

Roadmap to a Green Economy

aligning education, workforce
and economic development systems



Nine Mile Falls

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Prepared for the Governor's Policy Office for Education and Workforce Development

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Note to readers: A limited printing of the Executive Summary is available in hardcopy.

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Executive Summary

The Educating for A Green Economy Project (EGE) set out to determine: 1) the distribution and visibility of green jobs in the statewide workforce system, 2) whether there are strategies in place to provide all youth, especially youth with barriers, access to green job pathways, and 3) the level of awareness of the green economy amongst students, educators, counselors, workforce professionals and employers across Washington. The EGE Roadmap is the culmination of environmental, economic and education research literature reviews, worksite visits, feedback from meetings and workshops with key stakeholders and feedback from the EGE Advisory Panel.

For the purpose of EGE, “green” is defined in a literature review by Georgetown University’s Center on Education and the Workforce which found that there were generally three types of green definitions: 1) a social justice/worker-centered definition, which makes green contingent on its potential to address environmental inequity; 2) a renewable energy and energy efficiency definition, which defines green as activities in the clean energy sectors; and 3) a broad environmental definition, which defines green as anything relating to environmental protection and quality.¹

Washington economy was built on forestry, fishing, agriculture and hydroelectric power, all sectors that currently utilize renewable natural resources, and are thus part of the green economy. With increasing market demand for sustainable products and services, these industries must take into consideration environmental and societal needs to remain relevant. Green economy jobs are forecast to increase and will require new and different skill sets as identified by employers. To prepare students for careers to meet the need

of these industries and the green economy, education and workforce institutions are revising and building teaching resources and supports. Educators, workforce and economic development professionals, and industries can and should leverage sequentially connected PreK-12 and post-secondary education with workforce training at regional and local levels. Some inspiring examples of these types of partnerships are included in the case studies found in this report, and there is more work to be done.

The demand for workers with the appropriate skill sets for green jobs exceeds the supply of potential employees. Unfortunately, green jobs often are not classified as green jobs. How jobs are classified matters because job data are often used to make workforce development funding decisions at the state and local level. There are several reasons why the current job data collected in Washington is insufficient. One of the most striking is that current coding systems make it difficult to group jobs in categories that



1. Georgetown University Center on Education and the Workforce. (2010). *State of Green: The Definition and Measurement of Green*. https://cew.georgetown.edu/wp-content/uploads/2010/08/Literature-Review_Green.pdfbeyond-plan



Spokane County

are meaningful for decision makers. In addition to coding considerations, many green jobs do not show up as “high demand,” there is little accounting for emerging job trends, expected retirements, and job innovation, which would create more effective decision making. EGE is also proposing the acknowledgment of “critical demand” jobs and inclusion of this designation to help workforce development serve local employment needs.

Many traditional natural resource jobs in agriculture, clean energy and forestry increasingly require computer programming, artificial intelligence, and other technology skills. An EGE analysis of needed skills as reported by employers revealed that employees who can learn on the job, communicate well, have STEM-related technical skills, and possess an understanding of and commitment to environmental sustainability and stewardship are in demand. To optimize awareness and early development of these skills, an integrated, competency-based approach to education needs to be central in PreK-12 learning. Currently this type of learning is found in project-based programs such as PEI’s FieldSTEM® learning model which helps students meet the state’s integrated environmental and sustainability education standards, and in Career and Technical Education (CTE) programs.

Initial climate change studies indicate that communities furthest from environmental and educational justice are disproportionately affected and will continue to be disproportionately impacted as climate impacts increase². Students in these areas experience greater barriers to employment and have fewer opportunities to access coursework, project-based learning, credentialing programs, work experiences, after-school clubs, and other extended learning opportunities. This is particularly true

in communities of color and in rural and remote parts of the state. To better reach underserved youth, we will need to take deliberate steps to increase opportunities in these communities.

Now is the time for young people, who have the largest stake in a sustainable future, to be allowed to lead. Given the anticipated needs to mitigate and adapt to climate impacts, PreK-12 students could use this opportunity to study and learn about the intersections between social, economic and environmental sustainability in their communities. Students in Washington now begin in middle school to develop High School and Beyond Plans³ and portfolios. This is an opportunity to engage career counselors in green economy job communications and networking to ensure they are aware of green careers. By developing sequential PreK-12 to career braided pathways, young people can gain competencies to build portfolios that help them achieve their goals.

FieldSTEM type experiences at young ages, supported by education, industry and agency partnerships, may be the catalysts that help students find their pathway into a green job. We know from years of educational research that students learn best when they experience what they are learning; for many students, seeing, touching and doing make learning accessible. When combined with authentic projects that have real value to their community, learning keeps students engaged in a manner that goes beyond grades or a teacher’s approval. Focusing on learning outcomes that support the student, the community and the workforce will position Washington toward better realizing community value and industry need and ultimately translate to a greener economy. Local experiences can lead to local opportunities.

2. Enterprise Community Partners, Inc. (2018) Climate Change Disproportionately affects low-income communities. <https://www.enterprisecommunity.org/blog/climate-change-disproportionately-affects-low-income-communities>

3. OSPI’s High School and Beyond Plan Website <https://www.k12.wa.us/student-success/graduation/graduation-requirements/high-school-beyond-plan>

Green Economy Goals and Recommendations

GOAL 1:

Build and incentivize equitable PreK-12 and post-secondary braided pathways⁴ (educational coursework, career counseling, and workforce development) for green jobs.

Recommendations:

Fund the OSPI FieldSTEM proviso with an additional \$250,000 per year to connect traditional courses and Career and Technical Education (CTE) frameworks, to Career and Technical College guided pathways, and green career launch opportunities with Career Connect Washington. Add language to the proviso to:

- Develop frameworks and teaching materials for braided pathways from PreK-12 to career for green economy sectors utilizing competency-based models for learning.
- Create a statewide forum for student directed projects that contribute to the green economy and local stewardship.

Fund Centers of Excellence to facilitate and support equitable CTE Dual Credit agreements and matriculation for consistent secondary to postsecondary green career pathways across Washington.

GOAL 2:

Strengthen criteria for workforce development projects to diversify the workforce, reach communities furthest from environmental and educational justice, serve remote and rural community needs, and engage the next generation of natural resource stewards.

Recommendations:

Fund a green jobs grant program through OSPI's Environment and Sustainability Program or Career Connect Washington to increase opportunities for youth age 15-17 to participate in environmental sustainability education and stewardship projects that provide work integrated and career launch opportunities:

- Set minimum requirements to include "critical demand," jobs and communicate living wage information that reflects regional cost of living in addition to salary for remote and small rural (communities under 10,000 residents).
- Set minimum participation rates for Black, Indigenous, People of Color (BIPOC) youth and others furthest from educational justice.
- Encourage collaborations with programs such as Open Doors Youth Reengagement and alternative 9-12 secondary programs.

Incentivize community-based workforce and economic development projects that lead to green jobs across the state.

⁴. Braided pathways are the intertwining paths with opportunities for educational coursework, career counseling, and workforce development offered to learners with explicit connections to the multitude of pathways one can take to develop their skills building on the experiences they have had to head in a particular direction. Braided pathways demonstrate the multiple pathways to a particular job and highlight the key skills needed.



Crescent Lake

GOAL 3:

Provide green economy professional learning through project-based CTE and FieldSTEM type workshops using resources for educators available in the OSPI Open Education Resources (OER) portal.

Recommendations:

Engage industry and agencies in supporting teacher education for exposure to industry trends and best practices, and to inform development of guided pathways into green jobs and industries.

Continue funding outreach and engagement with STEM clock hours for CTE Directors and faculty in partnership with Washington Association for Career and Technical Education (WA-ACTE),

Continue legislative proviso funding for equitable climate science education for PreK-12 educators at current amount of \$3 million annually.

- Set a requirement that projects demonstrate how learning will help individuals and communities mitigate and adapt to climate impacts,
- Set minimum participation rates for educators serving communities furthest from environmental justice.

Encourage professional learning for counselors to include green jobs in their High School and Beyond Planning with youth, including examples of pathways to green jobs, with CTE sequencing.

GOAL 4:

Increase “green economy” visibility

Recommendations:

Develop standard criteria for “green job” designation at the occupation level.

- Market a standard icon to use for course listings, interactive career and job websites, job applications, and other outreach media.
- Support a re-work of the Workforce Training and Education Coordinating Board’s Career Bridge website to include searchable green economy jobs.
- Support a re-work of career interest assessments adding in a value for sustainable green jobs.

GOAL 5:

Collect and disseminate job information based on data that reflects current and future green jobs.

Recommendations:

Support Employment Security Department and the Workforce Training and Education Coordinating Board (WTECB) to work with Workforce Development Councils and green economy sector employers to provide cross-sector occupational demand numbers for green jobs that include local job openings predicted due to emerging trends, retirements and potential for green innovation.

Identify currently unaccounted and under-accounted occupations for inclusion in workforce data.

COVID-19:

This EGE Project began in November 2018 and writing about our findings and developing recommendations began in March 2020, just as the virus began to curtail our nation's activities. The implications of the COVID-19 pandemic for education and workforce are profound, and its course is yet unknown. We worry especially about the inequities in education and the impact on students furthest from educational justice. Educators who felt overloaded prior to COVID-19 may now be feeling overwhelmed. Rather than asking for additional workload, this EGE project recommends leveraging strategic opportunities to safely deliver green curriculum to PreK-12 through focused and deliberate pathways by:

- Identifying gaps and strengthening alignment in education, workforce and economic development systems to increase presence of green economy pathways
- Leveraging existing pathways by inviting industry and agency stakeholders to partner in FieldSTEM type opportunities, High School and Beyond Planning, and competency-based education systems
- Funding public/private partnerships to develop “green job” teaching resources, and work-integrated projects for teachers, available to all school districts through the user-friendly OSPI Open Educational Resources (OER) portal
- Increasing field-based projects and activities during COVID-19, as a safer option for proper physical distancing for students than in-classroom studies.



Wild Horse Wind and Solar Facility



Introduction

What is Educating for a Green Economy?

Educating for a Green Economy (EGE) is a partnership between the Pacific Education Institute (PEI), E3 Washington (Educators for Environment, Equity, and Economy), and Washington's Employment Security Department (ESD). **The Pacific Education Institute** (PEI) delivers high-quality professional learning and consultation services for educators in equitable, integrated, locally relevant, career connected, field-based STEM education. **E3 Washington** Educators for Environment, Equity and Economy (E3), the state's association for Environmental and Sustainability educators, believes every young person in Washington should participate in environmental and sustainability education experiences that are responsive to community and youth assets, needs, and aspirations.

The partnership was born out of conversations with Governor Inslee's Workforce Development policy office. The project set out to identify existing, promising practices in PreK-12 and post-secondary education and workforce systems that prepare students for a variety of green jobs. The EGE project will also make recommendations for next steps for education and workforce systems to ensure that pathways to green jobs are highlighted in state employment opportunities.

To accomplish this, PEI and E3 developed an advisory panel with representatives from workforce and economic development organizations, community colleges, and PreK-12 educators and employers. The advisory panel provided advice and perspective as the project determined components for a framework that encourages alignment of programs to create pathways from PreK-12 to employers. The project completed regional worksite visits and panels on emerging jobs in green economy sectors to learn about employer needs and to determine promising practices for teaching the necessary knowledge, skills, and abilities (KSAs) needed in these occupations. The project was also interested in understanding what mechanisms exist and where career connected learning initiatives needed improvements to ensure all students are aware of opportunities.

Washington is committed to the continuing evolution of a green economy. With support from Governor Inslee and legislators, industries across all sectors are continuing the transition to be more "green." A recurring question in our work was, "Will these jobs be accessible to all Washington students, including those with barriers to employment?" The EGE project worked with students, educators, state agencies, community partners and employers to learn how best to ensure equity in green economy job pathways.

Funding for this project came through a US Department of Labor Workforce Innovation and Opportunities Act (WIOA) grant to the Washington Employment Security Department. The EGE project, while determining next steps for involving education in the green economy, is also addressing barriers to employment for green jobs. EGE utilized the Outdoor Industry Jobs: A Ground Level Look at Opportunities in the Agriculture, Natural Resources, Environment, and Outdoor Recreation Sectors⁵ (Outdoor Industry Jobs) study conducted with funding through the state legislature.

Grounding work of EGE

This report was an outgrowth of a 2016, Washington STEM report for PEI which determined that there were only 13 field-based STEM occupations in Washington, none of which were considered “high demand.” The high demand designation is important because it is used to make funding decisions for programs and courses in Washington’s PreK-12 and community college system. At the same time, employers in environmental sciences, natural resource, agricultural and outdoor recreation sectors reported a very different outlook, indicating they had difficulty filling positions that were available. Each sector is a robust contributor to the state’s economy and each sector is facing hiring shortages of qualified employees.

In 2017, the Pacific Education Institute (PEI) met with the Workforce Training and Education Coordinating Board (WTECB) and took these findings to Senator Lynda Wilson who agreed to sponsor SB 5285, which called for a workforce study of mid-level field-based employment opportunities. The study intended to provide educators with the information they needed to inform and prepare students for opportunities in skilled mid-level science, technology, engineering, and mathematics (STEM) oriented occupations in the agriculture, natural resources, environment, and outdoor recreation sectors.

In 2018, WTECB conducted the study with Washington State University (WSU) Social and Economic Sciences Research Center. The resulting Outdoor Industry Jobs report found that the current data used to make decisions about employment prospects, especially in the agriculture, natural resource, environmental and outdoor recreation sectors are inadequate.⁵ EGE has identified the following points as imperative to determining how the state can move forward with this information.

- **Critical Demand Jobs:** By our definition, a “critical demand” job occurs in a community where, though there may be fewer than 30 jobs in a particular occupation, those jobs drive the many other jobs at production facilities, within transportation systems such as ports which then drive the jobs in the retail, service, education and housing sectors. An example of a critical demand job would be a forester in Clallam County where forester jobs support indirect jobs for thousands throughout the county. While the number of foresters will never show up as “high demand,” the local economy revolves around forestry making it a “critical demand” job. “High demand” is determined by the number of job openings for an occupation. Using just the number of job openings does not account for nuances, including the effect of “critical demand” jobs.
- **Incorporating the effect of a retiring workforce:** The workforce development system must account for occupations with an above average number of aging employees with retirements on the near horizon. Agriculture, forestry, and energy sectors all have a disproportional number of workers over the age of 55 and many of those jobs are in rural communities. Washington is missing an opportunity to forecast future job vacancies for these fields. The jobs will not show up as “high demand” because the jobs are currently filled and so are not counted.
- **Economic characteristics differ across the state making statewide data an inadequate measure for investment:** If “high demand” designation makes an occupation eligible for economic and workforce development funding, large

“High demand” and “high wage” designations drive funding which disproportionately affects workforce development opportunities for rural communities.

5. Workforce Training and Education Coordinating Board. (2018). *Outdoor-Industry Jobs*. https://app.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=OutdoorIndustryJobsReport_517d24af-0347-4096-b112-67dc63506fd9.pdf

population centers and corporations with densely situated employees receive an undue benefit. To strengthen a transition to a green economy, all regions and all employers must be included. Regional data related to key economic drivers and potential economic development must drive statewide investments.

- **Living wage differentials matter – high wage versus purchasing power:** A \$60K job in Kettle Falls or South Bend will buy much more than a \$60K job in Seattle. Our current system of career and college readiness must help young people understand that the purchasing power of a wage varies by region and that lifestyle choices are a consideration when determining future employment.
- **Family and Life-style choices matter:** For many Washingtonians, a higher wage can be offset by the lifestyle benefits of living near family. A move from a rural to an urban area is often driven by economic/employment or education reasons. In contrast, when people chose to move from an urban setting to a rural one, it is frequently lifestyle or family related factors prompting the move⁶. An exception can be found in rural areas with strong outdoor recreations opportunities; in those communities, people from urban areas move in to enjoy increased access to outdoor recreation⁷. With the growth of green jobs in both urban and rural⁸ communities, individuals can make decisions based on those lifestyle choices most suited to them and their families.
- **Innovation is missing:** As communities and industry innovate ways to increase efficiencies, transition to cleaner processes with renewable resources, and reduce and utilize waste, new jobs are being created and existing jobs are being adjusted. The Creating a Workforce with 21st Century Skills 5 report from Washington State University (WSU) Energy Program comments on the need to inform the public about changes in the workforce needing 21st century skills. “We must ensure that our current and future workforce is prepared not only for our current economic needs, but for the emerging opportunities forecast to require new and different skill sets.”
- **Many jobs are lost in the counts:** It is difficult to define clear sector parameters with the various coding systems used by different entities. At the federal level, the North American Industry Classification System (NAICS) is the standard used to classify business. Jobs associated with renewable natural resources are hard to tease out from the NAICS codes. State level data is collected primarily through Unemployment Insurance (UI) and poses difficulties for collecting accurate information. Self-employed and contract employment are not captured by Washington’s Employment Security Department (ESD). In addition, all tribal nation jobs show up under “local government,” a simplification that ignores tribal jobs associated with natural resource, agriculture, clean energy or outdoor recreation. Webcrawlers that collect information on job openings are becoming increasingly complex, and yet they still miss many jobs as individual companies do not use common job descriptive language.

6. von Reichert, Cromartie & Arthun *Journal of Rural and Community Development* 6, 2 (2011). 35–52

7. USDA-Economic Research Service Report (2015). *Factors Affecting Former Residents Returning to Rural Communities*

8. Washington State University Energy Program. (2013). *Creating a Workforce with 21st Century Skills*

- **Finally, skilled workers have value:** It was noted in Outdoor Industry Jobs that many skills needed for green jobs require some training after high school, but not necessarily a 4-year degree. In 2017, only 47% of Washington residents ages 25 to 64 had attained a post-secondary degree.⁹ That leaves 53% of the state's population without a 4-year degree. In some rural areas there is a high percentage of unemployment among youth ages 19-24. With employers reporting difficulty in hiring qualified workers, there is an opportunity to provide skills to the 53% to meet entry and mid-level green jobs to both benefit them and the state's growing green economy.

A key takeaway from the report is that publicly available data sources alone are insufficient to effectively inform the workforce development systems about the availability of jobs in many green economy sectors.

A key premise of our EGE project is that our PreK-12 system can be an effective place to engage young people in the importance of healthy (economically, ecologically and socially) sustainable communities, and to leverage PreK-12 learning to careers. Focusing on learning outcomes that prepare students for the local workforce moves Washington toward stronger communities and stronger industries that translate to a robust economy. The diversity of the state's locally controlled 295 school districts and 6 Tribal compacts schools add a complexity to the task of including the PreK-12 system; at the same time, that diversity allows students to engage in locally meaningful ways.

Having "boots on the ground" to connect local agencies and industry with PreK-12 learning builds student awareness of the skills needed and opportunities for employment in the green economy. Currently most workforce development efforts focus on 11th and 12th grade and post-secondary education, and most career launch efforts target youth eighteen or older. To be ready for those opportunities, youth need to experience applied learning in meaningful community-based contexts throughout the PreK-12 system. The state has initiated efforts to capture these students at earlier grades such as the requirements for the High School and Beyond Plan which reaches to middle school. While planning will help students begin to consider the pathways that are of interest to them, students still need incentives and experiences on which to build their skills and align with local pathways. When the learning is presented in an isolated discipline, it is not leveraged and is less than beneficial to students.



9. Washington Student Achievement Council. (2017). Statewide Attainment goals set the course <https://wsac.wa.gov/roadmap/attainment>

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EGE explores the interconnectedness between the Pre-K-12 education system and work supporting a green economy. This report will focus on equitable pathways to green jobs for certain sectors and make recommendations that can be applied across all green economy sectors.

Addressing equity for marginalized populations

“Let’s face it: with its traditional focus on the highest academically achieving new high school graduates, our U.S. system of higher education was developed to successfully support a certain demographic of student. And by the way, for many decades, the vast majority of those students who attended college were white men.” Kristi Wellington-Baker, Director, Washington’s Student Success Center & its Guided Pathways program¹⁰.

The diversity of communities in Washington is a source of pride and resilience for the state. This project specifically looked for strategies to ensure marginalized communities and those experiencing barriers to employment were included. EGE sought recommendations to remove barriers to green jobs.

While rural communities nationwide struggle with a lack of skilled workers to fill available family-wage jobs, the pathways presented to youth often send them elsewhere in search of jobs that do show up in the data. Rural individuals, who may want to stay in their hometowns, if looking for jobs through our workforce system including WorkSource offices and Career Bridge, will find data on “high wage” and “high demand” jobs. If not counseled appropriately, this data may encourage them to move to urban areas to find employment. If there is not a mechanism in communities to expose students to the variety of green jobs, students may have no idea such jobs exist in their hometowns. Often students don’t know what jobs are available to them in communities with strong natural-resource companies such as Sierra Pacific in Shelton, agencies such as the Department of Natural Resources in Castle Rock or Public Utility Districts (PUD) such as Asotin PUD in Clarkston. Green jobs exist and are emerging in both urban and rural areas. With industry and education working together to identify and provide pathways to those jobs, our rural and our urban communities and their economies can not only survive but thrive.

There are a wide range of relevant reports and resources informing this report and important findings related to developing a green economy workforce. These included reports on natural resource, sustainability and STEM careers, rural communities, working with WIOA and other underserved youth, workforce pathways and 21st Century Skills. In addition, the EGE Advisory Panel, numerous relevant interviews, meetings, work site visits, and workforce development forums have all provided advice to this report.

This Roadmap will focus on equitable pathways that lead to three key green economy sectors and will address known barriers for vulnerable and underrepresented communities: forest management and products, agriculture and clean energy. The learning gained from these sectors can be used for additional green economy sectors in the future including outdoor recreation, fisheries, conservation, marine systems and others. EGE explores the interconnectedness between the Pre-K-12 to post-secondary to employment systems to set goals and make recommendations for continuing Washington’s transition to a green economy.

¹⁰. Kristi Wellington Baker <https://www.coewa.com/blog/in-search-of-students-for-post-secondary-guided-pathways>



Yakima Valley

Chapter 1

Legislative action that supports a shift towards a green economy

Why transition to a green economy?

As impacts of a changing climate become apparent across Washington, people will increasingly need to mitigate and adapt to ensure the social, ecological, and economic well-being of communities. Mitigation and adaptation will require a combination of scientific inquiry, engineering design and effective communication to help communities respond to climate impacts. Supporting a transition to a greener economy, an economy that asks all sectors to consistently balance operational impacts with the effect on the non-living and living components of the ecosystem, including humans, will be an important focus for the state.

Washington's abundant natural resources and geographic position make it a center for global supply and distribution of goods. Washington is a leader in forest products, clean energy, regenerative agriculture and food systems. Today, the forest products sector is the only sector that can be considered carbon negative, taking more greenhouse gas from the atmosphere than it produces.¹¹ In 2019, Washington led the nation in the amount of electricity generated from renewable resources,¹² and leads the nation in clean energy generation and carbon friendly industries. The state ranks 10th in the U.S. for its energy efficiency standards¹³ and has committed to uphold the Paris agreement on climate change.¹⁴

Companies seeking to compete in a global market have been evolving practices to reduce waste, increase efficiencies and account for their environmental impacts. As human populations increase the demand on resources and our economic systems, we must also ensure our social justice and environmental systems are strengthened. Washington, with its rich natural resource economic base, is well positioned to continue to strengthen the programs that already make it a leader in the nation's inevitable transition to greener economies.

11. Ganguly, I.; Pierobon, F.; Sonne Hall, E. (2020). P. 11,194. Global Warming Mitigating Role of Wood Products from Washington State's Private Forests.

12. U.S. Energy Information Administration. (2019). Washington State Profile and Energy Estimates. <https://www.eia.gov/state/analysis.php?sid=WA>

13. The Spokesman-Review (2019). Washington State falls slightly in state energy efficiency scorecard rankings. <https://www.spokesman.com/stories/2019/oct/07/washington-falls-slightly-in-state-energy-efficiency/>

14. United States Climate Alliance (2019), U.S. Climate Alliance Governors Oppose Administration's Withdrawal from the Paris Agreement <http://www.usclimatealliance.org/publications/pariswithdrawal>

Legislative action focused on innovating in a green economy

In the last 15 years, the Washington Legislature has considered and passed several bills that focus on the “green economy” with implications for education, workforce, industry, and communities. These bills began a legislative response to an overall shift in societal values. Industries have likewise shifted to be “more green” with advanced technologies and automation efficiencies that lower costs, contribute to cleaner and more renewable processes, and create less waste.

Selected legislation is highlighted here showing statewide trends in three sectors: (1) clean energy, (2) natural resources with a focus on forestry, (3) agriculture, and in (4) workforce development and PreK-12 education.

Green Economy Washington state has had a green economy for decades as evidenced by our forestry and hydroelectric power sectors. Recognizing Washington’s enormous natural resources and geographic advantages, several initiatives have created a statewide emphasis on accelerating this green economy including the 2009 Evergreen Jobs Initiative, a comprehensive green economy jobs growth effort (RCW 43.330.370). The Department of Commerce (Commerce) and the Leadership Team include business, labor, education, and government representatives who coordinate workforce and economic development efforts for a green economy. The Evergreen Jobs Initiative and the Comprehensive Green Economy Jobs Growth Initiative (RCW 43.330.310) have both set goals to increase green economy jobs by 2020. In spring of 2020, the Supplemental Operating Budget, HB 1109.SL (38) directed Commerce to update Washington’s State Energy Strategy with two broad goals in mind. First, the strategy must identify ways to meet the state’s updated greenhouse gas (GHG) reduction targets. Second, the strategy must align with the requirements of the state’s 100% clean electricity law (Clean Energy Transformation Act 2). Washington legislation requires communities to respond to climate change by reducing emissions and preparing for a resilient future characterized by adapting to the current and foreseeable effects of climate change.

Forestry Sector Several pieces of legislation are contributing to existing sustainable practices in the forest industry. All recent work is grounded in the Forest and Fish Agreements of the 90’s. HB 2541 (2009) established a base of forest lands that may be used for commercial forestry. The Department of Natural Resources (DNR) was required to develop landowner conservation proposals that supported forest landowners by December 31, 2011. HB 1484 (2009) expanded the riparian open space program to include lands that contain federally listed threatened or endangered species. The Forest Practices Board must also implement an acquisition program for riparian open space and critical habitat. SBI254 (2011) re-commits the University of Washington (UW) to forestry education through its Institute of Forest Resources. HB2238 (2012) uses funds that would pay for compensatory mitigation to fund programs for forest landowners.

HB 1254 (2012) enlarges the scope of the Institute of Forest Resources’ mission to reflect modern forestry issues.

HB1275 (2017) provided streamlined permitting for aquatic investments on forest land. SB5450 (2017) directed a pathway to allow mass timber tall wood building construction. SB 5998 (2019) exempts working forestlands from increases in the real estate excise tax to protect the working forestland base. HB 1784 (2019) requires forest health investments to be prioritized to protect working forests. Most recently in March 2020, HB 2528 was passed recognizing the contributions of the state’s forest products sector as part of the state’s global climate response.

Clean/Renewable Energy Sector A major piece of legislation, in 2006, the Energy Independence Act (EIA) established renewable energy targets as a percentage of customer load. Eligible resources include power produced through hydroelectric plant upgrades, wind, solar and geothermal energy, landfill gas, wave, ocean or tidal power, gas for sewage treatment plants, biodiesel fuel and biomass. The 2019 Clean Energy Transformation Act (CETA) applies to all electric utilities serving retail customers in Washington and sets specific milestones to reach the required 100% clean electricity supply. By 2022, each utility must develop an implementation plan with energy efficiency and renewable energy targets. By 2025, utilities must eliminate coal-fired electricity. The 2030 standard is greenhouse gas neutral; utilities have flexibility to use limited amounts of electricity from natural gas if it is offset by other actions. Then by 2045, utilities must supply 100% renewable or non-emitting energy with no offsets.

Agriculture Sector Similarly the agriculture sector has developed best practices through legislation to support more regenerative and conservation focused practices. For example, SB 6179 Engrossed (2015) increases information on water banks and related programs in various areas of the state and SB 5014 (2015) which identified the Yakima Basin water banking program as a set of best practices. For example, SB 6179 (2015) requests input from stakeholders to establish, or maintain, water banking best practices that assist in providing water supplies for instream and out-of-stream users in multiple areas around



Sequim Valley

the state with historical water usage issues stemming from the “use it or lose it” water law. SB 6306 (2019/2020) created the Washington soil health initiative, a partnership administered by Washington State University, the Conservation Commission, and the Department of Agriculture. It requires the collaborating agencies to support and supplement the current Washington Soil Health Advisory Committee membership to promote effective implementation of the Soil Health Initiative, focusing on creating partnerships of stakeholders with the goal of improving agricultural viability by improving farm profitability, as well as improving nutrition by increasing health-promoting nutrients, micronutrients, and microbial processes in soils. Good soil health lends itself to reduced erosion, nutrient leaching, and improved water quality – all essential in environmental best practices. In 2020 SB 5947 established the sustainable farms and fields grant program further commit to working with the agriculture community to support carbon storage and successful farming.

Economic and Workforce Development: Washington plays an active role in economic development by managing federal funding, state and local taxes and legislation. For example, when the legislature established the state’s Economic Development Tax Authority, they stated that economic development is essential to the health, safety and welfare of all citizens. They included the importance of providing meaningful employment opportunities and thereby enhancing the quality of life.

In Washington, the Community Economic Revitalization Board (CERB) fosters economic development by stimulating investment and job opportunities and the retention of sustainable existing employment for the general welfare of the inhabitants of the state. The Growth Management Act in RCW 36.70A.020(5) lists 13 planning goals, one of which is economic development:

Encourage economic development throughout the state that is consistent with adopted comprehensive plans; promote economic opportunity for all citizens of the state, especially for unemployed and disadvantaged persons; and encourage growth in areas experiencing insufficient economic growth, all within the capacities of the state’s natural resources and local public facilities.

The Washington State Department of Commerce defines and focuses on economic development throughout the state by strengthening key industries, expanding international trade, helping small businesses grow, providing training to a new generation of workers, accessing funds and supporting local economic development partners.

Washington’s Employment Security Department coordinates the WorkSource program which brings together business, government agencies, colleges and social service nonprofits to improve access to employment and training services. Employment Security also oversees the Washington Service Corps, which provides important entry level jobs to youth looking for careers including many green career paths. The Workforce Training and Education Coordinating Board (WTECB) is a lead organization responsible for comprehensive, long-term workforce development strategies and goals. Using the Washington Workforce Core Measures, WTECB oversees programs that utilize federal and state workforce dollars. WTECB also hosts Career Bridge, where job seekers across the state can find jobs, trends, and resources.

Post-Secondary and Workforce Development In 2014, the US Department of Labor (DoL) finalized the Workforce Innovation and Opportunity Act (WIOA) to establish the relationship between national, state and local workforce investment activities.

The act benefits employers, dislocated workers, disadvantaged adults and low-income youth by matching employers with the skilled workers they need to compete in the global economy. DoL requires states to develop a strategic plan to receive WIOA funds. The Washington plan is called the Talent and Prosperity for All (TAP) Plan. TAP is designed to strengthen business engagement, streamline customer service, broaden system accessibility, and build a next-generation performance accountability system. TAP identifies other entities supporting workforce development in Washington, including community-based organizations, educational service districts, school districts, community and technical colleges, and city/county government and WorkSource. All these different groups provide a rich opportunity to develop green economy resources, as well as requiring real work to establish a niche in a complex network.

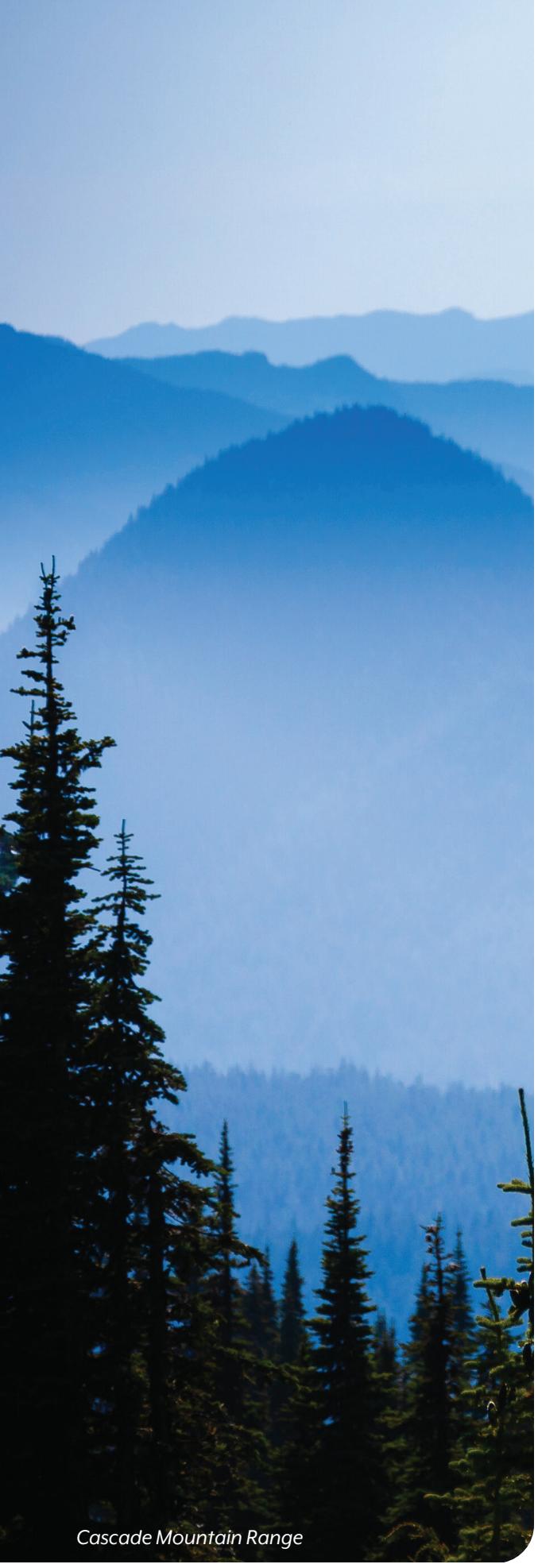
With the passage of HB 2158 (2019) and the launch of Career Connect Washington, Washington is moving to ensure that every student in the state has equitable access to a range of career connected learning opportunities. Career Connect Washington is a consortium of business, education, labor, and government leaders that is working to scale career connected learning through a comprehensive statewide system. With HB 2158 came an influx of funding to support career connected learning (CCL) allocating \$393 million towards programs, much of which provides grants for Washington students to attend post-secondary institutions. It also included \$63 million for Community and Technical Colleges funding all 34 Washington community and technical colleges to develop career-focused Guided Pathways.

Guided Pathways help students select courses, minimize achievement gaps, increase graduation rates and add to the value of students' certificates or degrees. It also funded \$35 million for the University of Washington and \$19 million for Washington State University CCL programs. The federal Perkins V expands opportunities for students to learn through career and technical education. SB 6421 (2020) extends the farm internship program through on the job training for farmers and interns who want to be farmers, one of the few examples that targets a green job industry. HB 2177 (2018) directs education funding in rural communities towards employment needs of the county. The objective of the program is to meet workforce needs of business and industry in rural counties by assisting students in earning certificates, associate degrees, or other industry-recognized credentials necessary for employment in high-demand fields. Note that the designation of "high-demand fields" can overlook the economic viability of "critical demand" fields for some communities.

On January 8, 2018, members of the Washington (WA) State House of Representatives introduced House Bill (HB) 2412 – Creating the Buy Clean Washington Act to the state legislature. Modeled after the Buy Clean California Act, HB 2412 proposed that WA state agencies awarding construction contracts require environmental product declarations (EPDs) for an eligible list of materials. Although the bill did not move forward for debate and voting in the 2018 legislative session, a modified version of the proposed study was included in the capital budget. The capital budget authorized the University of Washington (UW) Built Environments to collaborate with the Central Washington University (CWU) Construction Management Program and the Washington State University (WSU) Architecture and Engineering School to "analyze existing embodied carbon policy and propose methods to categorize structural materials and report structural material quantities and origins." This resulted in the Buy Clean Washington Study.

K-12 Education Washington's education system includes critical components that allow increasing opportunity for young people to pursue and attain meaningful green employment in the communities they choose. The public-school system includes education standards, WAC 392-410-115 pursuant to RCW 28.230.020 - Common School Curriculum, that require all schools to teach environmental and sustainability education and civic participation – two critical knowledge sets aligned with employment in green jobs.

HB 2811 passed in 2020 to establish a statewide environmental sustainability education program for early learning and K-12. This includes funding for integrated learning tied to green job sectors. In 2018, the Legislature passed ESSB 6032, now known as ClimeTime which provided initial funding for Washington climate science professional learning for classroom teachers; the funding was renewed in the 2019-21 biennium. This funding directs educators to implement Next Generation Science Standards (NGSS), including those related to climate science and healthy environments. The funding provides a major step towards ensuring that all Washington students become more knowledgeable about climate science and impacts and more prepared for careers in a green economy.



Chapter 2

The Challenge of Defining the “Green Economy” & “Green Jobs”

The “Green Economy”

The terms green economy and green jobs are relatively new to the discourse about employment in the US. In 2010, the Bureau of Labor Statistics (BLS) launched a green jobs study, creating a baseline definition of green jobs. Generally, “green jobs” include jobs related to conservation and outdoor recreation, environmental regulation and are beginning to include equitable and sustainable economies. While many industries continue to evolve their practices to be more environmentally friendly, the impact has been different than predicted. Rather than creating a whole new class of occupations, the result has been more of a “greening” of the whole economy. Many jobs now incorporate green skills and the demand for those skills will continue to grow. While the work is not new, the approach to it is. As the definition of a green economy and green jobs are changing, the EGE project chose not to adhere to a particular definition in this report.

Looking at existing definitions, both for a definition of “green” as it applies to jobs or the economy and the descriptive industry practices or sectors related to those occupations, reveals a wide variety of potential definitions.

Cascade Mountain Range

Table: Green Job/Economy Definitions

Source	2009 WA Green Economy Jobs Report	Federal Bureau of Labor Statistics	O*NET
Definition	Jobs rooted in the development and use of products and services that promote environmental protection and clean energy	(1) Output-based Approach: Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources. (2) Process-based Approach: Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.	Green jobs can be determined by the degree to which the green economy affects the work context, and worker requirements. The greening of occupations is defined as: "...the extent to which green economy activities and technologies increase the demand for existing occupations...shape requirements...or generate unique work and worker requirements
Descriptive industry practice	Energy efficiency	X	X
	Renewable energy	X	X
	Preventing & reducing environmental pollution	X	X
	Mitigation or cleanup of environmental pollution	X	
	greenhouse gas reduction		X
	recycling and reuse		X
	Organic agriculture; sustainable forestry		X “agriculture and forestry”
	soil, water, & wildlife conservation		X
	transportation		X
	research, design, & consulting		X
	manufacturing		X
	green construction		X
	governmental and regulatory administration		X
	education, training, & advocacy goods & services		X

Green jobs

Green jobs are found in nearly all Washington industry and occupational groups. To date, green-job studies in Washington and across the nation have only a small number of new occupations identified as uniquely “green.” For the most part, employers are adding work responsibilities and activities identified as green to existing jobs. Employers appear to be “greening” jobs through their products and services and through employee workplans. The O*NET website provides a way to identify Green Economy Sector jobs sorted by Category, Code, Occupation, and Sectors. The data is based on state and federal UBI data and so holds many of the same problems that were found in the Outdoor Jobs Report. And whole sectors are included such as manufacturing: if you select that sector, a job in aerospace manufacturing is one of the options and when it is selected

it is not apparent what makes that job “green.” This contributes to the confusion about how “green jobs” are defined. “I would argue that very few jobs and industries aren’t green to some extent. It’s a matter of degree.” said Alan Hardcastle, Senior Research Manager - WSU-Social and Economic Sciences Research, Green Light Nonprofit educating for a green economy connects students to jobs for a sustainable future

EGE recommends a standard criterion, and use of an icon, for green job designations at the occupational level for course listings, interactive and job websites, job applications, and other outreach media. A rework of Career Bridge will also assist job searchers by including green economy search words that produce results. To support further economic development, EGE also recommends that Employment Security and the WTECB collaborate with the Workforce Development Councils to provide cross-sector occupational demand numbers for green jobs predicted due to retirements and/or potential for green innovation. These steps assist both education and industry to build timely succession planning for the workforce.

As noted in our introduction, a literature review by Georgetown University’s Center on Education and the Workforce found that there were generally three types of green definitions: 1) a social justice/worker-centered definition, which makes green contingent on its potential to address environmental inequity; 2) a renewable energy and energy efficiency definition, which defines green as activities in the clean energy sectors; and 3) a broad environmental definition, which defines green as anything relating to environmental protection and quality. Recent discourse related to the green economy links the work to climate change and includes new jobs that will be created through investments in equitable de-carbonization, while also centering the work on social and intergenerational justice. This work defines the green economy in terms of sustainability that meets the needs and aspirations of the present population without compromising the ability of future generations to meet their own needs.

A changing climate creates significant challenges and opportunities on a global, national and regional scale. Governments and businesses around the world are responding to climate impacts with strategies to mitigate (reduce greenhouse gas emissions and transition to clean energy) and adapt (prepare for changes in storm events, floods, droughts, fires, sea level rise, and more). These strategies could lead to more family wage green jobs.

In the last two years, the number of publications supporting green jobs is exponentially increasing. Many of these are taking a skill-based approach to determine workforce development needs. EcoCanada¹⁵ in a report that specifically looked at skills needed for “green jobs” indicated that technical skills and 21st century skills are highly desired for entry level employees. The report also demonstrated that employees hoping to move to higher level positions in companies will need a broader set of knowledge and skills that include sustainability, efficiencies, understanding of policy, climate science, communication and collaboration.

Washington’s green economy

The findings of existing green economy employment studies vary greatly depending on which definitions, methods, and assumptions researchers use. No uniform definition of a green economy or a green job currently exist for the state. It is important to note that measuring/comparing/identifying green jobs from different studies, at different points of time, within different sectors often do not produce comparable results. These results are due to differences in measurements, definitions, and assumptions. Nevertheless, several studies are included here, and all point to a growing green economy with increasing numbers of green jobs. Two recent reports make recommendations for Washington’s green economy

In response to HB 1109(38), the Washington State Department of Commerce produced Washington’s Green Economy Interim Report¹⁶. The report demonstrates the state has strengths in key sectors that can be leveraged to respond to climate change and are essential to simultaneously meeting the state’s greenhouse gas emissions targets and achieving economic success. Commerce convened a work group regarding the development of Washington’s green economy based on the state’s competitive advantages in energy, water, natural resources and agriculture. The final report will serve as a foundation from which to build Washington’s green economy.

15. ECO Canada. (2019). Skills Essential for Success in the Environmental Sector Report. <https://www.eco.ca/>

16. Department of Commerce. 2020. Washington’s Green Economy Interim Report. <http://www.commerce.wa.gov/wp-content/uploads/2019/12/Washington-Green-Economy-Interim-Report.pdf>

The report noted ongoing work in industrial symbiosis, which is the collaboration among public and private businesses to foster the use of industrial byproducts including energy, water, materials, and logistics. Recommendations from the work group focus on: 1) investing in higher education research development and workforce training to foster green economic development in clean energy, water, agriculture and forestry (natural resources) and to enhance and accelerate green economic development; 2) identifying opportunities for integrating current and emerging technologies into and across energy, water, agriculture and forestry (natural resources) and opportunities to create and enhance use of resources, including water and energy conservation, while minimizing environmental impacts and integrating with smart grid technologies; 3) policy recommendations at the state and local level to invest in green economic development.

Notably and importantly, the PreK-12 school system was not incorporated into this project study as it focused on an inventory of higher education resources, according to the request of the Legislature.

Growing the Green Economy in Washington State a report produced by the Association of Washington Cities (AWC) in 2019, reported a high-level examination of four industry sectors essential to addressing climate change in our state: energy, water, agriculture and forestry, and building materials.¹⁷

Selected findings from this report include: 1) Clean energy sources and efficient energy use are key to responding to climate change and reducing greenhouse gas emissions; the State is well positioned to lead in energy efficiencies, energy smart technologies and emerging clean technologies; Washington is a pioneer in the global clean tech industry; 2) Smart grid technologies are evolving and will need to be flexible, for example, as we increase the numbers of electric vehicles (EVs), home solar power and wind generation, alongside more energy efficient appliances and conservation measures, the smart grid will need to balance sources with electricity use; 3) Cross-laminated timber (CLT) shows promise as a sustainable building material process in revised forest management, in addition to continued research on harvest and growth practices. The advantages of CLT include smaller carbon footprint, construction efficiencies, fire safety, structure and weight, better forest management, and reduced costs; 4) Increasing food production and efficiencies in water and energy to help define the future of agriculture in the face of a changing climate. This is an opportunity to target new business development and investments with new sustainable farming practices. Research and applied science in agronomy, biology, bioengineering, and genetics are prominent in Washington.

Again, this report is limited in its perspective because the research only considered higher education. Opportunities to work with PreK-12 environmental and sustainability education were not included. The AWC study also presented limited opportunities in green economy investments for natural resource and agriculture industries in the state.

Waiting until high school graduation and then looking for a job or career puts a student at a disadvantage. Some graduates will already have chosen a career because they were exposed to it through family ties or an internship. Without awareness and opportunities to explore work options, high school graduates may see only limited options for themselves. EGE recommends that Washington create a PreK-12 green jobs grant program through OSPI's Environmental and Sustainability Program, or Career Connect Washington, to increase opportunities for community-led environment and sustainability education, as well as field-based, hands-on STEM and CTE courses.

This program would be especially beneficial for both underserved rural areas of the state and for students who experience barriers to these opportunities and jobs. To maximize inclusiveness, the program should set minimum participation rates for small communities and inclusion of Black, Indigenous and Latinx youth.

Identifying green opportunities

We found a few common themes across the green job sectors that make it less visible than other job sectors: 1) Often green economy jobs are classified as engineering, manufacturing, energy, agriculture or forestry, and are not called-out as part of the "green economy." 2) Many of the green economy sector jobs require STEM proficiency but are often not classified as STEM positions. These jobs are often overlooked because the operating definition of STEM is disproportionately steeped in technology and engineering -underrepresenting the science of many natural resource and conservation careers. 3) Large industries such as computing, healthcare and aerospace have banded together to advocate for workforce development. However, the "green

¹⁷. Association of Washington Cities: Center for Quality Committees. (2019). "Growing the Green Economy in Washington State: Exploring an Eco-nomic Center," <http://cfqc.org/wp-content/uploads/2019/04/ExploreEcoNomincCenterSummary.pdf>.

economy" has not developed the same cohesion to garner attention from workforce development. Most natural resource, clean energy and most farming job sites employ workers in the tens rather than the hundreds of employees such as one can find in manufacturing jobs, a situation that lends itself to identifying potential mentors for apprenticeship opportunities from a large pool of employees.

Workforce reports identify a growth in "green economy" jobs in the sectors selected for the EGE project and are present in both urban and rural areas of the state. Many rural communities suffer from lower wages, higher unemployment and fewer youth opportunities. As green jobs continue to emerge, rural economies will certainly benefit. As an example, there are more forestry, agriculture, clean energy and outdoor recreation jobs in the areas targeted for increased economic development as Washington's Opportunity Zones.¹⁸

This chart demonstrates two key patterns, first the percentage of workers in both natural resources and agriculture over the age of 55 is high compared to other sectors, and secondly, few workers are in the 19-24-year age groups. Across the state and in every rural workforce development area, the aging of the workforce is noted as a statistical concern. These numbers predict an increasing and dramatic turnover in the next ten years, and industry and education must work together to build a more skilled workforce as older workers retire. As noted in the EGE report's Introduction, the age factor is not calculated in the numbers that determine job demand. Washington is missing a critical opportunity to forecast job vacancies in the future through succession planning for workforce sustainability. Additional graphs on the aging workforce are available in the Outdoor Industry Jobs Report.

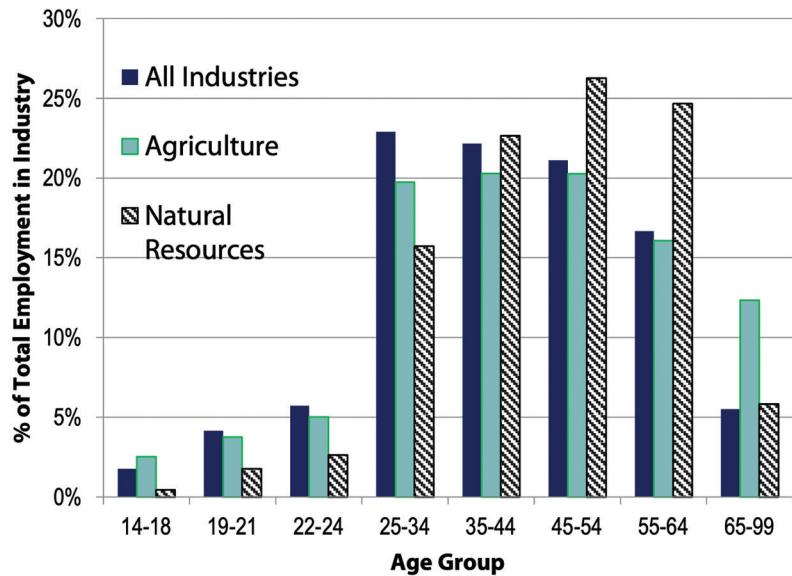
To incentivize community-based economic development projects that lead to green jobs across the state, but particularly in rural and remote areas, EGE recommends setting minimal participation for people experiencing barriers to employment, setting minimal requirements to meet "critical demand" and communicating living wage information that reflects the cost of living in addition to salary.

The distribution and value of green jobs in the clean energy, natural resources/forestry, and agricultural sectors

Identifying Green Jobs in Federal Resources

The U.S. Bureau of Labor Statistics (BLS) compiled a list from the natural resources/forestry, clean energy and agriculture sectors to reveal three categories of green jobs to include green new & emerging, green enhanced skills, and green increased demand:

Chart 5: Age Distributions in Selected Industries
Washington State, 2016



Source: U.S. Census Bureau, LEHD

18. Department of Commerce Website. Accessed 2020. <http://choosewashingtonstate.com/i-need-help-with/opportunity-zones/>

BLS Natural Resources & Forestry, Clean Energy, Agriculture Sectors	
Category	Occupations
Green New & Emerging	Biofuels Processing Technicians, Biofuels Production Managers, Biofuels/Biodiesel Technology and Product Development Managers, Biomass Plant Technicians, Biomass Power Plant Technicians, Geothermal Production Managers, Geothermal Technicians, Hydroelectric Plan Technicians, Hydroelectric Production Managers, Methane/Landfill Gas Collection System Operators, Methane/Landfill Gas Generation System Technicians, Solar Energy Installation Managers, Solar Energy Systems Engineers, Solar Photovoltaic Installers, Solar Sales Representatives and Assessors, Solar Thermal Installers and Technicians, Wind Energy Engineers, Wind Energy Operations Managers, Wind Energy Project Managers, Wind Turbine Service Technicians, Brownfield Redevelopment Specialists and Site Managers, Climate Change Analysts, Environmental Restoration Planners, Industrial Ecologists, Water Resource Specialists, Water/Wastewater Engineers, Precision Agricultural Technicians
Green Enhanced Skills	Civil Engineers, Electrical Engineers, Geological Sample Test Technicians, Machinists, Maintenance and Repair Workers, Mechanical Engineers, Power Plant Operators, Separating/Filtering/Clarifying/Precipitating/Still Machine Setters, Operators, and Tenders, Architectural and Engineering Managers, Environmental Engineering Technicians, Environmental Science and Protection Technicians, Including Health, Landscape Architects, Maintenance and Repair Workers, Public Relations Specialists, Reporters and Correspondents, Soil and Water Conservationists, Agricultural Technicians, General and Operations Managers, Landscape Architects
Green Increased Demand	Power Distributors and Dispatchers, Farm and Home Management Advisors, First-Line Supervisors of Logging Workers, Fish and Game Wardens, Forest and Conservation Technicians, Forest and Conservation Workers, Hydrologists, Natural Sciences Managers, Zoologists and Wildlife Biologists, Agricultural Inspectors, Buyers and Purchasing Agents, Farm Products, First-line Supervisors of Agricultural Crop and Horticultural Workers

A March 3, 2020 O*NET website update lists “All Green Economy Sectors,” sorted by Category, Code, Occupation, and Sectors.¹⁹ In addition the BlueGreen Alliance, which unites America’s largest labor unions and its influential environmental organizations, identifies ways today’s environmental challenges can create and maintain quality jobs and build a stronger, fairer economy. Their work centers around three objectives: clean jobs, clean infrastructure, and fair trade. “Within the Alliance, 600,000 employees contribute to the production of low-carbon electricity, including renewable energy, nuclear energy and low emission natural gas. According to the US Department of Energy, an additional 1.9 million Americans are employed, in whole or in part, in energy efficiency. Roughly 30 percent of the 6.8 million employees in the U.S. construction industry work on energy or building energy efficiency projects.”²⁰ At this federal level, green jobs are distributed widely and visible across the sectors but the way in which they are categorized is not in alignment.

19. O*NET 2020. All Green Economy Sectors. <https://www.onetonline.org/find/green?n=0&g=Go>

20. Department of Energy, 2020: <https://www.energy.gov/articles/doe-releases-first-annual-national-energy-employment-analysis>

Washington State Resources

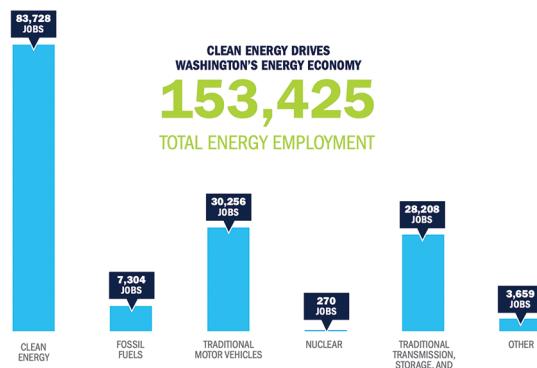
Clean energy is increasingly integral to Washington's economic growth, as more than five out of every ten jobs in the Evergreen State's energy economy are now in clean energy. Led by energy efficiency (63,000 jobs) and renewable energy (11,000 jobs), in 2019 Washington's clean energy economy ranked 14th among all 50 states with nearly 84,000 workers. An E2 report, Clean Jobs Washington 2019 based on work by the U.S. Energy

and Employment State Reports, focuses solely on the energy sector of the economy and does not include jobs in retail, repair services, water or waste management, and indirect employment or induced employment.^{21 22} Washington ranks among the top 15 states for employment in 10 clean energy categories: #2 Other Biofuels, #3 Small Hydropower, #6 Clean Storage, #10 Wind Energy, #11 Total Renewable energy, #11 Geothermal, #12 Bioenergy, #12 Total Transmission, Storage & Distribution, #13 Energy Efficiency, #14 Total Clean Energy.

The data also shows that seven out of every ten (69.9%) clean energy workers are employed by small businesses with fewer than 20 total employees. 45% of Washington's clean energy jobs are based outside the Seattle-Tacoma-Bellevue metro area. If counted as a single metro area, Washington's rural areas rank second in the state for clean energy jobs, behind only the Seattle-Tacoma-Bellevue metro.

Washington's Forest Industry also boasts important contributions to the state's economy and especially to rural counties. The Washington Forest Protection Association's Forest Industry Economic Impact Report shows the 105,000 jobs by county across the state totaling \$4.9 billion in wages and \$200 million paid to the state in taxes in the graphics located to the left and below²³. While growing, managing, harvesting, transporting and manufacturing wood and paper products emits some greenhouse gasses, growing trees and using wood products store more carbon, reducing Washington's carbon footprint by 12%. In a 2020 University of Washington study, authors state Washington's forest products industry is Below Net Zero. This ability of the timber industry to produce materials for buildings that store carbon and continue to sequester carbon at a rapid rate with young growth, strongly positions the industry to be part of green economy solutions for Washington. The Washington State Department of Natural Resources also manages large tracts of land in trust for residents contributing a significant workforce and revenue for local schools.

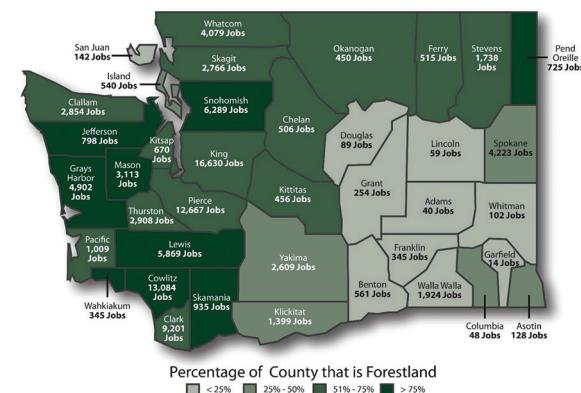
CLEAN ENERGY DRIVES WASHINGTON'S ENERGY ECONOMY



CLEAN ENERGY JOBS IN PERSPECTIVE



Forest Industry Economic Impact 105,000 jobs and \$4.9 billion in wages



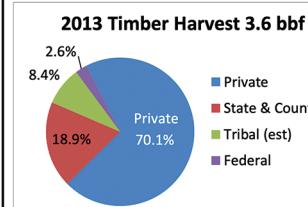
Percentage of County that is Forestland

Washington State is the 2nd Largest Lumber Producer in the Nation

80% of the total timber harvest and 49% of the timber industry jobs are in rural counties.

2013 Timber Ind.	State Total	Rural Counties Total	% of Total
Direct Jobs	41,486	20,864	50.3%
Total Jobs	104,986	51,837	49.4%
Total Wages	\$4,879,645,181	\$2,479,931,332	51.2%
Taxes	\$200,829,823	\$116,404,400	58.0%
Volume (2013)	3,649,641 mbf	2,936,709 mbf	80.5%

47% of Washington State forestlands are working forests, contributing to the Washington State economy through jobs, taxes and production of wood & paper products.



Washington State's privately owned forest landowners provided for 70% of the annual statewide timber harvest in 2013.

Forest Industry Total Jobs
Includes Direct, Indirect and Induced Employment

Data calculated using the Bureau of Economic Analysis Benchmark Series, RIMSII, Type II, Direct Effect multipliers, Forest2Market (2013 data)

Sources: Forest 2 Market economic study; University of Washington, Forestland Database, Luke Rogers www.ruraltech.org, WFPA Forest Facts & Figures; Washington Department of Revenue Timber Harvest Statistics www.dor.wa.gov

21. E2. 2019. Clean Jobs Washington 2019. <https://www.e2.org/wp-content/uploads/2019/12/E2-Clean-Jobs-Washington-2019.pdf>

22. National Association of State Energy Officials. 2020. State Reports. <https://www.usenergyjobs.org/2020-state-reports>

23. Washington Forest Protection Association. Accessed 2020. Forest Industry Economic Impact Report. http://www.wfpa.org/wp-content/uploads/2017/11/total-forest-industry-job-impact-by-county-statewide-g_1.pdf

Rich soils, diverse climates and large-scale irrigation make Washington one of the most productive agricultural regions in the world, allowing us to produce over 300 different crops. Agricultural production, food processing, and trade represent a significant segment of the state's economy, as evidenced by the chart to the right²⁴.

In the Eastern Washington Partnership (EWP) Workforce Development Plan (Ferry, Pend Oreille, Garfield, Stevens, Columbia, Lincoln, Whitman, Asotin, Walla Walla counties), agriculture contributes \$1.3 billion into the EWP counties' economy²⁵. If wine production, which is classified in the manufacturing sector, is added to agriculture, it brings the total figure to \$2 billion. Similar to state findings, key eastern Washington employers report that despite the large number of unemployed job seekers, many do not have the specific skills needed for the jobs that are vacant. Again, the individual who has achieved mid-level skills training will be more employable.

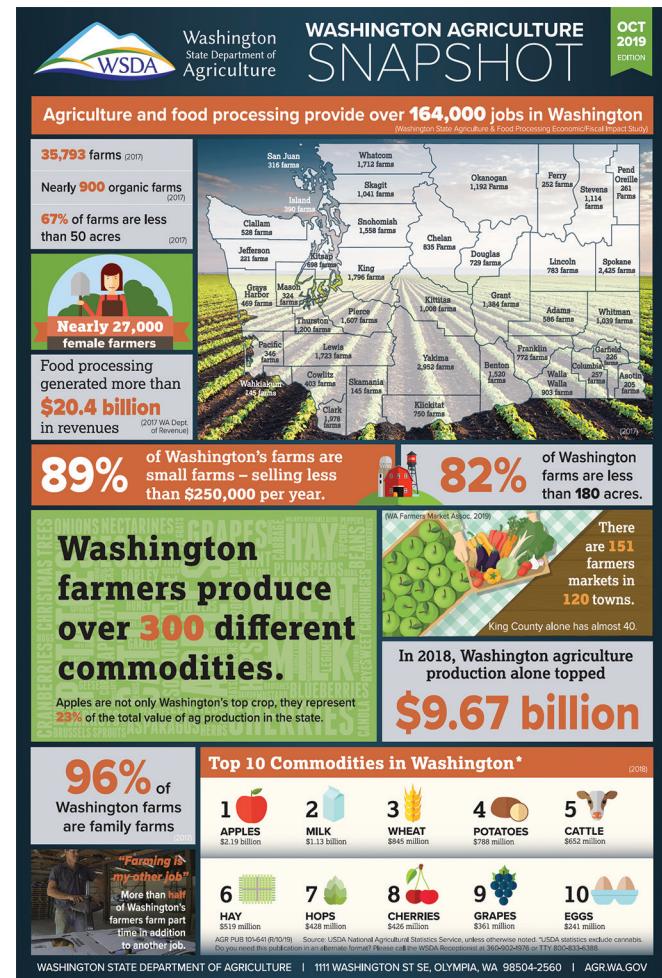
The forestry, agriculture, and hydroelectric power sectors have been green in Washington for decades. Market-driven concerns for sustainability and the environment, along with technological innovations, have accelerated green related legislation, the growth of the green economy and green jobs, and the need for PreK-12 braided pathways that build a ready workforce. Many green jobs require mid-level skills training, certifications, or two-year post-secondary degrees, thus offering a large percentage of Washington's residents an entry into ever-expanding green careers.

The demand for workers with the needed skill sets exceeds the supply of job seekers. To assist job seekers, EGE recommends identifying green job opportunities through standard designations, like an icon, in course listings, career counseling, job websites, job applications, and any outreach media. To continue green economic advantages, EGE also recommends incentivizing community-based economic development projects that reach out to rural and remote communities with minimum participation levels and awareness to participants about cost of living differentials with their purchasing power.

Green Sectors Skills at a Regional Level

Regional partnerships engage employers to identify and address common workforce needs. Industry partners help workforce development by identifying knowledge, skills and abilities (KSAs) needed by employees in their industry and highlight certifications and resources for training, apprenticeships and other opportunities that are recognized as providing valuable KSAs.

In a review of Washington's workforce development plans²⁶ from the mostly rural portions of the state, several themes emerged. There is a disproportionately aging workforce population 55+ years, particularly in the agricultural sector. A large percentage of the unemployed are youth (16-24), particularly in south central Yakima County. A high number of employers say they have unfilled jobs because they have been unable to find skilled workers. Most of the unfilled jobs were in the "middle range" of needed skills levels-- meaning they required some training, certifications, or post-secondary education, particularly two-year degrees. Most of these unfilled jobs are family-wage paying jobs. Barriers to employment that were noted included lack of high-



24. Washington State Department of Agriculture. 2019. Washington Agricultural Snapshot. <https://cms.agr.wa.gov/WSDAKentico/Documents/Pubs/641-WSDAAgInfographic-WEB.pdf?/641-WSDAAgInfographic-WEB>

25. Eastern Washington Partnership. 2016. Regional/Local Workforce Plan 2016-2020. <https://www.wtb.wa.gov/wp-content/uploads/2019/06/EasternStrategicPlan2016-2020.pdf>

26. Washington Workforce Training and Education Coordinating Board. Regional Workforce Plans. <https://www.wtb.wa.gov/planning-programs/regional-workforce-plans/>

school graduation, lack of English literacy skills, lack of basic and 21st Century skills including STEM skills, disabilities and lack of technical skill sets.

In a Washington's Employer Survey, the employers who had difficulty hiring most frequently listed the skill categories or areas as lacking in job applications as: 1) Occupation-specific skills (85 percent); 2) Positive Work Habits and Attitudes (63 percent); and 3) Communication Skills (62 percent).²⁷

Thus, skills lacking as identified in table 1C-1 are important to identify and even more important to address more specifically, for example, by following up with industry regarding what math is used in the field. Algebra, trigonometry, and calculus are mathematics tools for different functions but are typically viewed as a hierarchical continuum where more math means

higher as opposed to deeper understanding of how math concepts apply to solutions or, better yet, how one defines a problem for which a math solution is designed. Many of the green jobs requiring mid-level skills do not require high-level math skills, but rather broader math knowledge for specific jobs.

Table 1C-1: Percentage of Employers in the North Central WDA saying Job Applicants Lack Certain Skills, 2012

Skill	Percentage of Employers Noting Skills Lacking
Reading	24%
Writing	33%
Math	26%
Occupation specific	85%
Computer	42%
Team work	39%
Problem solving or critical thinking	62%
Communication	53%
Positive work habits and attitudes	63%
Ability to accept supervision	43%
Ability to adapt to changes in duties and responsibilities	48%

Source: Workforce Board, WA State Employers' Training Needs and Practices 2012

From North Central Workforce Development Plan
(Chelan-Douglas, Grant-Adams, Okanogan counties)

Employer engagement key to relevant experiences in green workforce development

The WSU Green Economy Jobs Report (2011) states that while there are some exclusively green economy jobs, "For the most part, employers are adding work responsibilities and activities identified as green to existing jobs. Employers appear to be "greening" jobs through their products and services and through the work practices they require of employees."²⁸ Employer engagement is important to provide students and teachers with relevant experiential learning opportunities to apply their academic, technical, and workplace content and skills. Increasing project-based learning that addresses environment and sustainability education standards can encourage the development of these green job skills. One refrain commonly expressed across the EGE Advisory Council and EGE interviewees is that green economy jobs require KSAs very similar to other workforce needs. Industry employers who advised EGE asked for many of the same goals identified by the CTE Perkins Act including improving graduation rates, STEM skills, proficiency in reading/ English language arts, post-secondary and certificate attainment and work-based learning. To increase CTE outcomes, the Perkins act also recommends stakeholder engagement, local job needs assessments and a labor market focus.

The Outdoor Industry Jobs Report recommends that workforce development policies and programs explore targeting transferable skills when addressing occupation-specific gaps. This is because an individual with transferable skills will have more opportunities available as employer needs shift or they choose to change careers. In addition, EGE employers identified skill upgrade training with new technologies including computer knowledge, programmable logic controllers, robotics, artificial intelligence, and automation technologies. "Students who can develop a process for on-boarding new skills and information are poised to be successful in a work world that demands constant skill upgrades".²⁹ Individuals with cross discipline knowledge and skills are particularly valuable as most industry jobs require skills from more than one discipline.

27. Washington Workforce Training and Education Coordinating Board. (2012). Washington's Employer Survey, <https://www.wtb.wa.gov/wp-content/uploads/2019/11/EmployerSurvey2012.pdf>

28. Washington State University Energy Program. Hardcastle, A. Kester, K. (2011). Growing Washington's Green Economy: Progress, Opportunities and Challenges <http://www.energy.wsu.edu/Documents/WSU%20Green%20Economy%20FINAL%20Report%201-23-12%20rev.pdf>

29. Washington State University. (2013) Creating a Workforce with 21Century Skills. <http://www.energy.wsu.edu/Portals/0/documents/2013%20Creating%20a%20Workforce%20with%2021st%20Century%20Skills%20FINAL.pdf>



Chapter 3

Alignment between education, economic and workforce development

Ensuring that students upon graduation are college and career ready is one of the goals of the PreK-12 education system. The Washington PreK-12 (primary & secondary education), and college (post-secondary education) systems are often left out of workforce development discussions. When they are included, it is generally only at the post-secondary level. However, the Office of the Superintendent for Public Instruction (OSPI), has recently led efforts to elevate educational practices that include career connected learning and has a robust career counseling program called Career Guidance Washington, which requires each student to develop a High-School and Beyond Plan.³⁰ Students are expected to begin developing their own plan starting in middle school and update the plan through high school graduation. These plans encourage students to develop portfolios demonstrating their Knowledge, Skills and Abilities (KSAs) and other accomplishments.

EGE sees the High School and Beyond Plan as a valuable tool to highlight project driven, FieldSTEM type learning preparing students for green jobs beginning in middle schools. EGE recommends that the planning include the principles of transitioning to a green economy with sequencing to “braid” the learning creating pathways and aligning learning from one level to the next using a competency-based approach. This leverages the learning and reduces redundancy.

Washington STEM’s Career Connected Learning Framework provides guidance for programs wishing to infuse career connected learning by describing a continuum of awareness, exploration, preparation, and work experiences that can be developed through strong public and private partnerships. Washington STEM supports equitable STEM moving through the framework to allow students to develop, apply, and be assessed on academic, technical, trade, and entrepreneurial skills that support their future career success.

The economic development system is designed to encourage business and job growth, while the workforce development system is designed to ensure individuals have the education, skills, and training needed to obtain jobs. When the two systems are aligned, job seekers receive

30. OSPI's High School and Beyond Plan Website <https://www.k12.wa.us/student-success/graduation/graduation-requirements/high-school-beyond-plan>

training and skill development that employers need, resulting in higher wages and increased career advancement, and employers have access to a skilled workforce that enables growth and increased productivity. Beyond benefiting employees and employers, a functional and aligned system has economic benefits to the broader community.

To offset disconnects between education, economic and workforce development, joint strategic planning with PreK-12 and post-secondary education is needed. Yet, there are challenges in bringing these groups together. A 2019 report by the Federal Reserve System Investing in America's Workforce Initiative identified gaps between workforce and economic development including lack of a lead entity or backbone organization, and communication, data, and information gaps. In addition, entities have their own goals and separate funding streams, and there is also a lack of critical support services to facilitate their alignment.³¹ Also, workforce and economic developers in any region often work in isolation, moving toward their own goals, and will sometimes compete for limited resources. This often means education, economic and workforce development operate without the information, partnerships and resources they need to develop the next generation of the state's workforce.

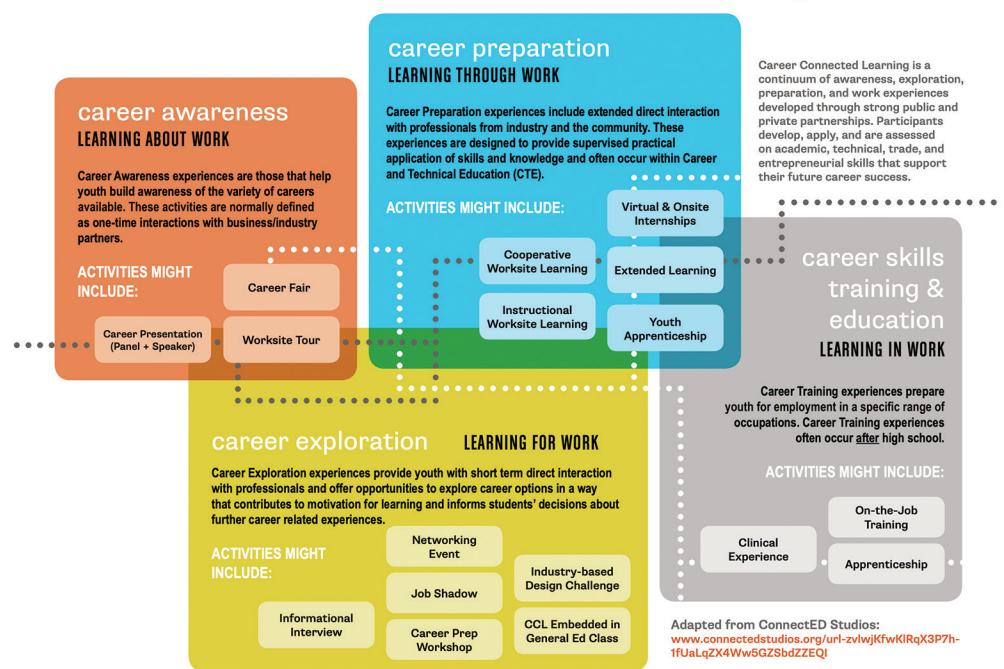
Many entities work to coordinate regional networks focused on career connected learning for educators. Washington STEM, Education Service Districts and more recently Career Connect Washington collaborate to increase regional education, economic and workforce development based on state plans and resources. Backbone organizations can support consistent communication among all partner organizations and help to close existing data and information gaps. When multiple organizations hold "backbone" responsibilities, it is important that they share similar goals and work to ensure their decision-making data accurately reflects the strengths and needs of the communities they serve.

The complexity of the education, economic and workforce development systems makes collaboration a challenge, but laying out specific alignment goals with a clear timeline to address agreed-upon goals is important for improving outcomes for both workers and employers. EGE looked for examples of cooperation amongst the four key systems: PreK-12 education, post-secondary education, workforce and economic development. The case studies included in this report demonstrate projects that include best practices for two or more systems.

Educating for a Green Economy (EGE) Forums and Forum Survey

In a series of statewide Educating for a Green Economy conversations, Career and Technical Educators were invited to join regional industry experts in a dialogue about career pathways in the agriculture, forest products and clean energy industries. At these sessions, industry and labor leaders shared their expertise and created a collaborative discussion on the green economy workforce and system-wide innovative education that leads to careers in the targeted sectors. The informative conversations stressed the importance of these industries for Washington's workforce and economic development and identified industries and careers as STEM related.

CAREER CONNECTED LEARNING FRAMEWORK



Adapted from ConnectED Studios:
www.connectestudios.org/uri-zvlwjkfkwk1rqx3p7h-1fuqlqz4ww5gzbdzzeqi

³¹. Understanding the Disconnect between Economic Development and Workforce Development Systems. Federal Reserve System. <https://www.investinwork.org/-/media/Files/reports/understanding-the-disconnect-between-economic-development-and-workforce-development-systems.pdf>

The primary consistent questions posed to all panelists included: 1) Describe the workforce challenges within your organization and/or the industry, 2) What advice would you give to educators for “skilling up” the next generation’s emerging workforce?

Responses across the sectors from employers were consistent, common themes include:

- Targeted industries are alive and well despite reputation of decline, e.g. forest products is the 3rd largest manufacturing sector in Washington with most mills located in small towns and rural communities
- Industries are increasingly aware that occupational data is flawed or non-existent
- Job seekers with KSAs across two or more disciplines are increasingly valuable, e.g. a students with an agriculture background and computer science skills will be hired immediately compared to one with just computer skills
- Job titles are outdated, even stressing a need for disruption of outdated job titles
- Identifying and hiring job seekers who possess 21st century skills, problem solving and knowledge of the science behind sustainability are difficult to find
- Millennials are excited about these “green jobs” and creating a new green economy
- Successful models for “skilling up” the next generation’s emerging workforce focus on how technology has changed these industries. Examples include drones, mechatronics, robotics, GIS, programming, capacity data management, and computerization. These growth opportunities continue to expand while education continues to keep pace with ever-changing technology and process improvements
- Effective methods to engage students in career pathways include internships, mentoring programs, industry tours, classroom presentations and integration of industry scenarios into standard curriculum.

The panels consisted of representatives from the targeted industries who were knowledgeable in the content and systemic structures of their business. These panelists provided unique insights into organizational practices and perceptions with commonalities among the panelists that included strong interest in building relationships for students to learn about careers with one commenting specifically that, “I don’t know a farmer who would turn a student intern away.” said Lindsey Williams, Executive Director of the Center of Excellence for Agriculture and Natural Resources. To further the opportunity, school district administrators were knowledgeable about their specific connections with programs they have in place but weren’t aware of many of the opportunities shared by industry, and they inquired further about how they could connect students to more work-site visits, internships, and tours. “How can our high school staff outline for students the various programs or 2-4 college degrees that would match green energy sector careers?” asked Kent Martin (CVSD) illustrating a common desire from education leaders in the audience to understand how to support students in preparing for jobs.

EGE held four forums before COVID-19 hit and slowed down plans to offer additional events. Each event included opening remarks by EGE Project lead, Kathryn Kurtz and was moderated by one of the EGE lead team.

Agriculture Forum at the Spokane Area Career and Technical Education Directors Regional Meeting, NEWTech Skills Center, Spokane, January 17, 2020

Panelists: Josh Riddle, Farm It, LLC; Seth Flanders, Water Resources Commodity Buffer Program, Coordinator, Spokane County Conservation District; Lindsey Williams, Director, Agriculture and Natural Resource Center of Excellence, Walla Walla Community College, Leslie Druffle, Outreach Coordinator, The McGregor Company; Moderator: Michelle Townshend, PEI

Forest Products Forum at the Washington Career and Technical Education Directors Conference, Vancouver Hilton, February 25, 2020

Panelists: Lisa Perry, Community Relations Manager, Sierra Pacific; Arika Atkins, Human Resources Manager, Weyerhaeuser; Bill Messenger, Workforce Director, Washington State Labor Council; Paul Spencer, Managing Member, Wind River Biomass; Elona Tragoub, Operations Director, Gorge Greens (Farm side), Wind River Biomass; Jon Cole, Operations Manager, SDS Lumber; Moderator: Lindsey Williams, Director, Center of Excellence for Agriculture and Natural Resources

Clean Energy Forum at the South Sound Career and Technical Education Regional Directors Meeting

April 17, 2020, Zoom

Panelists: Sara Bowles, Residential Conservation Program Coordinator, Tacoma Power; Kirk Haffner, President, South Sound Solar; Steve Parker, President, EnergySec; Travis Kinney, Electrical Engineer, Lewis PUD; Moderator: Barbara Hins-Turner, PEI

Clean Energy Forum at the Spokane Area Career and Technical Education Regional Directors Meeting; May 17, 2019, NEWTech Skills Center

Panelists: Jason Selwitz, Lead Faculty, Energy Systems Technology, Walla Walla Community College; Calle Bendickson, Principal, Corporation Social Responsibility, Itron; Jeremy Gall, Manager Craft Training, Avista Utilities; Ben Taylor, Senior Manager, Energy & Advising, Engie; Michael McBride, Business and Industry Analyst, Spokane Workforce Development Council; Moderator: Michelle Townshend, PEI.

EGE sought feedback from CTE educators who attended the industry forums through an electronic survey developed by the EGE 3rd party evaluator. The survey asked questions regarding forum/s attended and the knowledge, skills and abilities panelists shared that shape the success of their workforce. Most importantly, EGE sought to learn if any of those KSA's are being taught within existing CTE coursework, and if not, what resources are needed, what barriers / challenges exist and if the CTE audience would like to continue the dialogue with industry to strengthen their courses.

Overwhelmingly, the question "Would ongoing industry forums such as these be beneficial to keep you abreast of industry workforce initiatives, trends, and best practices?" received positive responses. The CTE audience indicated they would like ongoing teacher training, virtual forums that reach remote areas and conference workshops to dialogue directly with industry stating, "hearing about the "real work" was exciting."

Samples responses:

- "Panels are great. Zoom worked well regardless of school closure. Teachers don't have the ability to travel and I would like them to engage in these discussions more often. "
- "I really enjoyed listening to the panel speak from different perspectives of one industry. Please continue these offerings. They really help guide our direction."
- "I believe the way this was set up, through CTE Directors and inviting school staff was a good way to introduce and create awareness."
- "Regional and Virtual. Hearing about the "real work" happening is exciting. Also, would like to send my teachers."
- "At the conference I attended the forest products industry. It was very eye opening to how the timber industry works in the green economy and the wide variety of jobs available. Having a panel format was very engaging."
- "Helps us be aware of industry needs and support development of future employees."
- "Something that allows us to attend remotely regardless of location."
- "I would love there to be some "short clips" of this type of conversation that we can play to students to help them hear from industry leaders."

Communication among education, industry, and workforce development is a challenge. Although the education leaders indicated they were well-versed in their programs and industry panelists indicated they had opportunities for youth; communication and follow through regarding those opportunities to make school-to-industry connections appears to be an opportunity for growth. Technology adaptation challenges all sectors, and education including teacher professional development is needed to maintain relevant programs that meet the needs of industry. EGE recommends ramping up industry engagement for Career and Technical Educators to include teacher training and resources in both a virtual exchange as well as deepening the outreach through WA-ACTE events, conferences and regional meetings. This dialogue between industry and education is a needed component to strengthen the Roadmap for Washington's future green economy workforce.

Competency-Based Education

In EGE's regional stakeholder meetings, one of the key complaints uncovered is related to the need for a competency-based or mastery-based system of education. Too many students spend time in classes where they already have the competencies or skills expected for course completion. A system to provide opportunities for students to demonstrate learning such as in performance-based assessment or capstone projects could allow students to move through systems more effectively and utilize their time and energy learning the knowledge, skills and abilities they don't have. A competency-based education is part of the State Board of Education's (SBE) legislative platform and is supported in the Board's strategic plan. SBE staff plan to create a Competency-Based Education Report that will include a summary of the current status of competency-based education in the state and provide a basis for the Board moving forward with its platform and plan. The Board's platform calls for an initiative to "Engage partners to develop a framework for a competency-based diploma pathway and additional options for competency based credit," and to support "Expanding use of personalized learning strategies and project based

and career connected learning opportunities, including credit for competencies acquired in the workplace, through volunteer work, or other extracurricular activities."

Educators have noted that competency-based education is an "emerging topic" with much work to be done. Loss of FTE funding in high schools and course tuition fees at the post-secondary level prevent institutions from having incentives to support competency-based learning. However, alignment of education, economic and workforce development systems would allow Washington to get the most out of the limited available resources.

Partnerships are particularly important in communities with populations smaller than 10,000 people. Hub systems are a start to reaching remote rural communities; but when opportunities are centered in hubs, individuals from remote communities sometimes travel an hour or more each way to take advantage of those opportunities. This is a barrier to inclusion, particularly for low-income individuals.

The EGE project recommends developing deliberate braided pathways from PreK-12 to career utilizing competency-based models for learning and to reduce redundancy of learning.

Envisioning a coherent system that supports braided pathways

More work needs to be done to prepare youth for green economy jobs. The TAP and the WSU 21st Century Skills Report both recommend increasing industry and business engagement, especially to identify workforce needs and opportunities. This can be achieved through (1) partnerships with PreK-12 education including CTE programs at the state and local levels, (2) forecasting of future career opportunities aligned to KSAs , (3) access to apprenticeship programs, internships, and other youth workplace engagement opportunities.

Career Connect Washington (CCW) is the statewide program that collaborates with the federal Pathways to Prosperity Network, connecting young people to work experiences. Working from the belief that every Washington student deserves meaningful work, CCW funds organizations that combine classroom learning with practical career experiences for youth and young adults. Identifying and supporting development of the many pathways available, CCW supports organizations that provide career exploration, preparation and launch for jobs. CCW's goal is to have 100% of Washington students participating in career exploration and career preparation activities, and 60% of all students participate in a Career Launch program by 2030. To address the need to engage marginalized youth, EGE recommends developing career launch opportunities for youth age fifteen to seventeen specifically aligned to the green economy. Currently many career launch opportunities are available for youth eighteen and older, for many disadvantaged youth, this is too late.



Employment



Education
(K-12 and Postsecondary)



Benefits for students

- Applied, hands-on, learning opportunity
- Provides real life, paid, work experience
- Earn post-high school credit and credentials
- Supports equitable access jobs for all students

Benefits for employers

- Develops robust talent pipeline
- Reduces hiring costs
- Increases retention through strong student connections
- Adds diversity to candidate pool

The role of occupation-specific skills pathways, apprenticeships

Many of the pathways being developed are occupation specific. Occupation-specific skills can be addressed more adequately in real worksite applications or informed simulated worksite applications. Simulated work-based learning models can be generally described as:

1. Simulation Tools: educational tools designed to simulate application in industry.
2. Simulation Workplaces: environments designed to replicate applications in industry.
3. School-Based Enterprises: business models designed and implemented by students.³²

Designed appropriately for an occupation pathway with industry input and work-based learning, instructional or cooperative, offers students relevant exposure to career skill applications in the field with exposure to accurately reflect the workplace and provides students schema beyond a simulation. Designed to avoid workplace liability, competency-based experiences informed by industry and implemented through capstone projects or work-based learning, provide agile methods to meet both education and economic development needs in green career pathways.

Eighteen thousand people participate in apprenticeships each year in Washington. Apprenticeships require significant coordination with the Washington State Apprenticeship and Training Council and the Department of Labor and Industries (L&I).³³ Apprenticeship programs are often easier to implement in larger companies, but given that rural Washington has more green jobs and smaller businesses proportional to the population, there is a need to focus additional resources on developing apprenticeship opportunities in these areas. In order to support apprenticeships in small green economy sectors, small companies need help navigating the complexity of insurance, contracts, safety, training and time allocation (having 1 of 8 employees mentor is very different than having 1 of 300 employees mentor), and other issues. More green economy pre-apprenticeship and apprenticeship programs need to be established to include small business, and businesses that are not building bound, or who have employees across large regions. One idea that remains to be tested is to build career launch programs through associations to help small business offer placements.

Avista Utilities in Spokane was on the forefront of developing and delivering one of the first Career Connect Washington programs. “Avista is leading the way in Career Connected Learning and is sharing how they are supporting career exploration with other utilities,” Governor Jay Inslee said. This inaugural month-long program, called Energy Pathways, allows students to “try on” this career path in the fields of alternative and emerging energy, including wind, solar and battery technologies; energy efficiency and sustainability;



32. Moyer, Snodgrass, and Klein. 2017. *Simulated Work-Based Learning Instructional Approaches and Noteworthy Practices*. US Department of Education.

33. Washington State Department of Labor and Industries (LNI). (2019). https://lni.wa.gov/licensing-permits/apprenticeship/_docs/january2018.pdf

engineering; and maintenance and operations of the energy system. At the end of the program, the participating students also receive a Career and Technical Education (CTE) class credit through the Northeast Washington Technology (NEWTech) Skill Center in Spokane. Snohomish County PUD's CCW project is another example of a strong program designed to support the energy industry via a website that connects education with local industry for today's students. This resource page showcases examples of STEM careers at the PUD and Avista to spark students' curiosities within the energy industry

Chapter Three Conclusions The strategic alignment of workforce and economic development with education entities yields optimal end-result goals for all. A functional and aligned effort has economic benefits to the broader community. Workforce professionals and educators, partnering with industry to identify competencies needed for changing and new green jobs, can build effective teaching resources for braided pathways that are focused and responsive. Job seekers receive the competencies and skill development that employers need, resulting in better job satisfaction, higher wages and increased career advancement. If education systems focus on competencies, they are more likely to engage and retain marginalized youth benefitting employers who then have access to a skilled workforce that enables growth and increased productivity. Many good pathway programs already exist though much work could be done to highlight the elements of these pathways that are "green." There are many opportunities to strengthen braided pathways from PreK-12 to post-secondary and into the green economy. While these partnerships yield benefits for all, there are gaps in collaboration, leveraging of resources and sequencing of learning for PreK-12 to career.³⁴ Development of work integrated and career launch programs for youth in high school will be an important stepping stone to many of the career opportunities that exist today.



³⁴. Washington Student Achievement Council. (2017). Statewide Attainment goals set the course <https://wsac.wa.gov/roadmap/attainment>



Chapter 4

Building equitable PreK-12 and post-secondary green economy braided pathways

There is a system wide need to recognize that communities furthest from educational and environmental justice are hit unequally hard by climate impacts and our current COVID-19 related recession. Efforts that focused on green economies ensure workforce development opportunities are available to and benefit especially individuals from these communities. Career Connected Learning legislation (ESS HB 2158) includes an equity goal: “Race, income, geography, gender, citizenship status, and other demographics and student characteristics will no longer predict the outcomes of Washington’s K-12 students. Students who participate in Career Awareness & Exploration, Career Preparation, and Career Launch will complete programs, attain sustaining-wage entry-level jobs, and reach family-sustaining wage careers (across industries and occupations) at equitable rates across population demographics.”³⁵

Increase Equitable Involvement in the Green Economy

The “ground-truthing” we have done as part of this EGE project suggests that while many good programs exist to support Washington youth, a significant percentage of young people, particularly youth with barriers to employment, are not taking part in these opportunities. If we are to increase diversity while being equitable and inclusive, students need to be given opportunities to build their portfolios, expand their exposure to professional settings, learn more about workforce settings and grow their competencies.

One way to increase underserved populations “social capital” is by increasing funding in workforce programs that connect them to employers. The EGE project recommends green jobs grants targeting programs such as Open Doors and Alternative 9-12 secondary programs to reach underserved youth.

To break down barriers for students to participate, we should think broadly about how to make these programs enticing to young people. Teachers, mentors, youth program leaders and future employers, should resemble students with whom they interact. They should have educational opportunities showcasing learning styles. They

Spokane County

³⁵. *Career Connect Washington, Progress Report to the Legislature, September 2019*, p. 28

should be encouraged to participate in programs by providing them with dual enrollment credits, transportation, stipend/payment for internship/worksite learning, access to supports for students with special needs, language barriers and other accommodations, and mentors. In the current situation, many young people throughout Washington graduate from high school without the skills they need for a career of interest. This means that particularly students with barriers often need to retake high-school classes thereby investing their own money in post-secondary education. Students who start further behind in colleges often get discouraged and are more likely to drop-out. We recommend reversing these trends by providing youth with system recognized, project driven competencies as part of their PreK-12 educational experiences.

“

Academics and job skills, when taught together and in context, can focus a student's attention on career goals and provide the tools to reach those goals.

Components of a braided pathway

Individual careers often take meandering and divergent routes, but a menu of pathway choices and guidance that begins in PreK-12 allow young people to better choose their own path and achieve their goals. Pathways benefit all the partners including industries, educators, workforce development specialists, counselors, and communities by coordinating, leveraging, and offering the skill sets needed for various careers. Industries have participated because it helps recruit young workers who come prepared for work. Input helps the education system better tailor and update curriculum based on regional industry needs and trends, building a succession-focused talent supply pipeline. The education system organizes programs that enable current

and future workers to access education, training and on-the-job experiences. In turn, the workforce system identifies and provides the critical support services. Career connected learning refers to the range of education that combines school-based learning, extended (or out-of-school) learning and work-based learning.³⁶ CTE falls under career-connected learning but refers to learning directly in service to developing workforce KSAs.

There are numerous pathway components to prepare youth for green jobs.

Pathway component	Ways to develop this component	Ways to demonstrate achievement
Exposure/ Awareness	<ul style="list-style-type: none">• PreK-8 courses and project-based STEM and FieldSTEM learning• Work-site visits and tours,• Virtual experiences	<ul style="list-style-type: none">• Badge system or certificates of completion of activities that show students have achieved competencies
Student interest	<ul style="list-style-type: none">• After-school or summer programs students choose.• Youth-led PreK-8 project-based STEM and FieldSTEM learning• Service learning (volunteering)• Remote instructional friendly lessons/ activities with video and hands-on projects that can be done at home (list of materials that can be found in home, or schools can acquire with low expense and send home)	<ul style="list-style-type: none">• Experiences• KSAs demonstrated• Acknowledgement of their accomplishments
Planning	<ul style="list-style-type: none">• High School and Beyond Plan (HSBP)• Career and college readiness counselor led activities• CCL component embedded in classroom instruction	<ul style="list-style-type: none">• Youth HSBP portfolio at student led conference

³⁶. Career Connect Washington 2019. Career Connect Washington Strategic Plan. <https://careerconnectwa.org/wp-content/uploads/2019/02/190116-CCW-Long-Deck-vPOST4.pdf>

Building Knowledge, Skills and Abilities (KSAs)/ Competencies: Coursework	<ul style="list-style-type: none"> • PreK-8 courses and project-based STEM and FieldSTEM learning • After-school clubs, and other extended learning opportunities. • High school courses including CTE, Tech Prep, academy courses and running start • Mentorships • Informal field-based learning programs including summer programs • Mini-lessons embedded in existing courses • Simulation and virtual explorations, practice sessions, • Access to mentors and experts 	<ul style="list-style-type: none"> • Industry recognized stackable credentials or certifications • CTC coursework, certification and degrees • Awards • Youth presentations of projects or work • Recommendations • Youth portfolios
Building Knowledge, Skills and Abilities (KSAs)/ Competencies: On-the-job training	<ul style="list-style-type: none"> • Registered Apprenticeships • Pre-apprenticeships • Internships • Work-based learning 	<ul style="list-style-type: none"> • Performance reviews • Job accomplishments • Promotions • KSAs demonstrated

“

One-off career offerings such as career fairs, class speakers, a work-site visit, or a single CTE class, may help spark an individual's interest in the opportunities available to them. However, to instill the KSAs needed to build a green economy workforce, deliberate PreK-12 pathways are needed to build readiness for all students.

Professional Learning for Educators

Many teachers are not up to date on the KSAs needed to support a green economy. Changes in industry and technology need to be revisited and infused in on-going professional development. Teachers who value these standards and are knowledgeable about them will better promote and share opportunities with students. Career and readiness counselor-led activities require counselor and career specialist training to counsel students effectively for green career pathways.

The EGE project recommends providing professional learning support for educators by providing training and resources available in the OSPI OER portal and linking these to Career Bridge. To build equitable PreK-12 braided pathways for green jobs, EGE recommends funding work to identify relevant PreK-12 programs including CTE frameworks, CTC Guided Pathways, and green career launch opportunities with Career Connect.

A state portal, accessible to every school district and tribal entity could provide resources to support students. OSPI's Open Education Resource (OER) website, OER Commons contains OSPI-vetted and approved materials which meet state standards including Next Generation Science Standards (NGSS.) Several resources have been added to the website since COVID-19

has impacted school systems and the site could continue to evolve to include resources for pathways into green careers creating a robust portal to support students and educators interested in greening the economy. The EGE project encourages development of OER materials to support project based, FieldSTEM type activities and CTE frameworks situated as steps on a pathway to green careers. Cohesive EGE braided pathways could encourage stakeholders in the education, economic and workforce development systems to jointly develop metrics and track progress toward their alignment goals, whether related to policy, programs, or funding.

Keeping the focus on Youth

Youth use workforce data to identify careers that are expected to grow.³⁷ As a result, this data needs to reflect current jobs and anticipated employment opportunities, leaving the door open for youth to invent new jobs for themselves. Students often use tools to evaluate their skills, abilities and interest based on “self-reflective questions.” This approach should provide young people with a detailed sense of how KSAs will help them in careers of their choosing. Employers that do a good job of identifying the KSAs needed for job openings are more likely to find job seekers with those attributes.

Career Bridge uses a career interest assessment to help students identify how their interests connect to jobs. Students get results based on their proclivities, which include the following: social, investigators, realists, conventional, or artistic. Green jobs cross many of these interest types and many require students that have multiple interests. How would any of these existing interest types encourage a young person to seek a green career? One option is to build a system that helps youth find jobs associated with their value for a sustainable future, perhaps an interest in stewardship. How can we optimize the fact that green economy jobs often straddle multiple classifications in terms of sectors and student personality choices? The EGE project recommends a re-work of career interest assessments adding values aligned to green jobs.

We know from a public interest study led by Deloitte (2019), targeting Millennial and Generation Z youth that, “Among 20 challenges facing society that most concern respondents on a personal level, climate change/protecting the environment/natural disasters topped the list. Twenty-nine percent cited it as a worry, seven points more than the next-highest concern: income inequality/distribution of wealth.” Given the interest in environmental health among young people, career assessment tools in Washington should include a way for youth to find green jobs that range from manufacturing, design, accounting, forestry, agriculture, energy, mapping and planning. Local experience leads to local opportunities.

Students also want to know how much jobs pay and by location. This information should be put into context to include regional differences in the cost of living.³⁸ The EGE Advisory Panel has discussed how students make financial decisions acknowledging that when a student comes from poverty, or many other marginalized communities, there is not a lot of knowledge about how to build wealth. Some barriers to employment are financial literacy barriers. To address this, youth, and particularly underserved youth benefit from career counseling that includes financial advice and information about loans, scholarships and the costs of different programs.

The 2019 report to the legislature, Covering the Cost of Dual Credit for Students and Families, includes recommendations that align well with the Educating for a Green Economy Roadmap and can be tied efficiently to innovations in agriculture, energy, and natural resources. Refining statewide articulation agreements for CTE Dual Credit courses to ensure transferability of credits to and among colleges and universities serves as an overarching theme under which the preceding recommendations drive.

Green innovation in agriculture, clean energy, and natural resource sectors is evolving and doing so rapidly-- more so, we have discovered and shared in this report, than our current data resources have the capacity to accurately track. Additionally, interpreted restrictions on data sharing, where seamless information streams are needed, inhibits the capacity to measure the success of current programs on workforce impact and decisions producing the highest return on investment. Green opportunities in agriculture, energy, and natural resources can be targeted to localized regions of Washington where needs are identified and drive support for programs that equitably address underserved populations and have equal or greater potential to contribute innovation to the growing knowledge base evolving in the green economy.

37. Workforce Training and Education Coordinating Board. (2018). Outdoor-Industry Jobs. https://app.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=OutdoorIndustryJobsReport_517d24af-0347-4096-b112-67dc63506fd9.pdf

38. EMSI. Using Data for Regional Growth from an Urban-Rural Region in Washington State https://drive.google.com/file/d/1JNEmSwQEpeaTxtQCbj6_0I8BB0SRO3KnK/view

EGE recommends funding CTE-built articulated agreements and stackable credentials held at the community college level for the three target areas of this project: energy, forestry and agriculture. EGE also recommends that the Career Bridge and the High School and Beyond program link to credentials and college courses as appropriate.

Educational programs building KSAs and dispositions for a green economy workforce

Natural resources provide a cornerstone for Washington's economy and sustainability is cost-effective while offering a healthier environment. We also know from years of educational research, that students learn best when they can see, touch and apply their learning. Learning experiences may take place in natural settings like a park or wetland, in a workplace setting like a farm or working forest, or at a greenhouse or while working with solar panels. These experiences have been shown to increase student engagement as well as develop questioning, observation, writing, and other STEM skills.³⁹ For many students, interest occurs through project-based and experiential learning. Focusing on learning outcomes that support both the student, and the workforce, also support both individual's and community's needs to grow Washington's green economy.

What is needed—especially for students too often left behind by our education and workforce system—is a model that, by design, connects and integrates PreK-12 education, postsecondary education, and career-focused learning so that classroom-based instruction is paired with relevant, meaningful work experiences. Career Connected Learning (CCL) is a continuum of career opportunities that starts with career awareness and exploration and continues through high school and beyond with career preparation and workplace learning experiences.⁴⁰

Many of the surveyed green economy jobs require problem-solving, communications and teamwork. By increasing the use and efficacy of project-based learning and implementing the Integrated Environmental and Sustainability standards, students can develop these skills. The 2013 Creating a Workforce with 21st Century Skills: Developing the Strategies and Tools to Strengthen Washington State's Talent Pool noted "Learning to learn" is now considered an essential employment skill. Experiential learning such as work-integrated learning, project-based learning, and on-line gaming experiences provide a platform for learners to practice and implement the skills they are learning. The opportunity for work-integrated learning can be beneficial for students with a range of learning styles.⁴¹

Washington has a network of environment and sustainability learning programs. These programs are offered in formal and nonformal settings such as, schools, parks, community centers, zoos, aquariums and nature centers, and engage youth from preschool through high school and into adulthood. By providing in-school and extended-learning opportunities around the state, environment and sustainability community-based organizations (CBOs) support youth to develop their portfolios and KSAs. E3 Washington supports this network of environmental and sustainability educators which is a vital part of green economy workforce development.

In discussing experiential learning in the article, *Career Readiness: Bridging the Gap Between Education and Workforce Preparation*, Lori Meyer wrote: "Educators are exploring hands-on, project-based learning as well as work-based learning experiences that connect academic, technical, and workplace knowledge and skills. Changing how instruction is delivered, however, is no easy task. It requires a systemic approach that puts nearly everything on the table for discussion, including the structure of the school day, the physical environment, resource allocation, and even who teaches what content and where." The EGE project notes the need and recommends that this systemic approach include the PreK-12 continuum.

Embedding strategies to ensure equitable green pathways

Research shows that climate change will disproportionately affect disadvantaged communities. While concerns of climate policy has strained relationships throughout different sectors of the economy, this report is recommending including tools to promote equity in climate conversations.

39. Workforce Training and Education Coordinating Board. (2018). *Outdoor-Industry Jobs*. https://app.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=OutdoorIndustryJobsReport_517d24af-0347-4096-b112-67dc63506fd9.pdf

40. JFF, Washington STEM Career Connected Learning. (2019). <https://washingtonstem.org/wp-content/uploads/2019/09/CareerConnectedLearning-JobsfortheFuture.pdf>

41. Washington State University Energy Program. (2013). *Creating a Workforce with 21st Century Skills*

Racial Equity Tools⁴²

- Include an analysis as part of any decision-making process that considers assumptions that reflect, intentionally or unintentionally, dominant cultural norms, make those assumptions explicit and review and alter them, where appropriate.
- Help others see patterns of accumulated advantages and disadvantages and ways they are codified in laws, policies, regulations and other system behaviors, and feel more confident in discussing root causes as part of seeking solutions.
- Review organizational culture within their spheres of influence by incorporating a deeper understanding of white culture and white privilege, share that understanding with others, and make individual and collective changes that reflect equitable structural change.
- Feel motivated and accountable for their own continued learning around the concepts, analysis and practices explored in the training.

PreK-12 programming that contributes to strong pathways

Current models in the PreK-12 system that provide students with Career Connected Learning (CCL) experiences employ a systemic approach like PEI's FieldSTEM model. This model works in partnership with OSPI and with school districts to provide students in every grade with field experiences that connect curriculum to local agencies, organizations and businesses. There are many programs that provide students at select grades the opportunities to work on projects related to actual questions, problems, issues and opportunities in their communities. It engages students in the work of their community gives them a "seat at the table," empowering their voice in their communities.

Outdoor preschools are becoming more popular nationwide, encouraging kids to spend more time in nature. Washington just became the first state in the country to officially license them. Because the idea of outdoor early education is catching on nationwide, Washington launched a pilot program in 2017 to develop official requirements that all licensed outdoor preschools must follow. Until recently, no outdoor preschools in the United States were licensed, which meant they couldn't offer full-day programs, an important factor for many working families. Unlicensed outdoor preschools also can't offer state financial assistance to families.

But over the past two years, the Washington Department of Children, Youth and Families has worked on creating new guidelines specifically for outdoor learning, which has slightly different regulations than indoor schools. One new standard requires each classroom to have one teacher for every six kids, so most classes have two or three staff members. Other guidelines detail how to implement naptime, or what to do when it rains. In fall of 2019, with the new regulations in hand, the state began to officially license a few programs, becoming the first in the country to do so. In early September, two programs made it through the process: Squaxin Island Child Development Center in Shelton, and Kaleidoscope Preschool and Child Care Center in Eastsound.⁴³

There are many excellent programs throughout the state that support student learning and could be part of a more comprehensive braided pathway. For clean energy, Chelan County PUD's River of Power (Grade 4) curriculum supports teaching information on power generation, the Columbia River, and salmon migration in students' math and social science classes. The teaching materials are currently used at elementary schools in Wenatchee, Eastmont, Cashmere, Leavenworth, Entiat, Chelan and Manson school districts, as well as some private schools in the area. River of Power culminates each year



42. Racial Equity Tools, *Transforming White Privilege: A 21st Century Leadership Capacity* <http://www.racialequitytools.org/module/overview/transforming-white-privilege>

43. Takahama, E. (2019). *Learning in nature: Washington becomes first in the country to license outdoor preschools*. Seattle Times: <https://www.seattletimes.com/education-lab/learning-in-nature-washington-becomes-first-in-the-country-to-license-outdoor-preschools/>

with more than 1,000 fourth graders coming to Rocky Reach Dam to see hydropower in action. In another partnership with the Chelan County PUD, the Foundation for Water & Energy Education (FWEE), offer a Hydropower and STEM Career Academy. This is a week-long session for high school juniors and seniors to explore career options and educational pathways with STEM challenges that include doing hands-on activities with mechanical and electrical engineers, plant mechanics and operators, divers, and line workers. Wenatchee Valley College awards one credit for successful completion. These represent two valuable points of learning for a student; as we build braided pathways, we can link these experiences with opportunities to other grade level opportunities and to other pathways that lead to other areas of the clean energy sector.

OSPI coordinates CTE opportunities for youth. CTE classes fall into one of 16 “career clusters.” A career cluster is a group of jobs and industries that are related by skills or products. Within each cluster, there are “cluster pathways” that correspond to a collection of courses and training opportunities to prepare students for a chosen career. One of these cluster pathways includes the Agriculture, Food, and Natural Resources pathway. The 16 clusters were established at the national level by the States’ Career Clusters Initiative and are recognizable across the United States. Currently, OSPI Approved Local CTE Graduation Pathways are developed at the school district level.

From a review of CTE courses offered throughout Washington and interviews with CTE Directors and School District administrators, the EGE project found that many school districts, particularly smaller, rural districts, were not able to offer some CTE courses because they could not find instructors, or fill the classes they wanted to offer. If a high school has only 90 students, it is hard to fill a specialized class with enough students to justify a teacher.

Skill Centers are a key part in the overall expanded CTE system in Washington. Skill Centers are regional secondary schools that serve high school students from multiple school districts. They provide instruction in preparatory programs that are either too expensive or too specialized for school districts to operate individually. Currently, there are 14 Skill Centers throughout Washington and 3 branch campuses. Expanding the funding of these CTE courses will benefit both student and community.

College led programs that bridge high school to post-secondary opportunities

At the post-secondary level, the state’s Community and Technical Colleges with the Centers of Excellence and 4-year colleges and universities foster connections between education and industry to meet the ever-evolving needs of Washington’s current economy. They are training a workforce in technology that supports increased cost-saving efficiencies which also lead to more sustainable practices.

The Washington State Board of Community and Technical College (SBCTC) system and public and private colleges provide multiple opportunities for students to gain competencies (KSAs) aligned to employment. Washington has a system of 34 public community and technical colleges (CTCs). Each year, about 363,000 students train for the workforce, prepare to transfer to a university, gain basic skills, or pursue continuing education. Washington’s CTCs now offer Bachelor of Applied Science (BAS) alongside the Associate of Applied Science (AAS), many of these degrees support green jobs.

SBCTC Guided Pathways⁴⁴ help students navigate coursework towards a targeted goal. Courses are grouped together to form clear paths through college into careers. The student-centered framework is grounded in an equity-minded practice designed to increase and diversify the students and communities accessing and earning high value community college credentials. The vision is to build a system that advances racial, social, and economic justice by achieving equitable student aspiration, access, economic progress, and educational and career attainment. “The four pillars of the Guided Pathways framework are: 1) identifying relevant meaningful credentials to qualify students for roles in the workforce that are most suitable for them, 2) developing communications strategies and outreach to communities to offer practical access to higher education, 3) keeping students on their pathways, and 4) ensuring completion of the credential, whether a certificate or an associate’s degree.”

In a recognition of the current challenges of COVID-19, Kristi Wellington-Baker described current work on a direct administrative initiative to support the high school Class of 2020 and helping them to understand what their options are in the community college sector. This includes forging “individual partnerships between K-12 school districts and our colleges to make sure that

⁴⁴. State Board of Career and Technical Colleges Guided pathways Website <https://www.sbctc.edu/resources/documents/about/facts-pubs/guided-pathways.pdf>

every senior is on a path. Pathways is building up those relationships, going beyond standard counselor workshops and connecting people more deeply, encouraging dialogue about internships, job shadows and understanding what real-life work looks like."

The SBCTC hosts Washington's Centers of Excellence at eleven community and technical colleges to provide leadership and resources to support economic growth for industries that are vital to the state's economy. The Centers work strategically with industry, labor and education partners to develop pathways that assure the next generation of workers are ready to take on workforce challenges. Washington is the only state in the nation to have codified Centers of Excellence into state statute. Given the findings of this report, every industry has some aspect of green economy jobs. So, each of the Centers for Excellence have some role to play in green economy workforce development. Examples include:

Pacific Northwest Center of Excellence for Clean Energy (PNCECE), is hosted at Centralia College and led by an advisory board comprised of energy industry, labor and education leaders from across the state. The board has been actively involved in supporting the development and delivery of 20 community and technical college programs that support the pathways and evolution to a clean energy workforce and green economy. PNCECE, in partnership with the WSU Energy Program, has developed occupational skill standards and profiles that address KSAs. Of the 18 colleges that offer energy programs across the state, here are examples of clean energy concentrations.

- Centralia College, AAS in Energy Technology: Power Operations. In its infancy, the program was designed for coal-fired generation training, but over the past 10 years has evolved to a green jobs focus in energy efficiency, wind, solar, and offers the only hydropower generation class in the state. Students are placed with power utilities across the entire Pacific Northwest region. The Energy Technology program is also offered as a Running Start program. Through a partnership with Spokane Community College (SCC), the program is offered via distance courses to the SCC lone Campus serving the northeast region's workforce needs, specifically placing students at Seattle City Light's Boundary Project located on the Pend Oreille River.
- Shoreline Community College, AAS Energy Technology. This program focuses on training students in the expanding field of renewable energy by learning to manage, design, build, market or operate sustainable, clean energy technologies. This program also offers the Washington STEM Educator Solar Institute, a summer program that teaches middle and high school teachers how to introduce Solar Energy concepts into the classroom.
- Cascadia College:
 - AAS-T in Environmental Technologies and Sustainable Practices. This program prepares students to support organizations to comply with energy regulations, reduce water consumption, divert materials from the waste stream and implement more efficient methods.
 - BAS in Sustainable Practices. This program teaches the skills necessary to plan and implement sustainable approaches to how we live and work by blending coursework and community-based learning activities in natural science, social science, political science, research methods and economics.
- Walla Walla Community College, AAS degree in Energy Systems Technology. Students first complete a one-year electrical core course sequence, and then specialize in one or more of five concentrations that include Mechanical Electrical Technology, Industrial Mechanics, Precision Agriculture, Renewable Energy and Facilities Energy Management. This program was redesigned to align with the state's Guided Pathways model.

The Agriculture and Natural Resource Center of Excellence hosted at Walla Walla Community College is a local, national, and global model for innovative workforce development, and collaboration between industry and education. The center strives to support economic vitality and be an advocate for the understanding and recognition that Washington is a leader in agriculture and natural resource industries.

- Walla Walla Community College, BAS in Agricultural Systems. This program focuses on critical thinking skills, analyzing the interactions between natural, human, climatic, political, and economic components of the agroecosystem, identifying pathways to minimize the many potential negative effects on environmental, societal, and human health, and contributing to the agricultural industry through hands on exposure to diverse experiences and perspectives grounded in applied science and reality.

- Green River College, BAS in Forest Resource Management. This program teaches forest management practices in small class sizes, with access to a 200-acre campus forest, and input from local natural resource employers who help maintain a relevant curriculum.
- Grays Harbor College, BAS in Forest Resource Management. This program prepares students to engage professionally as Foresters in public and private companies, Conservation Scientists, Wildland Fire Supervisors, Surveyors and other environmental activities.
- Peninsula College, Sustainable Agriculture. The Sustainable Agriculture and Food Systems Short Term Certificate of Completion is designed for both aspiring farmers and community leaders interested in learning how to work in a regional food system in the areas of advocacy, education, production, and nonprofit service. Students who complete the certificate program will gain foundational knowledge and skills to work on a farm or operate their own farm business. The program will also benefit those seeking careers in local and community food systems. This program available at several other CTC's.

Colleges that address equity

- Peninsula Community College, Associate of Arts (AA) Bridge. The AA Bridge at Peninsula College provides an Associate of Arts degree inclusive of native perspectives. The program offers a unique set of courses particularly relevant to tribal communities, preparing students for Evergreen's Native Pathways Bachelor of Arts degree program. Classes are offered both online and face-to-face, and some classes are held at the Evergreen State College House of Welcome.
- Heritage University received a grant through the National Science Foundation Research Experiences for Undergraduates. The Heritage project: A Transformative Approach for Engaging First-Generation Underrepresented Minorities in a Research Experience encourage all students from Heritage University, Yakima Valley College, Columbia Basin College, Portland Community College, Portland State University, and other universities and community colleges from the Pacific Northwest region to apply for 10 week summer research internship and receive summer research stipend, and transportation funds during summer research experiences. Students will perform cutting-edge research from a wide selection of research institutions from the states of Washington and Oregon.

Sector-led program and resources to promote pathway learning

In some cases, industries have developed their own pathway programs to support workforce development for their industries. Spokane Community College and Avista Utilities have formed a partnership with an introductory course open to individuals interested in entry-level positions leading to career positions in the line or gas craft. The utility construction school is held at Avista's training facility. In the Line Construction, participants learn how to set and climb poles, install cross-arms, hardware, lines and transformers in addition to learning to use the various tools and equipment of the trade through actual field experience. Classroom training covers safety, electrical theory, transformers, switching, print reading, and the importance of attitude and teamwork necessary to succeed in today's work environment. Forty-three college credits are awarded for this program.

This yearly recruiting and educational event, designed to attract and recruit workforce entrants to hydropower in the Pacific Northwest. Students are asked to complete a short application with contact information, why they are interested in attending the event and what coursework they have taken related to hydropower. Once selected into the program the Hydropower Foundation works with students to get a resume polished and help students be prepared for a job opportunity. Students who are taking coursework in electrical, mechanical renewable energy, electronics, industrial technology, meter and relaying technicians, communications technicians, Supervisory Control and Data Acquisition (SCADA) engineers, journeymen, welders, machinist, energy systems engineering, utility resources, transmission, operations or other related coursework are invited to apply to attend Hiring for Hydro.

Oregon Forest Resources Institute's Find Your Path program describes various careers in Oregon's forest industry. The Oregon Forest Resources Institute uses Oregon forests as a context for student learning and to extend it beyond the classroom walls. In Oregon, nearly 50 percent of the state's 61 million acres is forestland. Forests supply renewable resources for lumber, paper and heating, along with jobs that support families and communities. It's important for students to understand how the forest industry works-- ecologically, economically and socially.

Chapter 4 Conclusions

This chapter identified and showcased the value of existing programming in PreK-12 and post-secondary and the importance of creating braided pathways to meet individual student needs. A student whose career interest is sparked and cultivated at a young age, is a student well prepared to enter the workforce. Waiting until a student graduates from high school, with little or no career preparation through academics and experiential learning, puts that student at a distinct disadvantage as a young adult looking for a job. This EGE project recommends building deliberate connections and sequenced learning to create braided pathways, beginning PreK-12 and continuing into post-secondary education. Specifically, to extend this continuum of learning, EGE recommends funding relevant PreK-12 programs including CTE frameworks, CTC Guided pathways, and green career launch opportunities with Career Connect Washington.



Mima Falls



Case Studies

Case Studies that Exemplify Projects that Educate for the Green Economy

Regional partnerships have resulted in positive examples that demonstrate the successes of programs, while still acknowledging an overall gap between employment needs and qualified employee candidates. The following case studies represents a variety of ways in which local or regional partnership co-designed integration between the key systems (PreK-12, post secondary, workforce and economic development) to begin the work of educating for the green economy to benefit students.

Case Studies Summary

Some of these case studies describe single successful partnerships. Some of these examples have partnerships within 1-2 of the components of the workforce system, post-secondary, workforce, economic development and industry). Building case studies that show pathways through a robust preschool to career braided pathway model is a goal of the project.

Green Innovation, the Wind River Project

The Wind River Project (WRP) is a partnership between waste-to-energy production and year-round food production. The Project is located in the town of Carson, WA in the Columbia River Gorge, population 2,116.

The Wind River Biomass Utility, once construction is completed, will bring waste wood from surrounding forests on site where it will be graded for highest use (currently firewood). The remainder will be chipped and run through our Combined Heat and Power utility (CHP) where biochar becomes the byproduct. The heat and power will be used for year-round food production in Wind River Organics' Dutch-style greenhouses, Gorge Greens. Meanwhile, the biochar will be returned to the topsoil where it will lock carbon away for thousands of years while increasing soil life, water and nutrient retention.

Elona Trogub, co-founder of the greenhouse division and office manager for WRP, is passionate about food and energy resilience and strengthening the local economy with meaningful work and family wage jobs. She is part of the team that developed the primary heat client greenhouses. They currently grow organic microgreens under the Gorge Greens brand that can be found in many Gorge, Portland and Vancouver-area grocery stores as well as some restaurants and CSA boxes. This initial phase is demonstrating the type of “smart farming” technology that will be deployed in the larger aquaponic (fish and plants) greenhouses.

According to Elona, the battle between a healthy economy and a healthy environment is an illusion. They can co-exist when the right set of values are core to the business. Thinking in systems and looking for win-win solutions are values that drive the Wind River Project. These values create meaningful jobs that improve quality of life for employees and benefit future generations. The Wind River Project makes green jobs by turning problems into opportunities. Designing, implementing and operating closed-loop manufacturing systems as well as designing and maintaining complex ecological systems for food and medicine production are skill sets that are critical for the 21st century. On that note, internships are available with Gorge Greens!

On the farm side, the skills that Wind River employees use include constructing and programming controls for automation along with sensors to collect data for later data analytics - all important for smart farming. On the utility side, it is understanding wood characteristics, working with sensors, maintaining equipment, and operating machinery. There are also the soft skills of working as a team to give and receive feedback to constantly improve systems and workflow and efficiency. And of course, coming up with new value-added products that can be made from all the outputs of systems.



From left:

Ryan Crist (Design/Controls),
Elona Trogub (Operations),
Dave Godring (Sales),
Michael Hanna (Data)

Regional Partnerships, PacMtn Workforce Development Area

Using Data for Regional Growth from an Urban-Rural Region in Washington State by EMSI.⁴⁵ The 2009 Washington State Legislature passed the Evergreen Jobs Initiative that called for coordination between workforce and economic development entities. The legislation gave each workforce development area in the state a directive: perform an industry cluster-based analysis to identify crucial sectors in their region. Workforce uses those sectors to design specific workforce strategies that enhance job and career outcomes for residents and strengthen business and industry in the region.

The Pacific Mountain (PacMtn) Workforce Development is a semi-urban-rural area that comprises five counties, four of them rural counties, but with three-quarters of the population living in Thurston County which includes the cities of Olympia, Tumwater and Lacey. In 2012, the PacMtn workforce group first convened leaders of local economic development councils, community colleges, and businesses, and EMSI, an economic modeling company, to conduct the data analysis and validate findings via on-the-ground research and use of a local vested consultant. The group crafted comprehensive strategies to attract, grow, and expand industries within the PacMtn region, and to unify workforce development, economic development, and education partners. It identified six targeted industry groups: food production, wood product and paper manufacturing, life sciences, chemical products and plastics manufacturing, IT/telecommunications, and hospitality and tourism. The initial report was completed in 2012 and updated in 2016 and fully reviewed in 2019.⁴⁶

Data revealed how industry clusters, tied to specific occupations, were not getting qualified candidates with necessary job skills. With this information, South Puget Sound Community College added new programs in chemical and plastics manufacturing, food processing and other areas. Centralia College shifted the college's welding program to include fabrication and blueprint reading, two in-demand skills that local employers said would make graduates stronger hires for businesses locally and around the state.

For the economic development group, the collaborative process helped bring to light the previously unknown regional assets in food processing production. This serves as an example of regional "ground-truthing" information, as well as a collaboration that led to improved workforce development programs and their usefulness to regional industries PacMtn Workforce Plan. Included in the outcomes of this plan was an initiative to focus on the importance of the forest and forest products jobs in the region. A forestry workgroup was formed, led by industry, to identify industry needs. Outcomes of this work include a new Log Truck Driving program at Grays Harbor College and the CTE Forest Management Framework developed in partnership with PEI, Grays Harbor College, 5 timber employers, OSPI and natural resource educators from several school districts. The Forest Management framework identifies the KSAs needed to prepare high school students for employment in forest management. It has been approved by OSPI for statewide science course equivalencies.

Most recently PacMtn used the updated Industry and Occupational Study to drive investment in food security. The work specifically focused on farmers and the related supply chain to deliver food from farms to those in need. Farmers have been dramatically impacted by COVID-19

CASE STUDY

through loss of workers and diminished ability to distribute their farm products, such as Farmer's Markets and community supported agriculture outlets. With a desire to bolster commitment to farming, the green economy and valuing access to fresh foods, PacMtn used an integrated service delivery approach and WIOA (federal funding). The funding helps participants attain farm and food related skills, and self-sufficient wage jobs that will persist in a post-recovery era. Deepening that commitment, PacMtn initiated pilot programming with two local school districts whose agriculture career technical education programs needed work-based learning elements. It is recognized that community garden programs engage teens and young adults through community service and help break cycles of hunger, poverty, inequality and oppression. The Summer Internship Program offers a 40-75 hour internship, in partnership with Yelm and Elma School Districts (rural areas) and GRuB (Garden-Raised Bounty). Interns will develop professional and employability skills and be offered work-readiness training online through the customized readiness program called Uplift!. These efforts are designed to instill pride in the historical vibrancy of the region, improve personal resilience and build self-confidence.

Students will literally get their hands dirty learning about growing, harvesting, preparing, and preserving food. These are students that are on current Individualized Education Plans or Section 504 of the US Department of Education which is designed to protect the rights of individuals with disabilities in programs and activities. Students will participate in paid work experience opportunities in the community-- tending gardens, building backyard gardens, performing tasks in horticulture and landscape.

PacMtn built these projects as part of their required WTECB regional plan. All 12 regional workforce areas are required to develop their own plans to offer a vision for their local workforce development system. The plans require partnerships between industry, workforce and education sectors. We see in the Pac Mountain example a long-term investment that paid off with robust pathways for youth and dislocated workers who might want to transition into careers in the green economy. It highlights the importance and value of system interconnections and leverage. As in the Pac Mtn case, key partnerships include labor, industry, workforce and economic development, education and entities who support the needs of populations with barriers to employment to provide stepping-stones for youth to build careers. If we expect youth to start in high-school or college, they already start behind many of their fellow students who have had more opportunities to develop KSAs. It may be easy to entice a young person whose parents or relatives work in the industry to consider forestry, agriculture or clean energy, but for youth who do not have any other exposure to these professions, it has proven to be too far outside of their sphere of experience for many to pursue these fields.

45. EMSI. *Using Data for Regional Growth from an Urban-Rural Region in Washington State* https://drive.google.com/file/d/1JNESwQEpeaTxtQCbj6_0l8BB0SRO3KnK/view

46. Pac Mtn Workforce Development Council. 2019. *Industry Cluster Report*. https://pacmtn.org/wp-content/uploads/2020/04/PacMtn_Industry-Cluster_Report_Review-Final_12-6-19-1.pdf

Regional Agriculture Economic Development, Yakima County

In Yakima County, one of four counties in the Southcentral Workforce Development area, agriculture fuels the regional economy. Food processing, warehousing, distribution, and tourism all stem from the region's agricultural commodities. The development of the overseas market for agricultural products is a major economic contributor. While labor needed for machine maintenance and harvesting of crops remains seasonal in nature, technological advances have increased demand and opportunities for skilled workers in farm management and food processing.

The combination of the tree fruit, the dairy and wine industries and resurgence of hop farming are all driving economical forces. The tree fruit industry has stimulated significant expansion in packing lines and storage facilities. The new packing lines rely on advanced technology, automation, robotics, sophisticated cameras, scanners and computer applications. The Darigold milk processing plant in Sunnyside is undergoing a \$90 million dollar technical and capacity expansion that will boost its production capacity to 5 million pounds of milk per day. The knowledge and skills required of workers at Darigold's plant include computer literacy, specialized technical training, food safety, and supervision. Throughout the food processing industry, the demand exists for skilled mechanics and maintenance workers, electricians, production supervisors, and food safety specialists. Wineries, and the rapidly burgeoning micro-breweries, require a workforce where workers must possess skills in brewing/winemaking, food safety, supervision, computer literacy and production control. Some additional skill requirements that exist throughout the general food processing industry include software and internet techs, hydraulic and pneumatic techs, lift truck drivers, agricultural equipment mechanics, bottling, labeling and canning line techs and lean manufacturing specialists.

Yakima County region is racially diverse, it is the homelands and reservation of the Confederated Tribes and Bands of the Yakama Nation, and it has the largest number of Hispanic residents in the state, with rising numbers of Native American and Asian families; 18% of youth are English language learners, a rise of 2.5% since the 2000 census. This presents an initial challenge to those youth who may need extra help with learning English and an opportunity as they become bilingual, a sought-after skill in the employment market.

Yakima County has a high school drop-out rate significantly higher than the state average and has over twice the Temporary Assistance for Needed Families child recipient rate compared to the rest of the state. The unemployment rate among 16-21 years old is higher than both the federal and state rates.

High levels of poverty continue to plague South Central Yakima. Many of those who live below the poverty level do not receive any form of assistance. Many individuals work full or part-time but do not earn a wage high enough to allow them to support their families. Many of those in poverty who seek work or who experience barriers to employment are being left behind. In addition, a great many of those who are finding entry-level jobs have trouble earning a wage that will support a family or achieve self-sufficiency.

EGE seeks strategies to ensure underrepresented populations and populations with barriers to employment, such as those in Yakima County, are prepared to achieve meaningful employment,

CASE STUDY

particularly in the green economy. Some of these strategies include early training in the basics that lead to higher levels of robotics, computer systems, and other technical skills related to agricultural industries. At West Valley School District's Futures Program young people are connecting to local career pathways. The school website outlines 4-year degrees in Agriculture and provides information on high school course work students can take to be ready. The Futures program and the Yakima Skills Center offer youth in the area with valuable CTE opportunities.

Given the growth in green employment opportunities in the Yakima Valley, EGE sees potential for more coursework that support youth in developing their skills, particularly with inclusion of certifications and 2-year degrees in agriculture and clean energy. Perry Technical Institute's Instrumentation & Industrial Automation Technology is a 2-year program that covers basic mathematics for electronics, electricity, solid state, digital devices, applied physics, and calculus. Programmable logic controllers, transmitters, transducers, recorders, and controllers are used to simulate control techniques. Students learn to monitor, install, troubleshoot, repair, and calibrate process controls for temperature, level, flow, and pressure. The program qualifies graduates for challenging and rewarding career employment as Instrumentation, Automation and Controls, and Engineering Technicians, and in the Aerospace, Agriculture, Energy, Manufacturing, Mining & Refining, Pharmaceuticals, Technology industries.

Carbon Friendly Forest Products, Sierra Pacific Industries

Sierra Pacific Industries (SPI) is a third-generation family-owned forest products company with operations in three states including Washington. Since 2001, Sierra Pacific has invested over one billion dollars in Washington facilities including Shelton, Aberdeen, Centralia and Burlington, and manages 300,000 acres of forestland. Lisa Perry, Community Relations Manager in Washington says the forest products industry is a modern and vital part of the solution to climate change and sustainability. "Forestry is a wonderful example of an industry that continues to implement policies to become safer and more 'green,' which go hand-in-hand." SPI employs over 900 employees in Washington and continues to grow, with jobs from entry-level to skilled trades, from truck drivers to sales managers, from foresters to engineers.

Perry notes that Sierra Pacific values "paid learning...being paid to learn on the job is sometimes under-valued in workforce circles as a pathway." All four Sierra Pacific mill managers in Washington started in entry-level positions and took advantage of the opportunities for advancement offered at SPI. She knows that young people often want to stay close to where they grew up and look for family-wage jobs in their communities.

Today's mills are high tech facilities that include lasers, scanners, optimizers and artificial intelligence. Historically, the crew did the heavy lifting, now they operate machines to ensure that the wood fiber is used efficiently, and the workplace is safe. Workers install, maintain, program and operate complex machinery throughout the mill. One of the major sustainability innovations of the forest products industry is the use of the byproducts of the mill process. Today's most modern mills use almost 100% of the log that is delivered. Bark is removed and sold to landscape material yards. Shavings can be made into products such as livestock beds. Chips are used to make paper and cardboard products. Sawdust is used to create pellets for fuel. Two of our mills used a mix of these products to produce electricity through a co-generation process, providing green power to local communities.

Within the forest industry, mass timber products such as cross laminated timber (CLT) are another example of innovation. These new products allow construction of much taller buildings, using wood. SPI does not manufacture CLT; however, there are two facilities in Washington that do: Katerra in Spokane and Vaagen Timbers in Colville. This type of construction lowers the carbon footprint, reduces building costs and creates a beautiful environment.

Perry notes that they have a shortage of people for a variety of job openings. One reason for the difficulty in connecting people to jobs is the lack of accurate and consistent labor market data, state level data is collected primarily through Unemployment Insurance (UI) and poses difficulties for collecting accurate information. Perry understands the connection between education, workforce and industry: she serves on the Bates Technical Advisory Board and the Centralia College Foundation Board to encourage courses and degrees that provide the forest industry with trained workers. At both Green River and Grays Harbor colleges, Perry attended industry advisory meetings to support inclusion of KSAs needed in forestry.

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The Sierra Pacific Foundation is awarding over \$618,000 in scholarships to 200 students as they attend colleges, universities and trade schools during the 2020-2021 school year. "It is both an honor and a privilege for our family to continue to offer this ongoing support during these challenging times," said Carolyn Emmerson Dietz, Foundation President. "COVID-19 may have changed the way we do things, but we remain committed to helping tomorrow's leaders. As we help these outstanding young people pursue their dreams, we are investing in the future and in the generations to come." Since 1979, the Sierra Pacific Foundation has donated over \$8.3 million dollars in scholarships and also contributes to youth activities and other community organizations. In 2019, the Foundation contributed \$1.9 million to organizations in local communities.

Cogeneration: Sierra Pacific Industries turns wood byproducts into energy for homes and businesses through seven state-of-the-art cogeneration plants. Cogeneration is the process of using steam twice, once to heat kilns to dry lumber and again to turn a turbine to make electricity. Together, these facilities produce over 150 megawatts of electrical power. That is enough power for 125,000 homes.

Bark, sawdust, and other low-grade byproducts of the manufacturing process were burned or sent to landfills in the past. Today, SPI turns these materials into fuel for on-site cogeneration facilities. Wood byproducts from the forest is also utilized in the cogeneration process. Un-merchantable wood (small trees & branches) is selectively removed and processed to improve the remaining stand of timber in areas where trees are too dense and pose a fire danger. Clean renewable energy production and environmental stewardship go hand in hand.

Biomass power produces several societal and environmental benefits in addition to its displacement of fossil-fueled electricity generation, which is a benefit common to all renewable generation technologies. In brief, the biomass power industry provides an environmentally responsible means of disposal of about 25 million tons of woody wastes annually, turning waste materials into valuable electricity. It prevents the open burning of a substantial amount of these tons, mostly agricultural and forest residues, with the attendant massive amounts of air pollution. It provides an alternative to landfill disposal of a substantial portion of these tons, with its attendant consumption of landfill volume and resulting generation of landfill gasses.⁴⁷



Lisa Perry, Community Relations-Washington, Sierra Pacific Industries shares workforce information with students.

⁴⁷ Forest Biomass Removal on National Forest Lands (2008) https://www.spi-ind.com/product_brochures/2008II18SNCPhaseI.pdf

Access to Green Braided Pathways, Pacific Education Institute (PEI)

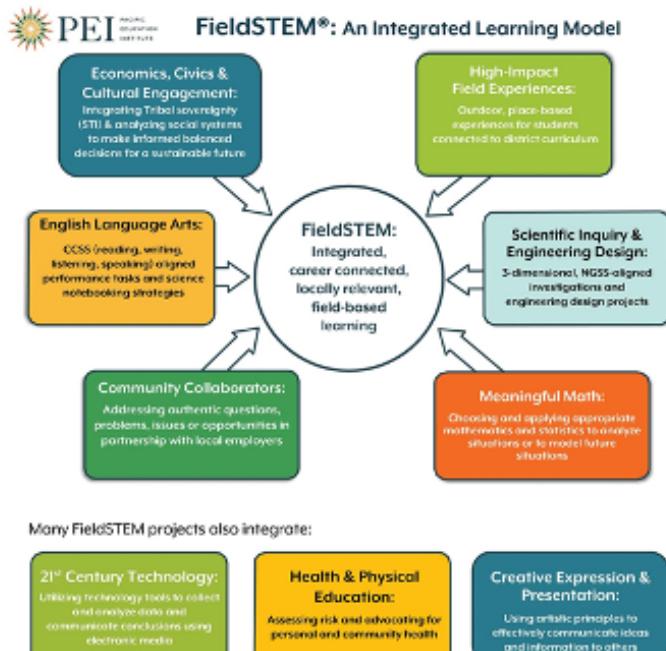
The Pacific Education Institute (PEI) is a leader in environmental and sustainability education through their work to support school districts to adopt FieldSTEM®, an integrated learning model. FieldSTEM connects the natural resource, agriculture, renewable energy, conservation, environmental science and outdoor education sectors to education, providing businesses, agencies and community-based organizations with tools to effectively engage students in career connected learning that will help them attain employment and thrive in future jobs. By collaborating with marginalized communities, including rural, low-income, Latino and Tribal communities, PEI promotes diverse and inclusive models of learning that lead to equity. At the same time, PEI is helping to bridge the gap between major workforce needs that go unmet in the green sectors and teacher and student perception that there are no jobs available in their communities.

PEI resources and tools include customizable, integrated curriculum guides, storylines and performance tasks that are designed by education experts and aligned to the Common Core State Standards (CCSS), Since Time Immemorial (STI), civics and economic standards, and Next Generation Science Standards (NGSS).

Targeting Career Connected Learning (CCL) for PreK-12 at PEI is the intentional support provided to educators to ensure that the work students do in the classroom is meaningful to people in the community outside the classroom. At younger grade levels, students visit local organizations and businesses to learn about the work in their communities and gain exposure to the variety of work that relates to the natural resources, agriculture, and environmental sectors. In intermediate grades, they continue to be

exposed to more professionals in their community and begin to explore the skills needed to succeed in those professions. In middle and high school, students take their career exploration to a new level with work-integrated learning wherein they actively investigate questions, design solutions, or build consensus in the classroom to make contributions to local organizations or businesses actual work. Students at these grade levels may also be involved in work-based learning, where they can job shadow, intern or become an apprentice.

At all levels, engaging students



FIELD ACADEMIES

in the work of their community gives them a “seat at the table” by strengthening their knowledge and skills and empowering their voice in their communities. The FieldSTEM Model, when implemented with high-impact field experiences at every grade level, builds the knowledge, skills and abilities of students PreK-12 toward green jobs in the natural resource, agriculture, conservation, environmental science, renewable energy and outdoor recreation fields.

PEI works at the school building or school district level to support learning. The Shelton School District has been working with PEI for many years and formalized the relationship six years ago under the FieldSTEM model. Every student at every grade level in the Shelton school district receives learning centered on field experiences with 23 different community partners K-9. Superintendent Alex Apostle noted that as the district implemented FieldSTEM, it realized that the FieldSTEM model provided the foundation for students to be prepared for their high school academy model. The program has its roots in the Academies of Nashville model. Academies center student learning on meaningful projects and work-based experiences that lead to intentional career paths and jobs. In 2021 Shelton is opening a natural resource academy that builds on this work.



Squaxin Island Climate Change Ecologist, Candace Penn, shares her love of the marine environment with Shelton students as part of the district FieldSTEM partnership with PEI.

A Clean Energy Pathway, Chris Burns

The pristine waterways in Washington provide not just a beautiful landscape, but also outdoor recreation, economic vitality, and clean renewable energy through the largest hydroelectric system in the world. There are more than 60 dams within the Columbia River watershed located in the most rural and remote areas providing tens of thousands of gigawatts of power that is transmitted across the state and region. These projects range from Seattle City Light's Boundary plant located on the Pend Oreille River to their Skagit River Diablo Canyon Dam both lighting up the city of Seattle. Tacoma Power's commitment to hydro power includes the remote east Lewis County Mossy Rock and Mayfield Cowlitz River projects that send their power to the City of Tacoma. The Mid-Columbia River dams that are owned and operated by the local public utility districts, the Corps of Engineers and Bureau of Reclamation, including the Grand Coulee Dam, the largest hydroelectric project in the country provide cheap renewable power to the entire Pacific Northwest region.

The engineering complexity of these projects presents a challenge for the nearly 6000 employees operating the 60-year-old interconnected generation and transmission system. In 2006, through a partnership with hydro employers, IBEW, Washington State University Energy Program and the Center of Excellence for Clean Energy, a research project was conducted to identify the knowledge, skills and abilities of plant operators and mechanics who need to understand this aging infrastructure coupled with new upgraded technologies. These occupational skill standards laid the groundwork to support the workforce training and education needed to develop a skilled workforce to operate this vast and complex system. As a result, over the past 14 years students in rural community colleges across the state have been introduced to Energy Technology skills and careers through Centralia College, Wenatchee Valley College, Grays Harbor College and Spokane Falls (lone) Community College programs.

Chris Burns tells his story, "When I first heard about Grand Coulee Dam as a child, I told everyone I would work at a dam someday. Of course, at the time I had no idea how I was going to make that possible. Many people begin their powerplant career by apprenticeship or military experience. My path is a more unconventional route of experience, education, and determination.

I started my career in the powerhouse of the Pulp & Paper industry in Cosmopolis, WA, fueling boilers with biomass (tree bark and sawdust) and learning how steam and water systems work to provide both electrical and steam to power the mill. When the mill was shuttered 7 years later, I enrolled in Centralia College's Energy Technology Power Plant Operations program. I was part of a worker retraining cohort program coordinated by the Center of Excellence for Clean Energy that included Pacific Mountain Workforce Development Council, WorkSource Grays Harbor, Washington State Labor Council, and Grays Harbor and Centralia Colleges. Through the



Chris Burns, Plant Operator, Douglas County PUD, Wells Dam

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Energy Technology Program, I learned about steam boiler & turbine operations along with all its auxiliaries, dam construction, turbine operations, electrical transmission, and AC/DC theory and its applications to power generation and transmission. After graduating with my AAS Degree, I was offered a Plant Equipment Operator job at the TransAlta coal-fired powerplant. There I was able to apply much of what I learned through the Energy Technology degree and pulp and paper mill to real-world applications. After 5 years and moving up to Assistant Control Operator, I again used my combined experience and education to transition to Journeyman Powerplant Operator at Douglas County PUD's Wells Dam where I helped manage a renewable power source, provide recreation and aid fish passage around the dam. Five years later, I heard about a plant operator opening at Grand Coulee Dam – my childhood dream. I applied to Coulee and they were excited about my application because rarely do they get applicants with hydro experience. I was hired as a Journeyman Operator and have been there for 2 years. My family has acclimated well to the east side of the state where one son is now managing a fruit packing plant and two are working the orchards. We are all happy living our rural life next to the river and the mountains."

In a state that produces 69% of its power though clean renewable water compared to a national average of 7% hydro power production, Washington has been leading the nation to a clean energy economy for over 60 years. Hydroelectric power serves Washingtonians with low cost rates and in regions such as Grant County PUD some of the lowest industrial rates in the country attract new and emerging industries to our state's economy.

Most importantly, these family wage hydroelectric jobs support families in the rural and remote areas of the state supporting our transition to the Roadmap to a Green Economy. The Center for Excellence for Clean Energy has created a website with Smart Grid Energy Occupations.



Labor Support, IBEW Local 46

IBEW Local 46 continues its proud tradition of quality craftsmanship, leadership in our communities, excellent wages and benefits for members, and innovation in organizing the unrepresented in the rural and urban areas of King, Kitsap, Jefferson and Clallam Counties. Local 46 has 6,000 members including 1,800 apprentices working in a variety of craft units such as Broadcast, HVAC, Inside Wireman, Low Voltage, Maintenance Units, Marine, Motor, Neon Sign, Residential and Sound & Communications.

Local 46 supports Pre-Apprenticeship Programs and hands-on training programs such as ANEW, PSE JATC (Puget Sound Electrical Joint Apprenticeship Training Committee) and others that help prepare people for entry into trades apprenticeship programs. Preparatory programs provide construction training and education, in addition to assisting with driver's licensing, transportation, childcare, budgeting, etc. and help prepare participants for enrollment in a Washington State Apprenticeship and Training Council-approved training program.

Keith Weir, Political Director for IBEW Local 46 shares his advice to high school students who are on a path to an apprentice program, "Complete a high school or GED program including either algebra or trigonometry with a C or above, have a valid driver's license, be physically fit and be able to pass a drug test. Construction still views Cannabis as a detriment to safety/hiring. It would also be good to have some type of construction experience such as volunteering with Habitat for Humanity or having worked with someone doing a remodel project. And a reminder that this is a CAREER, not just a JOB. This is only the first step into a future that YOU will have control over throughout your individual pathways!!! With Climate Change being our new reality, our governments, Local/State/Federal will need continued prompting to get our economy to be less dependent on fossil fuels to power our economy. IBEW will lead the way in clean, renewable alternatives, doing our part to ensure a cleaner, healthier future for all."

IBEW Local 46 is committed to green economy projects, energy efficiency improvements, sustainability practices and supports the Buy Clean Washington project. This project analyzes existing embodied carbon policy and proposes methods to categorize structural materials and report structural material quantities and origins for the State of Washington.

IBEW Local 46 also supports programs such as King County's 2020 Strategic Climate Action Plan (SCAP) that outlines to sharply reduce greenhouse gas emissions. It builds on deep partnerships and technical analysis to recommend specific actions to reach shared overarching goals of 50% by 2030 and 80% by 2050. The SCAP has a new section – Sustainable & Resilient Frontline Communities. This section is a framework for addressing climate equity in communities who are disproportionately impacted by climate change, and historic and current inequities. The final section of the SCAP is an expanded climate preparedness section that establishes the framework for preparing our region for the impacts of climate change. This will produce both immediate and long-range benefits - it helps reduce the damage to homes, businesses, and infrastructure while protecting human health, improving water quality, and supporting salmon recovery. On August 27, Executive Constantine will transmit King County's 2020 Strategic Climate Action Plan (SCAP) to the King County Council. <https://www.kingcounty.gov/services/environment/climate/actions-strategies/climate-strategies/strategic-climate-action-plan.aspx>



Conclusion

The Educating for A Green Economy Project set out to determine the state of the current and projected green economy, explore strategies to ensure youth with barriers to employment – and all students – have access to green economy jobs, and ensure students, educators, counselors and employers across the state are aware of the opportunities to transition to a green economy. Economic reports, workforce feedback, and input from industry told us that the green economy with accompanying green jobs continues to expand as technologies emerge and markets drive environmental concerns and sustainability. We found that awareness of, and access to, jobs revealed some barriers, particularly in rural and remote areas of the state and to those individuals experiencing barriers. One of our findings is that the current and future workforce pathways system itself could be more strategically aligned and should include PreK-12 learning in the continuum. The system is not broken, but gaps can be identified and remedied for optimal alignment that produces efficiencies, becomes more cost-effective, and better serves the needs of students, employers, and the green economy as a whole. Increased collaboration and system development among education, economic and workforce development and industry ensures these partners focus on shared goals and strategies for student learning and career preparation in ways that benefit students, employees and the green economy. A core value and recommendation of this EGE Project is that braided pathways extend from PreK-12 into careers. Including PreK-12 is important because it recognizes that pathways represent comprehensive learning opportunities across the full spectrum of a student's educational experience. Earlier exposure to green economy opportunities, experiences, and preparation will give younger students a head start in exploring options they may pursue, and how learning relates to real-world experiences and careers available to them. Including PreK-12 also expands opportunities for younger students to understand and participate in a pathway system that integrates academic and applied learning – FieldSTEM – in ways that are developmentally-appropriate and builds a foundation for future educational and career success. Yet, in the majority of programs and studies examined in the project, the absence of PreK-12 was notable. While there are good examples such as High School and Beyond programs and community outdoor education programs for young children, there were few linkages from any PreK-12 program to whatever the next pathway might be, and little if any deliberate strategy to integrate or leverage the learning.

Young people are aware of and concerned about anticipated needs to mitigate and adapt to climate impacts. Early and applied learning gives them a “seat at the table” to become involved citizens and informed in their careers. We can increase, embed and leverage applied learning opportunities in CTE programs and project-based learning to address environment and sustainability education standards and encourage the development of these skills. Given the anticipated needs to mitigate and adapt to climate impacts, students of all ages could use this opportunity to study and learn about social, economic and environmental sustainability in their communities. Developing green economy career pathways aligns for the strategy of integrated, collaborative, project-based learning and has the potential to strengthen Washington’s Common Core and NGSS.

Students with barriers to employment and underserved youth have fewer opportunities to access coursework, project-based learning, credentialing programs, work experiences, after-school clubs, and other extended learning opportunities. This is particularly true for communities of color, and in rural and remote parts of the state. Without awareness of and exposure to green careers through integrated work-based learning at the PreK-12 level, many young people will miss out on family wage jobs that allow them to remain in their hometowns, where their community economies can not only survive but thrive. In 2017, only 47% of Washington residents ages 25 to 64 had attained a post-secondary degree. That leaves 53% of the state’s population not attaining degrees outside of the PreK-12 system. Focusing on PreK-12 to career learning outcomes that support both the student, and the workforce, will move Washington toward a robust green economy.

Washington’s abundant natural resources and geographic position make it a center for global supply and distribution of goods, and a leader in forest products, regenerative agriculture and food systems as well as clean energy – all these sectors utilize renewable natural resources. With increasing market demand for green goods and services, these industries must balance economic gains with environmental and social needs. Green economy jobs are increasing and require new and different skill sets. Employers are finding a dearth of skilled youth to fill these jobs. At the same time, the workforce, particularly in these industries, is aging out. It is important to ensure that our current and future workforce is prepared to enter and strengthen the vitality of the 21st century Washington economy. Washington, with its rich natural resource economic base, is well positioned to strengthen the programs and workforce that already make it a leader in the nation’s inevitable transition to greener economies. The EGE project proposes a PreK-12 braided pathway that partners with all stakeholders to continue to build a strong green economy and green jobs for all youth.

