

## Clean Technology and Energy Sector

### Sector Strategy Update: June 2024

Prepared by the CleanTech Alliance, in partnership with  
the Pacific NW Center of Excellence for Clean Energy

**Please describe the greatest workforce needs facing your sector, with a focus on needs that career connected learning strategies can help to address.**

The workforce needs facing the clean technology/energy sector are varied and compounded by the fact that technology is moving faster than training opportunities. Clean energy/technology companies vary widely in composition - from small and large, new and old, and public and private. Some companies have a long history in this sector, while some are newly transitioning to a clean energy economy. Energy demand in America will triple, or quadruple, in the coming years (Miller, 2023), and delivering energy will be dependent on new generation, updated transmission lines, and newly installed efficiencies. None of this will be possible without a dynamic, growing, and diversified workforce.

Utilities, building owners and operators, and fleet managers are all rapidly adjusting to new goals, finding a new equilibrium in meeting state/federal initiatives, maintaining compliance with federal requirements, recruiting, and developing a diverse workforce. Utilities also face the need to keep electricity affordable, reliable, and sustainable, and for them these changes are aggravated by competition for engineers and IT employees. ; They need to enhance cyber security, are experiencing some of the highest attrition rates in history, and observe an overall lack of energy career knowledge.

In Washington state, there are 78,000 clean energy jobs, with the majority focusing on energy efficiency and renewable energy subsectors, such as solar, wind, low-impact hydroelectric, hydrokinetic, and geothermal energy (E2, 2022).

Many emerging clean technology/energy companies are still growing, with products and concepts such as hydrogen fuel cells and fusion reactors still in development. Along with the products, many of the positions within these companies are still changing as roles and needs evolve. These companies often do not have the resources to host internships and build workforce development programs, but the need for a well-trained workforce for these sectors in the Pacific Northwest couldn't be clearer and more compelling:

- The **Electricity** sector supports a 43% job growth (nearly 44,400 jobs) between 2021 and 2030, driven by increases in land-based wind, transmission, distribution, and solar.
- The **Fuels** sector supports a 19% net increase (nearly 7,400 jobs) between 2021 and 2030. Hydrogen drives this growth, adding more than 11,000 jobs, while biofuels adds

more than 1,400.

- Between 2021 and 2030, the **Buildings** sector supports a 22% employment increase (over 32,500 jobs), driven largely by Commercial HVAC and residential shell jobs. In fact, all buildings subsectors are projected to grow as energy efficiency and building electrification and decarbonization efforts ramp up. Employment supported by the **Transportation** sector increases by about 1% (approximately 2,000 net jobs) between 2021 and 2030, reflecting decreases in employment in conventional fueling stations and, to a lesser extent, vehicle manufacturing, along with net growth in vehicle maintenance, wholesale trade parts, and EV charging stations. (CETI) (CETI, 2023)

To grow and diversify this sector, employers have identified the largest need as increasing awareness of possible careers and potential pathways. If job seekers are unaware of the opportunities that exist, they are unable to prepare for them. Producing qualified workers in all aspects of the clean technology/energy sector starts with awareness and demand for programs that lead to these great careers. Additional outreach must be conducted with women, minorities, rural communities, and other underrepresented groups.

The largest workforce need for utilities in this sector is funding so that innovative workforce programs can be started or scaled without impacting ratepayers and existing operations. Many Washington state utilities are cautious about spending customer funds on innovative programs and new technologies. They wait for innovations to be tested by those who acquire grants or use private funds before investing. This is true not only for tangible assets, but for training practices, such as hiring high school students into work-based learning programs.

The largest workforce need for engineers will require increasing available slots at in-state universities and preparing more in-state students for success in engineering and STEM fields. There is a critical need for stronger preparation chemistry, a major barrier for underrepresented students (Harris, 2020) and more hands-on teaching of general STEM courses at the university level (Urton, 2020). Washington state continues to rank as low as 49th in the nation in the production of engineers (University of Washington, 2017), based on the size of our engineering workforce. As sectors other than ours will be competing to employ those engineers, the needs are only compounded.

**Between now and June of 2025, what are your sector's 3-6 occupations that are highest-priority for building supportive career connected learning pathways? Please focus on occupations that lead to economic self-sufficiency.**

Currently, our priority jobs are:

- Engineer (all disciplines) (SOC 17-2000)
- Electrician (SOC 47-2110; 47-2111)
- Technicians (SOC 49-0000)

- HVAC Technician (SOC 49-9020)
- Electric Vehicle (EV) Technician (SOC 49-2096)
- Solar Photovoltaic Technician/Installer (SOC 47-2231)

Many of our sector’s high-priority jobs have significant overlap with other sectors. Electrician is an occupation of focus for Construction and Maritime as well. We recognize that there is an opportunity to create a cross-sector approach, while simultaneously understanding that those sectors and many of the training programs for electricians face shortages and are focused on training for their specific sectors. Funding to increase diversity and create rural programs is needed to meet the need of multiple growing sectors.

Similarly, while there is no need to create a ‘clean energy engineer’ degree program – we recognize that engineers are in demand by multiple sectors and industries and emphasize the need to continue to create more in-state degree opportunities. For instance, the emerging fusion industry will employ more engineers, across a myriad of disciplines, than plasma physicists as it prepares for commercialization (and then the need for technicians and advanced manufacturing workers will increase as this sub-sector moves into deployment).

Finally, we believe that micro-credentialing or shared prerequisites could also be a strong source of alignment between sectors. A key example is encouraging state-wide support to help youth get a driver’s license, as precursor to earning a commercial driver’s license, both critical to several high-priority occupations for our’s and other’s sector.

**For each of the occupations identified above, please provide the information below to help inform pathway development efforts and investments.**

<b>Occupation: Engineer</b> (all specialties)	<b>Sub-sector: All</b>
<b>Average wage:</b> \$109,235 (average across specialties, O*NET)	
<p><b>Which skills/competencies do employers use as a benchmark to hire someone in this occupation?</b></p> <ul style="list-style-type: none"> <li>● Understanding of physics, mathematics, and the practical application of engineering science and technology</li> <li>● Analysis, design, and construction of electrical power and communication systems</li> <li>● Experience with structural analysis software such as STAAD, SAP2000,</li> </ul>	<p><b>Which credentials do employers cite as a valuable benchmark to hire someone in this occupation?</b></p> <ul style="list-style-type: none"> <li>● Bachelor's degree or higher</li> <li>● Professional Engineer License</li> <li>● MCSE Certification</li> <li>● EI (Engineering Intern) or EIT (Engineer in Training) achieved by passing the FE (Fundamentals of Engineering) exam</li> </ul>

SAFE, STRUDL, or ANSYS	
<p><b>Please describe possible career progression opportunities for this occupation:</b>            Career progression opportunities in engineering can vary based on specialty and the field/industry of occupation. Many students participate in internships while in school and enter employment as entry or junior engineers before working up to more advanced positions. Based on specialty, advancement opportunities include positions such as: chief engineer, senior operations manager, professor, research engineer, or nuclear reactor engineer.</p>	
<p><b>Please describe the top barriers employers have identified to hiring for this occupation:</b>            Employers have identified barriers to hiring engineers, including a lack of candidates with the right technical skills and experience. At the same time, a small pool of candidates creates great demand and makes the competition to hire them difficult for small and medium-sized companies. Employers also mentioned that hiring candidates who align with the company's culture and values is difficult. Similarly, hiring a diverse workforce can be a challenge. Utilities have had difficulty hiring engineers with hands-on experience at a pay rate that competes with private companies.</p>	
<p><b>Please describe the type of programs or approaches employers have found helpful in hiring for this occupation:</b>            Employers seeking to fill engineering positions often find success through internship programs. These programs are an excellent way for students to get experience in the field and understand the company's work culture and the position's practical challenges. This approach is a great opportunity for employers to learn if the intern has the right skills, attitudes, and disposition to work as a full-time employee in the company. Each employer has a different approach to offering their internship program. Tacoma Power has partnered with MESA (Math Engineering Science Achievement) at PLU on a three-week summer high school internship program. Students received direct on-the-job experience, learned power systems and the utility environment, and had exposure to several key positions and careers at the utility. They also found that hosting engineering meet-and-greet events, where college engineering students met TPU engineers, helped increase applicants of their internship pool. Other examples include: Energy Northwest offers The Public Power Internship Program designed to encourage, attract, and increase the number of students and professionals interested in the Pacific Northwest public power industry. The program's intent is to build connections with students through on-campus activities such as mentoring and support. Lewis County PUD offers six different internship programs (one being engineering); and McKinstry offers the Build, Learn, Understand, and Enrich (BLUE) internship program centered on giving participants resources, mentorship, and exposure to career opportunities in their field.</p>	
<p><b>Please share the data, employer feedback, and/or Regional Network feedback that helped you identify this as a high-priority occupation:</b>            Industry feedback tells us that utilities have had problems recruiting in the engineering fields and need transmission and distribution planners/engineers. There is expected to be a high retirement rate for engineers in the coming years and industry will need replacements.</p>	

<b>Occupation: Electrician</b>	<b>Sub-sector: All</b>
<p><b>Average wage:</b> \$80,650 (<a href="#">O*NET</a>)                      *wages can be higher depending on level (01 being highest) and employer</p>	
<p><b>Which skills/competencies do employers use as a benchmark to hire someone in this occupation?</b></p> <ul style="list-style-type: none"> <li>• Install, maintain, and repair electrical systems in accordance with the National Electrical Code (NEC)</li> <li>• Diagnose and troubleshoot electrical malfunctions</li> <li>• Fabricate and install various electrical systems/components</li> </ul>	<p><b>Which credentials do employers cite as a valuable benchmark to hire someone in this occupation?</b></p> <ul style="list-style-type: none"> <li>• High school diploma</li> <li>• Journey-level certification or Electrical License</li> <li>• First-Aid/CPR</li> <li>• OSHA 10 and or 30</li> </ul>
<p><b>Please describe possible career progression opportunities for this occupation:</b>                      Possible career progression opportunities for this occupation often start with a high school diploma or GED, required by most employers and apprenticeship programs, as well as a year of high school algebra with a grade of C or better. After successful completion of an apprenticeship, the apprentice becomes a journey-level worker. There are several specialties for journey electricians and if desired, a journey electrician can advance to master electrician and/or supervisory role.</p>	
<p><b>Please share the data, employer feedback, and/or Regional Network feedback that helped you identify this as a high-priority occupation:</b></p> <ul style="list-style-type: none"> <li>• Solar Electricity will continue to grow in the next 20 years. Jobs will be added to the market in all areas of the solar industry (Construction, Professional Services, and manufacturing), with the highest growth in the construction and professional services areas (CETI, 2024).</li> <li>• This occupation was also identified as a high priority based on Chmura labor market reports and feedback from industry.</li> <li>• As of June 1, 2024, there are more than 1,000 active job openings for electricians in Washington state, of those, 93 are in the Seattle area. (Chmura/Jobs EQ, 2024)</li> </ul>	
<p><b>Please describe the top barriers employers have identified to hiring for this occupation:</b>                      The top barriers employers have identified to hiring for this occupation include a limit to how many apprentices can be trained at any one time. Since this training takes place over years (8,000 hours) this can be a very slow process. Union rep's have stated that there are more than 1,000 electricians in the Seattle area looking for work; yet rural areas report a shortage of trained electricians.</p>	
<p><b>Please describe the type of programs or approaches employers have found helpful in hiring for this occupation:</b>                      Employers often use apprenticeships for training and hiring practices, with unions and JATCs</p>	

organizing the applicants and training. There are also existing pre-apprenticeship programs that help prepare future applicants for the apprenticeship.	
<b>Occupation:</b> HVAC Technician	<b>Sub-sector:</b> Clean Buildings
<b>Average wage:</b> \$61,520 ( <a href="#">O*NET</a> )	
<b>Which skills/competencies do employers use as a benchmark to hire someone in this occupation?</b> <ul style="list-style-type: none"> <li>• Diagnose residential or commercial furnaces, heat pumps, and AC problems</li> <li>• Comply with applicable standards, policies, or procedures (such as safety and maintenance)</li> <li>• Recommend and perform preventative maintenance on HVAC systems</li> </ul>	<b>Which credentials do employers cite as a valuable benchmark to hire someone in this occupation?</b> <ul style="list-style-type: none"> <li>• High school diploma</li> <li>• HVAC Technician certification/license</li> <li>• EPA License</li> <li>• 06a or 06b (restricted) Electrical License</li> </ul>
<b>Please describe possible career progression opportunities for this occupation:</b> Career progression for HVAC technicians has multiple starting points: apprenticeship or traditional education through a college program. An apprentice will become a journey-level worker while students will earn a certificate or associate degree. Whether certified or journey-level, technicians can advance into opportunities such as project manager, stationary engineer, or energy analyst.	
<b>Please share the data, employer feedback, and/or Regional Network feedback that helped you identify this as a high-priority occupation:</b> <ul style="list-style-type: none"> <li>• Chmura labor market reports and industry feedback have identified residential and nonresidential HVAC technicians as among the highest demand occupations in the clean energy industry in the next two years (Chmura, 2024).</li> <li>• In addition, the <a href="#">CETI Net-Zero Workforce Report</a> for buildings, with modeling assuming all buildings by 2035 will be highly efficient, indicates growth of approximately 3,676 jobs by 2025 and 20,000 net growth jobs by 2035 for residential and commercial HVAC (CETI, 2024).</li> </ul>	
<b>Please describe the top barriers employers have identified to hiring for this occupation:</b> Currently, large barriers have not been identified for this occupation but with only a few CTC programs and apprenticeships being offered in the state and the amount of growth expected in the next few years, it is anticipated that this will change.	
<b>Please describe the type of programs or approaches employers have found helpful in hiring for this occupation:</b> Depending on the training method, employers either hire from CTC programs or students who are part of an apprenticeship program. We will see growth in this area when hydrogen	

projects, involving transportation and storage, build across the state.

<b>Occupation:</b> Electric Vehicle Technician (Automotive Technician)	<b>Sub-sector:</b> Transportation/EV
<b>Average wage:</b> \$51,730 ( <a href="#">O*NET</a> )	
<b>Which skills/competencies do employers use as a benchmark to hire someone in this occupation?</b> <ul style="list-style-type: none"> <li>● Test drive vehicles; use diagnostics tests on components and systems using appropriate equipment</li> <li>● Conduct repairs aiming for maximum reliability</li> <li>● Perform thorough maintenance including replenishing fluids on cars and trucks</li> </ul>	<b>Which credentials do employers cite as a valuable benchmark to hire someone in this occupation?</b> <ul style="list-style-type: none"> <li>● ASE Certification</li> <li>● High school diploma</li> <li>● Commercial Driver's License (depending on the job)</li> </ul>
<b>Please describe possible career progression opportunities for this occupation:</b> Career progression for automotive/EV technicians can vary but begins with education, through either a certification or associate program. These programs often include on-the-job experience with dealerships or automotive repair shops and <a href="#">ASE</a> certification. ASE offers multiple levels of certification and test series for specialization including entry-level certification, professional technician, master technician, alternative fuels, hybrid/electric vehicle specialist, and new EV safety certifications. Further advancement opportunities can lead to positions such as shop foreman, field service technician, or shop owner.	
<b>Please share the data, employer feedback, and/or Regional Network feedback that helped you identify this as a high-priority occupation:</b> Industry feedback, new legislation, and increased funding has informed us that there are many changes coming to transportation and, in turn, to automotive workers. With Legislature appropriating nearly \$1 billion of funding last year for investments in cleaner transportation options, including the first hybrid-electric ferry and incentives to purchase clean fuel vehicles, there will be an increased need for automotive mechanics with the appropriate training to service hybrid and electric vehicles. As more fleets/consumers make the change to zero-emission vehicles, there will be a higher demand for qualified technicians, though we recognize this demand rises faster in more urban areas. However, with the state's commitment to 100% new zero emission vehicle sales by 2035, demand will grow for this career statewide.	
<b>Please describe the top barriers employers have identified to hiring for this occupation:</b> The top barrier for this occupation is the relatively new technology and the slow process of training implementation statewide.	

- Faculty of rural automotive training programs may appear to resist the transition to add EV and zero emissions training to their programs due to lack of technology, equipment and expertise in their area. Added to that, EV adoption may be too slow in their community for students to benefit.
- When a fleet transitions from fossil fuels to zero emissions, there may not be enough newly trained workers to support a rapid change. Training programs are gradually shifting and are still training technicians for today's internal combustion vehicles. Many fleet managers are relying on manufacturers to reskill and retrain incumbent workers, which is typically done in house.
- The state should consider funding existing automotive training programs to support the tools and equipment programs needed to train emerging technologies.

**Please describe the type of programs or approaches employers have found helpful in hiring for this occupation:**

Some employers are working directly with colleges to build and implement programs:

- Clark College's Dealer Ready Automotive Technology programs, including the Toyota Technician & Education Network (T-TEN) program. Similar programs are available at Spokane and Shoreline community colleges.
- Rivian has funded a program at Renton Technical College.
- King County Metro has created their own internal training program to upskill their existing staff mechanics.

<b>Occupation: Solar Photovoltaic Technician/Installer</b>	<b>Sub-sector: Solar</b>
<b>Average wage:</b> \$ 45,230 ( <a href="#">O*NET</a> )	
<p><b>Which skills/competencies do employers use as a benchmark to hire someone in this occupation?</b></p> <ul style="list-style-type: none"> <li>• Ability to lift 50 lbs. regularly throughout the day</li> <li>• Ability to use a ladder and tools</li> <li>• Follow layout plans and perform the structural mounting of racking, modules, and electrical equipment</li> </ul>	<p><b>Which credentials do employers cite as a valuable benchmark to hire someone in this occupation?</b></p> <ul style="list-style-type: none"> <li>• Driver's License</li> <li>• CPR/First Aid</li> <li>• OSHA 10</li> <li>• Electrical Trainee certificate/Electrical Apprentice</li> </ul>
<p><b>Please describe possible career progression opportunities for this occupation:</b>            Career progression in the solar industry can start in solar assembly or solar installation with some on-the-job training, and those with experience in construction or roofing need little to no training for solar installation. Many companies are also hiring solar installers as electrical trainees or apprentices- enabling them to become journey-level electricians (01 or 02). Other progression opportunities include maintenance specialist, fleet manager, system inspector, solar site assessor, and solar designer.</p>	



**Please share the data, employer feedback, and/or Regional Network feedback that helped you identify this as a high-priority occupation:**

Residential and commercial solar (PV) energy is a crucial technology for the transition to clean energy, but this reality is still evolving in the state.

- According to the [CETI Net-Zero](#) report, the solar sector will grow by a net 9,818 jobs by 2030 and includes jobs in site assessment, management, administration, engineering, and installation (CETI, 2024).
- The [2023 USEER](#) show the two largest employment sectors of electric power generation technologies in the nation were wind and solar, and saw increased employment from 2021 to 2022, following increases from 2020 to 2021. Solar had the largest number of jobs gained, adding 12,256 workers (+3.7%) (USEER, 2023).
- Chmura’s Real Time Intelligence report shows 3,000 current job openings that include “solar” in Washington state (Chmura, 2024)

**Please describe the top barriers employers have identified to hiring for this occupation:**

Barriers identified by employers for this occupation include finding qualified and willing individuals, ensuring candidates from lower income backgrounds are equipped with the proper safety equipment or provided with wraparound supports such as gas or transit cards, and managing the seasonal nature of the work. Many people do not realize that solar installation can lead to an electrical apprenticeship or other solar careers with advancing incomes.

**Please describe the type of programs or approaches employers have found helpful in hiring for this occupation:**

Employers in need of electricians are exploring partnerships with existing apprenticeship programs as well as exploring partnerships with workforce development organizations and 2-year colleges to create curriculum, train workers from distressed economic backgrounds, and partnering with NGOs to provide wraparound supports.

**For each region below, which workforce education & training programs are *effectively* meeting employer needs, or could effectively meet their needs with adjustment or expanded capacity? Where relevant, please color code responses to reflect their relevance to specific occupations.**

**Please provide your color-coding key below:**

**Engineer (all disciplines)**

**Electrician**

**HVAC Technician**

**Electric Vehicle (EV) Technician**

**Solar Photovoltaic Technician/Installer (Solar Design and Sales)**

**Capital**

**HVAC Technician**

- **Capital STEM Alliance - Renewable Energy Vehicle & Infrastructure Technician (REVIT) Training:** (diesel-to-hydrogen mechanics), commercial/multi-unit residence heat & water systems

	<p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>● <b>Renewable Energy Vehicle &amp; Infrastructure Technician (REVIT) Training:</b> diesel-to-hydrogen mechanics, commercial/multi-unit residence heat &amp; water systems, EV mechanics, HS class with credit in physics and CTE</li> <li>● <b>Grays Harbor and South Puget Sound Colleges</b></li> <li>● <b>Centralia College/Center of Excellence for Clean Energy (w/REVIT)</b></li> </ul>
<p><b>East</b></p>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>● <b>Avista High School Craft Program</b> (students are exposed to a broad range of disciplines and trades)</li> <li>● <b>Gonzaga University, Washington State University, Eastern Washington University</b></li> </ul> <p><b>HVAC Technician</b></p> <ul style="list-style-type: none"> <li>● <b>Spokane Community College</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>● <b>Spokane Community College</b></li> <li>● <b>ESD 101</b> (ASE training for CTC faculty)</li> </ul>
<p><b>King &amp; Pierce</b></p>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>● <b>Tacoma Power (Mix &amp; Mingle), internships and MESA programs</b></li> <li>● <b>2-year colleges: all offer pre-engineering programs</b></li> <li>● <b>University of Washington/Tacoma is working on a new program with Tacoma Power</b></li> </ul> <p><b>Electrician</b></p> <ul style="list-style-type: none"> <li>● <b>JumpStart (WJI)</b> – we anticipate this model would benefit from increased funding and geographic expansion, study results to recommend for formal program funding</li> </ul> <p><b>HVAC Technician</b></p> <ul style="list-style-type: none"> <li>● <b>Bates and Clover Park Technical Colleges</b></li> <li>● <b>AEM Bootcamp Internship</b> (Tacoma Public Schools)</li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>● <b>Bates Technical, Clover Park Technical and Shoreline Community colleges</b></li> </ul> <p><b>Solar design, sales and installation</b></p> <ul style="list-style-type: none"> <li>● <b>Shoreline Community College</b> (classes; program in development)</li> </ul> <p><b>Washington Alliance for Better Schools (WABS):</b> Worksite tours and classroom visits- new to this sector and still identifying careers</p>
<p><b>Mid-Columbia</b></p>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>● <b>Mid-Columbia STEM Nexus initiative</b></li> <li>● <b>WSU-Tri Cities</b></li> <li>● <b>Columbia Basin and Walla Walla colleges</b></li> </ul> <p><b>Electrician</b></p> <ul style="list-style-type: none"> <li>● <b>Columbia Basin College</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>● <b>Columbia Basin and Walla Walla colleges</b></li> </ul>

<b>North Central</b>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>• <b>Wenatchee Valley College</b> (BAS Engineering Technology)</li> </ul> <p><b>Electrician</b></p> <ul style="list-style-type: none"> <li>• <b>Wenatchee Valley College</b> (apprenticeship w/ DC PUD)</li> </ul> <p><b>HVAC Technician</b></p> <ul style="list-style-type: none"> <li>• <b>AEM Bootcamp Internship</b> (Wenatchee School District)</li> <li>• <b>Wenatchee Valley College</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>• (Wenatchee Valley College automotive with potential EV)</li> </ul>
<b>Northwest</b>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>• <b>Bellingham Technical College</b></li> <li>• <b>Western Washington University</b></li> </ul> <p><b>Electrician</b></p> <ul style="list-style-type: none"> <li>• <b>Bellingham Technical and Skagit Valley colleges</b></li> </ul> <p><b>HVAC Technician</b></p> <ul style="list-style-type: none"> <li>• <b>Bellingham Technical College</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>• <b>Bellingham Technical and Skagit Valley colleges</b></li> </ul> <p><b>SnoSTEM</b> (FWEE Summer Academy 2025)</p>
<b>South Central</b>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>• <b>Big Bend Community College</b></li> <li>• <b>Central Washington University</b></li> </ul> <p><b>Electrician</b></p> <ul style="list-style-type: none"> <li>• <b>Big Bend Community College</b> (battery mfg)</li> <li>• <b>Perry Technical Institute</b></li> </ul> <p><b>HVAC Technician</b></p> <ul style="list-style-type: none"> <li>• <b>Perry Technical Institute</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>• (Big Bend Community College automotive with EV potential)</li> <li>• Perry Technical Institute</li> </ul>
<b>Southwest</b>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>• <b>Rural CTE Cooperative - nPower Girls</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>• <b>Clark College</b></li> </ul>
<b>West Sound</b>	<p><b>Engineer (all disciplines)</b></p> <ul style="list-style-type: none"> <li>• <b>Olympic College</b></li> </ul> <p><b>HVAC Technician</b></p> <ul style="list-style-type: none"> <li>• <b>Peninsula College</b></li> </ul> <p><b>Electric Vehicle (EV) Technician</b></p> <ul style="list-style-type: none"> <li>• (Peninsula College automotive with EV potential)</li> </ul>
<b>Statewide</b>	<p><b>Labor/unions including IBEW 77, JATC</b></p>

**Between now and June of 2025, where is there regional momentum to support pathway development in this occupation?**

For each region listed, please describe:

- Key momentum factors (e.g., interested employers, high-priority for Regional Network, opportunity to improve equitable access, opportunity to scale existing programs, portions of CCW pathway already built)
- High-potential opportunities to support pathway development
- Is supporting those high-potential opportunities a shared priority across SL and RN?

There is a vast myriad of key momentum factors in our sector. With the need to transition to a clean energy future, supported by clean technology solutions and manufacturing now the law of the land, momentum to create this transition is emerging everywhere.

There is a key need to do career explore work to connect communities to the key employer and post-secondary institutions that are going to usher in a new clean energy economy. There is a strong need to strengthen and fund internships and re-skilling programs to map workers to rapidly developing technology.

**Capital**

- Key Momentum Factors: Lewis County Transit led REVIT program is in the Career prep phase and will lead to Career Launch
- High Potential Opportunities: Centralia College/Center of Excellence for Clean Energy K-12 Energy Outreach, summer program and CTE mobile lab include pathway development
- Key partners: Industry: Centralia City Light, First Mode, Fortescue, Grays Harbor PUD, Lewis County PUD, Lewis County Transit, Tacoma Power, TransAlta, and PSE; Education: Centralia College, ESD 113, Grays Harbor College, local school districts
- Shared: REVIT – dual credit curriculum building will be added to the renewable energy exploratory class. Centralia High School is building an Energy Academy. We will see a growth in need of hydrogen technicians.

**East**

- Key Momentum Factors:
  - NSF Funded Intent program – focused on grid modernization and collaboration between industry, education and sector organizations
  - Avista – a dynamic, innovative utility that is creating pathways for high school students to earn and learn (best practices will be shared across the state)
  - Key partners: Avista, Inland Power, Spokane Workforce Council, ESD 101, Community Colleges of Spokane
- High Potential & Shared Opportunities: ESD 101 – ASE Training for CTC faculty

**King & Pierce**

- Key Momentum Factors: JumpStart-Shoreline Community College feed for solar designers/installers; AEM Bootcamp Internship; Tacoma Power is partnering with UW/Tacoma to build a new pathway for engineering students that will be launched in 2025-26.

- Key Partners: First Mode, PSE, Tacoma Power; Shoreline and South Seattle colleges; and UW/Tacoma
- High Potential Opportunities: Shoreline CC is building upon its solar program to include codes, design, sales and installation. Support is needed to market the program to gain enrollment.
- Shared: We will see a growth in technicians within the fusion and hydrogen sub-sectors.

### Mid-Columbia

- Key Momentum Factors: Energy NW and WA Vertical (a WA ICAP Cluster) – nuclear energy; WSU's Advanced Grid Institute, and the newly funded Institute for Northwest Energy Futures; Columbia Basin College, Douglas County PUD
- High Potential Opportunities: Conduct outreach jointly with WSU to connect learners to their emerging research and engineering degree programs.
- Shared Priority: Career awareness at community gatherings such as RiverFest. Technologies in smart grid and small modular reactors may expand in this region.

### North Central

- Key Momentum Factors: Douglas County PUD and Wenatchee Valley College – electrician apprenticeship program – could it expand to include hydrogen?
- High Potential Opportunities: Hydrogen is building momentum in this region, which will increase the need of HVAC/electrician technicians and transportation.
- Shared Priority: CoE is working in the hydrogen sub-sector. Once funded, a workforce task-force will include this region.

### Northwest

- Key Momentum Factors: Alta Gas, Bellingham Technical College (technicians), Western WA University
- High Potential Opportunities: SnoSTEM is a strong CCW partner in this area for future growth of energy career awareness.
- Shared Priority: SnoSTEM, SnoPUD in Career Prep – summer academy and K-12 learning opportunities. Hydrogen may expand in this region.

### South Central

- Key Momentum Factors: Group14, Sila Nanotechnologies, Big Bend Community College – battery manufacturing technicians; Perry Technical College; Grant PUD (outreach)
- High Potential Opportunities: Recruiting for the emerging battery materials sector and developing technician training at Big Bend
- Shared Priority: Strong CCW presence to help build career awareness; hydrogen in aerospace technologies may expand in this region.

### Southwest

- Key Momentum Factors: Clark College Energy electives will be added to Mechatronics which will support EV technicians; partner with PGE and TriMet for jobs
- High Potential Opportunities: There is a future potential to bring hydrogen into the Toyota T-Ten EV lab.

- Shared Priority: Hydrogen may expand in this region (shared with CoE)

**West Sound**

- Key Momentum Factors: West Sound STEM; PSE
- Shared Priority: Hydrogen in transportation may be expanded in this region.

**What is needed to increase participation of BIPOC students in your sector's high priority occupations? To increase participation of students from rural areas? Which programs are doing this well?**

To increase the participation of BIPOC students in occupations of high priority in our sector, there needs to be a multifaceted and cross-sectoral partnership where academia (K-12, two-year community and technical colleges) partner with industry to increase awareness and create curricula and internship opportunities that provide students with both the necessary experience and the skills to fill and perform in these occupations.

Education institutions play a pivotal role in this partnership. They are uniquely positioned to provide programs and training opportunities specifically designed to meet the skills required for these high-priority jobs. Their contribution is instrumental in preparing BIPOC students for successful careers in our sector.

The industry should work together to formalize the skills they need in these occupations and work with academia and K-12 institutions to train students. There should be a mentorship component, someone who can help guide decision making and motivate students. At the same time, students should meet different professionals and learn from their experiences and career pathways.

Washington state is home to 34 two-year community and technical colleges (CTC), which offer a terrific opportunity for students to continue their education. Students can develop both the physical and cognitive skills needed to perform those jobs, with smaller class size and more focus on hands-on experiential learning. These post-secondary institutions are a great place to do so because of their affordability and the time needed to get a diploma/certificate. Also, these institutions have a wider presence in urban and rural areas and usually have staff that represent the cultural diversity of those they serve. Industry and research universities need to PARTNER with these schools to fund and enable them to do their work better, as a key method of preparing students for 4-year STEM degree success.

**What overarching strategies do you recommend to support pathway development for the highest-priority occupations in your sector?**

### Career Launch

Continue to map workers from diverse and underrepresented backgrounds and rural areas to existing apprenticeship programs and connect them and trainers with wraparound support providers.

Many of our sector's registered apprenticeships are union-based or overlap with other sectors' registered apprenticeships. We recommend continued work to build a joint strategy with the unions and the construction sector as we understand the joint demands of multiple sectors on critical apprenticeship programs for HVAC technicians, electricians, pipe fitters, and volume of construction workers needed to help build clean energy manufacturing plants, facilities, power plants, and other related infrastructure. These programs are subject to an urban/rural tension – where training programs in urban areas feel 'oversubscribed' while in rural areas there is high demand. Also, the growing but not fully predictable demand for clean energy installation and grid expansion makes it challenging for all parties to deliver the right number of workers at the right time.

Registered apprenticeships in our sector are largely driven by IBEW 77, which includes outside electricians, linemen, meter technicians and tree trimmers. Utilities think of organized labor when "registered apprenticeship" discussions are held. Though utilities claim there is a shortage within the applicant lineman pool, IBEW assures us that there is an adequate supply of workers. House bill 2082, which recently passed, will assess the needs of the electrical transmission industry and its workforce. A study will be led and published by the Washington state Department of Commerce.

### Career Prep

We recommend funding programs that help existing technician training get access to modern equipment for training, so students are learning on current technologies. This should be an ongoing effort, as the technology continues to develop, and a one-time replacement will not suffice.

Integrating clean technology/energy into existing education programs and developing pathways can be done in programs such as Automotive Technology at the CTC level with instructor training and integration of EV/hybrid and hydrogen fuel cell technology curriculum into existing classes or as classes within the program. This can also be achieved in the K-12 system by integrating clean technology/energy into science classes with modules such as Build Your Own Hydropower and the Center for Energy Workforce Development (CEWD) Energy Fundamentals 2.0, available teacher training, and programs such as Lewis County Transit led REVIT training program.

We recommend continued exploration of developing a 2-year general technician training program to impact the deployment of clean energy technology. The training program should cover a wide range of topics, including basic physics principles, engineering design,

instrumentation, and operations. We anticipate graduates from this program could support hydrogen, fusion, waste heat, battery materials, and other emerging clean energy generation programs. There are many more technologies coming to our sector, and we must start preparing workers. Until this occurs, employers will have to poach workers from other industries and conduct on-the-job training. We can help our state system prepare to support them so that clean energy can emerge faster.

### Career Explore

Highlight the breadth of clean energy and clean tech careers to grow and diversify the workforce. Enhancing awareness and recruitment campaigns for clean technology/energy careers can be done at all ages in the K-12 system. There are strides being taken to make these jobs more visible for students to learn about and experience. Unlike welders, firefighters, nurses, and others, no specific image comes to mind when talking about energy careers. The November CEWD conference included information on a national push to add Energy as a stand-alone Career Cluster, a huge step to getting more visibility for this sector. Our state should adopt the career cluster as well. Programs such as FWEE's STEM Summer Academy connect students to those working in the field, as well as to rewarding careers. These summer academies are expanding to different areas of the state. They are created to inspire students to consider the options and serve as an example of this strategy.

- Tell the stories of real clean energy workers: Rather than using generic images or stock photos, feature real clean energy workers and their stories in recruitment campaigns. Highlight their backgrounds, motivations for pursuing clean energy, and their impact in their roles.
- Showcase the diversity of clean energy careers: clean energy is a rapidly growing field with a wide range of career paths available. Highlight the diversity of roles within clean energy, from technicians and engineers to project managers and salespeople.
- Emphasize the potential for career growth and advancement: clean energy is a dynamic and evolving industry, and there are many opportunities for career growth and advancement. Highlight the potential for career progression and the skills and experience that can be gained by working in the field.
- Promote the positive impact of clean energy work: clean energy workers are not just helping to protect the environment; they are also helping to build a more sustainable and equitable future. Highlight the positive impact that clean energy work can have on communities, economies, and future generations.

**Between now and June of 2025, how will you prioritize your time, attention, and resources as a sector leader to support regional pathway development and advance the recommendations above? What specific actions will you take?**

Priorities for time, attention, and resources as sector leader will be in the following categories:

- Advancing sector strategy recommendations
- K-12 Engagement



- Existing Program Support
- Employer engagement
- Engaging with CCW Regional Networks and system actors
- Emerging technology analysis and support

### **Advancing sector strategy recommendations**

We plan on undertaking the following activities to support the recommendations made in the section above:

- **Registered Apprenticeship:** Industry engagement. Continue to engage and collaborate with industry leaders in the solar and HVAC field and existing apprenticeship programs in the different regions to expand or create apprenticeship programs tailored to industry needs.
- **Integrating clean technology/energy into existing education:** The Center of Excellence will host in-person EV training for CTC automotive, diesel tech and electrical tech faculty twice annually and supports the SBCTC and college system by partnering with external grants and partners to acquire lab tools and equipment for 2-year colleges. REVIT, listed below, incorporates renewable energy into high school programs.
- **2-year general technician training program:** We will continue to collect employer feedback regarding core curriculum needs and develop a picture that can then be mapped against existing 2-year programs. We will also work with the Fusion Industry Association, the NSF, and other global partners to study emerging global best practices to train the future fusion energy workforce and add that to this map.
- **Enhance awareness and recruitment campaigns for clean technology/energy careers:** See below

### **K-12 Engagement**

To increase participation of women, BIPOC, rural, or other underrepresented groups in the clean technology/energy sector, we need to create more programs centered on creating awareness of the jobs emerging from the transition to clean energy. This engagement needs to happen as early as 3<sup>rd</sup> grade and can include having curriculum that aligns with these careers, taking students on tours to companies, and having speakers come to their classroom to present about their jobs and career path. As students enter 6-8th grade, they and their families will need information about pathways and what classes they will need to take to enter these careers. Making information available throughout middle and high school will be the best way to prepare students for graduation and moving into the workforce or postsecondary programs. We will support this work by:

- Developing plans for an 'energy careers awareness' campaign. Connecting industry to regional networks with existing explore and prep programs in the K-12 system. One example: the partnership between CleanTech Alliance and Washington Alliance for

Better Schools. Please read the Engaging with CCW Regional Networks and System Actors section to learn more. We will continue to build relationships with K-12 programs that are designed to help students explore career options and prepare for life after school. Programs such as career explorations classes, internship programs, and CTE.

### Existing Program Support

As a sector leader, we will support programs such as those below to help them increase engagement or expand. We will do so by helping connect them to funding opportunities, connect them with wrap around support providers, educate and conduct outreach to educators and elected officials, and other communications that support program development and growth.

- **Jumpstart King County** merges Seattle Central College's Pre-apprenticeship Construction Training (PACT) program, Seattle City Light's Basic Electrical Applied Mathematics (BEAM) program, King County's Energize and YouthSource programs to provide pre-apprenticeship training for solar and heat pump installation careers.
- **AEM Bootcamp Internship**, launching summer 2024. This is a paid internship (\$17/hour X 4 hrs/day) that spans five weeks with 20-days of employment (with earnings up to \$1,360). Provides electricity, data analysis, HVAC, Energy Star for high school students who want to become an AEM apprentice (will apply for CCW funds). Partners include Tacoma Public Schools, Wenatchee School District, Tacoma Power and Chelan County PUD. 13 students at each site will enroll in internships/pre-apprenticeship programs that will give them an opportunity to apply for a full apprenticeship program.
- **Centralia College's CTE Mobile Lab** will be launched through a new Center of Excellence program. The mobile lab is designed to travel to rural communities to showcase programs contained in it (forklift, CDL simulators, VR energy career pathways).
- **Climate Corps/Energy K-12 Outreach Fellow**. Sponsored by TransAlta, SEI and the Center of Excellence, this fellow will be dedicated to increasing outreach throughout Lewis and south Thurston counties. The fellow will organize school to school competitions, faculty training opportunities, Utility in a Box and other outreach opportunities.
- **Climate Corps/Clean Buildings Fellow**. Sponsored by Washington state Department of Commerce, SEI and the Center of Excellence, this fellow will assist energy auditors and commercial building owners in meeting new laws within the Clean Buildings Act. Best practices of this program will be shared through a future expanded statewide program.
- **Renewable Energy Vehicle & Infrastructure Technician (REVIT) training program**. Led by Lewis County Transit, this program brings Capital STEM Alliance,

ESD 113, Centralia College, and administrators from local school districts together to develop high school and college dual credit curriculum. The first high school renewable energy exploratory class was launched fall 2023 at Centralia High School. Twenty-four students earned physics and CTE credit. The group held a DACUM for 22 SMEs to design dual credit (high school and college) that will continue the renewable energy pathway in EV and hydrogen fuel cell technologies (called hydrogen mobility technician). Once completed and tested, REVIT will be shared with other districts as a pathway to increase awareness of renewable energies, which will lead to increased workforce education and training opportunities. This program is a career prep program, and we will support it to become a career launch program.

- **The Foundation for Water and Energy Education's (FWEE)** summer academies gives students the opportunity to spend a week learning about the power industry, participating in hands-on activities, exploring dams, power houses, substations and fish hatcheries, and designing a career map with SMEs. The academy originated in Wenatchee and expanded to the Tri-Cities (summer 2023) and SW Washington/Centralia (summer 2024), with plans expanding to the Snohomish area (summer 2025).
- **Tacoma Power** – three programs: **MESA Summer Program** – 10 high school and community college students. The program partners with the Tacoma Community College and Tacoma/South Puget Sound MESA branches; **TPU Academy** – teaches 60 fourth-fifth graders about STEM. The program partners with the Boys and Girls Club; **TPU/UW-Tacoma Summer Internship** – 25 college interns for the summer, offering weekly professional development workshops, a 12-week speaker series to meet our industry professionals and site tours to our hydro projects, substations, etc.

### **Employer Engagement**

We will continue to educate and advocate for and with employers in our network so that they see examples of career connected learning. Specifically, the CoE's Advisory Board, the CleanTech Alliance's Board, and partners such as the Tech Alliance newly formed Innovation Committee will all be engaged to focus more employers on the need for workforce development and career connected learning as a pathway to realize innovative new solutions. Where possible, we will increasingly connect employers with existing career connected learning programs or facilitate conversations about new programs or pathways needed to support employer workforce needs.

### **Engaging with CCW Regional Networks and system actors**

We will continue engaging with workforce providers, training organizations and employers to refine our understanding of their evolving needs, challenges, and preferred solutions. We will continue to dialogue and build relationships with CCW regional partners to connect our sector's needs with their capacity and current programming, as well as educate them about emerging new clean energy and clean technology in their regions and existing solutions that

can be implemented. We will continue to develop a ‘roadmap’ of the existing training landscape and emerging needs.

Some of the high-priority opportunities identified in the “regional momentum” section above that we’d like to prioritize collaborating with regional networks to support include:

- We will continue to engage with the emerging battery materials hub in Moses Lake as they work to map local citizens to emerging jobs, and support Big Bend College in community building, outreach, and industry connections.
- WABS – We are developing a partnership with Washington Alliance for Better Schools’ Partnership for Access to Careers and Education Program in Pierce and King counties to invite clean tech/energy SMEs to talk in classrooms, and host students and teachers in their workspace. In these spaces, the SME will share their personal and professional pathways and experiences.
- Engage with WA Vertical, and members Energy Northwest and PNNL and others to support advanced nuclear workforce needs.
- Continue to define workforce needs of emerging hydrogen and fusion Industries. Outreach jointly with WSU to connect learners to their emerging research and engineering degree programs.
- CoE will continue to work on hydrogen, Climate Corps Fellows, a Summer STEM program, increased K12 outreach, and Clean Buildings Act Fellow projects detailed above. We want to connect those projects and outcomes with interested regional networks
- We need to continue to strengthen our relationships with the regional CCW and STEM folks.

### **Emerging Technology Analysis and Support**

Grid modernization technicians are anticipated to be an emerging job category. We are similarly aware that PSE has plans of opening a utility operations training center in Pierce County in 2026. INTENT (NSF funded grid modernization project in Spokane) is convening industry to study advanced manufacturing and grid modernization needs.

Washington state’s emergence as a hub for fusion is exciting news for job growth in the region. To support this development, it’s crucial to collaborate closely with industry leaders, educational institutions, and policymakers to gather data on projected job needs and timelines. By facilitating dialogue and partnerships, we can work towards establishing clear projections for the number of technicians, engineers, and advanced manufacturing jobs that will be created. This will enable us to better align workforce development efforts and resources to meet the needs of the growing fusion industry in the state. To support pathways for fusion energy jobs, we will focus on staying updated on advancements in fusion technology via 1:1 conversation with leaders in this sector, planning and attending Seattle Fusion Week, and collaborating with relevant organizations to educate and advocate for policies to promote fusion energy research, commercialization, and job growth. We will also continue to highlight new opportunities through our communication channels.

We will continue to stay informed and engaged about developments in the other emerging technologies that will make the transition to net zero a possibility in our state. Some of these technologies include solar design, hydrogen, biofuels, mass timber, small modular fission reactors, offshore wind, and battery chemistry materials. Advanced manufacturing jobs across these disciplines are also projected to grow.

- We will continue to foster relationships and partnerships with industry leaders and educational institutions to connect employers with training institutions to promote renewable energy adoption and workforce advancement in these fields.
- As many of these occupations are still emergent – it is likely we will recommend building career explore outreach programs to youth as a key tool to support many of these sectors.
- These fields will add to the need for a general technician training program to be created.

With the passage of the Clean Buildings Bill in 2019 and its augmentation in 2023, commercial building owners/managers need to measure and track energy usage, implement an operation and maintenance program, and create an energy management plan to meet the energy performance metrics imposed. The occupations of energy manager, energy auditor, and energy analytics will become increasingly important as businesses focus on reducing energy costs and complying with environmental regulations. We will watch demand and growth and expect to recommend support to connect students to existing under-enrolled programs.

## Conclusion

It is clear that rapid technology evolution will maintain challenging conditions to prepare a new or re-skilled workforce at exactly the right time. Additionally, the sector has clear needs to diversify its workforce, both demographically and geographically. We remain keenly aware that leadership changes at the state and federal level in a new election cycle and compound the fragility of the clean tech/energy sector. The stability and growth of the preferred energy solutions are subject to policy change, and this can impact the number of jobs and fields workers should be preparing for in the future. The sector's vulnerability to changes underscores that we must maintain commitment to existing sustainable energy policies. Government investment, alongside private and corporate capital must also be maintained, so investment in industry and emerging solutions does not falter. It is critical that we keep a focus on momentum already built, can continue to grow projected climate sector jobs needed in our state, and prepare our workforce to deliver these solutions to communities state-wide.