**** **Solar Photovoltaic** **Occupations**

**Labor Market Information Report**

Prepared by the San Francisco Bay Center of Excellence

for Labor Market Research

May 2018

# Recommendation

Based on all available data, there appears to be a significant undersupply of Solar Photovoltaic workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda and Contra Costa Counties). The annual gap is about 7,400 students annually in the Bay region and about 2,050 in the East Bay.

This report also provides student outcomes data on employment and earnings for programs on TOP 0934.40 - Electrical Systems and Power Transmissions at Laney College and statewide. Since Laney College is the only college in the region for which outcomes are available on this TOP code, outcomes for students taking courses on TOP 0934.00 – Electronics and Electric Technology in the sub-region and region is provided. It is recommended that this data be reviewed to better understand how outcomes for students taking courses on these TOP codes compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at Laney College and in the region.

It is recommended that Laney College consider listing their proposed new program under TOP 0946.10 – Energy Systems Technology. This is the TOP Code used currently by regional colleges with Solar Photovoltaic programs. The definition of this TOP code is listed as follows:

***0946.10– Energy Systems Technology:*** *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.*

There would still be a regional and sub-regional undersupply if the annual supply for TOP 0946.10 was used for comparison to the demand for the cluster of solar occupations selected, since there are only 17 annual awards issued by five colleges on this TOP code in the region, with 5 of these awards issued by one college in the East Bay.

# Introduction

This report profiles Solar Photovoltaic Occupations in the 12 county Bay region and in the East Bay sub-region for a proposed new program at Laney College. Labor market information (LMI) is not available at the eight-digit SOC Code level, and two of the five SOC code selected are at the eight-digit level. Therefore, the information shown in Tables 1, 2 and 5 are for the five SOC codes at the six digit SOC level. However, online postings data from Burning Glass is available at the eight-digit level for the other tables in the report.

|  |
| --- |
| * **Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products (SOC 41-4011**):  Sell goods for wholesalers or manufacturers where technical or scientific knowledge is required in such areas as biology, engineering, chemistry, and electronics, normally obtained from at least 2 years of post-secondary education.   + **Solar Sales Representatives and Assessors (SOC 41-4011.07):** Contact new or existing customers to determine their solar equipment needs, suggest systems or equipment, or estimate costs |
| *Entry-Level Educational Requirement: High school diploma or equivalent* |
| *Training Requirement: Moderate-term on-the-job training* |
| *Percentage of Community College Award Holders or Some Postsecondary Coursework: 31%* |
|  |
| * **First-Line Supervisors of Construction Trades and** **Extraction Workers (SOC 47-1011**): Directly supervise and coordinate activities of construction or extraction workers. |
| * + **Solar Energy Installation Managers (SOC 47-1011.03):** Direct work crews installing residential or commercial solar photovoltaic or thermal systems |
| *Entry-Level Educational Requirement: High school diploma or equivalent* |
| *Training Requirement: None* |
| *Percentage of Community College Award Holders or Some Postsecondary Coursework: 32%* |
|  |
| * **Electricians (SOC 47-2111):** Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems. |
| *Entry-Level Educational Requirement: High school diploma or equivalent* |
| *Training Requirement: Apprenticeship* |
| *Percentage of Community College Award Holders or Some Postsecondary Coursework: 47%* |
|  |
| * **Solar Photovoltaic Installers (SOC 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. |
| *Entry-Level Educational Requirement: High school diploma or equivalent* |
| *Training Requirement: Moderate-term on-the-job training* |
| *Percentage of Community College Award Holders or Some Postsecondary Coursework: 31%* |
|  |
| * **Helpers--Installation, Maintenance, and Repair** **Workers (SOC 49-9098):** Help installation, maintenance, and repair workers in maintenance, parts replacement, and repair of vehicles, industrial machinery, and electrical and electronic equipment. Perform duties such as furnishing tools, materials, and supplies to other workers; cleaning work area, machines, and tools; and holding materials or tools for other workers. |
| *Entry-Level Educational Requirement: High school diploma or equivalent* |
| *Training Requirement: Short-term on-the-job training* |
| *Percentage of Community College Award Holders or Some Postsecondary Coursework: 22%* |

# Occupational Demand

**Table 1. Employment Outlook for Solar Photovoltaic Occupations in Bay Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation | 2017 Jobs | 2022 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Annual Open-ings | 10% Hourly Wage | Median Hourly Wage |
| Sales Reps, Wholesale and Manufacturing, Technical and Scientific Products | 17,303 | 19,010 | 1,707 | 10% | 10,812 | 2,162 | $23.70 | $44.42 |
| First-Line Supervisors of Construction Trades and Extraction Workers | 15,736 | 16,964 | 1,227 | 8% | 9,304 | 1,861 | $15.17 | $37.60 |
| Electricians | 19,227 | 22,338 | 3,111 | 16% | 14,390 | 2,878 | $17.47 | $35.94 |
| Solar Photovoltaic Installers | 1,517 | 1,730 | 214 | 14% | 1,058 | 212 | $15.43 | $20.51 |
| Helpers--Installation, Maintenance, and Repair Workers | 3,449 | 3,775 | 326 | 9% | 2,560 | 512 | $10.59 | $15.18 |
| **Total** | **57,233** | **63,818** | **6,584** | **12%** | **38,124** | **7,625** | **$18.25** | **$37.30** |

*Source: EMSI 2018.2*

**Bay Region** includes Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

**Table 2. Employment Outlook for Solar Photovoltaic Occupations in East Bay Sub-Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation | 2017 Jobs | 2022 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Annual Open-ings | 10% Hourly Wage | Median Hourly Wage |
| Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products | 3,467 | 3,737 | 270 | 8% | 2,082 | 416 | $19.88 | $44.51 |
| First-Line Supervisors of Construction Trades and Extraction Workers | 5,474 | 5,805 | 331 | 6% | 3,089 | 618 | $15.49 | $36.86 |
| Electricians | 5,574 | 6,530 | 956 | 17% | 4,232 | 846 | $16.45 | $32.23 |
| Solar Photovoltaic Installers | 819 | 942 | 123 | 15% | 582 | 116 | $14.86 | $19.12 |
| Helpers--Installation, Maintenance, and Repair Workers | 1,068 | 1,182 | 114 | 11% | 810 | 162 | $10.67 | $14.78 |
| **TOTAL** | **16,402** | **18,196** | **1,794** | **11%** | **10,794** | **2,159** | **$16.40** | **$34.58** |

*Source: EMSI 2018.2*

**East Bay Sub-Region** includes Alameda and Contra Costa Counties

### Job Postings in Bay Region and East Bay Sub-Region

**Table 3. Number of Job Postings by Occupation for latest 12 months (May 2017 - April 2018)**

|  |  |  |
| --- | --- | --- |
| Occupation | Bay Region | East Bay |
| Electricians (47-2111.00) | 870 | 279 |
| Helpers--Installation, Maintenance, and Repair Workers (49-9098.00) | 172 | 37 |
| Solar Photovoltaic Installers (47-2231.00) | 109 | 43 |
| Solar Sales Representatives and Assessors (41-4011.07) | 84 | 27 |
| Solar Energy Installation Managers (47-1011.03) | 16 | 3 |
| **Total** | **1,251** | **389** |

*Source: Burning Glass*

**Table 4. Top Job Titles for Solar Photovoltaic Occupations for latest 12 months (May 2017 - April 2018)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Common Title | Bay | East Bay | Common Title | Bay | East Bay |
| Electrician | 477 | 148 | Solar Technician | 29 | 18 |
| Journeyman Electrician | 205 | 66 | Lead Electrician | 23 | 8 |
| Maintenance Assistant | 115 | 23 | Solar Electrician | 20 | 8 |
| Maintenance Electrician | 48 | 23 | Solar Advisor, Retail Industry | 19 | 3 |
| Solar Installer | 31 | 11 | Commercial Electrician | 17 | 3 |
| Industrial Electrician | 29 | 8 | Sales Consultant | 14 | 6 |

*Source: Burning Glass*

# Industry Concentration

**Table 5. Industries hiring Solar Photovoltaic Workers in Bay Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Industry – 6 Digit NAICS (No. American Industry Classification) Codes** | **Jobs in Industry (2017)** | **Jobs in Industry (2022)** | **% Change (2017-22)** | **% in Industry (2017)** |
| Electrical Contractors and Other Wiring Installation Contractors (238210) | 15,133 | 18,152 | 20% | 26.4% |
| Plumbing, Heating, and Air-Conditioning Contractors (238220) | 2,878 | 3,207 | 11% | 5.0% |
| Commercial and Institutional Building Construction (236220) | 2,311 | 2,691 | 16% | 4.0% |
| Residential Remodelers (236118) | 2,087 | 2,175 | 4% | 3.6% |
| Software Publishers (511210) | 2,059 | 2,453 | 19% | 3.6% |
| Computer and Computer Peripheral Equipment and Software Merchant Wholesalers (423430) | 1,723 | 1,751 | 2% | 3.0% |
| Custom Computer Programming Services (541511) | 1,685 | 2,019 | 20% | 2.9% |
| Local Government, Excluding Education and Hospitals (903999) | 1,606 | 1,697 | 6% | 2.8% |
| New Single-Family Housing Construction (except For-Sale Builders) (236115) | 1,539 | 1,479 | (4%) | 2.7% |
| Electronic Computer Manufacturing (334111) | 1,199 | 1,285 | 7% | 2.1% |
| Wholesale Trade Agents and Brokers (425120) | 1,093 | 1,226 | 12% | 1.9% |
| Computer Systems Design Services (541512) | 962 | 1,147 | 19% | 1.7% |
| All Other Specialty Trade Contractors (238990) | 934 | 931 | (0%) | 1.6% |
| Site Preparation Contractors (238910) | 671 | 652 | (3%) | 1.2% |
| Drugs and Druggists' Sundries Merchant Wholesalers (424210) | 614 | 674 | 10% | 1.1% |
| Painting and Wall Covering Contractors (238320) | 612 | 597 | (2%) | 1.1% |
| Drywall and Insulation Contractors (238310) | 573 | 626 | 9% | 1.0% |

*Source: EMSI 2018.2*

**Table 6. Top Employers Posting Solar Photovoltaic Occupations in Bay and East Bay (May 2017 - April 2018)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Employer** | **Bay** | **Employer** | **East Bay** |
| Sunrun | 34 | Outsource | 9 |
| Solarcity | 33 | Sunrun | 8 |
| Outsource | 29 | University California | 7 |
| Sunrise Senior Living, Inc. | 22 | Koch Industries, Incorporated | 6 |
| Jones Lang Lasalle Incorporated | 19 | La Solar Group | 6 |
| Tesla Motors | 19 | Solarcity | 6 |
| City Of San Jose City Hall | 14 | Tesla Motors | 6 |
| Grus Construction | 13 | Uc San Diego | 6 |

*Source: Burning Glass*

# Educational Supply

There are no awards being issued on the TOP code selected for this program 0934.40 - Electrical Systems and Power Transmissions in the Bay Region. However, there are students taking course on that TOP code in the region. Supply information is provided at the TOP 04 level for 0934.00 – Electronics and Electric Technology. There are 10 Community Colleges issuing 189 awards annually on that TOP code, and one other postsecondary educational institution issuing 35 awards on CIP 47.0101- Electrical/Electronics Equipment Installation and Repair, General, for a total of 224 annual awards in the region. Five of these colleges are in the East Bay sub-region, issuing 111 awards annually on TOP 0934.00.

It is recommended that Laney College consider listing their proposed new program under TOP 0946.10 – Energy Systems Technology. This is the TOP Code used currently by regional colleges with Solar Photovoltaic programs. The definition of this TOP code is listed as follows:

***0946.10– Energy Systems Technology:*** *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.*

**Table 7. Award on TOP 0934.00 - Electronics and Electric Technology in Bay Region and on CIP 47.0101 -Electrical/Electronics Equipment Installation and Repair, General**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| College | Sub-Region | TOP Code | CC Headcount | Associate Degrees | Certificates or Other Credit Awards | Total Awards |
| Chabot | East Bay | 093400 | 181 | 4 | 10 | 14 |
| Contra Costa | East Bay | 093400 | 44 | 0 | 4 | 4 |
| Diablo Valley | East Bay | 093400 | 281 | 9 | 17 | 26 |
| Laney | East Bay | 093400 | on another TOP | 9 | 24 | 33 |
| 093440 | 430 | 0 | 0 | 0 |
| Los Medanos | East Bay | 093400 | 216 | 14 | 20 | 34 |
| Marin | North Bay | 093400 | 18 | 0 | 0 | 0 |
| 093440 | 24 | 0 | 0 | 0 |
| San Francisco | Mid-Peninsula | 093400 | 98 | 2 | 11 | 13 |
| San Mateo | Mid-Peninsula | 093400 | 171 | 0 | 43 | 43 |
| Santa Rosa | North Bay | 093400 | 191 | 5 | 11 | 16 |
| 093440 | 14 | 0 | 0 | 0 |
| Skyline | Mid-Peninsula | 093400 | 79 | 0 | 6 | 6 |
| CET Sobrato | Silicon Valley |  | n/a | 0 | 35 | 35 |
| **Total Bay Region** | | **093400** | **1,201** | **43** | **181** | **224** |
| **Total East Bay Sub-Region** | | **093400** | **756** | **36** | **75** | **111** |

# *Source: IPEDS, Data Mart and Launchboard*

NOTE: Headcount of students who took one or more courses is for 2015-16. For Community Colleges, the annual average for Associate Degrees and Certificates is 2014-17. The annual average is 2013-16 for CET Sobrato (who had no awards listed in IPEDS for the most current year 2016).

# Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 7,625 annual openings for the Solar Photovoltaic occupational cluster and 224 annual awards for an annual undersupply of 7,401. In the East Bay, there is also a gap with 2,159 annual openings and 111 annual awards for an annual undersupply of 2,048. If the annual supply for TOP 0946.10 was used for comparison to the demand for the cluster of solar occupations selected, there would still be a regional and sub-regional undersupply, since there are only 17 annual awards issued by five colleges on this TOP code in the region, with 5 of these awards issued by one college in the East Bay.

# Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0934.40 - Electrical Systems and Power Transmissions and TOP 0934.00 – Electronics and Electric Technology**

Note: Outcomes are only available for 0934.40 for Laney College in the Bay Region. Therefore, the table combines outcomes for 0934.40 for Laney and the State and outcomes for 0934.00 for the Bay region and East Bay sub-region.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2015-16** | **Bay  (All CTE Programs)** | **Laney**  **(All CTE Programs)** | **State (0934.40)** | **Bay (0934.00)** | **East Bay (0934.00)** | **Laney (0934.40)** | **Top College on 0934.40 in the State** | |
| % Employed Four Quarters After Exit | 74% | 67% | 81% | 74% | 76% | 71%  (103 students) | San Bernardino | 93%  (14 students) |
| Median Earnings Two Quarters After Exit | $10,310 | $9,960 | $11,050 | $11,215 | $11,110 | $9,835  (n/a) | Santiago Canyon | $47,250 (n/a) |
| Median % Change in Earnings | 46% | 46% | 63% | 45% | 78% | 88%  (n/a) | Rio Hondo | 150% (n/a) |
| % of Students Earning a Living Wage | 63% | 61% | 77% | 66% | 65% | 65%  (51 students) | Santiago Canyon | 93%  (115 students) |

*Source: Launchboard Pipeline (version available on 5/14/18)*

# Skills, Certificates and Education

**Table 9. Top Skills for Solar Photovoltaic Occupations in Bay Region (May 2017 - April 2018)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Skill** | **Postings** | **Skill** | **Postings** | **Skill** | **Postings** |
| Electrical Work | 825 | Electrical Diagrams/Schematics | 96 | Prospective Clients | 56 |
| Repair | 600 | Oscilloscopes | 90 | Recruiting | 55 |
| Wiring | 315 | Sales | 87 | Conduit Bending | 54 |
| Electrical Systems | 296 | Rigid Conduit | 85 | Forklift Operation | 54 |
| Hand Tools | 264 | Wiring Repair | 83 | Photovoltaic (PV) Systems | 54 |
| Transformers | 221 | Carpentry | 82 | Safety Codes | 54 |
| Electrical Wiring | 218 | Circuit Breakers | 81 | Predictive/Preventative Maintenance | 53 |
| Schematic Diagrams | 194 | Electrical Experience | 80 | Lifting Ability | 52 |
| Customer Service | 155 | Hazard Identification | 80 | Painting | 52 |
| Test Equipment | 137 | Conveyor Systems | 79 | Project Management | 52 |
| Teamwork/Collaboration | 135 | Electrical Engineering | 79 | Electrical Codes | 51 |
| Machinery | 133 | Power Supplies | 79 | Power Distribution | 51 |
| Power Tools | 117 | New Construction | 66 | Electrical Equipment Repair | 50 |
| Wiring Diagrams | 117 | National Electrical Code | 64 | Welding | 50 |
| Occupational Health & Safety | 116 | Electrical Conduit | 63 | Recruiting | 55 |
| Voltmeters | 113 | Electrical Devices | 60 | Conduit Bending | 54 |
| Scheduling | 109 | Customer Contact | 59 | Forklift Operation | 54 |
| HVAC | 106 | Quality Assurance and Control | 58 | Photovoltaic (PV) Systems | 54 |
| Plumbing | 98 | Industrial Electrical Experience | 57 | Safety Codes | 54 |

*Source: Burning Glass*

**Table 10. Certifications for Solar Photovoltaic Occupations in the Bay Region (May 2017 - April 2018)**

Note: 55% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

|  |  |  |  |
| --- | --- | --- | --- |
| **Certification** | **Postings** | **Certification** | **Postings** |
| Driver's License | 313 | CDL Class C | 20 |
| Electrician Certification | 284 | North American Board of Energy Practitioners (NABCEP) | 12 |
| Electrical Certification | 22 | First Aid CPR AED | 10 |

*Source: Burning Glass*

**Table 11. Education Requirements for Solar Photovoltaic Occupations in Bay Region**

Note: 70% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

|  |  |
| --- | --- |
| **Education (minimum advertised)** | **Latest 12 Mos. Postings** |
| High school or vocational training | 334 (88%) |
| Associate Degree | 27 (7%) |
| Bachelor’s Degree or Higher | 17 (5%) |

*Source: Burning Glass*

# Methodology

Occupations for this report were identified by use of skills listed in O\*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

# Sources

O\*Net Online

Labor Insight/Jobs (Burning Glass)

Economic Modeling Specialists International (EMSI)

CTE LaunchBoard [www.calpassplus.org/Launchboard/](http://www.calpassplus.org/Launchboard/)

Statewide CTE Outcomes Survey

Employment Development Department Unemployment Insurance Dataset

Living Insight Center for Community Economic Development

Chancellor’s Office MIS system

# Contacts

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