Energy Systems Technology/Solar Technology

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

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.

Summary

- Community college energy systems technology programs provide the knowledge, skills, and abilities that lead to the solar photovoltaic installer occupation.
- Employment is expected to increase by 24% through 2025, with 79 job openings available annually over this period.
- This occupation's 50th percentile hourly earnings are $19.98 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 one award total in energy systems technology programs over the last three academic years.
- The Centers of Excellence recommends expanding energy systems technology programs to meet the regional demand for solar photovoltaic installers. For more information, see the recommendation section.

Introduction

California Community College energy systems technology (TOP 0946.10) programs prepare students for employment through instruction related to the theory and methods of energy conservation applied to heating, cooling, and related systems, including the measurement and assessment of energy consumption, diagnosis, and prescription. These programs include alternative energy systems (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by energy systems technology programs lead to the solar photovoltaic installer occupation.

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 Technician (Photovoltaic Design Technician), Solar Designer, Solar Installer, Solar Installer Technician, Solar Photovoltaic Installer (Solar PV Installer), Solar Technician

Entry-Level Educational Requirement: High school diploma or equivalent

Work Experience Required: None

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

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 52%

Job Counts and Projections

In 2020, there were 454 solar photovoltaic installer jobs in the Inland Empire/Desert Region. Employment for this occupation is expected to grow by 24% through 2025. Over this period, 79 annual job openings are projected for solar photovoltaic installers. 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 % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
454	565	24%	393	79	11%

Source: Emsi 2021.3

A search of online job advertisements over the last 12 months for solar photovoltaic installer jobs was conducted to reveal the details about the employers seeking these workers, including the time it takes to fill positions, earnings information, and in-demand skills. Over the previous 12 months, 307 job advertisements for solar photovoltaic 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 advertisements for solar photovoltaic installers within 41 days. The regional average time to fill is two days shorter than the statewide average time to fill, indicating that regional employers may 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 (Days)	Statewide Average Time to Fill (Days)
307	41	43

Source: Burning Glass – Labor Insights

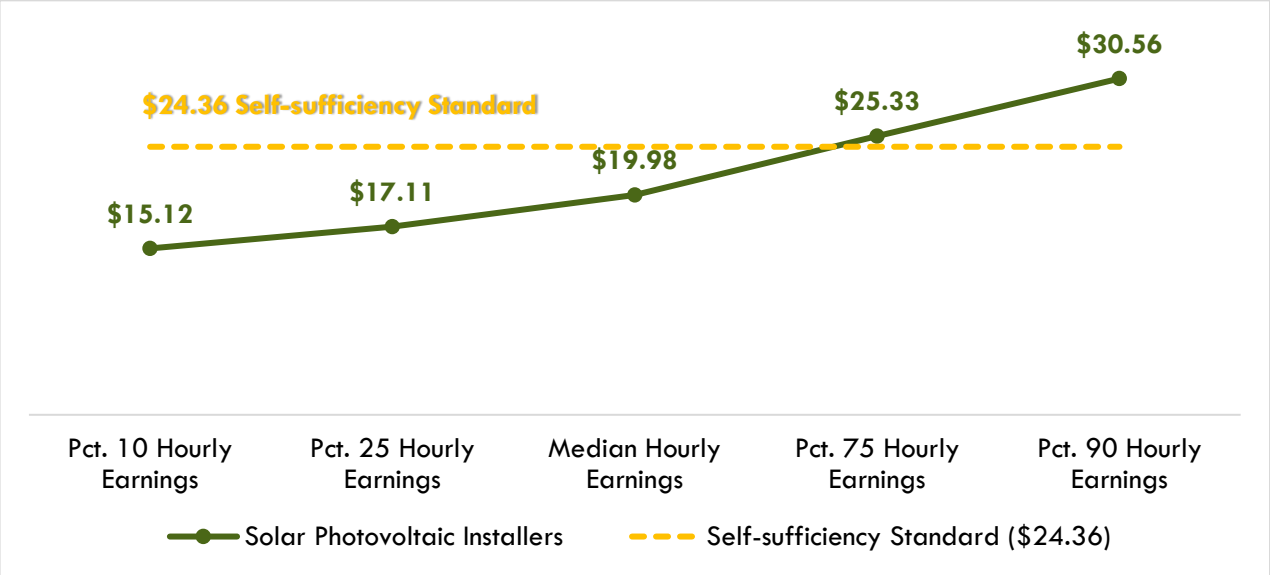
Earnings and Benefits

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.

Solar photovoltaic installers' 50th percentile hourly earnings are below the regional self-sufficiency rate. The hourly earnings for this occupation do not surpass the self-sustainability rate until the 75th percentile, indicating that only the top 25% of workers earn a self-sustainable wage. Exhibit 3 displays the hourly earnings for solar photovoltaic installers.

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 large solar employers generally include medical, dental, life, vision insurance, vacation, sick leave, and retirement (Detailed Occupational Guides, 2021).

Advertised Salary from Online Job Ads

Exhibit 4 displays online job ad salary data for solar photovoltaic installers over the last 12 months. Online job ad salary information reveals that employers are willing to pay solar photovoltaic installers a median annual salary of $48,000, below the region's $51,452 annual ($24.36 hourly) self-sufficiency standard. Consider the salary information with caution since only 74% (227 out of 307) of online job advertisements for this occupation provided salary information. The salary figures are prorated to reflect full-time, annual earnings status.

Exhibit 4: Advertised salary information

Real-Time Salary Information					
Number of job ads	Less than $35,000	$35,000 to $49,999	$50,000 to $74,999	More than $75,000	Median Annual Salary
227	7%	49%	39%	5%	$48,000

Source: Burning Glass – Labor Insights

Employers, Skills, Education, and Work Experience

Exhibit 5 displays the employers that posted ten or more job ads for solar photovoltaic 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. SunPower posted the most job advertisements for solar photovoltaic installers over the last 12 months.

Exhibit 5: Employers posting the most job ads for solar photovoltaic installers

Top Employers	Job Ads
SunPower	26
Freedom Forever	18
SunSystem Technology	18
Sunrun	16
All other employers	*229*
Total	**307**

Source: Burning Glass – Labor Insights

Exhibit 6 lists a sample of specialized and employability skills employers' seek when looking for workers to fill solar photovoltaic 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=275)*	**Employability skills**
• Customer Service	• Physical Abilities
• Photovoltaic (PV) Systems	• Communication Skills
• Lifting Ability	• Troubleshooting
• Roofing	• Detail-Oriented
• Electrical Experience	• Problem Solving

Source: Burning Glass – Labor Insights

According to the Bureau of Labor Statistics, approximately 52% of incumbent workers in this field hold a community college-level of educational attainment; "some college, no degree" and an "associate degree." All of the job advertisements for solar photovoltaic 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 solar photovoltaic 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
High school diploma or equivalent	*52%*	*157*	100%	-	-

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 solar photovoltaic installers. Most employers sought candidates with zero to two years of work experience.

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

Work Experience Typically Required	Real-Time Work Experience			
	Number of job ads	0 – 2 years	3 – 5 years	6+ years
None	*190*	82%	17%	1%

Source: Emsi 2021.3, Burning Glass – Labor Insights

Student Completions and Programs Outcomes

California Community College energy systems technology (TOP 0946.10) programs prepare students for employment through instruction related to the theory and methods of energy conservation applied to heating, cooling, and related systems, including the measurement and assessment of energy consumption, diagnosis, and prescription. These programs include alternative energy systems (Taxonomy of Programs, 2012). According to the Chancellor's Office Curriculum Inventory (COCI), most community colleges in the state code their solar installation, technician, and maintenance programs under this TOP program. College of the Desert is the only regional community college that offers programs that utilize the energy systems technology (0946.10) program code, assigning 11 programs to this code (COCI, 2021).

Only five of the 11 programs offered under this code are specific to solar technology, listed as noncredit certificates and programs that require "16 to less than 30-semester units".

- Residential Solar (Certificate of Achievement requiring 16 to <30-semester units)

- Residential Solar Installation (Noncredit)
- Residential Solar Surveying & Planning (Noncredit)
- Solar Battery Storage Installation & Maintenance (Noncredit)
- Solar Site Planning Project (Noncredit)

College of the Desert has issued one associate degree in energy systems technology programs in the 2019-2020 academic year. No other awards data was found under the energy systems technology program. Utilizing CCCCO tools to compare MIS Data Mart and COCI data allows awards listed under the same TOP code to be disaggregated based on the number of units the certificate required. Only one of College of the Desert's programs, Building and Energy Systems Professionals, is an associate degree program. As a result, we can be sure that the single award conferred was not in a solar program. Exhibit 9 displays completion data for regional energy systems technology (TOP 0946.10) programs in the region.

Exhibit 9: 2019-20 community college awards for energy systems technology programs in the Inland Empire/Desert Region

TOP 0946.10 – Energy Systems Technology	Associate Degree
College of the Desert	1
Total	**1**

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 10. The outcome methodology is available in the appendix section of this report.

Exhibit 10: 0946.10 – Energy systems technology strong workforce program outcomes

Strong Workforce Program Metrics: 0946.10 – Energy Systems Technology Academic Year 2018-19, unless noted otherwise	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2019-20)	147	1,003
Completed 9+ career education units in one year (2019-20)	49%	33%
Perkins Economically disadvantaged students	90%	69%
Students who attained a noncredit workforce milestone in a year (2019-20)	-	89%
Students who earned a degree, certificate, or attained apprenticeship (2019-20)	-	41
Transferred to a four-year institution (transfers)	-	36
Job closely related to the field of study (2017-18)	-	68%
Median annual earnings (all exiters)	-	$37,080

Strong Workforce Program Metrics: 0946.10 – Energy Systems Technology Academic Year 2018-19, unless noted otherwise	Inland Empire/Desert Region	California
Median change in earnings (all exiters)	-	30%
Attained a living wage (completers and skills-builders)	-	53%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Recommendation

Community college energy systems technology programs provide the knowledge, skills, and abilities that lead to the solar photovoltaic installer occupation. Employment for solar photovoltaic installers is expected to increase by 24% through 2025, with 79 job openings expected annually. The hourly earnings for this occupation exceed the regional self-sufficiency standard until the 75th percentile, indicating that only the top 25% of workers earn a self-sustainable wage.

College of the Desert has issued one award total in an energy systems technology (TOP 0946.10) program over the last three academic years. However, it should be noted that this award was not conferred in a solar-related program.

The Centers of Excellence recommends expanding energy systems technology programs to meet regional demand for solar photovoltaic installers. Colleges considering this program should partner with applicable employers to document their demand for solar photovoltaic installers and the skills needed for students to earn self-sustainable earnings after exiting the program.

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November 2021

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Appendix: Methodology

Exhibit 9 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, 2021a). 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, 2021a).

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 the hiring intentions of employers; 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 solar photovoltaic 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 (10th to 90th percentile)	Median Hourly Wage (50th percentile)	Average Annual Earnings	Entry-Level Education & On-The-Job-Training	Work Experience Required
Solar Photovoltaic Installers (47-2231)	454	111	24%	79	$15.12 to $30.56	$19.98	$45,100	High school diploma or equivalent & 1-12 months	None

Source: Emsi 2021.3