Clean Energy Workforce and Employment Gap Analysis in the Hill District of Pittsburgh, PA

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Notice

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Glossary

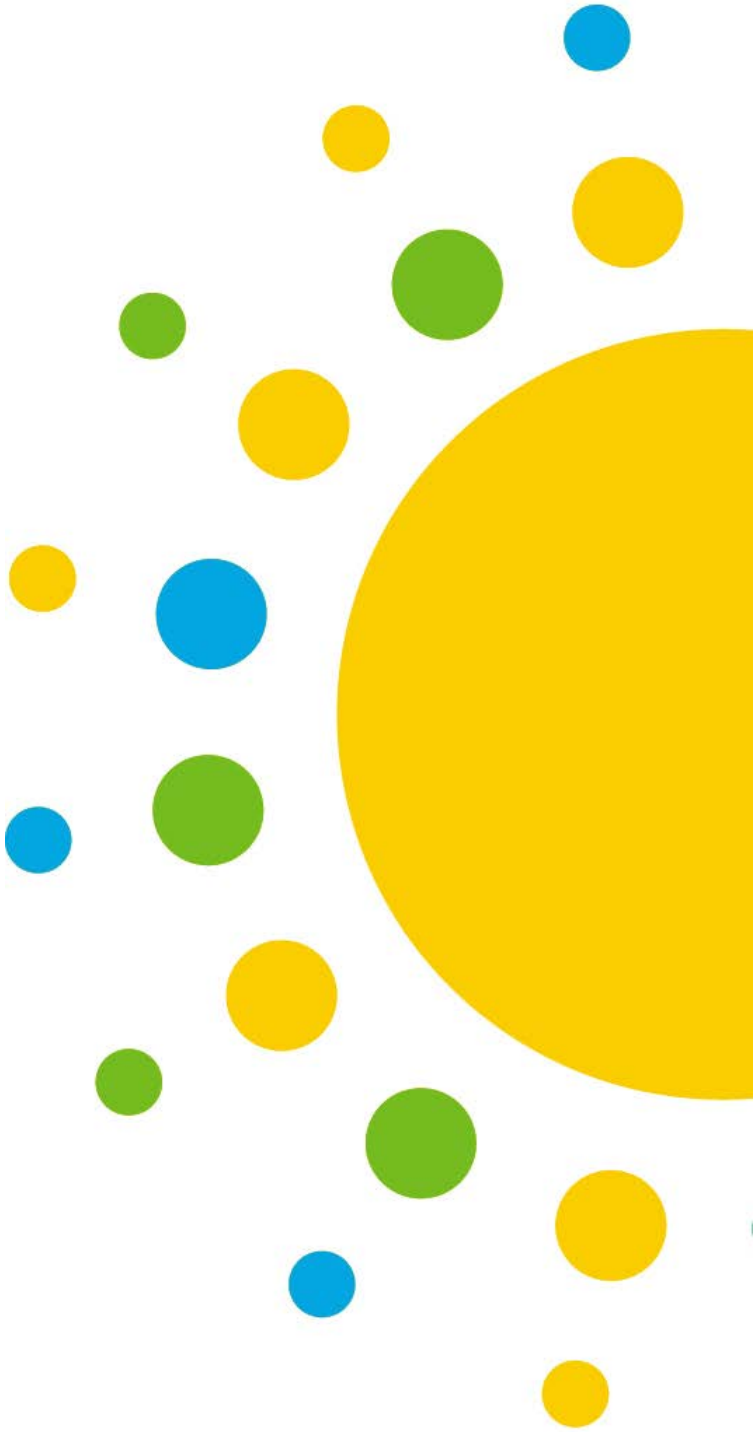
Advanced Manufacturing	Advanced manufacturing refers to manufacturing practices that improve factory efficiencies (saving time, energy, or water), or that produce renewable or clean energy products.
Building Science	Building science is the study of how the different elements of building design, engineering, and construction, including the heating/cooling and ventilation systems, interact to affect comfort, health, safety, and energy efficiency.
Career and Technical Education (CTE)	CTE is career-focused programming at middle schools, high schools, and community colleges, combining academic instruction with skills training and work opportunities. CTE is funded by the Perkins Act, through the U.S. Department of Education.
Energy Efficiency	Energy efficiency refers to improvements made to buildings that reduce the amount energy consumed in the building. This can include the adoption of more efficient appliances, or upgrades to the exterior envelope of the building (ex: walls/roof/attic insulation and air sealing, window/door sealing or replacement) that reduce air movement between inside and outside, reducing the need for space heating in cold months and space cooling in warm months.

Glossary

Electrification	Electrification refers to adoption of technologies powered by electricity in place of natural gas or other fossil fuels. In buildings, this refers to appliances and equipment such as space and water heating, cooking, and clothes drying.
Industrial Decarbonization	Industrial decarbonization refers to the adoption of technologies, processes, and materials in manufacturing and industrial settings that reduce carbon emissions. It can include electrification or increasing energy efficiency of machinery, equipment, or other systems, replacing carbon-intensive fuels and feedstocks with lower carbon alternatives, or capturing and storing carbon at industrial facilities.
Wrap-around services	Also referred to as supportive services, wrap-around services are services and resources provided to individuals going through an education or training program that address underlying inequities and make it more likely they will succeed in their training and career pathway. These services can include things such as paid training, childcare reimbursement, transportation assistance, career counseling, or legal aid.

Contents

Background & Context



Communities LEAP Pilot Technical Assistance Opportunity

The Communities Local Energy Action Program (Communities LEAP) Pilot Competitive Technical Assistance opportunity aims to facilitate sustained, community-wide economic empowerment through clean energy, improve local environmental conditions, and open the way for other benefits primarily through the U.S. Department of Energy's clean energy deployment work.

This opportunity was open to low-income, energy-burdened communities that are also experiencing either direct environmental justice impacts or direct economic impacts from a shift away from historical reliance on fossil fuels.

Hill District Communities LEAP Overview

Through Communities LEAP, a community coalition focused on the Hill District neighborhood of Pittsburgh is working with a technical assistance provider network led by the National Renewable Energy Laboratory (NREL). The coalition includes community organizations, nonprofits, the city government, and the utility.

Technical assistance provides analysis and information to support Hill District stakeholders in their goals to create informed residential energy efficiency and renewable energy transition strategies that:

- Improve housing conditions and lower energy bills
- Incorporate energy efficiency and renewable energy strategies into existing, community-driven development efforts
- Generate quality local jobs.

Presentation Overview

This presentation provides:

- ✓A summary of potential employment impacts of residential energy efficiency investments in the Hill District, aligned with NREL's housing stock analysis
- ✓A scan of existing energy efficiency and clean energy workforce and education stakeholders in and around the Hill District
- ✓Gaps and potential opportunities for new or expanded training to align with energy efficiency and clean energy goals.

For more information, see: Inventory of Clean Energy Education and Workforce Development Programs in Allegheny County, PA and ResStock Communities LEAP Pilot Residential Housing Analysis

Defining Workforce Development

In the context of this presentation, Workforce Development refers to the processes involved in preparing people with the **awareness, knowledge, skills, and support** they need to meet the current and future needs of employers (Better Buildings n.d.).

Image source: Better Buildings (n.d.)

Historic Investment in Energy Efficiency, Electrification, and Renewable Energy

Inflation Reduction Act (IRA)

- An analysis commissioned by the BlueGreen Alliance from the Political Economy Research Institute (PERI) at the University of Massachusetts Amherst finds that the IRA is projected to create 9+ million jobs over the next decade (BlueGreen Alliance n.d.).
  - This includes 900,000+ jobs in efficient buildings.
  - This includes 900,000+ jobs in clean manufacturing.

- 70% of jobs created are expected to be filled by people with less than a four-year college degree (Pollin et al. 2023).

Top Occupations for Clean Energy Job Growth in the U.S.

According to the U.S. Bureau of Labor Statistics, solar, geothermal, and wind electric power generation have the highest projected *job growth rates* of any U.S. industry, estimated at 60% growth between 2022 and 2032. However, solar and wind will have the highest total number of jobs, far outpacing geothermal.

Wind turbine service technicians are the top occupation for expected growth at 45%, and solar photovoltaic installer is projected to be the 15th fastest growing occupation at 22% (Colato and Ice 2023).

Chart 6. Fifteen fastest growing industries, percent change, projected 2022–32

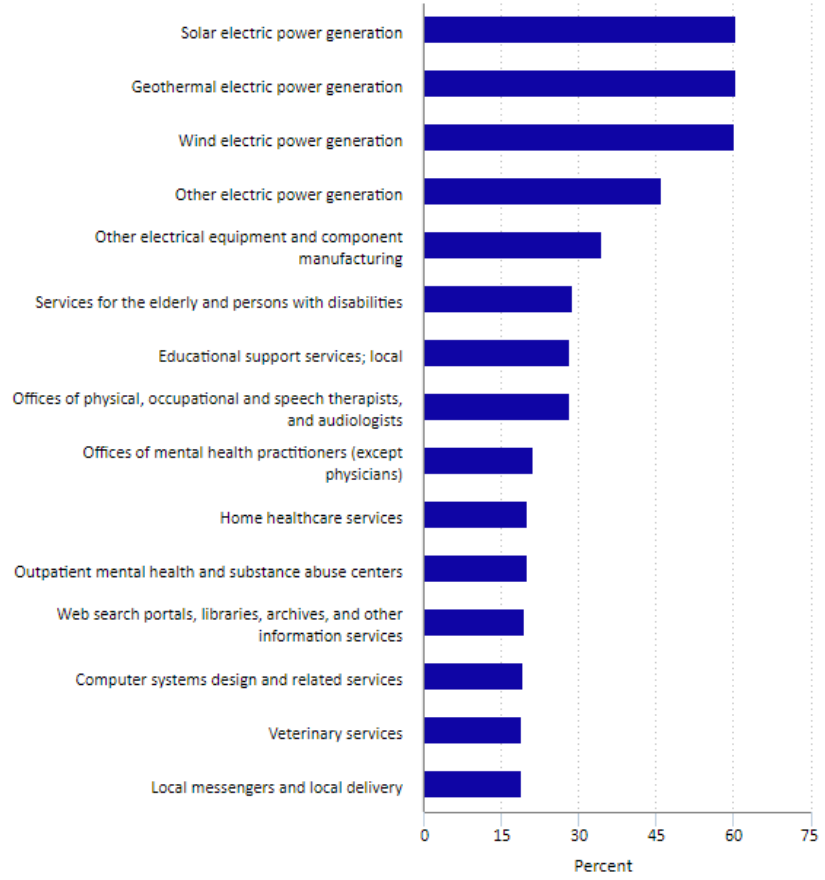


Image source: Colato and Ice (2023)

Clean Energy Employment Impacts

While any new investment will support jobs, **small scale solar and building efficiency retrofit projects** are more likely to have higher and more sustained local employment impacts compared to commercial retrofit, new construction, utility scale solar, or wind energy generation projects (Communities LEAP 2023).

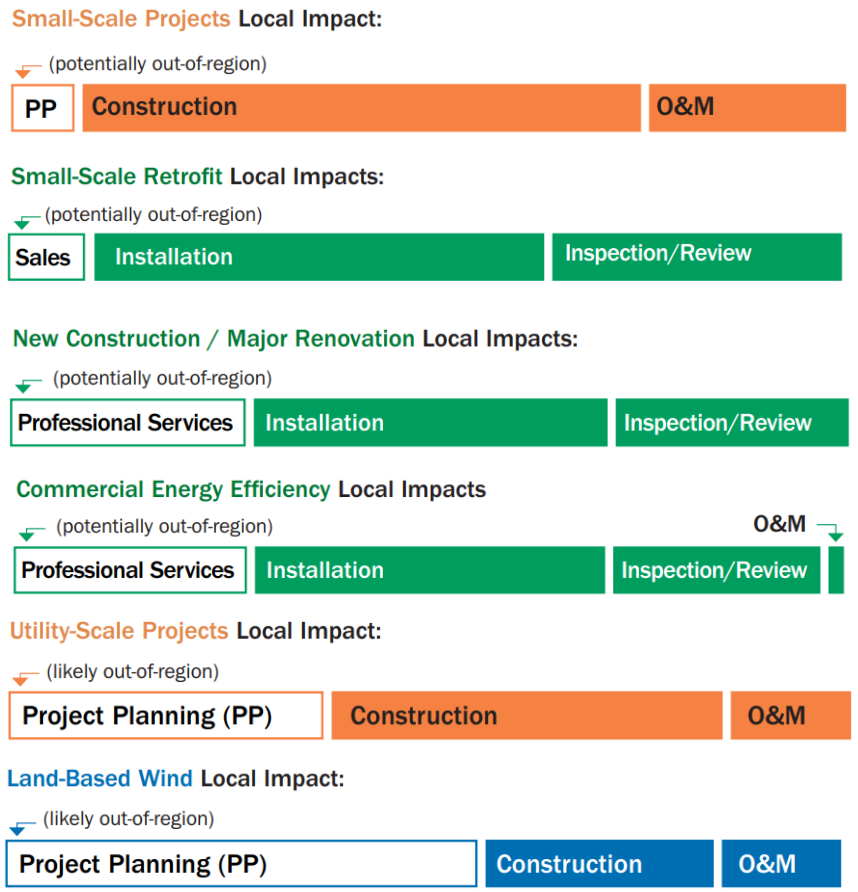
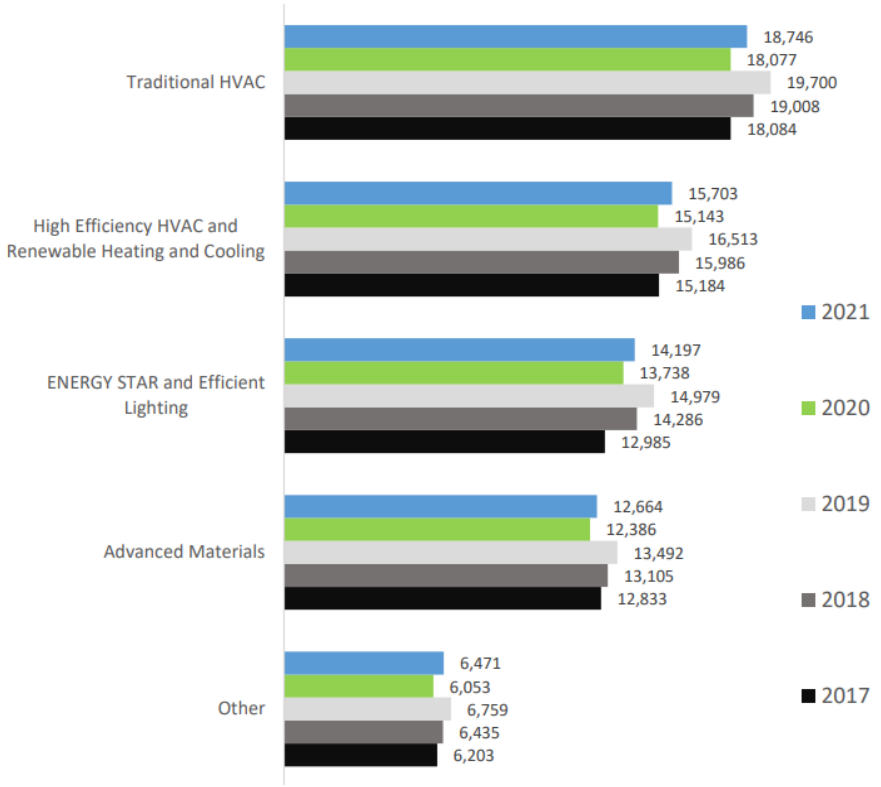


Image source: Communities LEAP (2023)

Clean Energy Employment in Pennsylvania

Pennsylvania Energy Efficiency Jobs by Subtechnology, 2017-2021



- Allegheny County has an estimated 12,706 total clean energy jobs, with 9,288 of those being energy efficiency workers (BW Research Partnership 2022).
- Most of the energy efficiency jobs in the State are in traditional and high efficiency HVAC, and most are construction positions (versus professional services or manufacturing) (BW Research Partnership 2022).
- HVAC installers and mechanics were also the occupations with the fastest growth since 2015 (BW Research Partnership 2023).

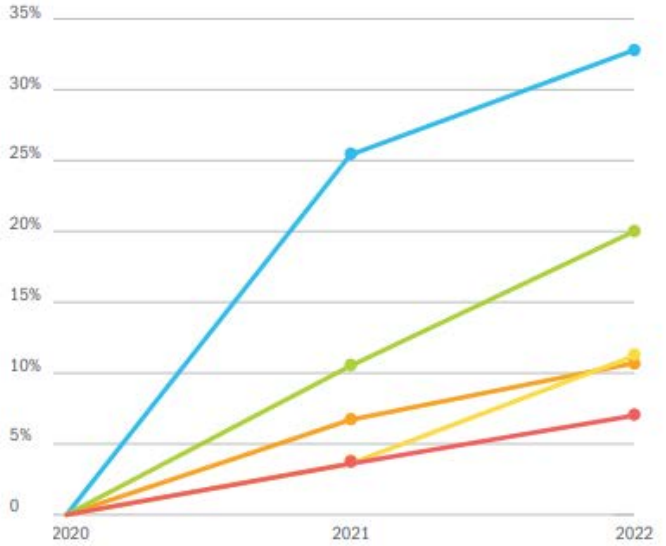
Clean Energy Job Growth in PA

Since 2020, clean energy employment growth in PA has outpaced overall energy job growth and employment overall.

Energy efficiency employs the most workers of any clean energy subsector but has seen less robust job growth since 2020.

Although at the state level, clean vehicles saw the highest job growth of any sector, in Allegheny County clean vehicle jobs actually decreased over this period (E2 2023).

FIG 5 // PENNSYLVANIA ENERGY EMPLOYMENT by clean energy sector employment growth



2020	2021	2022
Energy Efficiency		
65,397	67,782 (+3.6%)	69,990 (+7.0%)
Renewable Generation		
9,473	10,466 (+10.5%)	11,370 (+20.0%)
Storage/Grid		
3,598	3,727 (+3.6%)	4,000 (+11.2%)
Biofuels		
1,243	1,326 (+6.7%)	1,376 (+10.7%)
Clean Vehicles		
7,211	9,040 (+25.4%)	9,582 (+32.8%)

	Allegheny County Data, 2022		Pennsylvania State Data, 2022	
	Total Jobs	Job Growth	Total Jobs	Job Growth
Renewable Generation	1,834	8.3%	11,370	8.6%
Storage/Grid	506	5.8%	4,000	7.3%
Biofuels	82	1.5%	1,376	3.7%
Energy Efficiency	9,658	3.0%	69,990	3.3%
Clean Vehicles	625	-1.9%	9,582	6.0%

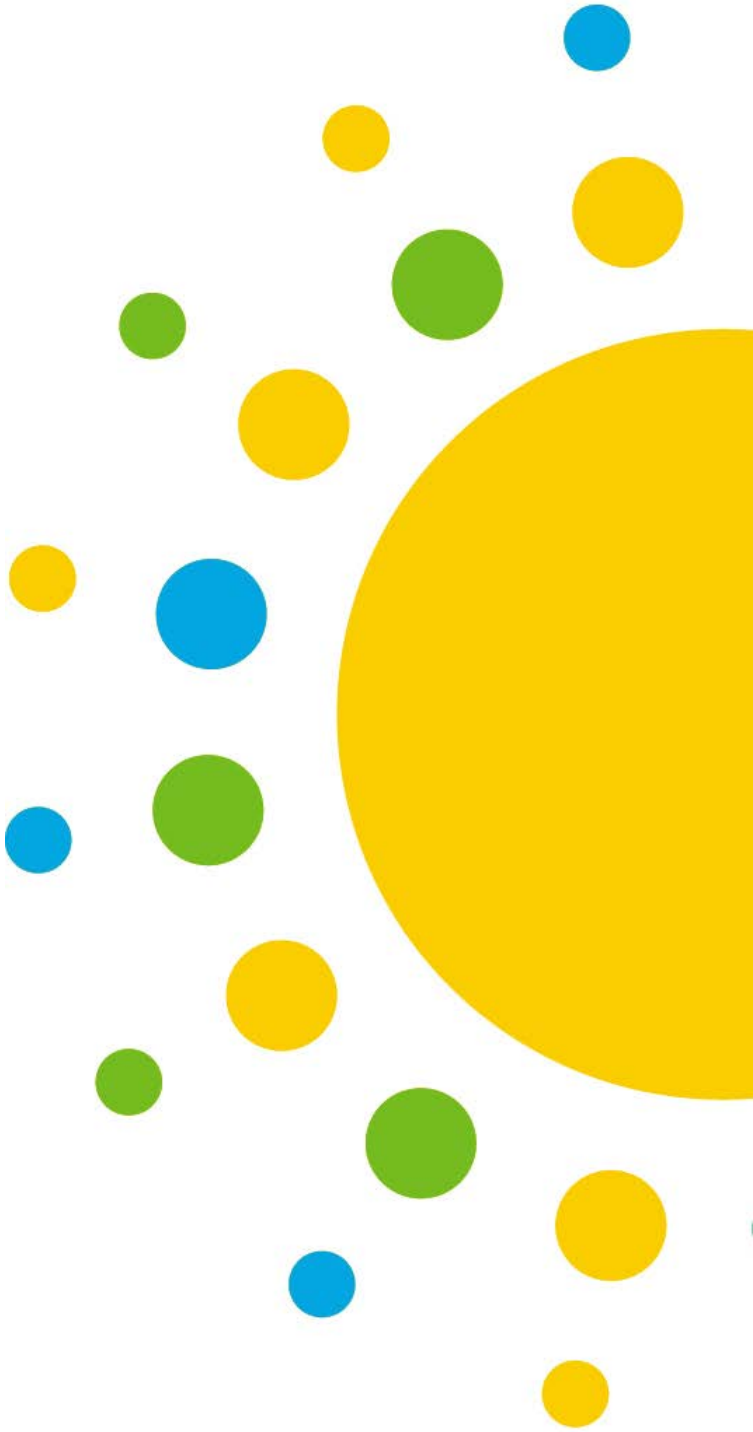
Source: E2 (2023)

Fair Chance Hiring Resources

One issue raised by the community coalition was whether clean energy jobs offer opportunities for people with criminal records. Jobs for the Future (JFF) offers a Fair Chance cohort training program for employers, focused on expanding employment opportunities for people with criminal records.

JFF is also supporting Sustainable Pittsburgh, Partner4Work, and others to expand and scale construction and clean energy jobs through their Quality Green Jobs Regional Challenge. This existing partnership may offer an opportunity to expand their support to include fair chance training for local employers.

Potential Employment Impacts of Energy Efficiency and Electrification



Methodology & Limitations

The employment estimates described in this section are based on the estimated cost to upgrade the homes in the Hill District as modeled through a building stock and energy upgrade analysis completed using ResStock™ (Liu et al. 2023), combined with state level jobs multipliers published by NREL in 2022. For more information on the methodology and results of the ResStock analysis, please see: Residential Home Repairs, Energy Efficiency, and Electrification in the Hill District of Pittsburgh.

These job multipliers were originally developed for national and state-level estimates. There is likely greater uncertainty in results when applying the model at smaller scales, as was done in this work.

These estimates are intended to offer a *rough estimate* to help the community understand the potential scale of employment impact (if all homeowners in the Hill District were to purchase/implement these upgrades) and does not constitute a detailed jobs modeling analysis.

For more information on how these job multipliers were developed, please reference section 2.3.3 of Truitt et al. (2022).

Potential Employment Impacts

Installing the following four select upgrades packages to all eligible homes in the Hill District (as identified by the ResStock analysis) could support approximately 200+ direct job years.*

ResStock Upgrade Package	Share of Dwelling Units Needing Upgrade Per ResStock Analysis	Range of Annual Utility Bill Savings	Estimated Job Years Supported by Upgrades*
Basic Enclosure	97% of all units	$90-$350	~40
Enhanced Enclosure	98% of all units	$104-$208	~55
Heat Pump Water Heater	99% of all units	$-22-$46	~25
High Efficiency Heat Pump w/ electric heat backup	100% of all units	$-156-$286	~150

***Direct jobs** are only those involved in the design, planning, and installation of the measures.

- Does NOT include indirect jobs (associated supply chain), or induced jobs (resulting from increased local spending).

***Job years** means the job numbers shown are total jobs needed, regardless of how long it takes to complete the work.

- Ex: 200 job years could be 200 jobs that last 1 year, 40 jobs that last for 5 years, or 20 jobs that last for 10 years.

Potential Employment Impacts

Below are examples of the main types of occupations and associated wages for workers that would install these upgrades. Additional information on occupations of interest to the coalition is included on subsequent slides.

ResStock Upgrade Type	Sample Occupations*	Sample Average Annual Wages** (Pittsburgh Metro Area, 2022)
Basic/Enhanced Enclosure	• Residential Energy Efficiency Technician • Carpenter/Carpenter Apprentices • Residential Energy Auditor	• Residential Remodeler: $51,420*** • Carpenters: $56,780 • Construction and Building Inspectors: $58,990
Heat Pump Water Heater	• Plumber/Plumber Apprentice	• Plumbers: $72,210
High Efficiency Heat Pump w/ electric heat backup	• HVAC Installer/Apprentice • Electrician/Electrician Apprentice	• HVAC Installers: $55,400 • Electricians: $71,030

*Brown et al. (2023)

**U.S. Bureau of Labor Statistics (2022)

***U.S. Bureau of Labor Statistics (n.d.)

Residential Energy Efficiency Technician

Essential duties: Install building performance measurements and collect a range of technical data to support the energy audit and home energy upgrade process.

Preferred Experience & Training

Experience or education in the building trades, building science, and/or housing construction; Experience with hand and power tools

Recognized Certifications:

BPI-Building Science Principles (BSP) Certificate of Knowledge, Air Leakage Control Installer, Infiltration and Duct Leakage Certifications (Green Buildings Career Map n.d.[a])

Photo by Werner Slocum, NREL 72235

Residential Energy Auditor

Essential duties: Conduct on-site energy audits and assessments and perform energy modeling to determine the current and desired energy performance, safety, and durability of residential buildings.

<u>Preferred Experience & Training</u>

Two-year degree, vocational or technical school training

<u>Recognized Certifications:</u>

RESNET HERS Rater, BPI Building Analyst Technician (BA-T), BPI Building Analyst Professional (BA-P), or BPI Energy Auditor (Green Buildings Career Map n.d.[b]).

Image source: Green Buildings Career Map (n.d.[b])

HVAC Installer

Essential duties: Install or repair heating, central air conditioning, HVAC, or refrigeration systems, including oil burners, furnaces, and heat pumps.

Electrician

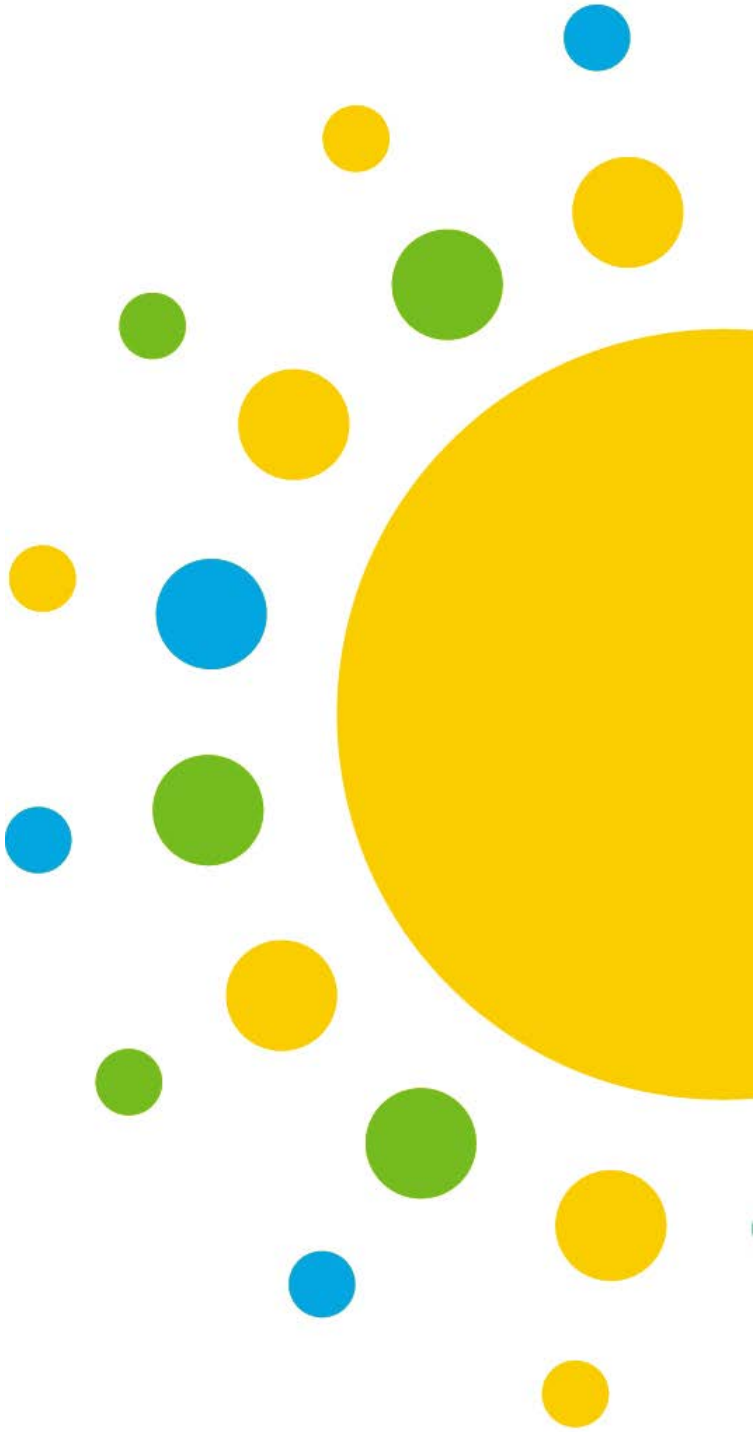
Essential duties: Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is completed in accordance with relevant codes.

Preferred Experience & Training:

Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations, particularly for commercial building work.

Most occupations in this zone require training in vocational schools, related on-the-job experience, and/or an associate's degree (ONET Online n.d.).

Clean Energy Education & Workforce Ecosystem Gap Analysis



Methodology & Limitations

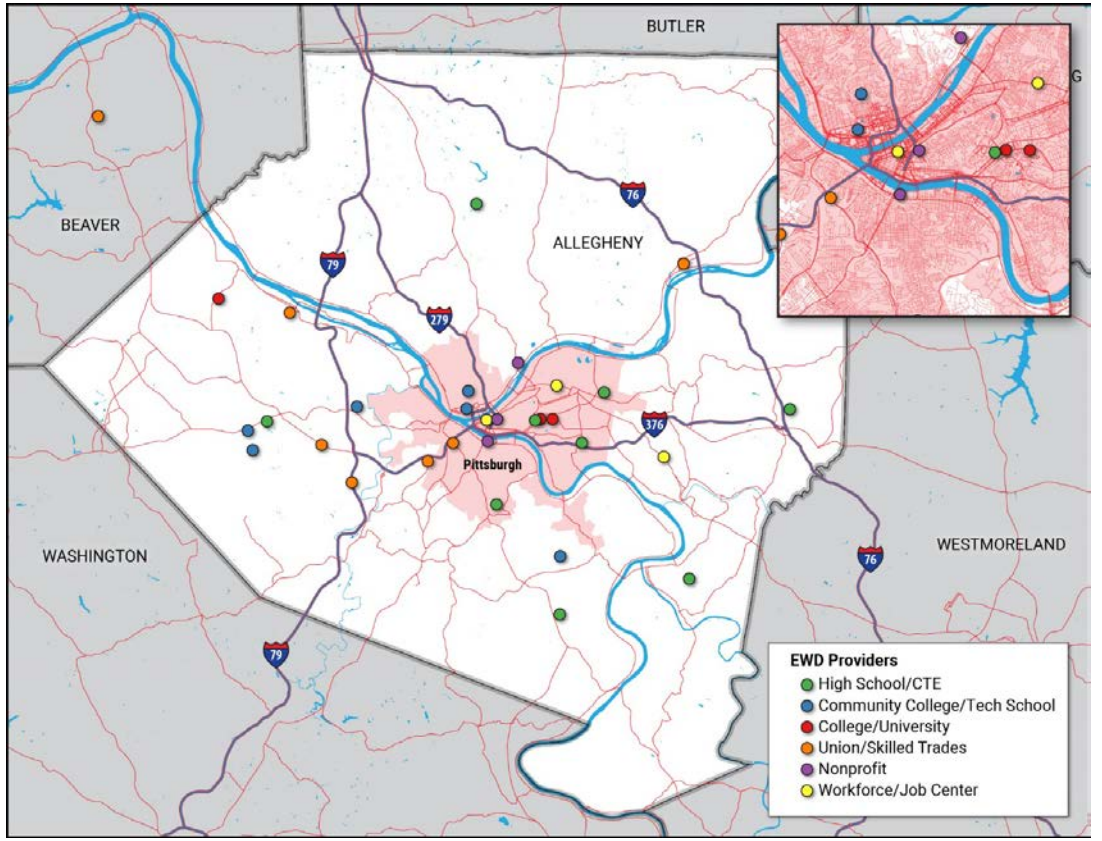
This gap analysis was designed to identify existing resources and possible gaps in Allegheny County's existing education and workforce ecosystem related to building energy efficiency and clean energy.

This analysis did not conduct market research related to whether jobs in those areas currently exist or are in demand.

Education and Workforce Development Ecosystem - General

NREL's inventory of Education and Workforce Development (EWD) resources found a robust training ecosystem in Allegheny County.

Although many programs are based in Pittsburgh, **there are a variety of training opportunities at different levels throughout the county.**

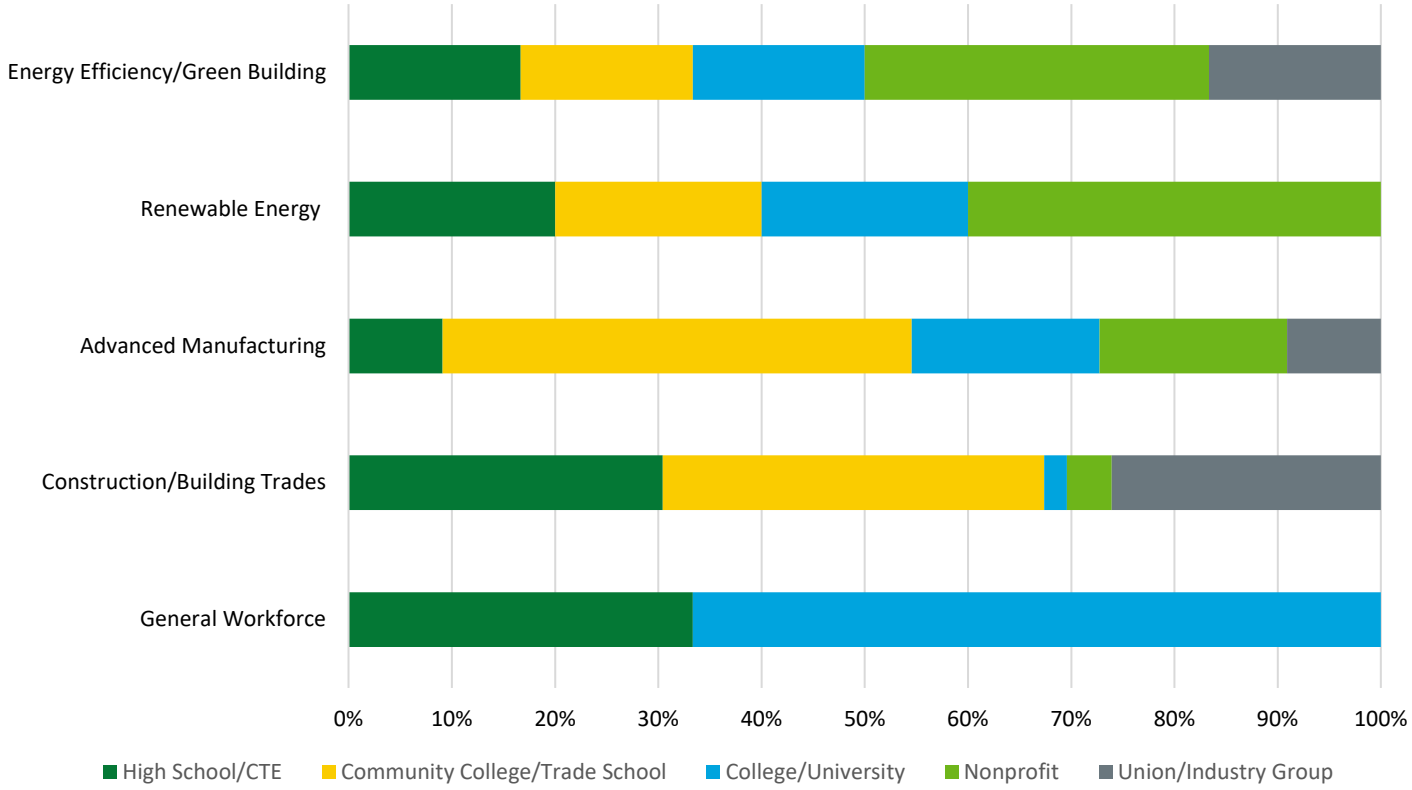


Map of EWD Programs in Allegheny County (Moe 2024)

Education and Workforce Development Ecosystem - General

There are a **variety of programs** at the high school, community college/trade school, and university levels, programming offered through union and industry groups, as well as local nonprofits. There are also several programs that are collaborations between multiple partners identified in the inventory.

EWD Programs by Technology Area and Program Type

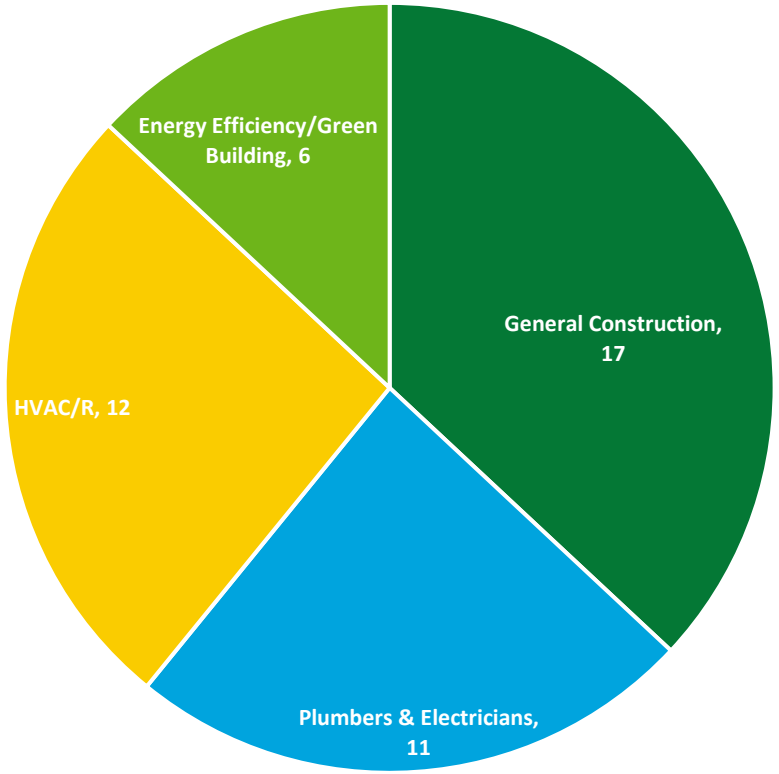


Education and Workforce Development Ecosystem - Buildings

NREL's inventory found a robust training ecosystem for the **building trades** (including high school career and technical education (CTE), community college, technical schools, and unions).

However, there is a general lack of energy efficiency or building science content within these programs, especially in workforce pipeline programs for new workers.

Buildings-Related Training Programs in Allegheny County



Example Education and Workforce Development Programs - Buildings

Allderdice High School RHVAC Program

The Refrigeration, Heating, Ventilation and Air Conditioning (RHVAC) program prepares students to install, repair, and maintain residential and commercial systems.

It is part of the Pittsburgh Public Schools CTE program. Dual enrollment credits are available with the Community College of Allegheny County.

PIT2Work Construction Program

This 6-week pre-apprenticeship program trains people interested in the building trades. Upon completion, participants can qualify to pursue certain union apprenticeships.

The program is a partnership with Partner4Work, Pittsburgh International Airport, and the Buildings Guild of Western PA.

Education and Workforce Development Ecosystem - Buildings

Programs That Address Energy Efficiency/Green Building Content:

- Allderdice High School Engineering Technology Program
- Community College of Allegheny County (CCAC) Mechatronics Technology Program
- Energy Innovation Center Building Maintenance Training
- Green Building Alliance professional trainings
- Insulators Union Local 2
- University of Pittsburgh Energy Science and Technology Program.

Education and Workforce Development Ecosystem – Other Clean Energy

NREL's inventory identified 19 non-buildings clean energy training programs in Allegheny County. Most are in **advanced manufacturing** across all levels (including high school CTE, community college, technical schools, and unions).

However, there is a general lack of content related to industrial energy management or decarbonization, except at a university research level.

Image Source: Powerpoint Stock Image

Example Education and Workforce Development Programs – Other Clean Energy

New Sun Rising Solar Program

The Solar Workforce + Education Program is located at Millvale Food + Energy, and is a partnership with CCAC, Triboro Ecodistrict, and others. It offers:

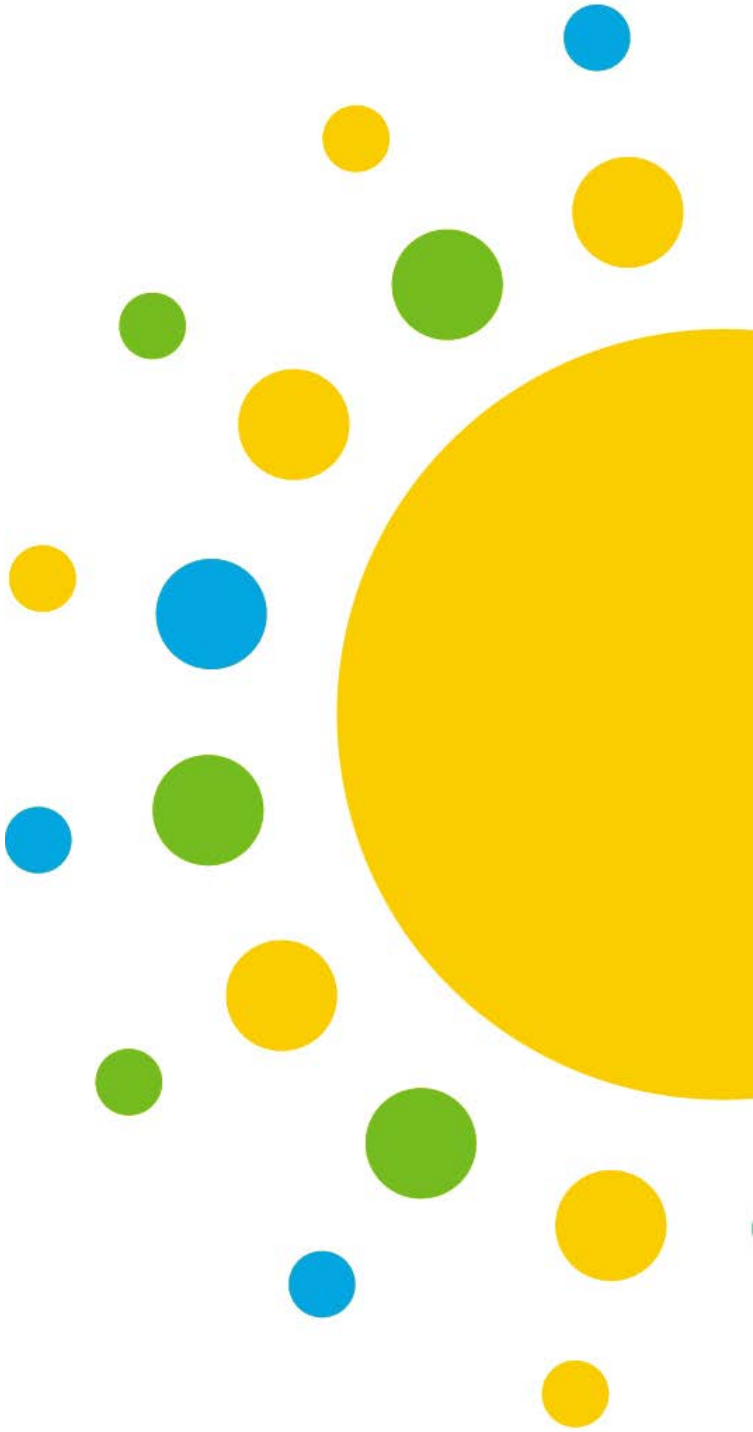
- Student education, fellowships, and career introductions
- Training and certifications for small local electrical contractors.

CCAC Facilities Maintenance

This Associates in Science degree combines academic and technical education and training, and prepares students to:

- Diagnose and repair building or industrial facility systems
- Solve electrical and mechanical system problems
- Examine and troubleshoot industrial equipment.

Opportunities



Education and Workforce Development Opportunities - Buildings

The gap analysis indicates an opportunity to develop new trainings, or embed new content into existing training programs, so that workers are prepared to meet the demands of new investment and opportunities in **residential building efficiency and electrification**.

Image Source: Powerpoint Stock Image

Education and Workforce Development Opportunities – Industrial Decarbonization

Given the robust manufacturing industry and educational landscape in Allegheny County, there is an opportunity to develop programs to support industry energy management training at the factory level.

One potential opportunity is for local education and workforce development providers to engage with DOE's Industrial Assessment Centers program, which engages training, education, and workforce entities across the country to provide training to students and energy services to local small and mid-sized manufacturers.

Education and Workforce Development Opportunities – General

Outside of unions and high school CTE programs, there are also only a few training programs available at no cost that are **short-term and focused on specific skills-building, and which offer any sort of wrap-around services**, and fewer that have a clean energy focus.

This could create a barrier to participation for adults who are currently out of work or looking to switch industries.

There is an opportunity to engage with partners that already offer this type of programming to expand their offerings, for example, New Sun Rising, Energy Innovation Center, Partner4Work, CCAC, and the Trade Institute of Pittsburgh.

Education and Workforce Development Opportunities – General

Prior to any work done to create new education or workforce programming, it is essential to understand the market demand and/or work with local partners to ensure that employment will be available related to the training.

There may also be a need to identify and support local contractors who are doing similar or relevant work, and who might be interested in expanding their business models to meet any new demand.

Thank You

www.energy.gov/communitiesLEAP

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