

LABOR MARKET ANALYSIS

FOR PROGRAM RECOMMENDATION



C·O·E

CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

WATER TECHNOLOGY AND REPAIR IN THE NORTH/FAR NORTH REGION

North (Greater Sacramento)
Center of Excellence

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SUMMARY

The North (Greater Sacramento) Center of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled careers in the North/Far North region. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - jobs that typically require education beyond a high school diploma but less than a bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this analysis due to the lessened barriers for entry-level work, such as no formal education and fewer on-the-job training requirements.

Key findings include:

- The North/Far North region held 2,176 water technology and repair-related jobs in 2022. These jobs are projected to increase by 9% over the next five years, adding 195 new jobs to the region by 2027.
- Over the next five years, water technology and repair-related occupations are projected to have 250 annual openings in the North/Far North region.
- Entry-level (25th percentile) wage data shows that the water technology and repair occupations included in this report earn \$22.82 to \$52.49 per hour, which are above the region's living wage of \$18.72 per hour. (See Appendix C for notes about the updated living wage).
- Awards data analysis shows that North/Far North training providers conferred an average of 68 awards (certificates and associate degrees) in Electronics and Electric Technology (0934.00); Energy Systems Technology (0946.10); and Water and Wastewater Technology (0958.00) programs over the last three academic years (2020-21 through 2022-23).

Recommendations include:

- The North (Greater Sacramento) Center of Excellence recommends moving forward with developing a new water technology and repair-related program and/or making modifications (substantial changes) to existing programs.

INTRODUCTION

The North (Greater Sacramento) Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- These middle-skill occupations which require more education and training beyond a high school diploma but usually less than a four-year degree:
 - Electrical and Electronic Engineering Technologists and Technicians (17-3023)
 - Engineering Technologists and Technicians, Except Drafters, All Other (17-3029)
 - Electrical and Electronics Repairers, Powerhouse, Substation, and Relay (49-2095)
 - Power Plant Operators (51-8013)

A review of related programs revealed the following Taxonomy of Programs (TOP) titles and codes are appropriate for inclusion in this report:

- Electronics and Electric Technology (0934.00)
- Energy Systems Technology (0946.10)
- Water and Wastewater Technology (0958.00)

The corresponding Classification of Instructional Program (CIP) titles and codes are:

- Water Quality and Wastewater Treatment Management and Recycling Technology/Technician (15.0506)
- Power Plant Technology/Technician (15.1702)
- Hydroelectric Energy Technology/Technician (15.1705)

OCCUPATIONAL DEMAND

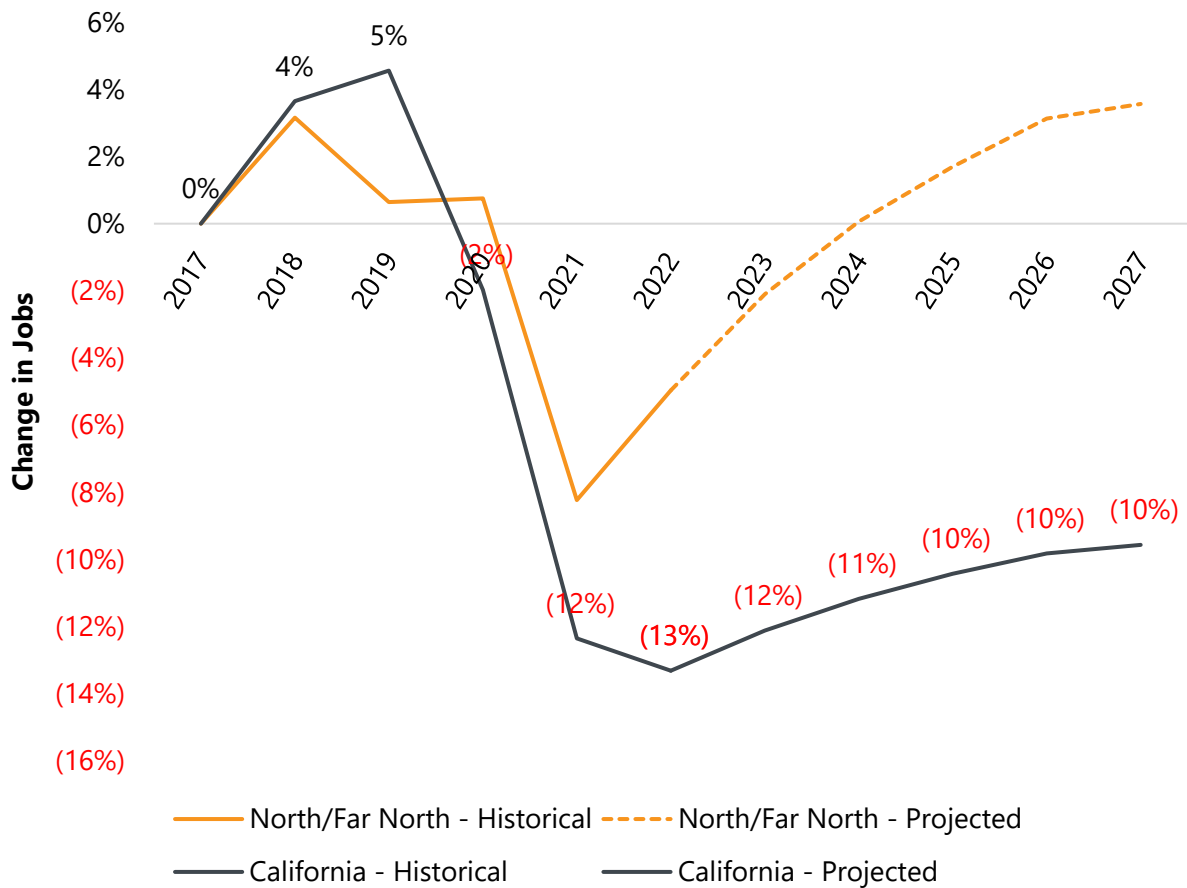
Exhibit 1 summarizes the five-year projected job growth for the four water technology and repair occupations in the 22-county North/Far North region and California.

Exhibit 1. Employment and projected demand, 2022-2027

Occupation	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	2022-2027 Annual Openings
Electrical and Electronic Engineering Technologists and Technicians	820	889	69	8%	96
Engineering Technologists and Technicians, Except Drafters, All Other	578	631	53	9%	65
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	255	298	42	17%	32
Power Plant Operators	523	554	31	6%	57
North/Far North	2,176	2,372	195	9%	250
Electrical and Electronic Engineering Technologists and Technicians	18,392	18,957	565	3%	1,934
Engineering Technologists and Technicians, Except Drafters, All Other	12,124	12,825	701	6%	1,263
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	2,017	2,148	131	7%	212
Power Plant Operators	2,727	2,854	127	5%	284
California	35,259	36,784	1,525	4%	3,693

Exhibit 2 compares the net changes in jobs between 2017 through 2022 and the projected changes through 2027. The rate of change is indexed to the total number of jobs in 2017.

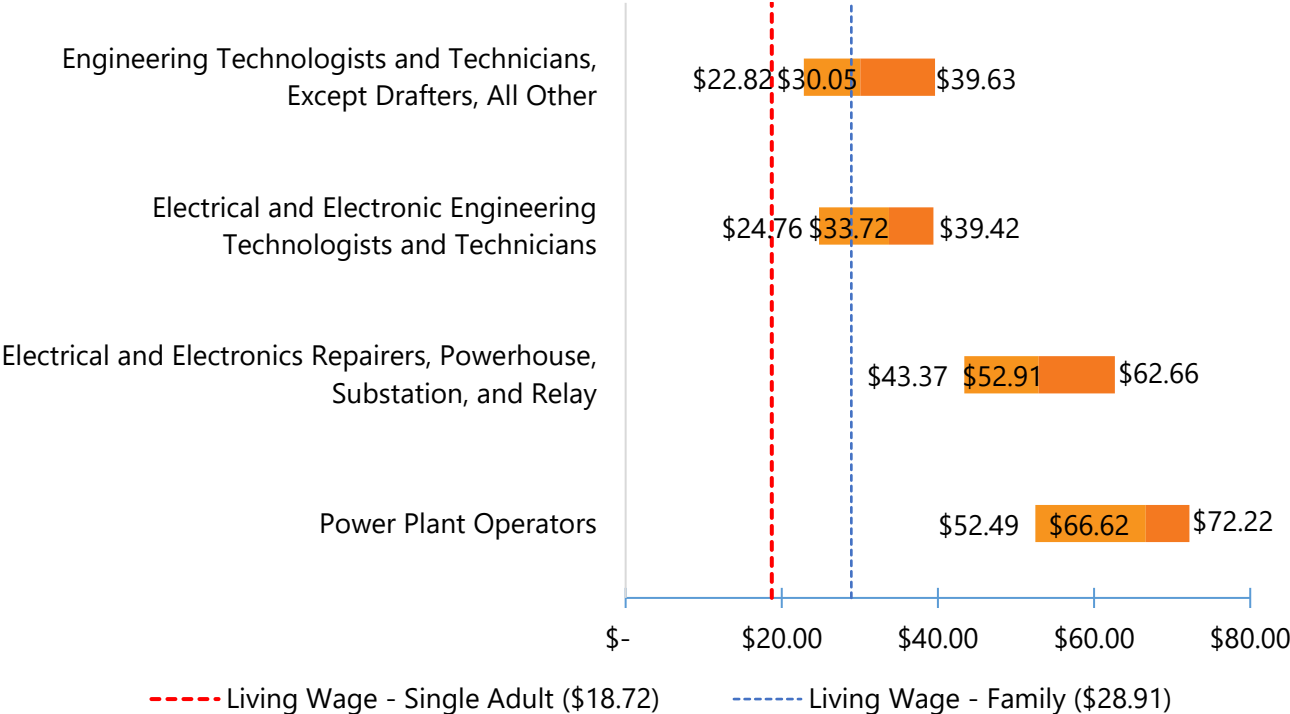
Exhibit 2. Changes in employment, 2017-2027



WAGES

Exhibit 3 compares the 25th percentile, median, and 75th percentile hourly wages for the four water technology and repair occupations to the regional living wage for one working adult (\$18.72 per hour) and a small family (\$28.91 per hour).^{1,2} The 25th and 75th percentile hourly wages are used to estimate entry-level and experienced worker wages.

Exhibit 3. Hourly wages by occupation, 2022



¹ Living wage is defined as the level of income one working adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. Please note that the 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

² A small family is defined as one working adult and one school aged child (between the ages of 5 and 12 years).

JOB POSTINGS

About Job Postings Analysis

This section analyzes recent data from online job postings. Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends. However, please note that job postings are not the same as labor market demand; demand is based on projected annual openings. Job postings should be used to support inform community college curriculum development and to identify potential employers for targeted experiential learning opportunities.

Please note that there are several limitations to analyzing and interpreting online job postings. Employers may post a position multiple times to increase the number of job applicants. Job postings may remain online after a business chooses not to fill a position. Employers may advertise one posting to fill multiple vacancies. And, not all jobs are posted online.

The North COE identified 116 online job postings related to water technology and repair in the 22-county North/Far North region. Job posting data comes from Lightcast (formerly Emsi Burning Glass) and represents unique advertisements newly posted online during the last 12 months, from April 2023 through March 2024. Appendix A lists the job titles that were used to obtain relevant water technology and repair job posting information.

Top Employers and Job Titles

Exhibit 4 shows the top 10 relevant job titles with the most job postings.

Exhibit 4. Top jobs titles

Job Title	Number of Job Postings
Water Restoration Technicians	29
Hydrologic Technicians	27
Water/Wastewater Operators	21
Hydro Operators	21
Instrumentation and Controls Technicians	13
Water Utility Workers	11
Electrical and Instrumentation Technicians	4
Water Technicians	4
Plant Technicians	3
Instrumentation Technicians	3

Exhibit 5 shows the top relevant employers with the most job postings for water technology and repair occupations.

Exhibit 5. Top Employers

Employer	Number of Job Postings
PG&E	13
State of California	11
City of Sacramento	7
United States Forest Service	6
AECOM	5
Department of Water Resources	4
Roto Rooter Plumbing	4
Jacobs Engineering Group	3
Yuba Water Agency	3
Placer County Water Agency	3

Top Skills and Qualifications

Exhibit 6 shows the top skills across three categories (specialized, common, and software skills) for the occupations of interest.³

Exhibit 6. Most in-demand skills

Specialized Skills	Common Skills	Software Skills
Wastewater	Operations	Microsoft Excel
Construction	Communication	Microsoft Office
Control Systems	Planning	Microsoft PowerPoint
Supervisory Control and Data Acquisition (SCADA)	Writing	Operating Systems
Pump Stations	Interpersonal Communications	Spreadsheets
Instrumentation	Coordinating	Wonderware
Process Control	Management	Microsoft Outlook
Programmable Logic Controllers	Troubleshooting (Problem Solving)	Profibus
Machinery	Mathematics	Microsoft Access
Water Resources/Treatment	Customer Service	AutoCAD

NOTE: In the North/Far North region, there were 348 online job postings that listed “Supervisory Control and Data Acquisition (SCADA)” as a required skill in the job description. This was a separate data pull.

³ Specialized skills are those primarily required to perform specific tasks in an occupation. Essential skills are typically related to employability. These are skills that are prevalent across many occupations and include both interpersonal attributes and learned skills (aka “soft skills”). Software skills are specific to any software tool or programming component used to support a job.

Exhibit 7 shows the minimum level of education, preferred by employers, for the water technology and repair-related job postings in the North/Far North region.⁴

Exhibit 7. Employer-preferred education

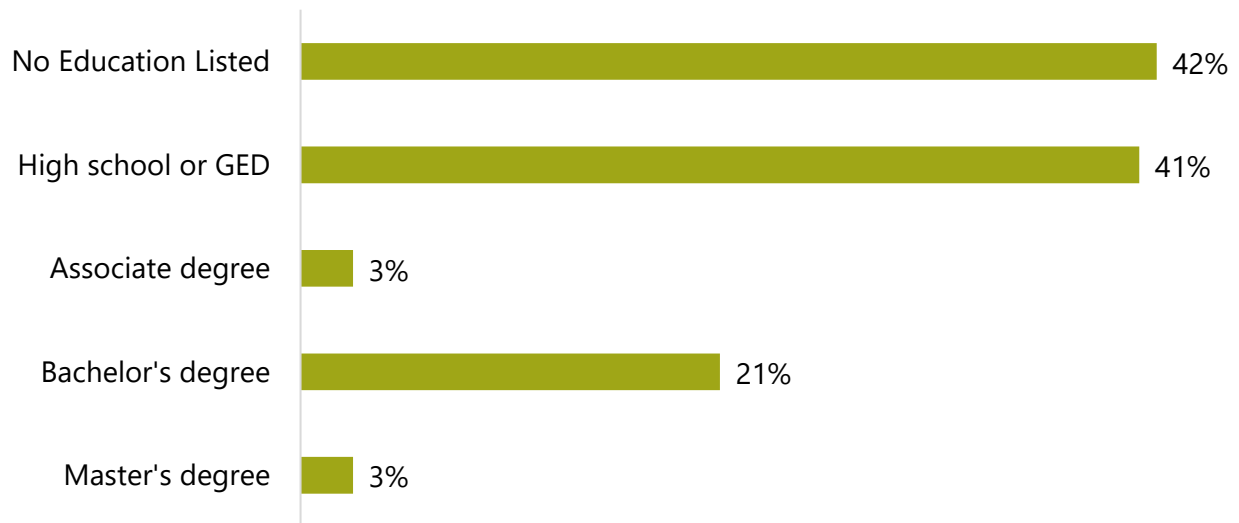
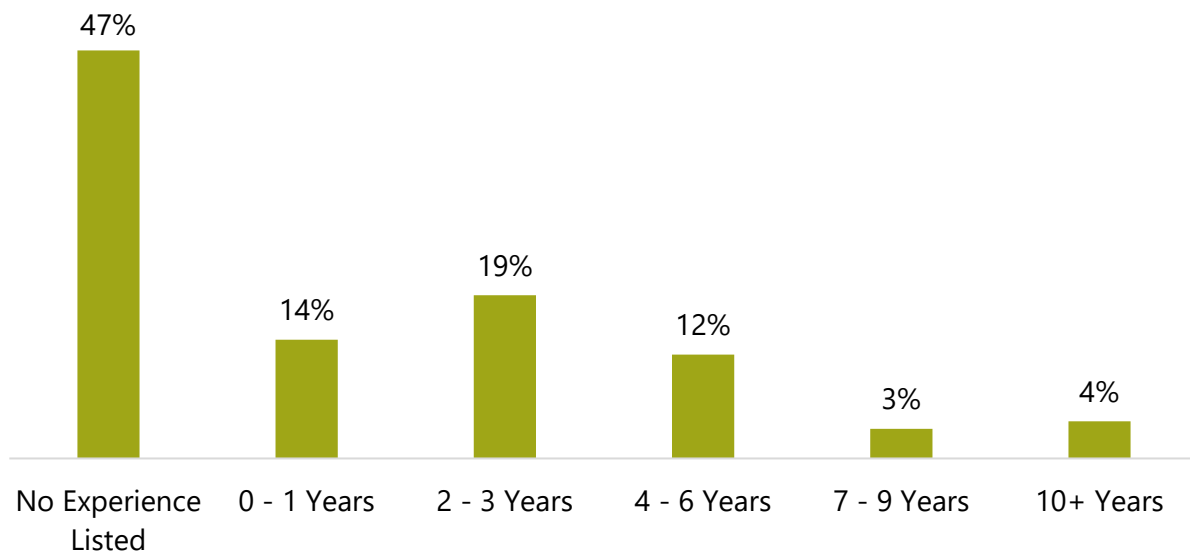


Exhibit 8 shows the minimum level of experience, preferred by employers, for the water technology and repair-related job postings in the North/Far North region.⁵

Exhibit 8. Employer-preferred job experience



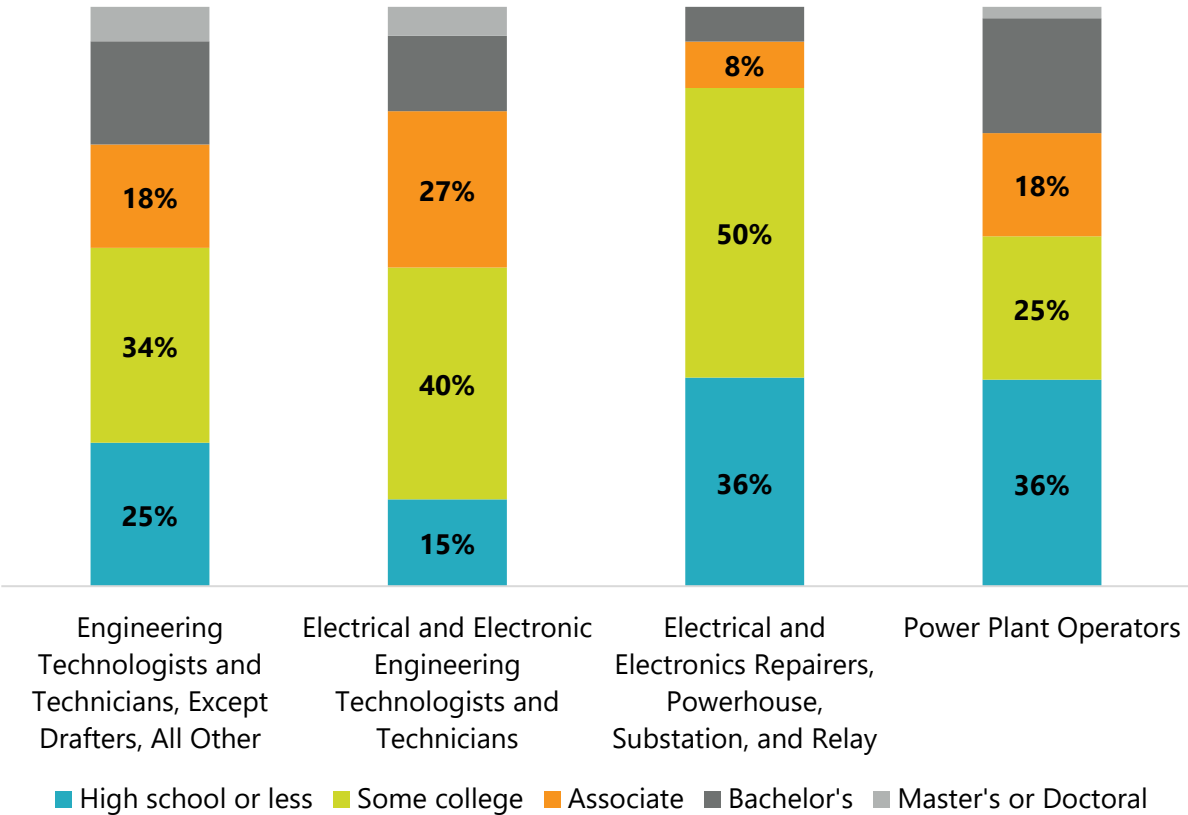
⁴ Employers may include more than one level of education as a hiring requirement in a job posting. As a result, the values in exhibit 8 may sum to greater than 100%.

⁵ Employers may include more than one level of experience as a hiring requirement in a job posting. As a result, the values in exhibit 9 may sum to greater than 100%.

EDUCATION AND TRAINING REQUIREMENTS

The U.S. Census Bureau collects data on the highest education level achieved by workers across all occupations. Exhibit 9 shows California's educational attainment of the current workforce in the selected occupations.

Exhibit 9. California educational attainment for water technology and repair-related occupations



The U.S. Bureau of Labor Statistics (BLS) uses a categorical system to assign typical entry-level education and job requirements to each occupation for which the BLS publishes projection data. These categories include entry-level education, work experience in a related occupation, and on-the-job training. Exhibit 10 shows the typical entry-level job requirements for each occupation included in this report.

Exhibit 10. Typical entry-level job requirements

Occupation	Entry-level Education Requirements	Work Experience Requirements	On-The-Job Training Requirements
Engineering Technologists and Technicians, Except Drafters, All Other	Associate degree	None	None
Electrical and Electronic Engineering Technologists and Technicians	Associate degree	None	None
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	Postsecondary nondegree award	Less than 5 years	Moderate-term on-the-job training
Power Plant Operators	High school diploma or equivalent	None	Long-term on-the-job training

EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 11 shows the TOP and CIP codes for educational programs related to the four water technology and repair occupations included in this report.

Exhibit 11. TOP and CIP codes for training programs related to water technology and repair

TOP Programs and Codes	Aligned CIP Programs and Codes
Electronics and Electric Technology (0934.00)	Power Plant Technology/Technician (15.1702)
Energy Systems Technology (0946.10)	Hydroelectric Energy Technology/Technician (15.1705)
Water and Wastewater Technology (0958.00)	Water Quality and Wastewater Treatment Management and Recycling Technology/Technician (15.0506)

Community College Supply

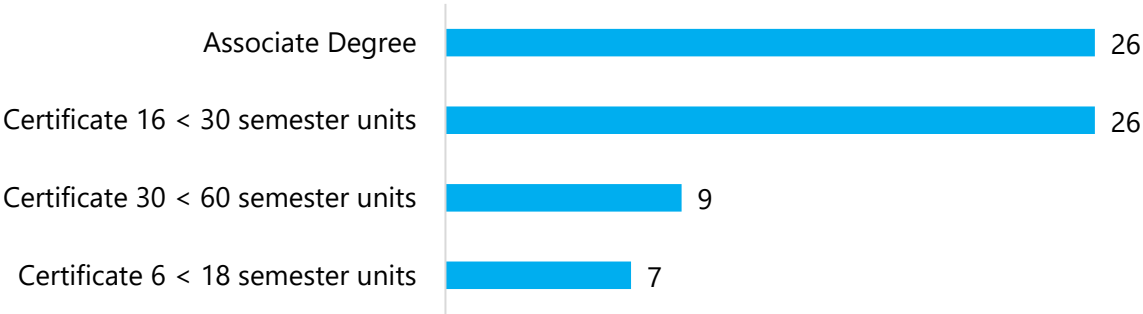
Exhibits 12 and 13 compare the average number of certificates and degrees from the selected North/Far North community college programs over the last three academic years. Eight community colleges in the region awarded an average of 68 awards over the last three academic years.

Exhibit 12. Annual average community college awards by program

Program - TOP Code	College	Annual Awards 2020-21	Annual Awards 2021-22	Annual Awards 2022-23	3-Yr Annual Awards Average
Electronics and Electric Technology (0934.00)	American River	58	47	40	48
	Sacramento City	2	2	1	2
	Subtotal	60	49	41	50

Program - TOP Code	College	Annual Awards 2020-21	Annual Awards 2021-22	Annual Awards 2022-23	3-Yr Annual Awards Average
Energy Systems Technology (0946.10)	Mendocino	-	1	-	0
	Redwoods	3	5	9	6
	Sierra	1	-	-	0
	Subtotal	4	6	9	6
Water and Wastewater Technology (0958.00)	Folsom Lake	2	12	3	6
	Shasta	4	-	-	1
	Woodland	4	4	5	4
	Subtotal	10	16	8	11
	Grand Total	74	71	58	68

Exhibit 13. Annual average community college awards by type, 2020-21 through 2022-23



Other Postsecondary Supply

No other postsecondary institutions offer programs under the CIP codes Power Plant Technology/Technician (15.1702); Hydroelectric Energy Technology/Technician (15.1705); and Water Quality and Wastewater Treatment Management and Recycling Technology/Technician (15.0506).

FINDINGS

This report focuses on the following four water technology and repair-related occupations: Electrical and Electronic Engineering Technologists and Technicians (17-3023); Engineering Technologists and Technicians, Except Drafters, All Other (17-3029); Electrical and Electronics Repairers, Powerhouse, Substation, and Relay (49-2095); and Power Plant Operators (51-8013).

Occupational Demand

- The North/Far North region held 2,176 jobs for the four water technology and repair-related occupations in 2022. These jobs are projected to increase by 9% over the next five years, adding 195 new jobs to the region by 2027.
- Jobs for the occupations included in this report are projected to grow at a faster rate in the North/Far North region (9%) than in California (4%).
- Over the next five years, water technology and repair-related occupations are projected to have 250 annual job openings in the North/Far North region.

Wages

- Entry-level (25th percentile) wage data shows that the occupations included in this report earn \$22.82 to \$52.49 per hour, which is above the region's living wage of \$18.72 per hour. (See Appendix C for notes about the updated living wage).

Job Postings

- In the last 12 months, there were 116 online job postings for water technology and repair-related occupations.
- PG&E is the employer with the highest number of job postings (13).

Education and Training Requirements

- The typical entry-level education for the occupations included in this report ranges between a high school diploma or equivalent and an associate degree. Additionally, between 43% and 67% of incumbent workers in the studied occupations have educational attainment levels consistent with community college offerings (some college or associate degrees).

Postsecondary Supply

- Eight community colleges in the North/Far North region offer degrees and certificates in programs that have historically trained for the four occupations of interest. Together, these programs conferred an average of 68 awards (certificates and associate degrees) over the last three academic years.
- No other postsecondary institutions offer programs under the CIP codes Power Plant Technology/Technician (15.1702); Hydroelectric Energy Technology/Technician (15.1705); and Water Quality and Wastewater Treatment Management and Recycling Technology/Technician (15.0506).

RECOMMENDATIONS

- Based on a comparison of annual openings to average annual awards in the North/Far North region, there seems to be an undersupply between educational supply and occupational demand.
 - Eight community colleges (American River; Folsom Lake; Mendocino; Redwoods; Sacramento City; Shasta; Sierra; and Woodland) in the North/Far North region issued an average of 68 awards over the last three years (2020-21 to 2022-23).
 - There are 250 projected annual openings for the four water technology and repair-related occupations included in this report.
- The North (Greater Sacramento) Center of Excellence recommends moving forward with developing a new water technology and repair-related program and/or making modifications (substantial changes) to existing programs.

New Program Recommendation		
Move forward with the new program	Proceed with caution	A new program is not recommended
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX A. EMPLOYER JOB TITLES

The following job titles were used to gather employer job postings data relevant to water technology for this report. These workers are essential in maintaining and advancing water technology systems:

1. Hydrologic Technicians
2. Water/Wastewater Operators
3. Hydro Operators
4. Instrumentation and Controls Technicians
5. Water Utility Workers
6. Electrical and Instrumentation Technicians
7. Water Technicians
8. Plant Technicians
9. Instrumentation Technicians

APPENDIX B. METHODOLOGY AND SOURCES

This report identified Occupations using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

"The Chancellor's Office Curriculum Inventory System (COCI)." California Community Colleges Curriculum Inventory (COCI), 2023. <https://coci2.ccctechcenter.org/>.

Glasmeier, Amy K. "Living Wage Calculator." Living Wage Calculator, 2023. <https://livingwage.mit.edu/>.

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. <https://nces.ed.gov/ipeds/>.

Labor Market Information Division. California Employment Development Department. <https://labormarketinfo.edd.ca.gov/>.

Lightcast (Formerly EMSI/Burning Glass) 2023.3; QCEW Employees, Non-QCEW Employees, and Self-Employed. <https://www.economicmodeling.com/>. (Note: EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors)).

Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office. <https://datamart.cccco.edu/>.

O*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA). <https://www.onetonline.org/>.

Self-Sufficiency Standard Tool for California. The University of Washington. <http://www.selfsufficiencystandard.org/>

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6th Edition. <https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx>

"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. June 2021 Edition. <http://coecc.net/>

APPENDIX C. GLOSSARY

Key Terms	Definition
Occupation	<p>Occupation refers to a category of jobs, careers, or professions that are similar regarding the work performed and the skills the workers possess. Workers who perform essentially the same tasks are in the same occupation, whether in the same industry. Some occupations are concentrated in a few industries, while others are found in many industries.</p> <p>Occupations differ from jobs in that jobs show the number of positions held in each occupation.</p>
Jobs	<p>A job is a specific instance of employment and includes any position where a worker provides labor for monetary compensation.</p> <p>Job numbers include employees (those who work for businesses) and proprietors (those who work for themselves). Full- and part-time jobs are included and counted equally (i.e., not adjusted to full-time equivalents). Data for jobs, or employment, are annual averages.</p>
Employment	<p>Employment refers to filled jobs, whether full- or part-time, temporary or permanent. The scope of "who" is counted as employed is noted in Appendix B. Methodology and Sources.</p>
Job Change	<p>Job change is the net increase or decrease of jobs over a given timeframe.</p>
Job Opening	<p>Job openings are the projected number of positions available for workers entering an occupation.</p> <p>Openings include growth and replacement job counts. Growth job counts are the positive change in the total number of workers employed. Replacement job counts are the estimates of new workers needed to replace workers permanently leaving the occupation.</p>
Percentile Wage (or wages)	<p>A percentile wage is the value of a wage at which a certain percentage of workers falls below. For example, a 25th percentile hourly wage of \$15.00 indicates that 25% of workers earn less than \$15.00, while 75% earn more. Percentile wages are specific to the geography shown in the report.</p> <p>The 25th-percentile and 75th-percentile hourly wages are used as a proxy for entry-level and experienced-level wages.</p>
Living Wage	<p>The living wage is the level of income a single, working adult with no children must earn to meet basic needs. The living wage is calculated using basic allowances for food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs, and assumes full-time employment (40 hours per week, 52 weeks a year).</p> <p>Beginning in 2023-24, NFN COE adopted the MIT calculations for a living wage better aligned to the economic conditions following the pandemic. For additional information, please visit https://livingwage.mit.edu/.</p>

Key Terms	Definition
Educational Attainment	Educational attainment is the highest level of education achieved by workers in an occupation. The data include workers aged 25 years and older.
Typical Entry-level Education	<p>The education level most workers need to gain employment in an occupation. Categories range from "no formal educational credential" and "high school diploma or equivalent" to "doctoral or professional degree." The types most relevant to community training are "some college, no degree," "postsecondary nondegree award," and "associate degree."</p> <p>The typical entry-level education may differ from the actual educational levels attained by workers employed in an occupation.</p>
Typical Work Experience	The relevant prior experience a worker needs to gain employment in an occupation. Categories include "5 years or more", "less than five years," and "none."
Typical On-The-Job (OTJ) Training	The level of on-the-job training a worker needs to obtain for competency in the skills required for an occupation. Categories include "none," "short-term (1 month or less)," "moderate-term (more than one month but less than 12 months)," "long-term (more than 12 months)," "apprenticeship," and "internship/residency."
Awards	Awards are the number of certificates and degrees conferred for a specific course of study each year. Awards count "papers" and, as a result, may be greater than the number of students who complete a program.

Funding Acknowledgement: This report was made available with Strong Workforce Program funding from the North Far North Regional Consortium.

COVID-19 Statement: This report includes employment projection data produced by Lightcast (formerly EMSI). Employment projections are developed using models based on historical data, which in this set of projections covers the period through 2021. Most input data, therefore, precedes the pandemic. Employment projections are long-term projections intended to capture structural changes in the economy, not cyclical fluctuations. As such, projections data are not intended to capture the impacts of the recession that began in February 2020. Cyclical fluctuations, like recessions, impact projections when they become part of the historical data set.

Important Disclaimer: All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges, or their representatives based upon components or recommendations contained in this study.

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Centers of Excellence for Labor Market Research, Economic and
Workforce Development Program



CENTERS OF EXCELLENCE
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