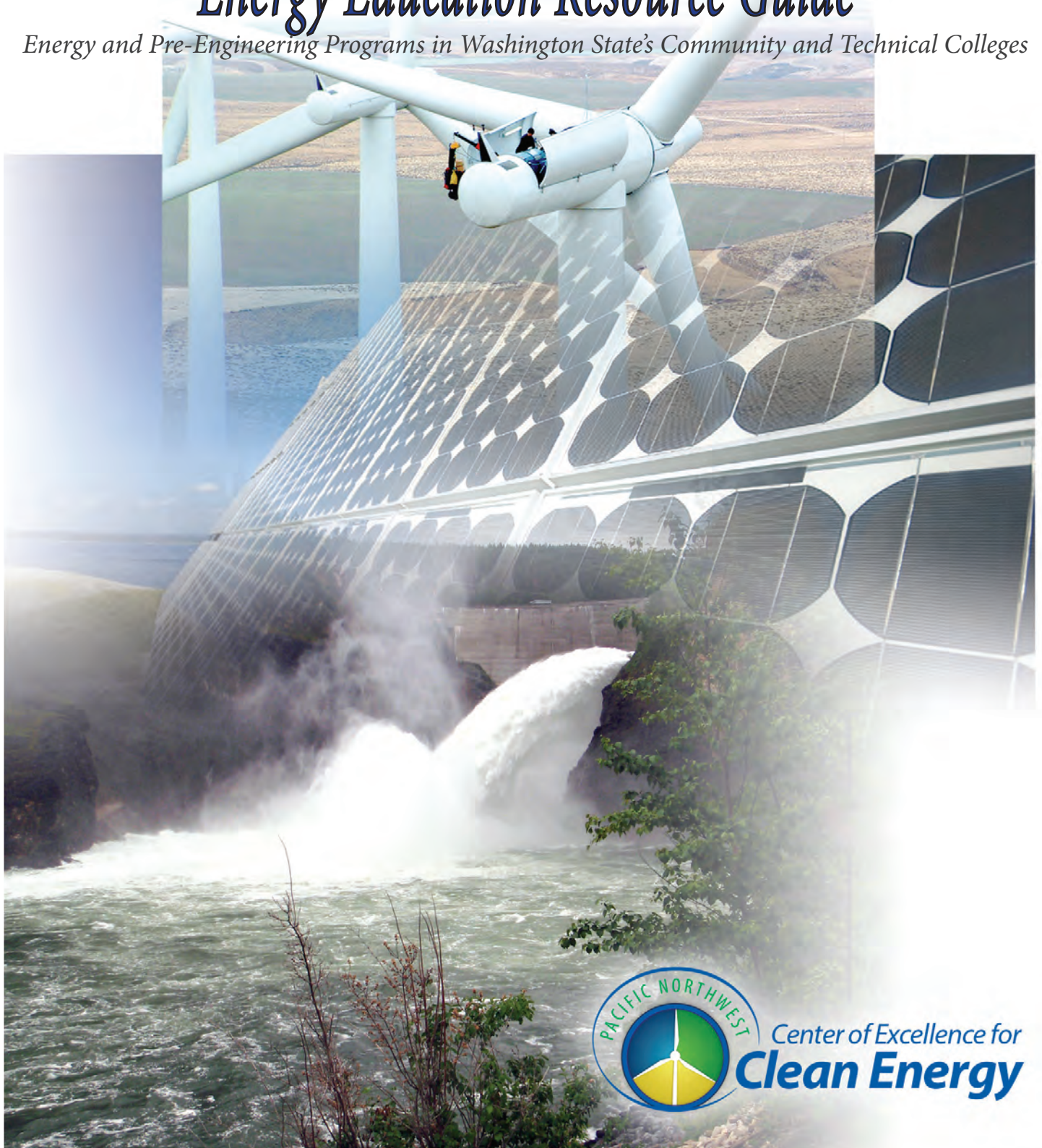


*Pacific Northwest Center of Excellence for Clean Energy*  
*"A Centralia College Partnership"*

*Energy Education Resource Guide*

*Energy and Pre-Engineering Programs in Washington State's Community and Technical Colleges*



Center of Excellence for  
**Clean Energy**



Ten Centers across Washington State represent a sector strategy that serves as economic development drivers for industries and helps the state's economy grow. Each Center focuses on a targeted industry and is built upon a reputation for fast, flexible, quality education and training programs for Washington state Community and Technical Colleges (CTCs).

Centers serve as a point-of-contact and resource hub for industry trends, best practices, innovative curriculum, and professional development opportunities. The Centers also maximize resources by bringing together workforce education and industry partners in order to develop highly-skilled employees for targeted industries.

#### What do Centers of Excellence do?

- Maintain an institutional reputation for innovation and responsive education and training delivery to their targeted industry.
- Act as a broker of information and resources related to their targeted industry for industry representatives, community-based organizations, economic development organizations, community and technical colleges, secondary education institutions, and four-year colleges and universities.
- Translate industry research into best practices.
- Provide system coordination, coaching, and mentoring to assist in building seamless educational and work-related systems.
- Build a competitive workforce for driver industries in Washington State.

#### Who/Where are we? - [www.coewa.com](http://www.coewa.com)

Aerospace and Advanced Materials Manufacturing at Everett Community College - [www.coeaerospace.com](http://www.coeaerospace.com)

Agriculture at Walla Walla Community College - [www.agcenterofexcellence.com](http://www.agcenterofexcellence.com)

Allied Health at Yakima Valley Community College - [www2.yvcc.edu/coe/default.html](http://www2.yvcc.edu/coe/default.html)

Careers in Education at Green River Community College - [www.careersined.org](http://www.careersined.org)

Pacific Northwest Center of Excellence for Clean Energy at Centralia College - [cleanenergyexcellence.org](http://cleanenergyexcellence.org)

Construction at Renton Technical College - [www.constructioncenterofexcellence.com](http://www.constructioncenterofexcellence.com)

Global Trade & Supply Chain Management at Highline Community College - [www.coeglobaltrade.com](http://www.coeglobaltrade.com)

Homeland Security Emergency Management at Pierce College - [wp.pierce.ctc.edu/blog/hsemcoe](http://wp.pierce.ctc.edu/blog/hsemcoe)

Information & Computing Technology at Bellevue College - [www.coeforict.org](http://www.coeforict.org)

Marine Manufacturing & Technology at Skagit Valley College - [www.marinecenterofexcellence.com](http://www.marinecenterofexcellence.com)



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For more resources and educational material, visit [cleanenergyexcellence.org/collegeprograms](http://cleanenergyexcellence.org/collegeprograms)

Published March 2016 by PNCECE

***The Pacific Northwest Center of Excellence for Clean Energy*** is a nationally recognized model providing strategic coordination for the energy industry's skilled workforce in the Pacific Northwest. The Center is led by a broad based consortium comprised of industry and labor leaders that guide the center to:

- Develop and mature industry and labor partnerships to better understand the ever changing workforce issues facing electric utilities and independent power producers.
- Translate energy industry research into "Best Practices" training and education to ensure programs meet industry's workforce needs.
- Provide clear education and career pathways for students and job seekers for entry into high skills high wage energy jobs.
- Create a competitive workforce pipeline to meet increasing energy demands and support the economic future of the Pacific Northwest.

***The Advisory Board*** is a permanent standing board to provide advice and insight to the Center of Excellence from the perspective of industry, education, labor, and the community. The board helps the Center achieve its mission by ensuring that programs and projects advance the needs of the energy sector within the region. The diversity of membership provides an invaluable resource to center staff and program partners to easily access information and contacts throughout the industry. The strength of the advisory board was a key component in the elevation of the center from a state organization to a Department of Energy recognized Regional Center of Excellence. The current advisory board members are:

**Pat McCarty (Chair), Tacoma Power**

Avista – Jeremy Gall

Bonneville Power Administration – P.J. LeCompte

Centralia City Light – ML Norton, Micah Goo

Northwest Territories Power Company (Canada) – Jay Pickett

IBEW Local 77 – Bob Guenther

Lewis County PUD – Daniel Kay, P.E.

Pacific Mountain Workforce Development Council

Lewis Economic Development Council

Puget Sound Energy – Troy Nutter

Seattle City Light – Keith Gulley

TransAlta Centralia – Chuck Higgins

Washington State Labor Council – Kairie Pierce



**Educational Partners**

Construction Center of Excellence – Shana Peschek

Grays Harbor College – Mike Kelly

Regional Education and Training Center, Satsop Campus – Dr. Bob Topping

Washington State University Energy Program – Todd Currier

**Centralia College/Pacific Northwest Center of Excellence (PNCECE) Members**

Jim Lowery, Centralia College Trustee

Barbara Hins-Turner, Executive Director, PNCECE

Anthony Valterra, WISE Lead Grant Manager, PNCECE

James Hovis, Program Manager, PNCECE

Rulon Crawford, Energy Technology Assistant Professor/Program Coordinator, Centralia College

John Steidel, Energy Technology Faculty, Centralia College

## Director's Corner

~Barbara Hins-Turner, *Executive Director, Pacific Northwest Center of Excellence for Clean Energy "A Centralia College Partnership"*

### Power Up Your Future

There is amazing work happening in the Community and Technical College (CTC) system across Washington state and the region to develop a skilled energy industry workforce. As the energy industry faces massive retirements and technology enhancements are requiring a more "tech savvy" workforce, the industry is reaching out to the CTC system to support their workforce needs.

Within these pages, you will find a vast array of programs that are preparing students to build and sustain our energy future. These programs have been "niched up" across the state to focus on solar and wind energy, sustainability, energy management, power generation and more.

Students graduating from these programs are finding living wage jobs at starting wages from \$15-\$25 per hour with companies such as Avista, Tacoma Power, Puget Sound Energy and Public Utility Districts across the state. We invite you to contact these colleges to learn more about an exciting career in the energy industry.



[www.cleanenergyexcellence.org/careers/index.html](http://www.cleanenergyexcellence.org/careers/index.html)

## Education Resource Guide

This guide is designed to ensure you start your journey to a career in energy with all the information you need to successfully arrive at your goal. It is critical to any educational success that the college, degree, and certificate are the right fit.

**Bachelor of Applied Science (BAS)** is designed to build on associate degrees that provide workplace skills and provide a path to the baccalaureate level without requiring the student to earn another two-year degree.

**Associate in Applied Science-Transfer (AAS-T)** is designed for students who plan to transfer to a 4-year institution with an applied science degree in a professional/technical program.

**Associate in Applied Science (AAS)** is awarded to students completing an approved course of study in a professional technical program

**Certificate of Achievement** is designed for students who wish to take specialized courses in a particular field and desire certification acknowledging completion of specific program modules.

**Certificate of Accomplishment** is designed to provide recognition of completion of certain approved courses or small modules of courses offered through a particular technical program.

## *Electrical Construction, Electrical & Facility Maintenance Engineering*

**Electrical Construction** - For students pursuing a degree or certificate in electrical construction for jobs in commercial and residential construction, public utility agencies and industrial construction and maintenance.

**Career options:** Prepares students to apply to the Southwest Washington Electrical Joint Apprenticeship Training Committee, an organization affiliated with the International Brotherhood of Electrical Workers Local #76. Upon completion of the 3,000 hours of instruction, students will be given 4,000 hours that apply toward the EL01 license.

**Degree offered:** Associate of Applied Science: Electrical Construction (120-158 credits)

**Certificate offered:** Certificate of Competency: Residential Electrician (67 credits)

**Extended learning options:** Yes



*Student at Bates Electrical Construction Program*

**Electrical Engineering Technician** - Bates offers the only program in the region in which students prepare for careers in electrical code application, interior and exterior lighting design, and all aspects of electrical design. Instruction includes all phases of electrical engineering, CAD drafting, and design for commercial buildings. Students are encouraged to seek certification as electrical engineering technicians.

**Careers options:** Design and draft electrical power, signal, interior and exterior lighting systems. Assist in specification writing and share on-site construction supervision.

**Degree offered:** Associate of Applied Science: Electrical Engineering Technician (120 credits)

**Exam offered:** National Institute for Certification in Engineering Technologies (NICET)

**Facilities Maintenance Engineer** - Includes electricity, welding, blueprint reading, machine maintenance, grounds keeping, boiler repair and operation, HVAC/R and advanced industry applications. Students will be prepared for Class IV and Class V boiler operator/fireman certification. This is a pre-apprenticeship program for the Western Washington Operating Engineers Facilities Custodial Services Apprenticeship Committee and the Western Washington Stationary Engineers Apprenticeship Committee.

**Careers options:** Students prepare for careers in the building care and maintenance industry.

**Degree:** Associate of Applied Science: Facilities Maintenance Engineer (120 credits)

**Certificates:** Certificate of Competency: Facilities Maintenance Engineer (84-87 credits); Cert. of Training: Building Care and Maintenance I (18 credits); Cert. of Training: Maintenance Technician II (17 credits)

**Extended learning options:** Yes





## *Electrician, Instrumentation & Control Technology*

**Electrician** - Students develop electrician skills along with communication and interpersonal skills. Instruction provides opportunities to achieve the competencies students need to maintain existing electrical systems, perform new electrical construction, and perform other electrical jobs. Graduates can be credited with up to 1,472 supervised work experience hours per RCW 19.28.191 and WAC 296-46B-940. In order to receive the approved experience hours, students must have an electrical trainee card from L&I prior to enrolling in the program.

**Careers options:** Most graduates work as electricians. In the United States, more than half of all electricians are employed in the construction industry. Others work as maintenance electricians in virtually every industry including electrical equipment distributors, communications companies, electrical utility companies and industrial manufacturing plants. Potential positions include apprentice electrician, journeyman electrician, electrical contractor, electrical equipment technician, maintenance electrician, television cable technician, utility company technician, telephone technician and electrical equipment salesperson. Nationally, one out of every 10 electricians is self-employed.

**Degree offered:** Associate of Applied Science: Electrician (116 degrees)

**Certificates offered (2):**

- Electrical Construction
- Electrical Fundamentals

**Instrumentation & Control Technology** - Prepares students to maintain, repair, and troubleshoot instrumentation and control systems. A combination of theory and hands-on training offers a variety of modern process measurement and control instrumentation with actual working processes and computer simulations which duplicate conditions that technicians experience. Approximately half of the instructional time is laboratory experience to develop knowledge and skills with electronic circuits, test equipment, individual instruments, multiple instrument control systems, and practical computer applications. The program is an active member of the Industrial Instrumentation & Controls Technology Alliance (IICTA), an organization with educational and industry partners across the nation. The IICTA's mission is to "*promote the partnership of education, industry and businesses in developing activities to assure the existence of a sufficient quantity of highly qualified instrument & controls technicians who are highly sought after by the industry.*" These activities include: setting educational standards, promoting networking, and providing funding for scholarships and programs.

**Careers Options:** Most graduates work as instrumentation and process control technicians in bio-pharmaceutical manufacturing facilities, oil refineries, food processing, pulp/paper mills, power plants, metal smelters, systems integrators, research and development or water/sewage treatment facilities. Opportunities also exist in medical instrumentation, chemical plants, canneries, aerospace, sales and communications.

**Degree offered:** Associate in Applied Science: Instrumentation & Control Technology (132 credits)

**Under development: Associate of Applied Science – Transfer (AAS-T) degree in Clean Energy Technology.** The degree will be geared towards providing students with a strong foundation in electronics, engineering fundamentals, and sustainable energy technology, and will be designed so that graduating students will have the option of going directly to industry or transferring to the Institute for Energy Studies program at Western Washington University. Bellingham Technical College, Western Washington University, and Center of Excellence for Clean Energy have been working closely with local industry in the creation of this degree to ensure it means industry needs and expectations. The project is funded by the National Science Foundation.

## Industrial Electrical Technology

**Industrial Electrical Technology** - This program reflects the industry's changing trends and maintains a broad-based curriculum which blends theory and practical applications. Instruction, rooted in safety, is a blend of electrical/electronic theory, applied industrial electricity, electrical codes, process control/instrumentation and programmable logic controllers. Related instruction includes mathematics, technical drawing interpretation, computer applications, communications, preventive maintenance, safety, and first aid.

**Career Options:** Industrial Electrical program provides a comprehensive two-year curriculum designed to prepare students for career opportunities as industrial electrical technicians.

**Degree offered:** Associate in Applied Science: Industrial Electrical Technology (105 credits)

**Certificates offered (9):**

- Certificate of Accomplishment: Basic Electricity (15 credits)
- Certificate of Accomplishment: Electronics (15 credits)
- Certificate of Accomplishment: Industrial Electricity (20 credits)
- Certificate of Accomplishment: Instrumentation (15 credits)
- Certificate of Accomplishment: National Electric Code (20 credits)
- Certificate of Accomplishment: Programmable Logic Controllers (15 credits)
- Certificate of Achievement: Electronics Technology (46 credits)
- Certificate of Achievement: Industrial Electrical (48 credits)
- Certificate of Achievement: Programmable Logic Controllers (48 credits)



*Working in the lab at Big Bend Community College.*

*Photo courtesy of Festo*



*Arlen Everist, Seattle City Light  
Meter Electrician Apprentice*



## Environmental Technologies and Sustainable Practices

**Bachelor of Applied Science degree in Sustainable Practices** - This program is designed for students who have completed a two-year degree in a related subject or who meet the distribution requirements through prior college coursework. Students work closely with faculty and a dedicated advisor to complete 90 credits of upper division coursework such as “Social Perspectives on Sustainable Practices” and “Earth Systems and Global Climate Change”.

**Career Options:** Graduates are prepared for technical and management positions in the sustainability field and to pursue advanced degrees and certifications.

**Degree offered:** Bachelor of Applied Science in Sustainable Practices (182-183 credits)

**Environmental Technologies and Sustainable Practices** - The Associate in Applied Science-Transfer degree in Environmental Technologies and Sustainable Practices is a comprehensive technical degree that provides industry-specific knowledge and professional skills that are vital to staking a claim in the emerging green economy. Governments and businesses in this state and around the world are looking for professionals who can “pioneer innovative pathways” as we rethink and redesign how we consume resources; students in this program have the chance to be a part of that as professional practitioners, as well as in roles as informed consumers and political citizens. Graduates learn the skills necessary to plan and implement sustainable approaches to how we live and work by managing complex projects for government agencies, private and non-profit organizations, water, energy, and agriculture industries, construction management firms, and educational institutions.

**Career options:** A degree in Environmental Technologies and Sustainable Practices helps students prepare for the following industry positions: carbon footprint analyst, energy efficiency specialist, energy resource manager, greenhouse gas emissions specialist, lifecycle analysis technician, sustainability coordinator, sustainability trainer, sustainability systems analyst (92-93 credits)

**Degree offered:** Associate of Applied Science-Transfer - Environmental Technologies and Sustainable Practices

**Certificates offered (3):**

- Community Energy Systems Specialist (55-60 credits)
- Energy Audit Specialist (32 credits)
- Energy Management Specialist (64-68 credits)



*Environmentally friendly parking  
Solar photovoltaic panels are used to power up the electric car  
charging stations at Cascadia*

## Energy Technology - Power Operations

**Energy Technology - Power Operations** - The Energy Technology/Power Operations AAS program at Centralia College prepares students to compete for entry-level positions such as power plant operator, substation operator, technician, and other high voltage pre-apprentice and apprenticeship positions within the energy industry. Upon successful completion of the program students are able to:

- Describe the basic concepts of electron flow, magnetism, and Ohm's Law
- Describe how electricity is generated, transmitted, and distributed
- Specialize in generation, metering, power transmission, substation operations, boiler operations, hydro dam operations, plant mechanics, and wind or solar generation.
- Successfully take the entrance-exams for entry level jobs and apprenticeships.

Program advisors include industry and organized labor leaders from Avista, Bonneville Power Administration, Centralia City Light, IBEW 77, Lewis County PUD, Puget Sound Energy, Seattle City Light, Tacoma Power and The Washington State Labor Council. The program is also broadcast through interactive (ITV) virtual classrooms in the following Washington Community Colleges: Grays Harbor College, and Spokane Community College - Ione Campus.

**North American Electric Reliability Corporation (NERC) System Operator certification preparatory class** - The class provides students a foundation to help them prepare for NERC's system operator certification exam. It also prepares operators to handle the bulk power system during normal and emergency operations. These industry-accepted qualifications are set through internationally recognized processes and procedures for agencies that certify persons.

**Career options:** The program prepares students for entry level positions such as power plant assistant control operator, technician, and other high voltage apprenticeships. Jobs in this field include but are not limited to: power generation, transmission, metering, substation operations, plant mechanics, and boiler operations.

**Degree offered:** Associate of Applied Science: Energy Technology – Power Operations (100-110 credits)



*Centralia College Energy Program students on a tour at Mayfield dam with Tacoma Power*



## *Electrician Low Voltage Fire/Security, Sustainable Building Science*

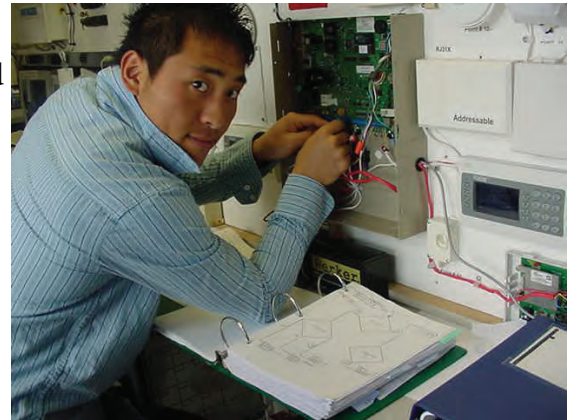
**Electrician Low Voltage Fire/Security** - Students participate in hands-on training with advanced equipment, techniques, and programming related to burglar alarms, fire alarms, card access, and closed-circuit TV to prepare for careers as alarm system installers and service technicians.

This program is approved as a Limited Energy specialty electrical training program in Washington state. Successful completion of the degree program credits students with 1,815 hours of work experience, and certificate program completers are credited with 1,089 hours of work experience.

**Career options:** Prepares students for positions in the electronic fire/security industry as low voltage electrician apprentices, service technicians or installers.

**Degree offered:** Associate in Applied Technology: Electric Low Voltage Fire/Security (123 credits)

**Certificate offered:** Electric Low Voltage Fire/Security (78 credits)



*Working in the electrician lab at Clover*

**Sustainable Building Science** - This program is designed to train construction professionals and facilities managers for building applications and systems that consume a minimal amount of non-renewable resources and contribute to environmental and personal health. Participants receive a solid foundation in applied mathematics, applied physics, and communication, as well as training in industry-specific applications using energy efficiency technology to diagnose building deficiencies. This program prepares graduates for careers in resource energy management, indoor air quality, solar installation, home energy rating systems, and other specialties that support the design, building and maintenance of sustainable living environments.

**Careers options:** Advanced training in sustainable systems, solar (photovoltaic) systems, resource conservation management and weatherization prepares graduates for a variety of careers within the construction and utilities industries, including careers as resource conservation managers, energy auditors, weatherization specialists, solar energy specialists and home energy raters.

**Degree offered:** Associate in Applied Technology: Sustainable Building Science (96 credits)

**Certificate offered:** Residential Construction Certificate (40 credits)



*Students in the electrician lab at Clover Park  
Photo courtesy of Festo*



## Nuclear Technology, Solar/Photovoltaic Designer

**Nuclear Technology** - This program works closely with the nuclear industry, both locally and nationally, to develop the next generation of nuclear workers. As one of 36 Nuclear Uniform Curriculum Programs (NUCP) in the United States, Columbia Basin College (CBC) and Energy Northwest partner to assure that the CBC Nuclear Technology program is aligned with the needs of the nuclear power industry and are consistent with the established standards for accredited utility training programs so that all graduates have the same basic knowledge necessary to be successful power plant workers.

**Career options:** Graduates can work within the nuclear industry in areas such as the continued safe and economical operation of existing nuclear power plants and processing facilities, disposal of nuclear waste, and other advanced industrial applications of nuclear technology.

**Degrees offered:** Associate in Applied Science: Nuclear Technology with the following options:

- Instrumentation and Control Technician (110-112 credits)\*
- Power Plant operator Non-Licensed Nuclear Operator (104-106 credits)\*
- Radiation Protection Technician (100-102 credits)

**Certificate offered:** National Academy for Nuclear Training (NANT) certificate. This national certification is earned beyond the AAS degree in Nuclear Technology, and if achieved, affirms a graduate's skills and knowledge for the respective ACAD 08-006 curriculum and training position for two years after the issue date.

\*Instrumentation and Control Technician and Power Plant Operator options receive transferable skills that allow them to also work in industries such as: energy generation, process operations, and manufacturing.

**Solar/Photovoltaic (PV) Designer** - The conservation of energy and generation of new energy from sources such as solar, wind, and biomass is increasingly becoming a national concern. CBC has developed a hands-on approach to address energy system design, installation, and maintenance.

**Careers options:** Solar/photovoltaic designer, installer and maintenance technician. Starting wages in these programs range between \$15 - \$18 per hour.

**Certificate offered:** Solar/Photovoltaic (PV) Designer Short-term Certificate(5 credits)



*Working in the lab at Columbia Basin*



*Residential solar in Thurston County  
Photo Courtesy of South Sound Solar*

## Technical Customer Service Representative, Building Analyst

**Technical Customer Service Representative** - This program teaches students how to troubleshoot incoming customer questions, maintain accurate electronic records, and provide excellent leadership and customer service. Coursework covers topics in typing, supervision, marketing, business communications, and business protocols. The program features hands-on labs which provide students with practical experience.

This program was created as part of the WISE grant funded by a Department of Labor TAAACCT grant\*, using skill standards that were funded by the Pacific Northwest Center of Excellence for Clean Energy under a Department of Energy grant.

**Career Options:** Washington State currently has 2,600 open positions for customer service professionals in a call center environment. Graduates can work with area employers such as Comcast, Frontier, Snohomish County PUD and Puget Sound Energy, many offering full-time positions with benefits  
**Certificate Offered:** Technical Customer Service Representative (43 Credits)



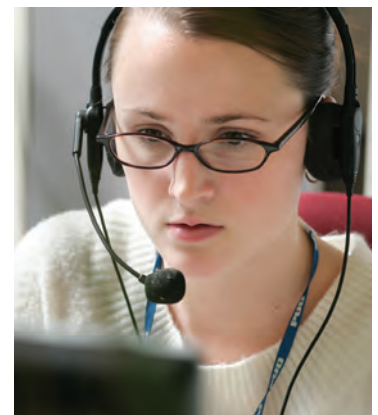
**Building Analyst** - This is the first online program of its kind, it was developed and written in partnership with nationally recognized building science experts. Students learn about the principles of green buildings—from insulation to indoor air quality—as well as how to perform comprehensive building assessments. It covers everything an individual in the building, remodeling, or trade industry needs to know to make buildings perform more efficiently. The course covers critical topics ranging from insulation to moisture management to indoor air quality basics. Students will also learn the skills you need to professionally conduct visual building inspections, perform diagnostic testing, determine residential building improvement opportunities, document a home's performance, prioritize improvements, and prepare a work scope that will guide the homeowner's decision-making process for making the improvements.



*Photo courtesy of Puget Sound Energy*

This program is recognized by North American Technician Excellence (NATE) and Building Performance Institute (BPI) for 28 hours of continuing education (28 CEHs) applicable to NATE and BPI recertification. Must obtain a 75% or higher to obtain CEH recognition.

\* This workforce product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. This product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor make no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. WISE is led by Centralia College and the Center of Excellence for Clean Energy in partnership with the Centers of Excellence for Aerospace & Advance Manufacturing and Construction. Centralia College is an equal opportunity employer/program and auxiliary aids and services are available upon request to individuals with disabilities.





## Energy Technology – Power Operations

**Energy Technology - Power Operations** -Energy Technology program at Grays Harbor College (GHC) prepares students to compete for entry-level positions such as pre-apprentices and apprentice positions within the energy industry. Coursework includes AC/DC Electricity, Power Generation, Plant Design and Operations, Industrial Safety and Rigging, Energy Efficiency, Power Plant Operations, Power Industry Job Preparation, Mathematics, Communication and Computer skills. The Power Plant Operators courses are broadcast by Interactive Television (ITV) from Centralia College to GHC in Aberdeen, WA.

Program advisors include industry and organized labor leaders from Avista, Bonneville Power Administration, Centralia City Light, IBEW 77, Lewis County PUD, Puget Sound Energy, Seattle City Light, Tacoma Power and Washington State Labor Council. These companies as well as other utilities throughout the Northwest hire students.

**Career options:** Jobs in this field include but are not limited to: power generation, transmission, metering, substation operations, plant mechanics, and boiler operations.

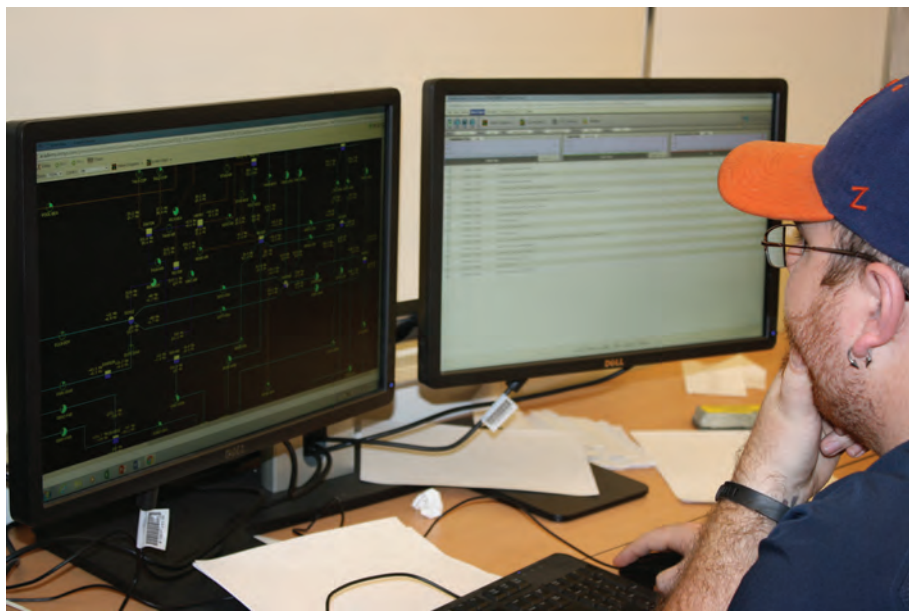
**Degrees offered:** Associate of Applied Science: Energy Technology-Power Operations (95 credits)

**Certificates offered:** Certificate of Completion: Power Technology (52 credits)

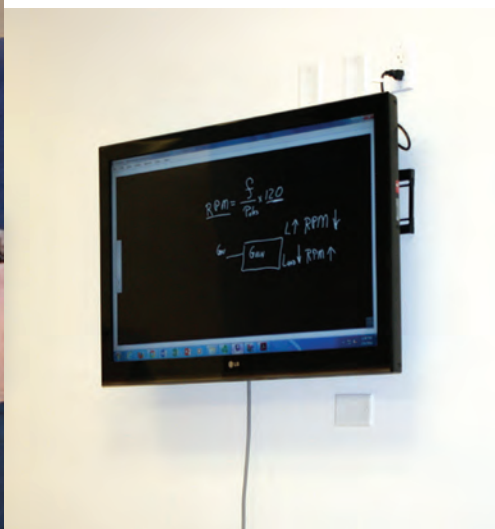
### Energy Technology - Entrepreneurship

This program is for students in the Energy Technology programs who have a desire to start their own business, explore an idea for their own business, or to take courses in entrepreneurship as electives in the degree programs. A majority of these courses are offered online and delivered from Peninsula College. Non-energy students are welcome to take the classes as well.

**Certificate offered:** Certificate of Achievement: Energy and Innovation Entrepreneurship (24 credits)



*Student working on the Grid System Operator Simulator*



*Grays Harbor College students viewing a class from Centralia College using the ITV system*

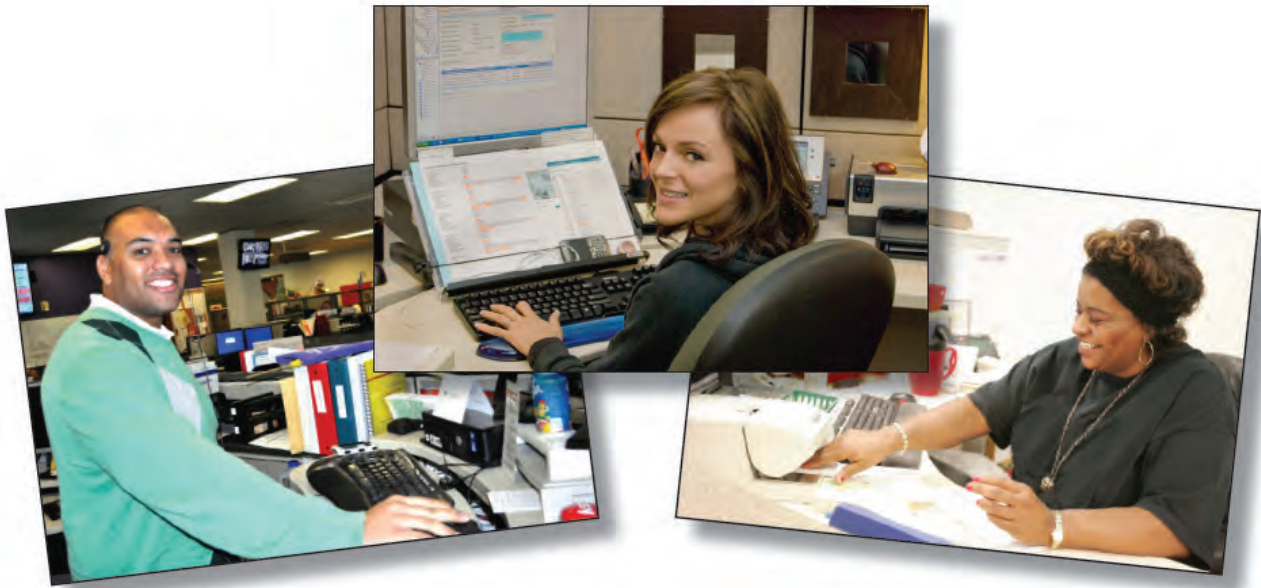


## *Technical Customer Service Representative*

**Technical Customer Service Representative** - This program teaches students how to troubleshoot incoming customer questions, maintain accurate electronic records, and provide excellent leadership and customer service. Coursework covers topics in typing, supervision, marketing, business communications, and business protocols. The program features hands-on labs which provide students with practical experience.

This program was created as part of the WISE grant funded by a Department of Labor TAAACCT grant\*, using skill standards that were funded by the Pacific Northwest Center of Excellence for Clean Energy under a Department of Energy grant.

**Career Options:** Washington State currently has 2,600 open positions for customer service professionals in a call center environment, many offering full-time positions with benefits.



*“Advancements in modern technology and mobile communications are now enabling utilities to provide greater choice and deliver safe, dependable service to customers. As utility consumers apply new technologies to better manage their energy use, successful utility Customer Care organizations will play a vital role in transforming the customer experience from business-as-usual to integrating new tools, and providing education and expertise across the industry.”*

*Aundrea Jackson*

*CIS Project Manager*

*Customer Access Center Manager*

*Puget Sound Energy*

\* This workforce product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. This product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor make no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. WISE is led by Centralia College and the Center of Excellence for Clean Energy in partnership with the Centers of Excellence for Aerospace & Advance Manufacturing and Construction. Centralia College is an equal opportunity employer/program and auxiliary aids and services are available upon request to individuals with disabilities.

## *Energy & Science Technology*

**Energy and Science Technology-** This program prepares students to meet the increasing demand for jobs related to green technology and alternative energy.

Graduates are qualified to serve as technical representatives across a range of industries that include developmental technologies in the renewable energy field. Students will receive a well-rounded education that includes courses in math, statistics, written and oral communication, social science, alternative energy, biology, chemistry, physics, and computers.

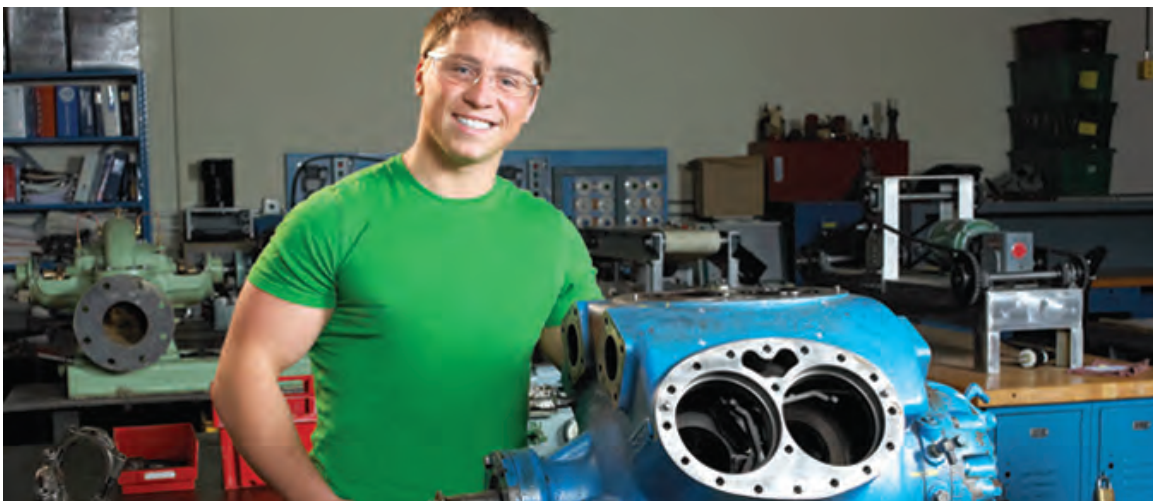
Electives also allow students to direct their studies toward environmental, chemical, bioenergy, energy technology, and industrial/laboratory specializations. Stand alone certificates are also available for each specialization.

**Career options:** The program prepares students for employment as technicians in areas such as biomedical and industrial laboratories, manufacturing operations, energy companies, and environmental positions in public and private institutions.

**Degree offered:** Associate in Applied Science: Energy & Science Technician (93-99 credits)

**Certificates offered (6):**

- Certificate of Completion: Bio-Energy (19 credits)
- Certificate of Completion: Energy Technology (19 credits)
- Certificate of Completion: Industrial/Laboratory (19 credits)
- Certificate of Completion: I-BEST Bio-Energy (25 credits)
- Certificate of Completion: I-BEST Energy Technology (28 credits)
- Certificate of Completion: I-BEST Industrial Laboratory (25 credits)



*Working in the building and maintenance lab at Lake Washington Institute of Tech-*

## North Seattle College

9600 College Way North, Seattle, WA 98103

[www.northseattle.edu](http://www.northseattle.edu)



**NORTH SEATTLE  
COLLEGE**

*One of the Seattle Colleges*

### *Industrial Power and Control*

**Industrial Power and Control** - Course content emphasizes the control of large electrical currents and large electromechanical systems through solid state, digital and microprocessor devices. The program provides in-depth study of industrial controls, fluid power, AC and DC rotating equipment, instrumentation and measurement, and system control principles.

Upon completion of the degree, students are able to:

- Identify and apply technical concepts and terms used in industrial energy and control.
- Analyze and troubleshoot industrial energy generation, conversion and control systems.
- Use electronic circuit simulation software for circuit design and analysis.
- Repair, maintain and install electronic and electrical control systems.
- Locate, evaluate, and apply relevant information from various sources to address workplace problems.

**Career options:** Industrial Power and Control is a two-year program that prepares students for immediate employment and future advancement in companies or government organizations that manufacture, service, sell, design or support electrical and electronic systems that control machinery, automation, and/or processes.

**Degree offered:** Associate of Applied Science: Industrial Power and Control (111 credits)

**Certificate offered:** Industrial Power and Control (71-73 credits)

## Peninsula College

1502 East Lauridsen Blvd. Port Angeles, WA 98362

[www.pencol.edu](http://www.pencol.edu)



**PENINSULA  
COLLEGE**

### *Entrepreneurship*

**Entrepreneurship** - The Energy and Innovation Entrepreneurship Certificate program prepares students for new venture planning, entrepreneurial start-up, social media marketing, and entrepreneurial finance. The program teaches students how to build a successful entrepreneurial venture from the ground up including analysis of an entrepreneurial mind set, market assessment, how to write a business plan, and innovative social media marketing strategies. This program is designed to allow students in Energy Technology and other innovation programs the opportunity to gain the knowledge and understanding of entrepreneurship.

This program introduces future entrepreneurs to key opportunities in the energy and innovation market place. It also includes an overview of energy revenue streams, concepts of supply and demand, pricing and marketing, federal regulatory and localized rate case impacts and the changing role of customers in the energy economy.

This program was created in collaboration with the Pacific Northwest Center of Excellence for Clean Energy and Grays Harbor College.

**Certificate Offered:** Entrepreneurship (24 Credits)





## *Sustainable Building, Engineering Technology*

**Bachelor of Applied Science: Sustainable Building Science Technology** - This program prepares students who have completed an apprenticeship program, a two-year technical degree or approved associate degree and have 2-5 years of related work experience. This unique, 90-credit degree prepares working adult students to apply expertise and systems knowledge to support highly technical building operations, focusing on the complexities of building science, energy codes, building codes and facility management. Students advance their careers in building functions and finance in order to manage structures that are healthier and more durable, efficient, economical, and sustainable. The degree is taught in a hybrid format, 80% online and 20% in person, with class meetings held at the Seattle Georgetown campus once a month.

**Career Options:** This 90-credit degree program offers industry professionals a pathway to becoming a skilled Building Science Professional.

**Degree offered:** Bachelor of Applied Science: Sustainable Building Science Technology (90 credits)

**Engineering Technology** - Engineering technicians play a key role in implementing designed solutions to technical problems. These tasks are accomplished with a solid background in mathematics, physics, and applied engineering, as well as skills in problem-solving and creative thinking. Successful graduates of the engineering technology program are qualified to seek employment as engineering technicians or may transfer to a four-year college to pursue a degree in Engineering or Engineering Technology. We also offer a full range of pre-engineering tracks, including electrical and mechanical engineering designed to transfer to university engineering programs.

**Degree offered:** Associate of Applied Science: Engineering Technology (95 credits); Associate of Science in Engineering (Track 2) (90 credits); Associate of Science in Computer and Electrical Engineering (101 credits); Associate of Science Other Engineer (107 credits)

**Certificate offered:** None

**Programs offered at:**

Georgetown Campus

Puget Sound Industrial Excellence Center/

Apprenticeship & Education Center

6737 Corson Avenue South, Seattle, WA 98108

Phone: (206) 934-5350



*Courtesy of Puget Sound Energy*

## Clean Energy Technology

**Clean Energy Technology** - The Clean Energy Technology Associate in Applied Arts and Sciences degree is designed to provide students with the theoretical and practical knowledge and skills necessary for a career in sustainable design, construction, maintenance and management. Upon completion of the degree, students are prepared for to take the the Photovoltaic Entry Level Exam through the North American Board of Certified Energy Practitioners (NABCEP). Shoreline works with professional affiliates, advisory committees and accreditation guidelines to ensure students receive the knowledge and skills currently in demand for employment.

Graduates have an understanding of alternative energy and high performance and zero energy building practices including alternative energy systems, green building techniques, and designing and installing residential and commercial electric, metering and control systems. Emphasis is on residential and commercial buildings with specialties in passive solar and sustainable (green) building Design and photovoltaic (solar electric) system. A strong-hands-on component is obtained through the use of Washington State University's Zero Energy House, which is permanently located on the main campus of Shoreline Community College.



*Residential solar in Thurston County.  
Photo Courtesy of South Sound Solar*

**Career options:** Graduates can work as utility conservationist; solar certification specialists; solar customer service professional; entry level energy consultant; green building project specialist; inventory control specialist-solar; solar-process data miner; renewable energy educational liaison; solar PV system designer; solar sales consultant; solar technical support; construction trainee; energy auditor; and LEED documenters.

**Degree offered:** Associate of Applied Arts and Sciences: Clean Energy Technology (90 credits)

**Certificate offered:** Certificate of Proficiency: Clean Energy Technology (45 credits)



## *Electrical Maintenance & Automation, Energy Technology - Power Operations*

**Electrical Maintenance & Automation** - Electrical maintenance technicians are responsible for the maintenance, testing, repair, and/or replacement of the electrical systems and controls found in modern industrial plants and large commercial buildings. As the electrical systems become more sophisticated, so must the skills of the electrical maintenance technician. By mixing the theoretical with practical hands-on lab experiences using modern up-to-date industrial equipment and techniques, the student will be prepared for a challenging career in electrical maintenance.

**Career options:** Employment opportunities are being created by the expanding industrial and manufacturing sector in the Pacific Northwest. The energy changeover to alternate energy sources (which are primarily electrical) are expected to make the long-range demand for industrial electricians even greater. Ever increasing automation and mechanization of processing and manufacturing plants have created a need for well-trained entry-level electrical maintenance technicians.

Potential positions include but are not limited to: electrical apprentice, electric service technician, industrial plant electrician technician found in automated manufacturing industries such as wood and paper products, food processing, metals processing, hydro projects, and equipment manufacturing.

**Degrees offered:** Associate of Applied Science: Electrical Maintenance & Automation (123 credits); Associate of Applied Science: Power Systems Maintenance (123 credits)

### *Ione Campus*

**Energy Technology - Power Operations** - The Energy Technology/Power Operations AAS program is broadcast through interactive virtual classrooms at Centralia College. This program prepares students to compete for entry-level positions such as power plant operator, substation operator, technician, and other high voltage pre-apprentice and apprenticeship positions within the energy industry. Upon successful completion of the program students are able to:

- Describe the basic concepts of electron flow, magnetism, and Ohm's Law
- Describe how electricity is generated, transmitted, and distributed
- Specialize in generation, metering, power transmission, substation operations, boiler operations, hydro dam operations, plant mechanics, and wind or solar generation.
- Successfully take the entrance-exams for entry level jobs and apprenticeships.

Program advisors include industry and organized labor leaders from Avista, Bonneville Power Administration, Centralia City Light, IBEW 77, Lewis County PUD, Puget Sound Energy, Seattle City Light, Tacoma Power and The Washington State Labor Council.

**Career options:** The program prepares students for entry level positions such as power plant assistant control operator, technician, and other high voltage apprenticeships. Jobs in this field include but are not limited to: power generation, transmission, metering, substation operations, plant mechanics, and boiler operations.

**Degree offered:** Associate of Applied Science: Energy Technology – Power Operations (100-110 credits)



## Lineworker

Participants learn the skills and knowledge required of a line crew helper. Students learn to set and climb poles, install crossarms, hardware, line, and transformers. They learn how to use various tools and equipment of the trade through actual field experience. Overhead and underground construction practices are taught along with associated subjects such as basic electricity, transformers, etc. Classroom training covers safety, electrical theory, interviewing skills, and the importance of attitude and teamwork to succeeding in today's work environment. Participants are exposed to classroom instruction along with physically demanding outdoor construction work in varying weather conditions. Students are assigned to crews for the more demanding tasks and for actual crew experience. Safety and teamwork are stressed throughout the course. Participants are expected to become accustomed to heights while pole climbing and to complete a variety of tasks while on the pole. A typical day starts with three to four hours of classroom work such as safety briefings/tailboards, electrical theory, math, and interviewing skills. The rest of the day is spent in the training yard doing hands-on training.

The line construction trade requires an extreme physical fitness level, hard work, and commitment both mentally and physically. Students must be able to work under pressure and make quick, sound decisions. The trade sounds fun and looks cool, but it is extremely dangerous. Lineworkers put their lives and the lives of their coworkers on the line every day.

This program assists you in obtaining a Class A CDL, First Aid/CPR card, Flagging Traffic Control card, and Forklift certification. These are NOT required for acceptance into the program.

This is NOT your typical college course. Students are expected to be in class every day just as they would be present at a job site. Tardiness and absenteeism are NOT tolerated. The class is very fast-paced, and missing one day or partial days puts a student too far behind in course work to catch up. Training is four months (78 days, 616 hours instruction time) divided into three steps. The course runs Monday through Friday, eight hours per day, with academic and skills training. Homework will be assigned. Testing and certifications may require some evening and/or weekend scheduling.



*Photos courtesy of Avista*



*Apprentice Lineman at work*



## Wind Technology

**Wind Energy Technology** - This program provides entry level training for wind energy and wind turbine generator technicians. The two-year technical training focuses on safety, power generation, distribution, electrical theory and control mechanisms, mechanical systems, along with crane rigging, bolt torque, and general education components. Wind Turbine Technicians play a key role in ensuring quality, safety and service involving the operation and maintenance of wind turbine units, performing mechanical and electrical troubleshooting, as well as repair and preventative maintenance. Work may include basic circuits, electrical motors and their controls, electronic controls, programmable logic controllers and variable frequency drives. Wind Turbine Technicians install and maintain, repair and replace malfunctioning parts and equipment, transmissions and drives, programmable logic controllers, motors, and breakers.

**Career options:** The need for employees to service the wind generators and wind turbines will increase. Approximately 250 technicians are needed in the next five to seven years within a 50 mile radius of WWCC, Walla Walla and Clarkston campuses. Work may include basic circuits, electrical motors and their controls, electronic controls, programmable logic controllers, and variable frequency drives. Potential careers for Wind Energy and Wind Turbine Technology graduates include positions such as wind technician, high voltage technician, electronic technician, relay technician, and supervisor.

**Degree offered:** Associate in Applied Arts and Sciences: Wind Energy Technology (100.2 credits)

**Certificate offered:** Wind Energy Technology (63.2 credits)



*Photos courtesy  
of Puget Sound  
Energy*







## Electrical Technology, Plant Operations

**Electrical Technology** - Electrical Technicians apply technical knowledge and skills to operate, maintain and repair electric apparatus and systems. Such systems include residential, commercial, industrial and power generation. This program provides entry level training with emphasis on the new technology for controls and energy efficiency. Two year technical training covers safety, electrical theory, applied wiring, controls, electric motors, electronics, programmable logic controllers, and power generation–distribution.

**Career options:** There is a need for trained electrical employees for installation and maintenance. Energy is a very important part of our nation's future, and new technologies to save energy are emerging every day. Work may include but is not limited to: installation of new systems - residential and commercial, basic circuit repair/troubleshooting, advanced control circuit repair/troubleshooting, electrical motors and motor maintenance, and programmable logic controller programming

**Degree offered:** Associate in Applied Arts and Sciences: Electrical Technology (95.6-105.6 credits)

**Certificate offered:** Electrical Technology (64 credits)

**Plant Operations** - This program prepares students Plant Operators and Technicians to work for facilities that convert biomass into electricity, heat, transportation fuels, clean water, and/or high-value chemicals and products.

**Career options:** Safe, skilled, professional, and motivated technicians and operators are in demand for first generation and advanced biofuel plants, municipal wastewater treatment plants, industrial food and beverage processors, pulp and paper mills, and cogeneration facilities.

**Degree offered:** Associate in Applied Arts and Sciences Degree in Plant Operations (111.4-121.4 credits), Applied Associate in Science Transfer with emphasis in Plant Operations with emphasis in Bioenergy

**Certificate offered:** Plant Operations Certificate (51.4 credits), Biomass Feedstock Management Certificate (52.4 credits) Short Certificate in Bioproducts (20 credits)



*Walla Walla students on a field trip at ZeaChem in Boardman, Oregon*



## Electrical Technology

**Electrical Technology** - The Electrical Technology program guides students through the steps required to become a construction or industrial maintenance electrician. With successful completion of this 24-month program at Perry Technical Institute and the required Yakima Valley Community College classes, students receive an Associate of Applied Science Degree in Electrical Technology. The diversified curriculum covers everything from electrical math and AC/DC fundamentals to National Electric Code and solid state electrical fundamentals. Gain valuable theory and hands-on application through classroom assignments, shop experience and fieldwork.

In the two-year program, you'll learn how to install, connect, test, and maintain electrical systems for industrial, commercial, residential, process control, security, and communications. The Washington State Department of Labor and Industries recognizes two years of training toward journeyman certification.



Electricians work in nearly every industry. Work in the construction field, in industrial settings such as manufacturing plants, or for contractors maintaining and repairing existing electrical systems.

The advent of new technologies, increased use of automation, and the need to retrofit outdated structures is increasing the demand for electricians.



**Career options:** Upon graduation, you'll be qualified to take a variety of career paths. You can work in the construction field; in industrial settings such as manufacturing plants; and for electrical contractors maintaining and repairing existing electrical systems. Electricians work in nearly every industry.  
**Degree offered:** Associate of Applied Science: Electrical Technology

*A partnership between Yakima Valley Community College and Perry Technical Institute provides students the opportunity to receive an Associate of Applied Science Degree in different technical areas. Students take the technical program at Perry Technical Institute and complete 27 credits at YVCC to receive an Associate of Applied Science Degree. 24 of the 27 credits must be YVCC classes. Perry Technical Institute: 2011 W Washington Ave., Yakima; [www.perrytech.edu](http://www.perrytech.edu)*

*Photos courtesy of Yakima Valley Community*

## Pre-Engineering Programs

Solve technical problems with Math & Science! Engineering is essentially solving problems by using science to design applications. These Colleges offer pre-engineering programs that cover the courses typical of the first two years of an engineering degree.

**Bellevue College** - [www.bellevuecollege.edu](http://www.bellevuecollege.edu)  
**Bellingham Technical College** - [www.btc.edu](http://www.btc.edu)  
**Cascadia Community College** - [www.cascadia.edu](http://www.cascadia.edu)  
**Centralia College** - [www.centralia.edu](http://www.centralia.edu)  
**Everett Community College** - [www.everettcc.edu](http://www.everettcc.edu)  
**Green River Community College** - [www.greenriver.edu](http://www.greenriver.edu)  
**Lake Washington Institute of Technology** - [www.lwtech.edu](http://www.lwtech.edu)  
**Lower Columbia Community College** - [www.lowercolumbia.edu](http://www.lowercolumbia.edu)  
**North Seattle Community College** - [www.northseattle.edu](http://www.northseattle.edu)  
**Olympic College** - [www.olympic.edu](http://www.olympic.edu)  
**Shorline Community College** - [www.shoreline.edu](http://www.shoreline.edu)  
**South Seattle Community College** - [www.southseattle.edu](http://www.southseattle.edu)  
**Spokane Falls Community College** - [www.spokanefalls.edu](http://www.spokanefalls.edu)  
**Tacoma Community College** - [www.tacomacc.edu](http://www.tacomacc.edu)

## Scholarship Opportunities

**The Institute of Electrical and Electronics Engineers Power & Energy Society (IEEE PES)** - is an association dedicated to advancing innovation and technological excellence for the benefit of humanity. Student members have access to mentors, who are professionals in power engineering, and scholarships!

**IEEE-PES Scholarship Plus Initiative** – awardees receive up to \$7,000 over three years and opportunities for 2 – 3 years of career experience with leading industry employers. (<http://ieee-pes.org>)

**American Public Power Association (APPA)** - Public power is a collection of more than 2,000 community-owned electric utilities, serving more than 48 million people or about 14 percent of the nation's electricity consumers. **Demonstration of Energy and Efficiency Developments (DEED)** - DEED offers four types of scholarships: Educational, Student Internship, Student Research Grant, and Technical Design Project. (<http://www.publicpower.org/>)

### Educational Scholarships

Provides funding to support the education of students working toward technical careers that are in short supply and high demand by electric utilities. \$2,000 per scholarship paid directly to student's university.

### Student Internships

These paid internships provide work experience at an electric utility sponsored by a DEED member utility. \$4,000 plus up to \$1,000 in travel funds to attend applicable conference.

### Student Research Grants

These student grants provide funding to support research in an energy-related project. \$4,000 plus up to \$1,000 in travel funds to attend applicable conference.

### Technical Design Projects (TDP)

Provides funding to support students working on a technical project of interest to electric utilities, especially engineering students working on their senior project. \$5,000 paid directly to student by DEED; up to \$3,000 in travel funds to share project results.

# Multi-Occupational Trade Degrees

Multi-occupational degrees provide journeymen-level workers with education designed to prepare them for advancement in their chosen field. These programs are suitable for candidates who have completed a Joint Apprenticeship Training Committee approved apprenticeship program with a minimum of 6,000 clock hours of instruction in technical skills and at least 432 clock hours of related supplemental classroom instruction.

The following schools offer Multi-Occupational Degrees:

**Bates Technical College** (Apprenticeship Studies Degree)- [www.bates.ctc.edu](http://www.bates.ctc.edu)  
Partners: Sellen, Absher, Skanska, McKinstry, MacDonald Miller, GLY

**Centralia College** - [www.centralia.edu](http://www.centralia.edu)  
Partners: Avista, Puget Sound Energy

**Columbia Basin College** - [www.columbiabasin.edu/index.aspx](http://www.columbiabasin.edu/index.aspx)

**Everett Community College**  
Partners: IAM/Boeing, Snohomish County PUD

**Olympia College:**  
Partners: Puget Sound Naval Shipyard

**Renton Technical College** - [www.rtc.edu](http://www.rtc.edu)  
Partners: Sellen, Absher, Skanska, McKinstry, MacDonald Miller, GLY

**South Seattle College** - [www.southseattle.edu](http://www.southseattle.edu)  
Partners: Seattle City Light, Snohomish County PUD, Puget Sound Electrical, Sellen, Absher, Skanska, McKinstry, MacDonald Miller, GLY, IAM/Boeing

**Spokane Community College** - [www.ccs.spokane.edu](http://www.ccs.spokane.edu)  
Partners: Avista, Concrete Cutters inc, McKinstry Spokane, ACI NW, Coffman Engineers, ICON Corporation, Lydig Construction, Graham Construction, Garco Construction, IAM/Boeing

**Wenatchee Valley College** - [www.wvc.edu/default.asp](http://www.wvc.edu/default.asp)  
Partners: Chelan County PUD

## What is Apprenticeship?

“Apprenticeship is a combination of on-the-job training (OJT) and related classroom instruction under the supervision of a journey-level craft person or trade professional in which workers learn the practical and theoretical aspects of a highly skilled occupation.” ~*Washington State Department of Labor and Industries*

The energy industry trades require skilled crafts people to perform jobs. Apprenticeship is a required training program for most of these journey level positions.

### Helpful resources for Apprentices:

**Bonneville Power Administration Apprenticeships** - [www.bpa.gov/Careers/Apply/Pages/Apprenticeships.aspx](http://www.bpa.gov/Careers/Apply/Pages/Apprenticeships.aspx)

**Chelan County P.U.D. Apprenticeships** - [www.chelanpud.org/Apprenticeships.html](http://www.chelanpud.org/Apprenticeships.html)

**Idaho Power Apprenticeships** - [www.idahopower.com/Careers/Apprenticeships/descriptions.cfm](http://www.idahopower.com/Careers/Apprenticeships/descriptions.cfm)

**Seattle City Light Apprenticeships** - [www.seattle.gov/light/careers/apprentice/default.asp](http://www.seattle.gov/light/careers/apprentice/default.asp)

**Tacoma Public Utilities Apprenticeships** - [www.mytpu.org/jobs/tacoma-power-apprenticeships.htm](http://www.mytpu.org/jobs/tacoma-power-apprenticeships.htm)



## *Community and Technical College Applied Energy Bachelors Degrees*

Applied bachelor's degrees fill skill gaps in practical, market-driven fields where job requirements have advanced beyond the associate degree level. They add junior and senior levels to two-year professional-technical (vocational) degrees that would otherwise not transfer and count toward bachelor's degrees at universities. The degrees vary from a two-year management track on top of a two-year technical education, or a continuation of a professional-technical degree.

**Cascadia College** - Bachelor of Applied Science in Sustainable Practices - This program is designed for students who have completed a two-year degree in a related subject or who meet the distribution requirements through prior college coursework. Students work closely with faculty and a dedicated advisor to complete 90 credits of upper division coursework such as "Social Perspectives on Sustainable Practices" and "Earth Systems and Global Climate Change". [www.cascadia.edu/programs/degrees/bassp.aspx](http://www.cascadia.edu/programs/degrees/bassp.aspx)

**South Seattle College** - Bachelor of Applied Science in Sustainable Building Science Technology - This program prepares students who have completed an apprenticeship program, a two-year technical degree or approved associate degree and have 2-5 years of related work experience. This unique, 90-credit degree prepares working adult students to apply expertise and systems knowledge to support highly technical building operations, focusing on the complexities of building science, energy codes, building codes and facility management. Students advance their careers in building functions and finance in order to manage structures that are healthier and more durable, efficient, economical, and sustainable. The degree is taught in a hybrid format, 80% online and 20% in person, with class meetings held at the Seattle Georgetown campus once a month. [www.southseattle.edu/programs/bas](http://www.southseattle.edu/programs/bas)

## *Energy-Related Bachelors Degrees*

**Central Washinton Univeristy** - [www.cwu.edu/engineering/electronics-engineering-technology-program](http://www.cwu.edu/engineering/electronics-engineering-technology-program)

**Eastern Washington University** - [www.ewu.edu/cstem/programs/engineering](http://www.ewu.edu/cstem/programs/engineering)

**Evergreen State College** - [www.evergreen.edu/academics/home](http://www.evergreen.edu/academics/home)

**University of Washington** - [www.ee.washington.edu](http://www.ee.washington.edu)

**Western Washington University** - [energy.wvu.edu/programs](http://energy.wvu.edu/programs)

**Washington State University, Everett** - [everett.wsu.edu/majorsdegrees/electrical-engineering](http://everett.wsu.edu/majorsdegrees/electrical-engineering)

**Washington State University, Tri-Cities** - [tricitie.wsu.edu/electricalengineering](http://tricitie.wsu.edu/electricalengineering)

**Washington State University, Vancouver** - [ecs.vancouver.wsu.edu/electrical-engineering](http://ecs.vancouver.wsu.edu/electrical-engineering)



*Chelan County PUD Rocky Reach Dam*

# *From Shipyard to Heat Pumps: One Woman's Path to Success in the Clean Energy Field*

by Lisa Brunette

It was 2007, and Sara Bowles found herself out of a job. She'd survived the first round of layoffs at Westport Shipyard in Hoquiam, but the second one swiped a position as metal polisher right out from under her.

"I loved that job," she says, recalling with fondness how she often came home covered in metal dust. "It was a killer job for the area, too. Close to town, good benefits, weekends off."

The problem was, the maritime pleasure craft industry wasn't exactly recession proof. She did finish work on metal handrails and other parts that went into multimillion dollar yachts, and when the economy tanked, there wasn't as much call for those.

She'd been good at it, too. Like a lot of women, Bowles had an eye for detail that made her well-suited to finish work, and she'd always been good with her hands, typically drawn to hobbies like furniture staining, or rewiring lamps. Growing up in the woods outside Monroe, Wash., she never shied away from any work due to her gender. "I always had the mindset that I could do anything you can do and probably better," Bowles says.

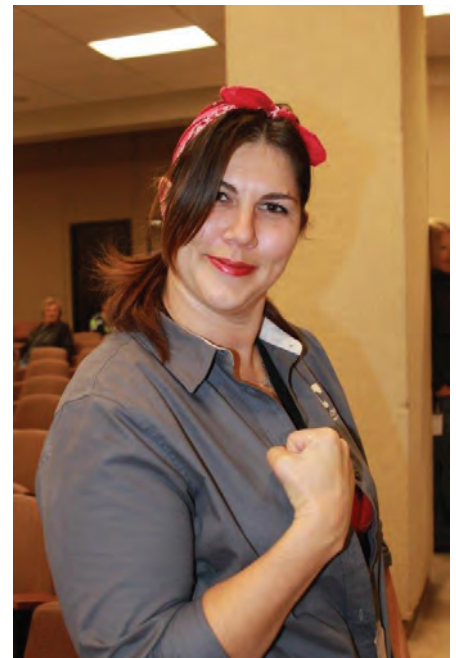
So when the layoffs hit the shipyards, Bowles knew her next career move had to be recession-proof. As a single mother, she had to position herself to stay employed no matter what happened to the economy. Her daughter depended on her.

"I figured there would always be work in the energy industry because of our society's growing reliance on power," explains Bowles. And fortunately for her, Grays Harbor College and Centralia College had a partnership that allowed her to earn an Applied Associates in Science Degree in Energy Technology. She was able to take classes taught by Centralia professors like Rulon Crawford and John Steidel remotely, learning about power plant operations.

The curriculum covered power generation from all sources, transmission and distribution, basic electricity, and most importantly for Sara, energy efficiency.

"Energy efficiency spoke to me," Bowles says. "I like the idea of leaving the Earth clean for the next generation."

By 2010, she'd earned her AAS. But highly driven, she looked for ways she could get even more out of her education.



*Bowles as "Rosie the Riveter", an icon for many women in the trades. Rosie the Riveter was popularized during WWII when women filled trade roles left by men called to the front lines.*



*Student at Bates Technical College Electrical Construction Program*



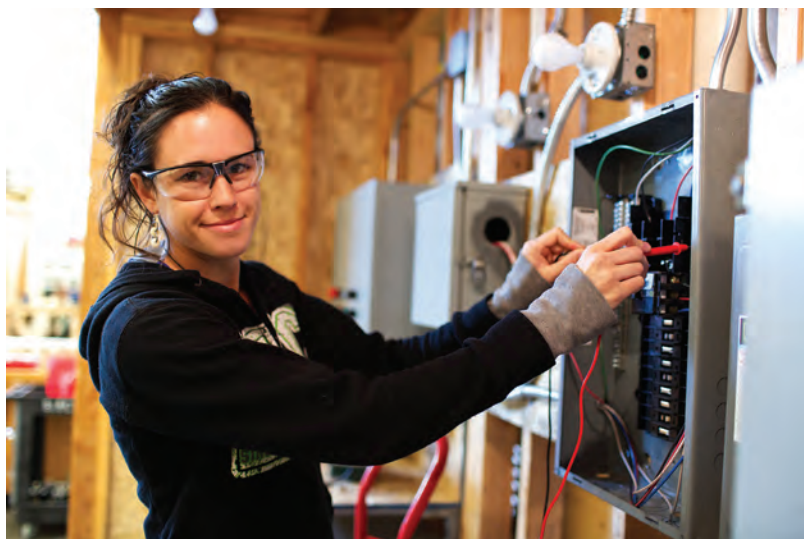
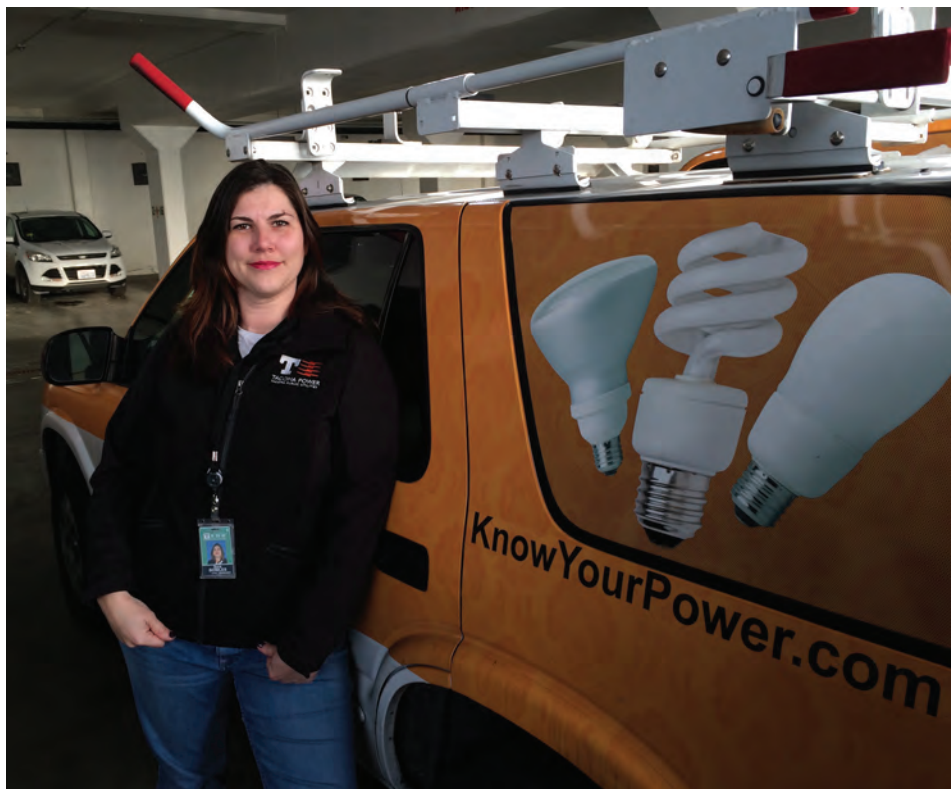
Evergreen State College's Upside Down Degree program fit the bill. It allowed Bowles to take the broad-based general courses she hadn't previously taken while honoring the energy-specific education she had, all within her already defined career focus. Evergreen had an articulation agreement with Grays Harbor College that made this possible. "They accepted all my credits and had the curriculum that allowed me to build further on my energy tech degree," says Bowles.

She earned a Gates Foundation scholarship for the first year, with student loans filling in the second. Her schooling included a paid internship with the Lewis Economic Development Council, which gave her the opportunity to run the Lewis County Energy Program focused on a commercial lighting program funded by the WSU energy grant. When that grant ended, she worked for a while at The Center of Excellence for Clean Energy. And then she landed her dream job.

Bowles is now Tacoma Power's Residential Conservation Program Coordinator. "It's a mouthful of a title," she says. She works primarily with the ductless heat pump and duct sealing program. The heat pumps use what she rattles off as a "super simple inverter-driven technology with a variable speed fan indoors and no ductwork for heat to escape."

As part of her work in the field, she conducts inspections, routinely climbing into crawl spaces under her customers' houses. Even if a male customer doesn't initially warm to the idea of a woman inspector, by the time Bowles suits up and ventures into that territory, she's earned his respect. "Wow, I don't even want to go down there, some of them will say."

It's been a long and winding road since Bowles lost that shipyard job, but she loves her work now even more. "If I can spend 30 years at Tacoma Power," she says, "I will."



*Student at Bellingham Technical College Electrician Program*



## *National Energy Career Websites*

**Society of Women Engineers** - [www.societyofwomenengineers.swe.org](http://www.societyofwomenengineers.swe.org)

**Get Into Energy** - [www.getintoenergy.jobs](http://www.getintoenergy.jobs)

**Department of Energy** - [www.energy.gov](http://www.energy.gov)

**Energy Central** - [www.energycentraljobs.com](http://www.energycentraljobs.com)

**Northwest Public Power Administration** - [www.nwppa.org](http://www.nwppa.org)

**Energy Job Search** - [www.thinkenergygroup.com](http://www.thinkenergygroup.com)

**Careers in Wind Energy** - [www.awea.org](http://www.awea.org)

**Careers in Hydropower** - [www.hydro.org](http://www.hydro.org)

## *Energy Industry Employers in Washington*

**Atlantic Power Corporation** - Private Electric - [www.atlanticpower.com](http://www.atlanticpower.com)

**Avista** - Private Electric - [www.avistacorp.com](http://www.avistacorp.com)

**Benton County PUD** - PUD Electric - [www.bentonpud.org](http://www.bentonpud.org)

**Big Bend Electric Cooperative Inc.** - Cooperative Electric - [www.bbec.org](http://www.bbec.org)

**Blaine City Light** - Municipal Electric - [www.cityofblaine.com](http://www.cityofblaine.com)

**Bonneville Power Administration (BPA)** - Wholesale Electric - [www.bpa.gov](http://www.bpa.gov)

**Bureau of Indian Affairs (BIA)** - Federal Entity - [www.bia.gov](http://www.bia.gov)

**Bureau of Reclamation** - Federal Entity - [www.usbr.gov](http://www.usbr.gov)

**Centralia City Light** - Municipal Electric - [www.cityofcentralia.com](http://www.cityofcentralia.com)

**Chelan County PUD** - PUD Electric - [www.chelanpud.org](http://www.chelanpud.org)

**Cheney Power** - Municipal Electric - [www.cityofcheney.org](http://www.cityofcheney.org)

**City of Cashmere** - Municipal Electric - [www.cityofcashmere.org](http://www.cityofcashmere.org)

**City of Ellensburg** - Municipal Electric - [wa-ellensburg.civicplus.com](http://wa-ellensburg.civicplus.com)

**City of McCleary** - Municipal Electric - [www.cityofmcclary.com](http://www.cityofmcclary.com)

**City of Milton** - Municipal Electric - [www.cityofmilton.net](http://www.cityofmilton.net)

**City of Richland** - Municipal Electric - [www.ci.richland.wa.us](http://www.ci.richland.wa.us)

**City of Sumas** - Municipal Electric - [cityofsumas.homestead.com](http://cityofsumas.homestead.com)

**Clallam County PUD** - PUD Electric - [www.clallampud.net](http://www.clallampud.net)

**Clark County PUD** - PUD Electric - [www.clarkpublicutilities.com](http://www.clarkpublicutilities.com)

**Columbia REA** - Cooperative Electric - [www.columbiarea.com](http://www.columbiarea.com)

**Covanta Energy** - Private/Electric - [www.covanta.com](http://www.covanta.com)

**Cowlitz County PUD** - PUD Electric - [www.cowlitzpud.org](http://www.cowlitzpud.org)

**Douglas County PUD** - PUD Electric - [www.douglaspu.org](http://www.douglaspu.org)

**Elmhurst Mutual Power & Light Co.** - Cooperative Electric - [www.elmhurstmutual.org](http://www.elmhurstmutual.org)

Enel North America Inc. - Private/Electric - [www.enelgreenpower.com](http://www.enelgreenpower.com)  
Energy Northwest - Private/Electric - [www.energy-northwest.com](http://www.energy-northwest.com)  
Enwave Seattle - Private/Electric - [www.enwaveseattle.com](http://www.enwaveseattle.com)  
Ferry County PUD - PUD Electric - [www.fcpud.com](http://www.fcpud.com)  
Grant County PUD - PUD Electric - [www.grantpud.org](http://www.grantpud.org)  
Grays Harbor County PUD - PUD Electric - [www.ghpud.org](http://www.ghpud.org)  
Inland Power & Light - Cooperative Electric - [www.inlandpower.com](http://www.inlandpower.com)  
Jefferson County PUD - PUD Electric - [www.jeffpud.org](http://www.jeffpud.org)  
Kittitas County PUD - PUD Electric - [www.kittitaspud.com](http://www.kittitaspud.com)  
Klickitat County PUD - PUD Electric - [www.kittitaspud.com](http://www.kittitaspud.com)  
Kootenai Electric Cooperative Inc. - Cooperative Electric - [www.kec.com](http://www.kec.com)  
Lewis County PUD - PUD Electric - [www.lcpud.org](http://www.lcpud.org)  
Mason County PUD #3 - PUD Electric - [www.masonpud3.org](http://www.masonpud3.org)  
McKinstry - Design/Build/Operate/Maintain - [www.mckinstry.com](http://www.mckinstry.com)  
Modern Electric Water Company (Spokane Valley) - Cooperative Electric - [www.mewco.com](http://www.mewco.com)  
Nespelem Valley Electric Cooperative - Cooperative Electric - [www.nvec.org](http://www.nvec.org)  
Okanogan PUD - PUD Electric - [www.okanoganpud.org](http://www.okanoganpud.org)  
Orcas Power & Light - Cooperative Electric - [www.opalco.com](http://www.opalco.com)  
Pacific County PUD - PUD Electric - [www.pacificpud.org](http://www.pacificpud.org)  
PacifiCorp - Private/Electric - [www.pacificcorp.com](http://www.pacificcorp.com)  
Pend Oreille PUD - PUD Electric - [www.popud.org](http://www.popud.org)  
Peninsula Light Company - Cooperative Electric - [www.penlight.org](http://www.penlight.org)  
Port Angeles City Light - Municipal Electric - [wa-portangeles.civicplus.com](http://wa-portangeles.civicplus.com)  
Puget Sound Energy - Private/Electric - [www.pse.com](http://www.pse.com)  
Seattle City Light - Municipal Electric - [www.seattle.gov/light](http://www.seattle.gov/light)  
Skamania PUD - PUD Electric - [www.skamaniapud.com](http://www.skamaniapud.com)  
Snohomish County PUD - PUD Electric - [www.snopud.com](http://www.snopud.com)  
Tacoma Power - Municipal Electric - [www.mytpu.org](http://www.mytpu.org)  
Tanner Electric Cooperative - Cooperative Electric - [www.tannerelectric.coop](http://www.tannerelectric.coop)  
Tenaska Washington Partners II, L.P. - Private/Electric - [www.tenaska.com](http://www.tenaska.com)  
Town of Eatonville - Municipal Electric - [www.eatonville-wa.gov](http://www.eatonville-wa.gov)  
Town of Steilacoom - Municipal Electric - [www.townofsteilacoom.com](http://www.townofsteilacoom.com)  
Transalta - Independent Power Plant - [www.transalta.com](http://www.transalta.com)  
United States Army Corps of Engineers - Federal Entity - [www.usace.army.mil](http://www.usace.army.mil)  
Vera Water & Power - PUD Electric - [www.verawaterandpower.com](http://www.verawaterandpower.com)  
Wahkiakum County PUD - PUD Electric - [www.wahkiakumpud.org](http://www.wahkiakumpud.org)  
Whatcom County PUD - PUD Electric - [www.pudwhatcom.org](http://www.pudwhatcom.org)



## Washington State Community and Technical Colleges

Colleges in green offer energy and electrical programs

- 1 - Bates Technical College
- 2 - Bellevue College
- 3 - Bellingham Technical College
- 4 - Big Bend CC
- 5 - Cascadia College
- 6 - Centralia College
- 7 - Clark College
- 8 - Clover Park Technical College
- 9 - Columbia Basin College
- 10 - Edmonds CC
- 11 - Everett CC
- 12 - Grays Harbor College

- 13 - Green River College
- 14 - Highline College
- 15 - Lake Washington Institute of Technology
- 16 - Lower Columbia College
- 17 - North Seattle College
- 18 - Olympic College
- 19 - Peninsula College
- 20 - Pierce College-Fort Steilacoom
- 21 - Pierce College-Puyallup
- 22 - Renton Technical College
- 23 - Seattle Central College
- 24 - Shoreline CC

- 25 - Skagit Valley College
- 26 - South Puget Sound CC
- 27 - South Seattle College
- 28 - Spokane CC
- 29 - Spokane Falls CC
- 30 - Tacoma CC
- 31 - Walla Walla CC
- 32 - Wenatchee Valley College
- 33 - Whatcom CC
- 34 - Yakima Valley CC

Courtesy State Board for Community and Technical Colleges at <http://www.sbctc.ctc.edu>

For the most current information, visit <http://cleanenergyexcellence.org/CollegePrograms>