

Building and Energy Systems Professional

Inland Empire/Desert region (Riverside and San Bernardino counties combined)

Summary

- Employment for the building and energy systems occupational group is expected to **increase by 18% between 2018 and 2023** in the Inland Empire/Desert region (IEDR). A total of **3,251 job openings** will be available over the five-year timeframe.
- The **median wages** for the building and energy systems occupational group are **above the MIT Living Wage estimate of \$12.39 per hour** for a single adult living in the IEDR.
- **There appears to be an opportunity for program growth** because there are more annual job openings for the building and energy systems occupational group (**650 average annual openings**) than annual credentials issued for the selected community college programs in the region (**78 annual average community college credentials, 264 other educational institution credentials, 342 total**).

Introduction

This report provides labor market data on the occupations related to the California Community College environmental control technology (HVAC) (TOP 0946.00) and energy systems technology (0946.10) programs. Descriptions of these programs can be found on pages seven and eight, respectively. The occupations included in the building and energy systems occupational group are the following:

- Construction and Related Workers, All Other
 - Solar Thermal Installers and Technicians*
 - Weatherization Installers and Technicians*
- Energy Auditors*
- Heating, Air Conditioning, and Refrigeration Mechanics and Installers
- Solar Photovoltaic Installers

*These are emerging O*Net occupations that are embedded within broader Standard Occupational Classifications (SOC) system. Traditional labor market information (LMI) is not available at the emerging O*Net occupation level. *Construction and related workers, all other* (SOC 47-4099) is a broad occupation code that has been included in this report to display traditional LMI for *solar thermal installers and technicians* (SOC 47-4099.02) and *weatherization installers and technicians* (SOC 47.4099.03) combined, which are the only two emerging occupations embedded within this broad occupation. *Energy auditors* (SOC 13 1199.01) is an emerging occupation embedded within the broader occupation, *business operations specialists, all other* (SOC 13-1199). Traditional LMI for *business operations specialists, all other* is

not included in this report because five additional emerging O*Net occupations are embedded within it. Employer demand for *energy auditors* is available in the job postings section of this report.

Job Opportunities

In 2018, there were 4,606 jobs in the building and energy systems occupational group in the Inland Empire/Desert region (IEDR). This occupational group is projected to increase employment by 18% by 2023. Employers in the region will need to hire 3,251 workers over the next five years to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). Exhibit 1 displays five-year projections for the building and energy systems occupational group in the IEDR.

Exhibit 1: Five-year projections for the building and energy systems occupational group

Occupation	2018 Jobs	2023 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	3,904	4,556	17%	2,654	531	18%
Construction and Related Workers, All Other	388	418	8%	241	48	17%
Solar Photovoltaic Installers	314	472	50%	356	71	13%
Total	4,606	5,446	18%	3,251	650	17%

Source: EMSI 2019.2

Earnings

The median wages for the building and energy systems occupational group are above the MIT Living Wage estimate of \$12.39 per hour for a single adult living in the IEDR (Glasmeier, 2019). Experienced wages are sufficient for two working adults and one child (\$14.75 per hour, per adult, or \$30,680 annually for each adult). Exhibit 2 displays wage information for the building and energy systems occupational group in the IEDR. Traditional labor market information, which includes earnings data by percentile, is not available for *energy auditors*. For this reason, the average advertised annual earnings from online job postings is also included in Exhibit 2. There were too few online job postings for *construction and related workers, all other* from which to glean advertised annual earnings.

Exhibit 2: Earnings for the building and energy systems occupational group

Occupation	Entry-Experienced Hourly Wage Range (25 th to 75 th percentile)	Median Hourly Wage (50 th percentile)	Average Annual Earnings	Average Advertised Annual Earnings from Job Ads
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$15.40 to \$25.67	\$19.31	\$44,000	\$54,000
Solar Photovoltaic Installers	\$16.42 to \$23.50	\$18.17	\$43,000	\$40,000
Construction and Related Workers, All Other	\$11.73 to \$17.09	\$13.80	\$30,700	N/A
Energy Auditors	N/A	N/A	N/A	\$98,000

Source: EMSI 2019.2

Job Postings, Employers, Skills, and Education

Exhibit 3 displays the number of job ads posted during the last 12 months along with the regional and statewide average time to fill for the building and energy systems occupational group in the IEDR. On average, local employers fill online job postings for the building and energy systems occupational group within 45 days. This regional average is the same as the statewide average, indicating that local employers fill open positions within a similar timeframe as other California employers. There were no regional jobs ads for *solar thermal installers and technicians*, making the regional time to fill currently unavailable for this occupation.

Exhibit 3: Job ads and time to fill for the building and energy systems occupational group, May 2018 – Apr 2019

Occupation	Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	577	42	43
Solar Photovoltaic Installers	113	60	61
Energy Auditors	47	48	44
Weatherization Installers and Technicians	7	47	48
Solar Thermal Installers and Technicians	0	N/A	61
Total	744	45	45

Source: Burning Glass – Labor Insights

Exhibit 4 displays the employers posting the most job ads for the building and energy systems occupational group during the last 12 months in the Inland Empire/Desert region. There were too few online job postings for *weatherization installers and technicians* and *solar thermal installers and technicians* from which to obtain reliable employer information.

Exhibit 4: Employers posting the most job ads for the building and energy systems occupational group, May 2018 – Apr 2019

Occupation	Employers
Heating, Air Conditioning, and Refrigeration Mechanics and Installers (n=465)	<ul style="list-style-type: none"> Alliance Residential Company Advanced Management Company & R3 Construction Services
Solar Photovoltaic Installers (n=87)	<ul style="list-style-type: none"> Horizon Solar Power T.A.K. Electric, Inc.
Energy Auditors (n=36)	<ul style="list-style-type: none"> Infinity Energy Horizon Solar Power
Weatherization Installers and Technicians (n=5)	<ul style="list-style-type: none"> N/A
Solar Thermal Installers and Technicians (n=0)	<ul style="list-style-type: none"> N/A

Source: Burning Glass – Labor Insights

Exhibit 5 displays a sample of specialized and employability skills that employers are seeking when looking for workers to fill positions in the building and energy systems occupational group. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is commonly referred to as “soft skills.” The skills requested in job postings may be utilized as a helpful guide for curriculum development. There were too few online job postings for *solar thermal installers and technicians* from which to gather reliable skills data.

Exhibit 5: Sample of in-demand skills from employer job ads for the building and energy systems occupational group, May 2018 – Apr 2019

Occupation	Specialized Skills	Employability Skills
Heating, Air Conditioning, and Refrigeration Mechanics and Installers (n=510)	<ul style="list-style-type: none"> Repair Plumbing Predictive/ Preventative Maintenance 	<ul style="list-style-type: none"> Troubleshooting Communication Skills Physical Abilities
Solar Photovoltaic Installers (n=92)	<ul style="list-style-type: none"> Roofing Photovoltaic (PV) Systems Customer Service 	<ul style="list-style-type: none"> Communication Skills Physical Abilities Troubleshooting

Occupation	Specialized Skills	Employability Skills
Energy Auditors (n=39)	<ul style="list-style-type: none"> Sales Solar Energy Energy Consulting 	<ul style="list-style-type: none"> Teamwork/Collaboration Organizational Skills Communication Skills
Weatherization Installers and Technicians (n=7)	<ul style="list-style-type: none"> Insulation Caulking Construction Industry Knowledge 	<ul style="list-style-type: none"> Bilingual (English & Spanish) Time Management Detail-Oriented
Solar Thermal Installers and Technicians (n=0)	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A

Source: Burning Glass – Labor Insights

Exhibit 6 displays the entry-level education typically required to enter each occupation according to the Bureau of Labor Statistics (BLS), educational attainment for incumbent workers with “some college, no degree” and an “associate degree” according to the U.S. Census (2016-17), and the minimum advertised education requirement from employer job ads. N/A indicates that either traditional LMI is not available for detailed-emerging occupations or there were too few job postings to yield minimum advertised education requirements. Traditional labor market information, which includes typical entry-level education and educational attainment, is not available for *energy auditors*, *weatherization installers and technicians*, and *solar thermal installers and technicians*. There were also too few online job postings for *solar thermal installers and technicians* from which to gather reliable education data.

Exhibit 6: Typical entry-level education, educational attainment, and minimum advertised education requirements for the building and energy systems occupational group, May 2018 – Apr 2019

Occupation	Typical Entry-Level Education Requirement	Educational Attainment*	Minimum Advertised Education Requirement from Job Ads			
			Number of Job Ads (n=)	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Postsecondary nondegree award	41%	219	97%	3%	-
Solar Photovoltaic Installers	High school diploma or equivalent	30%	22	100%	-	-
Energy Auditors	N/A	N/A	10	20%	-	80%
Weatherization Installers and Technicians	N/A	N/A	7	100%	-	-
Solar Thermal Installers and Technicians	N/A	N/A	N/A	N/A	N/A	N/A

Source: EMSI 2019.2, Burning Glass – Labor Insights

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

Student Completions and Program Outcomes

This section contains completion and outcome data for the California Community College environmental control technology (HVAC) (TOP 0946.00) and energy systems technology (TOP 0946.10) programs. Exhibits 7 & 9 display the average annual regional California Community College (CCC) credentials conferred during the three academic years between 2014 and 2017, from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, along with the enrollments from the most recent year available on LaunchBoard. Credentials 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. Enrollments are the count of enrollments in courses assigned to the TOP code in the selected year. The relevant TOP code is from the Taxonomy of Programs manual, and the corresponding program titles used at each college (in *italics*) are sourced from the Chancellor's Office Curriculum Inventory (COCI). Please note that a credential is not always equal to a single person in search of a job opening since a student may earn more than one credential, such as an associate degree in addition to a certificate.

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 comes 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 in order 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, 2019a). 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, 2017). Data from the latest academic year for each metric is provided in Exhibits 8 & 11.

Program descriptions are sourced from the California Community Colleges Taxonomy of Programs manual. Descriptions for the programs included in this report are the following:

Environmental Control Technology (TOP 0946.00): Assembly, installation, operation, maintenance, and repair of air conditioning, heating, and refrigeration systems.

Exhibit 7: Annual average community college credentials and enrollments for the environmental control technology (HVAC) program in the Inland Empire/Desert region

0946.00 – Environmental Control Technology (HVAC)	CCC Enrollments, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
College of the Desert – Air Conditioning & Refrigeration	473	
Associate Degree		3
Certificate 18 to < 30 semester units		17
Riverside – Air Conditioning & Refrigeration	412	
Associate Degree		6
Certificate 18 to < 30 semester units		34
San Bernardino – Heating, Ventilation, Air Conditioning, and Refrigeration	285	
Associate Degree		3
Certificate 30 to < 60 semester units		14
Victor Valley	61	
Total CCC Enrollments, Academic Year 2016-17	1,231	
Total Annual Average CCC Credentials, Academic Years 2014-17		77

Source: LaunchBoard, MIS Data Mart, COCI

Exhibit 8: Environmental control technology (HVAC) program strong workforce outcomes

Strong Workforce Program Metrics: 0946.00 – Environmental Control Technology (HVAC) Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	1,231	305
Completed 12+ units in one year (2016-17)	137	41
Economically disadvantaged students (2016-17)	68%	70%
Transferred to a four-year institution (transfers)	N/A	0
Employed in the fourth fiscal quarter after exit (completers)	81%	78%
Median annual earnings (completers)	\$41,399	\$40,852
Job closely related to the field of study (2014-15)	88%	80%
Median change in earnings (completers)	26%	40%
Attained a living wage (completers and skills-builders)	67%	72%

Source: LaunchBoard

Energy Systems Technology (TOP 0946.10): Theory and methods of energy conservation applied to heating, cooling, and related systems, including the measurement and assessment of energy consumption, diagnosis and prescription. Includes alternative energy systems.

Exhibit 9: Annual average community college credentials and enrollments for the energy systems technology program in the Inland Empire/Desert region

0946.10 – Energy Systems Technology	CCC Enrollments, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
College of the Desert	78	
Certificate 18 to < 30 semester units		1*
Victor Valley	71	
Total CCC Enrollments, Academic Year 2016-17	149	
Total Annual Average CCC Credentials, Academic Years 2014-17		1

Source: LaunchBoard, MIS Data Mart

*College of the Desert issued one certificate in 2016-17

College of the Desert has many program titles assigned to this TOP code. Exhibit 10 contains all active program titles.

Exhibit 10: Active program titles for energy systems technology (TOP 0946.10) at College of the Desert

College	Program Titles for 0946.10 from COCI
College of the Desert	<i>Build & Energy Systems Professionals, Building Commissioning Technician, Building Energy Consultant, Lighting and Controls Technology, Power Generation and Distribution, Residential Solar Installation, Residential Solar Surveying & Planning, Solar Battery Storage Installation & Maintenance, Solar Site Planning Project, Zero Net Energy (ZNE), Zero Net Energy (ZNE) Technology</i>

Exhibit 11: Energy systems technology program strong workforce outcomes

Strong Workforce Program Metrics: 0946.10 – Energy Systems Technology Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	149	39
Completed 12+ units in one year (2016-17)	25	19
Economically disadvantaged students (2016-17)	58%	59%
Employed in the fourth fiscal quarter after exit (all exiters)	36%	60%
Median annual earnings (all exiters)	\$12,539	\$30,718
Job closely related to the field of study (2014-15)	N/A	100%
Median change in earnings (completers)	N/A	124%
Attained a living wage (completers and skills-builders)	N/A	70%

Source: LaunchBoard

Credentials granted from other educational providers outside of the California Community College system are displayed in Exhibits 12 & 13 along with the relevant CIP code. This is final release data compiled from the Integrated Postsecondary Education Data System (IPEDS) for the most recent three years available.

Exhibit 12: Annual average other educational providers credentials awarded for solar energy technology/technician programs

15.0505 – Solar Energy Technology/Technician	Other Educational Providers Annual Average Credentials, Academic Years 2013-16
Coast Career Institute	
Award < 1 academic yr	30
Total Annual Average Other Credentials, Academic Years 2013-16	30

Source: IPEDS

Exhibit 13: Annual average other educational providers credentials awarded for heating, air conditioning, ventilation and refrigeration maintenance technology/technician (HAC,HACR,HVAC,HVACR) programs

47.0201 – Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician (HAC, HACR, HVAC,HVACR)	Other Educational Providers Annual Average Credentials, Academic Years 2013-16
CET-Coachella	
Award 1 < 2 academic yrs	46
CET-Colton	
Award 1 < 2 academic yrs	25
InterCoast Colleges-Riverside	
Award 1 < 2 academic yrs	32
Mayfield College	
Associate Degree	1
Award < 1 academic yr	76
Summit College	
Award < 1 academic yr	46
Westech College	
Award 1 < 2 academic yrs	8
Total Annual Average Other Credentials, Academic Years 2013-16	234

Source: IPEDS

References

- Burning Glass Technologies. (2019). *Labor Insights/Jobs*. Retrieved from <https://www.burning-glass.com/>
- California Community Colleges Chancellor's Office. LaunchBoard. (2019). *California Community Colleges LaunchBoard*. Retrieved from <https://www.calpassplus.org/Launchboard/Home.aspx>
- California Community Colleges Chancellor's Office. LaunchBoard. (2019a). *Strong Workforce Program Metrics Data Element Dictionary*. Pg. 3. Retrieved from <https://www.calpassplus.org/MediaLibrary/calpassplus/launchboard/Documents/SWP-DED.PDF>
- California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. (2019). *Data Mart*. Retrieved from <https://datamart.cccco.edu/datamart.aspx>
- California Community Colleges Chancellor's Office, Curriculum and Instructional Unit, Academic Affairs Division. (2012). *Taxonomy of Programs, 6th Edition, Corrected Version*. Retrieved from http://extranet.cccco.edu/Portals/1/AA/Credit/2013Files/TOPmanual6_2009_09corrected_12.5.13.pdf
- Economic Modeling Specialists International (EMSI) (2019). *Datarun 2019.2*. Retrieved from <https://www.economicmodeling.com/>
- Glasmeier, A. Massachusetts Institute of Technology (MIT). (2019). Retrieved from <http://livingwage.mit.edu/>
- National Center for O*NET Development. (2019). *O*NET OnLine*. Retrieved from <https://www.onetonline.org/>

Contact

Michael Goss, Director
Center of Excellence, Inland Empire/Desert region
michael.goss@chaffey.edu
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Appendix: Occupation definitions, sample job titles, five-year projections for building and energy systems occupations

Occupation Definitions (SOC) code), Education and Training Requirement, Community College Educational Attainment

Energy Auditors (13-1199.01)

Conduct energy audits of buildings, building systems, or process systems. May also conduct investment grade audits of buildings or systems.

Sample job titles: Building Energy Consultant, Building Performance Consultant, Building Performance Specialist, Energy Auditor, Energy Consultant, Energy Rater, Home Energy Rater, Home Performance Consultant, Quality Assurance Supervisor, Residential Energy Auditor

Solar Photovoltaic Installers (47-2231)

Assemble, install, or maintain solar photovoltaic (PV) systems on roofs or other structures in compliance with site assessment and schematics. May include measuring, cutting, assembling, and bolting structural framing and solar modules. May perform minor electrical work such as current checks.

Sample job titles: Installer, Photovoltaic Installer (PV Installer), PV Design and Installation Technician, Solar Designer/Installer, Solar Installer, Solar Installer Technician, Solar Photovoltaic Installer (Solar PV Installer), Solar Technician

Entry-Level Educational Requirement: High school diploma or equivalent

Training Requirement: Between one and twelve months of on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 30%

Construction and Related Workers, All Other (47-4099)

All construction and related workers not listed separately.

Entry-Level Educational Requirement: High school diploma or equivalent

Training Requirement: Between one and twelve months of on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 31%

Solar Thermal Installers and Technicians (47-4099.02)

Install or repair solar energy systems designed to collect, store, and circulate solar-heated water for residential, commercial or industrial use.

Sample job titles: Installer, Maintenance Technician, Service Technician, Solar Energy Technician, Solar Hot Water Installer (SHW Installer), Solar Installer, Solar Maintenance Technician, Solar System Installer, Solar Technician, Solar Thermal Installer

Weatherization Installers and Technicians (47-4099.03)

Perform a variety of activities to weatherize homes and make them more energy efficient. Duties include repairing windows, insulating ducts, and performing heating, ventilating, and air-conditioning (HVAC) work. May perform energy audits and advise clients on energy conservation measures.

Sample job titles: Building Analyst/Supervisor, Director of Housing and Energy Services, Energy Administrator, Energy Assistant, Energy Auditor, Energy Conservation Director, Housing Director, Lead Weatherization Installer-Technician, Weatherization Director, Weatherization Installer

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

Install or repair heating, central air conditioning, 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 Service Tech (Heating, Ventilation, Air Conditioning Service Technician); HVAC Service Technician (Heating, Ventilation, Air Conditioning Service Technician); HVAC Specialist (Heating, Ventilation, and Air Conditioning Specialist); HVAC Technician (Heating, Ventilation, Air Conditioning Technician); HVAC Technician (Heating, Ventilation, and Air Conditioning Technician); Service Technician; Systems Mechanic

Entry-Level Educational Requirement: Postsecondary nondegree award

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

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 41%



Table 1: 2018 to 2023 job growth, wages, education, training, and work experience required for the building and energy systems occupational group, Inland Empire/Desert region

Occupation (SOC)	2018 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage Range (25 th to 75 th percentile)	Median Hourly Wage (50 th percentile)	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Heating, Air Conditioning, and Refrigeration Mechanics and Installers (49-9021)	3,904	652	17%	531	\$15.40 to \$25.67	\$19.31	\$44,000	Postsecondary nondegree award & more than 12 months	None
Construction and Related Workers, All Other (47-4099)	388	30	8%	48	\$11.73 to \$17.09	\$13.80	\$30,700	High school diploma or equivalent & 1-12 months	None
Solar Photovoltaic Installers (47-2231)	314	158	50%	71	\$16.42 to \$23.50	\$18.17	\$43,000	High school diploma or equivalent & 1-12 months	None
Total	4,606	840	18%	650	-	-	-	-	-

Source: EMSI 2019.2