | 17   | -   | 47   |
| San Bernardino  | 2                | 17   | -  | -  | -   | 20   |
| <b>Total</b>  | <b>14</b>        | <b>17</b>                                      | <b>57</b>                                      | <b>31</b>                                      | <b>10</b>                                     | <b>129</b>   |

Source: MIS Data Mart

California program outcome data may provide a useful insight into the likelihood of success for the proposed program. Community college student outcome information based on the selected TOP code and region is provided in Exhibit 11. Among the students exiting environmental control technology (HVAC) programs in the region, 81% of students reported working in a job closely related to their field of study, the median annual earnings were \$35,194, and 71% attained a living wage. The outcome methodology is available in the appendix section of this report.

*Exhibit 11: 0946.00 – Environmental control technology (HVAC) strong workforce program outcomes*

| <b>Strong Workforce Program Metrics:<br/>0946.00 – Environmental Control Technology (HVAC)<br/>Academic Year 2018-19, unless noted otherwise</b> | <b>Inland<br/>Empire/Desert<br/>Region</b> | <b>California</b> |
|--|--|-------------------|
| Unduplicated count of enrolled students (2019-20)  | 714  | 4,817             |
| Completed 9+ career education units in one year (2019-20)  | 38%  | 34%               |
| Perkins Economically disadvantaged students  | 79%  | 75%               |
| Students who attained a noncredit workforce milestone in a year (2019-20)  | 100%                                       | 84%               |
| Students who earned a degree, certificate, or attained apprenticeship (2019-20)  | 86   | 903               |
| Transferred to a four-year institution (transfers)   | -  | 19                |
| Job closely related to the field of study (2017-18)  | 81%  | 80%               |
| Median annual earnings (all exiters)   | \$35,194                                   | \$44,558          |
| Median change in earnings (all exiters)  | 17%  | 26%               |
| Attained a living wage (completers and skills-builders)  | 71%  | 66%               |

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Exhibit 12 displays awards reported by other education providers in heating, air conditioning, ventilation, and refrigeration maintenance technology/technician (CIP 47.0201) programs. Completion data is compiled from the Integrated Postsecondary Education Data System (IPEDS) for the most recent three years available. On average, eight other education institutions in the region have issued 312 awards annually over the last three academic years.

*Exhibit 12: Other educational provider heating, air conditioning, ventilation, and refrigeration maintenance technology/technician training programs, three-year annual average credentials in the region*

| <b>47.0201 – Heating, Air Conditioning, Ventilation, and Refrigeration Maintenance Technology/Technician</b> | <b>Associate Degree</b> | <b>Award 1 &lt; 2 academic years</b> | <b>Award &lt; 1 academic year</b> | <b>Other Educational Providers Annual Average Credentials, Academic Years 2016-19</b> |
|--|-------------------------|--------------------------------------|-----------------------------------|---|
| Baldy View Regional Occupational Program   | -                       | -                                    | 5                                 | 5   |
| CET-Coachella  | -                       | 31                                   | -                                 | 31  |
| CET-Colton   | -                       | 23                                   | -                                 | 23  |
| InterCoast Colleges-Riverside  | -                       | 19                                   | -                                 | 19  |
| Mayfield College   | 1                       | -                                    | 73                                | 74  |
| Summit College   | -                       | -                                    | 102                               | 102   |
| UEI College-Riverside  | -                       | 25                                   | -                                 | 25  |
| UEI-Ontario  | -                       | 33                                   | -                                 | 33  |

| 47.0201 – Heating, Air Conditioning, Ventilation, and Refrigeration Maintenance Technology/Technician | Associate Degree | Award 1<2 academic years | Award <1 academic year | Other Educational Providers Annual Average Credentials, Academic Years 2016-19 |
|---|------------------|--------------------------|------------------------|--|
| <b>Total</b>  | <b>1</b>         | <b>131</b>               | <b>180</b>             | <b>312</b>   |

Source: IPEDS

## Recommendation

Community college environmental control technology (HVAC) programs provide the knowledge, skills, and abilities that lead to the community college-level occupation, heating, air conditioning, and refrigeration mechanic and installers. Employment for heating, air conditioning, and refrigeration mechanics and installers is expected to increase by 10% through 2025, with 465 job openings expected annually. This occupation's median hourly earnings are \$22.89 per hour, below the regional \$24.36 per hour self-sustainable earnings standard for a single adult with one child. The 75<sup>th</sup> percentile hourly earnings surpass the self-sustainability standard, indicating that only the top 25% of workers in this occupation earn a self-sustainable wage.

Regional community colleges have issued 129 awards in environmental control technology (HVAC) (TOP 0946.00) programs over the last three academic years. Among the students exiting environmental control technology (HVAC) programs in the region, 81% of students reported working in a job closely related to their field of study, the median annual earnings were \$35,194, and 71% attained a living wage. Other education providers in the region have issued 312 awards annually over the previous three academic years. Combined, regional education providers issued 441 awards annually in this field.

The Centers of Excellence recommends expanding environmental control technology (HVAC) programs. Despite the strong regional demand for this occupation, it should be noted that the median hourly earnings associated with this occupation fall short of the regional self-sufficiency standard. Colleges considering this program should partner with local employers to identify the skills and certifications needed to achieve self-sustainable earnings after exit.

### Contact

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## Appendix: Methodology

Exhibit 10 displays the average annual California Community College (CCC) awards conferred during the three academic years between 2017 and 2020 from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. Awards are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case to calculate an annual average. This is done to minimize the effect of atypical variation that might be present in a single year.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from records provided by California's Employment Development Department's Unemployment Insurance database. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2021 a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2021 a).

Job advertisement data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014). Online job advertisements often do not reveal employers' hiring intentions; it is unknown if employers plan to hire one or multiple workers from a single online job ad or if they are collecting resumes for future hiring needs. A closed job ad may not be the result of a hired worker.

Table 1. 2020 to 2025 job growth, wages, entry-level education, training, and work experience required for heating, air conditioning, and refrigeration mechanics and installers in the Inland Empire/Desert Region (Riverside and San Bernardino counties combined)

| Occupation (SOC)  | 2020 Jobs | 5-Year Change (New Jobs) | 5-Year % Change (New Jobs) | Annual Openings (New + Replacement Jobs) | Entry-Experienced Hourly Wage (10 <sup>th</sup> to 90 <sup>th</sup> percentile) | Median Hourly Wage (50 <sup>th</sup> percentile) | Average Annual Earnings | Entry-Level Education & On-The-Job-Training         | Work Experience Required |
|---|-----------|--------------------------|----------------------------|--|---|--|-------------------------|---|--------------------------|
| Heating, Air Conditioning, and Refrigeration Mechanics and Installers (49-9021) | 4,253     | 428                      | 10%                        | 465                                      | \$14.77 to \$38.21  | \$22.89  | \$52,800                | Postsecondary nondegree award & More than 12 months | None                     |

Source: Emsi 2021.3