The Green Workforce

in the National Career Clusters® Framework

Achieving a vision of Career Technical Education (CTE) that is accessible and supportive to every learner without limits requires a cohesive, flexible, and responsive career preparation ecosystem that aligns systems and removes barriers between and across programs and learner levels. It also calls for fully connected systems through which each learner can skillfully navigate their own career journey and explore, decide on, and prepare for dynamic and evolving careers.

While the design and language of The National Career Clusters® Framework bridges the gap between education and the world of work, many programs fall outside traditional industry sectors and span a variety of Career Clusters. This series highlights programs that blur the lines between sectors and prepare learners for career success in a variety of industries.

Regardless of the sector, green careers have a specific focus on improving environmental outcomes. These careers could be approached either more broadly through a lens of the environment or climate change or through specific programs and career pathways that directly prepare learners for a career focused on the environment or technologies that aim to minimize the impacts of climate change. These programs also connect to larger societal impacts, including personal and community health and the historical and future impact of pollution caused by both industry and consumers.

Career Clusters
Pathways to College & Career Readiness

This publication centers this workforce and discusses where and how these careers can be accessed through The National Career Clusters Framework. Advance CTE is continuing to develop new resources specifically focused on the burgeoning green workforce and will continue to update this and other resources connected to that space.

Overview

The green workforce is complex and multifaceted, spanning a wide variety of sectors. Green jobs, often described in many different ways, are called out specifically by the U.S. Bureau of Labor Statistics as "jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources" or "jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources."[1] This green workforce has been the center of significant recent federal investment, including through the Bipartisan Infrastructure Law, the Inflation Reduction Act, and the CHIPS and Science Act.[2]

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When combined with other sectors including energy efficiency, energy transmission and distribution, renewable energy, clean transportation, and adaptation and resilience, experts estimate that more than 4.2 million climate jobs exist in the United States.[3] Demand for green jobs is up by more than 50% in the United States since 2019.[4] Other listings of green jobs include those connected to environmental and community health, such as monitoring impacts of pollution and mitigating those impacts.

Despite this growth, the ability to fill many of these green jobs remains daunting for many employers. The rapid growth in the climate-connected sectors outpaces the ability to train and hire for these positions, leaving significant gaps in hiring for electricians, manufacturing, solar installers, and broadly across the entire energy workforce.

These issues are exacerbated by an overall skills gap for the green workforce, with a significant number of current and potential employees lacking the skills needed to make further strides in transitioning to a green economy; according to LinkedIn, only 1 in 8 workers has one or more green skills.[5]

Though these challenges are evident, the opportunity is also clear. Gen Z and millennial employees are making major decisions about their career futures based on the impact on the environment, and nearly all of these generations want purpose-driven work.[6] Gen Z and millennials are accelerating their green skills much faster than previous generations.[7] CTE programs centered on the green workforce, and those that are not inherently focused on a "green career" but use an environmental lens for their curriculum, can help drive momentum for younger learners to explore and access environmentally focused careers and related CTE programs.

Connection to the Career Clusters Framework

The National Career Clusters Framework has many Career Clusters and Sub-Clusters that directly and dedicatedly prepare learners with "green job skills," or the specific academic, technical, and applied knowledge needed to succeed in the green workforce.

Many Career Clusters have existing and new opportunities to expand specific programs that drive learners directly toward green careers. Some state and local secondary and postsecondary programs require limited updating to standards and curricula to "greenify" a program, while others may require a more holistic overhaul.

Using the Framework, states and local agencies can consider what is possible in creating new secondary, postsecondary, and adult reskilling/upskilling programs that specifically engage learners in a given Career Cluster in a climate-oriented career pathway. Given the growing interest in green careers, states may consider the expansion of purpose-driven framing of career pathways and programs of study that focus on environmental impacts to further encourage learner participation, particularly where the connection may not be immediately apparent.

The following chart illustrates some of the specific Clusters and Sub-Clusters that encourage a specific focus on the green workforce. This list is not comprehensive, and we encourage you to work with state, local, and regional stakeholders to develop green programs that meet the needs of your learners and your economy.

Examples of Green Programs of Study Aligned with the Career Clusters

Career Cluster/ Sub-Cluster	Example Programs of Study	Sample Occupations
Advanced Manufacturing • Engineering • Production & Automation • Robotics • Safety & Quality Assurance	Engineering Technology Green Manufacturing Safety & Environmental Assurance Electric Vehicle Battery Production	Sustainability Engineer Environmental Quality Control Professional
Agriculture • Agribusiness • Agricultural Technology & Automation • Animal Systems • Food Science & Processing • Plant Systems • Water Systems	Agribusiness Sustainable Food & Farming Forestry Aquaculture	Environmental Auditor Agricultural Technician
Construction • Architecture & Civil Engineering • Construction Planning & Development • Skilled Trades	Green Construction Electrical Systems Landscape Architecture	Environmental Impact Surveyor Planning Engineer

Career Cluster/ Sub-Cluster	Example Programs of Study	Sample Occupations
Energy & Natural Resources • Clean & Alternative Energy • Conservation & Land Management • Ecological Research & Development • Environmental Protection • Resource Extraction • Utilities	Solar Design & Installation Wildlife Management Environmental Science Water & Wastewater Systems Clean Energy System Design	Power Technician Energy Transfer Engineer Field Researcher Park Ranger Conservationist Climate Resilience Technician
Healthcare & Human Services • Biotechnology Research & Development • Community & Social Services • Physical Health	Biotechnology Research Community Health	Community Health Professional Air Quality Monitor Public Health Advocate
Construction • Travel & Leisure	Ecotourism	Sustainable Tourism Manager
Public Service & Safety • Local, State, & Federal Services	Policy Analysis Regional & Urban Planning	Urban Planner
Supply Chain & Transportation • Air & Space Transportation • Ground & Rail Transportation • Maintenance & Repair • Marine Transportation • Planning & Logistics • Purchasing & Warehousing	Aviation Technology Railroad Operations Electric Vehicle Maintenance Marine Transport Supply Chain Management	Fuel Transport Engineer Electric Vehicle Technician Ethical Trade Manager Supply Chain Technologist

Interdisicplinary Nature

While specific programs aligned to individual Career Clusters can and should exist, an orientation toward green job skills can be applied to any career, though the depth and type of connection varies by occupation. Using labor market data and advice from local, state, and regional employers, states should consider what specific skills are needed to build interdisciplinary programs of study that meet the needs of learners and employers alike.

For example, a program of study focused on electric vehicles could involve courses in engineering technology from the Advanced Manufacturing Career Cluster, electrical systems from the Construction Career Cluster, energy transmission and transfer from the Energy & Natural Resources Career Cluster, and automotive maintenance from the Supply Chain & Transportation Cluster.

Beyond specific programs, many states have statewide environmental literacy plans that focus on ensuring that all residents of that state can be environmentally literate; for many of these plans, secondary and postsecondary education, and in particular CTE, remain a cornerstone.[8] **Delaware**, for example, believes that any job can be a green job and is developing an environmental literacy framework specifically for its CTE pathways. This framework calls out seven broad environmental literacy competencies that can be applied to each of the Delaware Pathways:

- Identify and explore career paths within a chosen industry that expose disparities and improve environmental outcomes for the economy, businesses, communities, and individuals.
- Explain human-created local and/or global environmental impacts within a chosen industry and the results of those impacts on economic, business, community, and individual health and wellness.
- Demonstrate an understanding of inter-relationships between and among components of environmental systems, e.g., atmosphere (air), hydrosphere (water), biosphere (living organisms), and pedosphere (soil).
- Conduct a cost-benefit analysis, with respect to a chosen industry, to evaluate the environmental, social, and economic impact of business and consumer decisions.
- Discern between rigorous environmental scientific research and speculative interpretations.

- Identify and analyze environmental issues, policy, regulations, and legislation with respect to a chosen industry.
- Propose new or updated policy, regulations, and/or legislation that support environmental conservation, energy efficiency, environmental justice, and/or health and wellness in the workplace or community.

The newly updated Career Ready Practices similarly call for a renewed focus on sustainability and conservation of resources across all career pathways. Some specifics include the following:

Remain resilient in a changing workplace and world of work (e.g., resilience and adaptability)	Act as a good steward of organizational and personal finances and resources (e.g., risk assessment, cost-benefit analysis, and resource conservation).	Consider environmental and social impacts of decisions (e.g., ethical decisionmaking, community awareness, & sustainable practices).

Resources for State Implementation

The following resources provide additional information about the green workforce and can be used to support the development of programs specific to the green workforce:

American Climate Corps

Career and Technical Education (CTE) for Climate Jobs: A Framework for Secondary and Postsecondary CTE (MDRC, 2023)

Climate Jobs National Resource Center

Climate Opportunity Map (Brown University, Climate Solutions Lab, 2024)

Interstate Renewable Energy Council—Clean Energy Career Maps

Toward a Youth-Inclusive Green Economy: Five Levers for Scaling Positive Change in the Next Five Years (Education Development Council, 2023)

U.S. Green Building Council—Green Building Careers

Visit the ***Resources*** webpage for additional publications connecting key sectors and educational disciplines to the Career Clusters Framework. .

Acknowledgement

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[1] U.S. Bureau of Labor Statistics. (n.d.). Measuring green jobs. https://www.bls.gov/green/home.htm#:~:text=Green%20jobs%20are%20either%3A,or%20use%20fewer%20natural%20resources

[2] The White House. (2022, February 15). Fact sheet: Biden-Harris administration advances cleaner industrial sector to reduce emissions and reinvigorate American manufacturing. https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/15/fact-sheet-biden-harris-administration-advances-cleaner-industrial-sector-to-reduce-emissions-and-reinvigorate-american-manufacturing/

[3] Pouy, N. (2024, February 26). Fact sheet: Climate jobs (2024). Environmental and Energy Study Institute. https://www.eesi.org/papers/view/fact-sheet-climate-jobs-2024

[4] Beckett, E. (2023, October 4). The growth of green jobs: Building for the future. Lightcast. https://lightcast.io/resources/blog/the-growth-of-green-jobs

[5] LinkedIn Economic Graph. (n.d.). Global green skills report 2023. https://economicgraph.linkedin.com/research/global-green-skills-report

[6] Deloitte. (n.d.). 2024 Gen Z and millennial survey: Living and working with purpose in a transforming world. https://www.deloitte.com/content/dam/assets-shared/docs/campaigns/2024/deloitte-2024-genz-millennial-survey.pdf?dlva=1

[7] LinkedIn Economic Graph.

[8] North American Association for Environmental Education. (n.d.). State environmental literacy plans: SELP 2019 status report. https://naaee.org/sites/default/files/2022-07/naaee_selp_2019_status_report.pdf