

Workforce Needs Assessment

Introduction

Maryland possesses a robust energy efficiency workforce and several workforce development programs designed to support individual workers and grow the field in the state. As the energy sector rapidly changes to align with energy needs as well as local, state, and federal energy efficiency and sustainability goals, it is important to understand the current state of the workforce as well as anticipated changes from future demand and development. Between the 2022 and 2023 calendar year, Maryland's energy efficiency workforce was anticipated to grow 7%, in line with 6.4% growth across the U.S.¹ This Workforce Needs Assessment identifies the baseline workforce of fully qualified energy workers, projects the future energy efficiency workforce demand, and provides resources for the Maryland Energy Administration (MEA) to utilize for workforce tracking and development opportunities.

Summary of Findings

- There are 125,007 energy workers in Maryland with over half (66,570) working in energy efficiency.
- There will need to be an increase of between 22,608 and 64,000 workers in energy efficiency in the next 10 years to meet future workforce demand.
- The top declining occupations in Maryland are mostly administrative or retail roles. These occupations are anticipated to lose over 25,000 jobs by 2032, leading to an opportunity to transition these workers to the clean energy workforce.
- There are an estimated 3,000 future employees in trade schools, with more potential coming from high school career technical education (CTE).
- There are an estimated 6,000 future employees currently enrolled in apprenticeship programs that could lead to energy or energy adjacent careers.
- Existing workforce development programs are run by educational institutions, unions, private training centers, community organizations, and more. There are over 120 workforce organizations that can be utilized by energy efficiency contractors in Maryland. Refer to Appendix B for a comprehensive list of workforce development programs in the State.
- Entrepreneurial programs in Maryland specific to energy businesses include the Maryland Energy Innovation Institute (MEI²), Maryland Clean Energy Center (MCEC), Maryland Energy Innovation Accelerator (MEIA), and Maryland Technology Enterprise Institute (Mtech). These organizations collaborate to provide energy start-ups with all resources needed to create a successful business.

Workforce Level and Projections

The Maryland energy workforce has grown roughly 1% annually since 2020, after the global Covid-19 pandemic caused work stoppage and delays between 2019 and 2020. In 2022, Maryland's energy efficiency workforce made up nearly 3% of the nation's energy efficiency workforce. The state boasts the 12th largest energy efficiency workforce in the country.²

Current Workforce Level

In 2022, Maryland had 125,007 energy workers employed by businesses in the state. Energy workers are employed by firms directly involved in any stage of development, production, distribution, etc. within the energy industry. Energy industry sectors include electric power generation, fuels, energy efficiency, transmission, distribution, and storage, and motor vehicles. Of over half the energy workers in Maryland in 2022, 66,570 worked in the energy efficiency sector. All

¹ U.S. Department of Energy. "United States Energy & Employment Jobs Report 2023 Energy Employment by State: 2023" June 2023. <https://www.energy.gov/sites/default/files/2023-06/USEER23-MD-v2.pdf>.

² U.S. Department of Energy. "United States Energy & Employment Jobs Report 2023". June 2023. <https://www.energy.gov/sites/default/files/2023-06/2023%20USEER%20REPORT-v2.pdf>

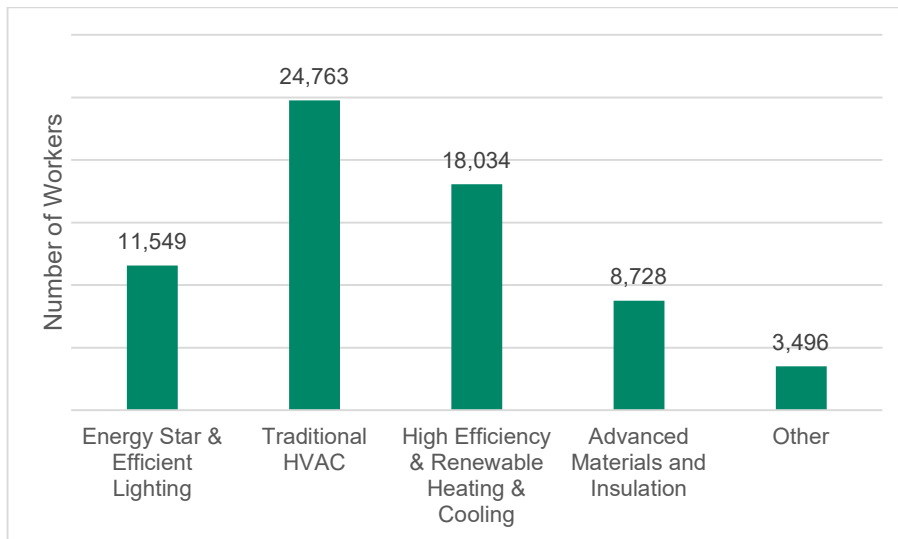
data in this section has been gathered from the U.S. Energy & Employment Jobs Report 2023 (USEER), which surveys energy employers in each state to establish an annual report of workforce levels across energy sector jobs.³

The number of workers in the energy efficiency workforce can be broken-down by technology application or the industry sector. For detailed technology applications within energy efficiency, the survey includes:

- ENERGY STAR & efficient lighting
- Traditional HVAC
- High efficiency & renewable heating & cooling
- Advanced materials and insulation
- Other⁴

In Maryland, the largest technology application within the energy efficiency technology application is traditional HVAC and the second largest is more efficient or renewable heating and cooling solutions. Detailed technologies included within in the ENERGY STAR category include ENERGY STAR certified HVAC, LED lighting, appliances, insulation, air-source heat pumps, roofing, commercial food service equipment, windows, doors, skylights, data center equipment, electronics, ground-source heat pumps, or geothermal heat pumps. Other ENERGY STAR appliances not identified here fall into the other category. The energy efficiency workforce broken down by detailed technology application is shown in Figure 1.

Figure 1 Maryland Energy Efficiency Workforce by Detailed Technology Application



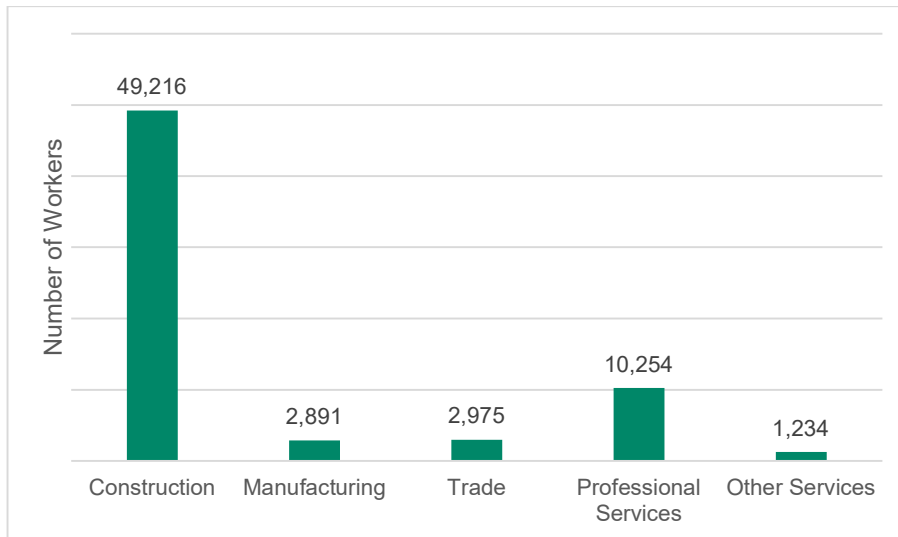
Source: USEER 2023

Within the detailed technology applications listed above, workers surveyed have positions in construction, manufacturing, wholesale trade, professional services, and other. Specific roles within these categories include positions in installation or repair, production and manufacturing, administrative, management and professional, or sales. In the energy efficiency technology application, construction workers include employees of construction or repair firms that can engage in construction, installation, maintenance, and repair. Construction workers also include employees of firms that perform construction, installation, maintenance, or repair on any equipment that qualifies for ENERGY STAR certification as listed above. Over 73% of the energy efficiency workforce consists of construction workers, as shown in Figure 2.

³ U.S. DOE, United States Energy & Employment Jobs Report 2023.

⁴ According to the U.S. DOE Employment Jobs Report 2023, ENERGY STAR technologies not identified in energy efficiency fall into the "Other" category.

Figure 2 Maryland Energy Efficiency Workforce by Industry Sector



Source: USEER 2023

Projected Workforce Demand

Based on data from USEER, the current number of workers in the energy efficiency sector in Maryland is 66,570. This section provides a projection of workforce levels for the next ten years by research, data, and analysis on energy efficiency workforce.

Projected Workforce Demand Analysis Results

The lower and upper end estimates for the projected increase in number of workers required are shown in Table 1. This analysis yields a range of potential increases in energy efficiency workforce demand over the next decade, from an approximate 34% increase to potentially doubling the current workforce in the state.

Table 1 Projection of Energy Efficiency Labor Demand by 2033

Scenario	Description of Scenario	Total Number of Workers Needed	Increase in the Number of Workers	Percentage Increase in the Number of Workers
Lower End Estimate	Only considers current incentives and cost-effective measures	89,178	22,608	34%
Upper End Estimate	Considers meeting Maryland's building efficiency targets	130,570	64,000	96%

The lower end estimate is based only on incorporating utility programs and current Inflation Reduction Act (IRA), MEA, and Department of Housing and Community Development (DHCD) incentives for residential building efficiency. The upper end of the estimate is based on meeting energy efficiency targets for residential and commercial buildings in Maryland, which requires roughly \$2 billion per year in investment.⁵

Methodology

Lower End Estimate

From previous work for the Building Energy Transition Implementation Task Force, Rewiring America estimated that the current level of federal and state incentives targeting residential building energy efficiency totals to \$4.3 billion over the

⁵ These estimates are from previous analysis performed by Rewiring America and LBNL for the MDE Building Energy Transition Implementation Task Force. These figures can be found on the following website from the 7/27/2023 meeting. <https://mde.maryland.gov/programs/air/ClimateChange/Pages/BETITF.aspx>

next ten years, which would translate into roughly 17,061 direct jobs in energy efficiency.^{6,7,8} This value was added to the National Renewable Energy Laboratory (NREL) estimate of 5,547 additional jobs by 2030 in energy efficiency, which is based on utility programs.⁹ Therefore, the sum of effects from federal, state, and utility energy efficiency program investment would produce an additional 22,608 jobs by 2030, or a 34% increase over current levels.

Upper End Estimate

From analyses supporting the Building Energy Task Force by Rewiring America and Lawrence Berkeley National Laboratory (LBNL), roughly \$2 billion per year of investment starting in 2025 will be required to meet Maryland’s target for building efficiency for commercial and residential buildings. This is a substantial level of investment and will lead to a significant increase in energy efficiency labor demand. If the \$2 billion of annual investment is met starting in 2025, this will equate to roughly an increase of 8,000 energy efficiency jobs per year to 130,570 jobs at the beginning of 2033, a 96% increase (or roughly double) from current levels. This 96% increase includes existing incentives and cost saving measures from the lower end estimates, but also includes any additional increases in incentives, mandates, or private investments that will be necessary to meet Maryland’s building efficiency targets.

Labor Market Trends in Growing and Declining Industries

This section identifies labor market trends in growing and declining industries as well as employees from declining industries in Maryland who may be interested in the field of energy efficiency. The analysis in this section uses data primarily from The U.S. Bureau of Labor Statistics (BLS).

According to the BLS, the fastest growing occupations by 2032 include wind turbine service technicians, nurse practitioners, and data scientists.¹⁰ The fast-growing occupations in Maryland follow a similar trend, where information technology and healthcare industries are projected to have the highest levels of labor increases. The following table provides the ten industries with the highest levels, by employee count, of projected labor increases by 2032.¹¹

Table 2 Occupations with the Highest Labor Increases in Maryland by 2032

Occupation	Current Employment	Average Annual Wage	Projected Change in Employment	Percent Increase from Current Level
Software Developers	27,800	\$135,390	7,145	26%
Home Health and Personal Care Aides	24,960	\$32,590	5,416	22%
Cooks, Restaurant	19,850	\$35,120	4,049	20%
Medical and Health Services Managers	12,530	\$148,650	3,559	28%
General and Operations Managers	78,370	\$116,510	3,292	4%
Light Truck Drivers	26,660	\$47,420	3,066	12%
Stockers and Order Fillers	48,660	\$36,360	3,066	6%
Information Security Analysts	9,070	\$135,920	2,857	32%
Registered Nurses	49,790	\$87,990	2,788	6%

⁶ In this analysis, Rewiring America assumed MEA’s FY22 funding of \$14.3 million for 10 years, DHCD funding annualized using \$38 million 3-year funding and forecast 10 years, and IRA rebate funding only includes energy efficiency rebates, not electrification. Utility programs were also not included in this calculation.

⁷ Marilyn A. Brown, Anmol Soni, and Yufei Li, “Estimating Employment from Energy-Efficiency Investments,” *MethodsX* 7 (2020): 100955. <https://doi.org/10.1016/j.mex.2020.100955>.

⁸ Results from this paper estimates roughly 4 jobs per \$1 million of investment in energy efficiency. This paper also assumes that each of the four jobs lasts 5.14 years.

⁹ Sarah Truitt et al., “State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030”. 2022. <https://doi.org/10.2172/1862660>.

¹⁰ “Fastest Growing Occupations: Occupational Outlook Handbook,” U.S. Bureau of Labor Statistics, September 6, 2023. <https://www.bls.gov/ooh/fastest-growing.htm>.

¹¹ “Occupational Employment and Wage Statistics,” U.S. Bureau of Labor Statistics, accessed January 2, 2024. <https://www.bls.gov/oes/>.

Financial Managers	15,410	\$160,590	2,466	16%
--------------------	--------	-----------	-------	-----

Nationally, the fastest declining occupations include office administrative workers and telephone operators.¹² Maryland follows a similar trend, and also includes cashiers and retail sales in its fastest declining occupations. The following table provides the ten occupations with the highest levels of projected labor decreases by 2032.¹³

Table 3 Occupations with the Highest Labor Decreases in Maryland by 2032

Occupation	Current Employment	Average Annual Wage	Projected Change in Employment	Percent Change from Current Level
Cashiers	60,280	\$30,440	-6,269	-10%
Secretaries and Administrative Assistants	47,610	\$44,910	-5,523	-12%
Customer Service Representatives	47,110	\$42,570	-2,591	-6%
Executive Secretaries and Executive Administrative Assistants	10,960	\$74,040	-2,313	-21%
Office Clerks	27,030	\$40,150	-1,784	-7%
First-Line Supervisors of Office and Administrative Support Workers	31,960	\$66,950	-1,662	-5%
Retail Salespersons	67,170	\$33,830	-1,411	-2%
First-Line Supervisors of Retail Sales Workers	20,420	\$52,750	-1,368	-7%
Bookkeeping, Accounting, and Auditing Clerks	19,640	\$50,620	-1,218	-6%
Cooks, Fast Food	7,900	\$29,640	-1,082	-14%

The number of projected job decreases for the occupations shown in Table 3 is 25,220. If additional occupations from BLS projections, outside of these ten, are also included the total decrease in employment is 41,562. Employees from declining occupations may transition to energy efficiency occupations to offset growing labor demand in that industry. To address this transition, Maryland has various pipelines and training programs in energy efficiency which will be discussed in the following sections.

Table 4 Relevant Industry Analysis

Occupation	Current Employment	Average Annual Wage
Construction Laborers	20,060	\$43,120
Maintenance and Repair Workers, General	19,890	\$49,080
Electricians	11,770	\$66,230
First-Line Supervisors of Mechanics, Installers, and Repairers	10,010	\$76,870
Plumbers, Pipefitters, and Steamfitters	9,900	\$60,910
HVACR Mechanics and Installers	7,760	\$63,280
Construction Managers	6,110	\$118,020
Operating Engineers and Other Construction Equipment Operators	5,610	\$56,730
Installation, Maintenance, and Repair Workers, All Other	5,170	\$48,140
Electrical, Electronic, and Electromechanical Assemblers ¹⁴	2,270	\$50,190

¹² "Fastest Growing Occupations: Occupational Outlook Handbook," U.S. Bureau of Labor Statistics, September 6, 2023. <https://www.bls.gov/ooh/fastest-growing.htm>.

¹³ "Occupational Employment and Wage Statistics," U.S. Bureau of Labor Statistics, accessed January 9, 2024. <https://www.bls.gov/oes/>.

¹⁴ Except Coil Winders, Tapers, and Finishers.

According to the BLS, the average annual salary for Maryland across all occupations is \$68,541. The average annual salary for the ten fastest declining occupations from Table 3 is \$42,910. This dataset does not have a specific occupation category for energy efficiency, but the average annual salary for electricians and plumbers is \$61,354, which is higher than the declining occupations and more similar to the average salary in Maryland. Additional salaries for relevant energy efficiency occupations are shown in Table 4.

Existing Workforce Development

Workforce development organizations in Maryland provide apprenticeship and workforce development opportunities through 148 training programs with over 57% of those focusing on energy efficiency or renewable energy. Organizations within the state also offer apprenticeships that can help participants gain experience in the field. This section describes different workforce development opportunities within the state and includes estimations on the number of state residents enrolled in existing programs that will eventually enter the workforce. A list of existing training, certification, and wraparound programs can be found in Appendix B. The list is based on the 2021 Maryland Clean Energy Report and amended to include updates and additional programs.

State Services

The Division of Workforce Development and Adult Learning (WDAL) oversees Maryland's American Job Centers, which offer free, in-person assistance to businesses and job seekers, and the Maryland Workforce Exchange, which operates online to connect job seekers with trainings and opportunities.¹⁵ The Maryland Apprenticeship and Training Program connects job seekers and employers to generate successful apprenticeship opportunities.¹⁶ The State also provides online tools to connect businesses with available grant funding that can help support their workforce development programs.¹⁷ These grants are in-part administered through EARN Maryland, which targets high-projected-growth industry sectors, both through existing workforce development organizations, and directly with industry partners. As of 2023, among the recipients across sectors, grants were awarded to groups performing energy efficiency and broader construction sector training. EARN actively adjusts their grants structure by sector on an annual basis, so as demand for energy efficiency projects increases, it can be anticipated this sector would receive proportionally greater funding.¹⁸

Unions

Along with the many State resources to locate and enroll in continuing education or apprenticeships, unions also provide workforce development opportunities to their members. In 2022, there were 327,000 union members in Maryland (a 10.1% unionization rate).¹⁹ There are many union options for contractors in the country with local chapters including the International Brotherhood of Electrical Workers (IBEW), the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of United States and Canada (UA), and the Associated General Contractors (AGC). Each of these unions provides members with access to trainings and apprenticeships virtually or local to the area that help members learn the ropes in the industry. For example, UA Local 586, serving Baltimore and Hagerstown, provides free instruction, on-the-job training, and job opportunities that help members get certification, qualifications, licenses, and ultimately a job in the industry. In Baltimore, their five-year training program provides 1,250 free hours (equivalent to 30 college credits) for enrolled members, and results in licensing for plumbing, gasfitting, and HVACR specialties.²⁰ Additional union opportunities are listed in the Workforce Organizations table in Appendix B.

Educational Pipeline

Trade Schools

¹⁵ "Maryland's American Job Centers - Workforce Development & Adult Learning," Maryland Department of Labor, accessed December 20, 2023. <https://www.dlrl.state.md.us/county/>.

¹⁶ "Maryland Apprenticeship and Training Program (MATP) - Division of Workforce Development and Adult Learning," Maryland Department of Labor, accessed December 20, 2023. <https://www.dlrl.state.md.us/employment/apprl/>.

¹⁷ "Workforce Training Grants - Maryland Business Express," Maryland Business Express (MBE), accessed December 20, 2023. <https://businessexpress.maryland.gov/grow/workforce/workforce-training-grants>.

¹⁸ "EARN Maryland Annual Report 2023." 2023. Maryland Department of Labor. <https://dlrl.state.md.us/earn/earnannrep2023.pdf>.

¹⁹ "Union Members in Maryland - 2022: Mid-Atlantic Information Office," U.S. Bureau of Labor Statistics, February 6, 2023. [https://www.bls.gov/regions/mid-atlantic/news-release/unionmembership_maryland.htm#:~:text=The%202022%20unionization%20rate%20\(10.1,is%20the%20lowest%20on%20record.&text=Maryland%20had%20327%2C000%20union%20members%20in%202022](https://www.bls.gov/regions/mid-atlantic/news-release/unionmembership_maryland.htm#:~:text=The%202022%20unionization%20rate%20(10.1,is%20the%20lowest%20on%20record.&text=Maryland%20had%20327%2C000%20union%20members%20in%202022).

²⁰ "Apprenticeship Programs: Baltimore, MD," UA Local 486 Apprenticeship, accessed January 9, 2024. <https://getpipng.com/program/baltimore-md>.

Trade schools, or private career schools (PCS), offer career training to adults. Specifically, they are privately owned and operated postsecondary schools.²¹ PSCs offer a variety of training types from construction and HVAC to dog grooming or truck driving. The National Center for Education Statistics includes data for 25 PSCs in Maryland.²² However, only three of the trade schools in the system (North American Trade Schools, Fortis Institute-Towson, and All-State Career-Baltimore) offer relevant energy trades with a total enrollment of almost 3,000 across all trades taught at the schools listed. Other notable PSCs in Maryland not listed in the NCES data include Power52 Energy Institute in Howard County, which provides an Energy Professional Training Program and the Jane Addams Resource Corporation, which provides construction and welding programs. The Annual PSC Training Report created by the Maryland Higher Education Commission is currently unavailable, but additional information on enrolled students should be available when it has reopened.²³

High School Career Technical Education (CTE)

CTE is available in Maryland's public schools across 11 different clusters of jobs, including construction and development and manufacturing, engineering, and technology. The construction and development program leads to careers in electrical, plumbing, and construction professions with courses available in HVAC and maintenance. These programs are helpful to the industry and can act as a pipeline. In total, around 40% of students are enrolled in CTE programs, with 5% (5,681) of those students enrolled in construction and development and 11% (12,135) enrolled in manufacturing, engineering, and technology.²⁴ It can be expected that the continued growth of CTE programs will lead to increased interest in technical fields in the future.

Apprenticeships Pipeline

As of August 2023, there were over 11,000 registered apprentices in the state of Maryland with 4,033 electricians, 1,482 steamfitters, 738 plumbers, and 547 HVAC/R Technicians.²⁵ The number of active apprenticeships has been steadily growing since 2012. Many apprenticeship opportunities come through unions, as discussed above, but others can be found using Maryland's Apprenticeship and Training Program or other state initiatives as previously mentioned.

Additionally, youth/high school apprenticeships have been on the rise. The 2022-2023 school year had 608 student participants in all apprenticeships – three times the amount of the 2021-2022 school year and 22.5 times as many as enrolled during the 2017-2018 school year. The CTE committee set a goal for 45% of high school students to complete an apprenticeship or occupational credential before graduation by the 2030-2031 school year.

Energy Efficiency Business Support

There are programs within Maryland that promote and support entrepreneurs that may benefit energy efficiency businesses. Many of these programs are connected to create the largest opportunity for success and wraparound services.

General Entrepreneurship Services

Maryland offers networking and support services for entrepreneurs in the State. The Maryland Entrepreneur Hub provides an organized list of resources, organizations, events, and job boards for prospective employees and for employers.²⁶ Resources include mentorship, coworking spaces, and grant funded opportunities. The Hub connects businesses to organizations that offer services in consulting, funding, workforce or economic development, and connections to potential business partners.

For small or new businesses, the Maryland Small Business Development Center (SBDC) offers consulting and training on money management and marketing to gain customers and increase revenue.²⁷ They can also help businesses identify funding from a variety of sources.

²¹ "Approval to Operate a Private Career School in Maryland," Maryland Higher Education Commission, accessed January 10, 2024. https://mhec.maryland.gov/institutions_training/Pages/career/pcs/apprfactsheet.aspx.

²² "Integrated Postsecondary Education Data System," National Center for Education Statistics, accessed December 20, 2023. <https://nces.ed.gov/ipeds/>.

²³ "Academic Affairs Division: Career & Workforce Education, Private Career Schools," Maryland Higher Education Commission, accessed January 9, 2024. https://mhec.maryland.gov/institutions_training/Pages/career/pcs/index.aspx.

²⁴ "Career and Technical Education," Maryland State Education Association, accessed December 20, 2023. <https://marylandeducators.org/career-and-technical-education/>.

²⁵ "Maryland Apprenticeship Overview" (Maryland Department of Labor, 2023).

<https://dls.maryland.gov/pubs/prod/NoPblTabMtg/AppCmsn2023/MDL-2030-Commission-Slides.pdf>

²⁶ Maryland Entrepreneur Hub, accessed January 23, 2024. <https://marylandentrepreneurhub.com/>.

²⁷ "Helping Small Businesses Is Our Job," Maryland Small Business Development Center, accessed January 23, 2024. <https://www.marylandsbdc.org/>.

Specific Energy Business Support

The Maryland Energy Innovation Institute (MEI²) is a part of the University of Maryland School of Engineering and is dedicated to growing new energy technologies. MEI² is a major contributor for innovation in the energy field, as it collaborates with academic research projects with the intention to generate funding and coordination between stakeholders to support entrepreneurs in the State.²⁸ As a partner of the university, MEI² provides wraparound services for startups by providing incubators, courses, and grant funding, culminating in patents. MEI² provides \$650,000 per year in energy seed grants and has helped launch 28 companies in Maryland in conjunction with the Maryland Energy Innovation Accelerator (MEIA). MEIA is run by The Maryland Clean Energy Center (MCEC), which is a partner of MEI².

The MCEC functions as a green bank, providing access to funding, facilitating public-private partnerships to support entrepreneurs through obtaining funding, and serving as a resource for businesses in the energy efficiency and conservation sectors. The Maryland Energy Innovation Accelerator (MEIA), created by the MCEC, offers opportunities for sponsorship, entrepreneurship, business advice, funding application assistance, and mentorship. MEIA provides three different programs for entrepreneurs:

- Pre-Accelerator: A two-month, part-time course for faculty, students, researchers, and early-stage businesses to test customer reception on their business model and technology.²⁹
- Launchpad: Connects faculty, students, and federal lab researchers with Energy Executives to develop a business model and full commercialization plan with a \$15,000 budget.³⁰
- Accelerator: This program helps startups fill executive positions and connect the company with partners and funders with a budget of \$10,000.³¹

The Maryland Technology Enterprise Institute (Mtech) is also part of the School of Engineering and supports any technology-based venture.³² Mtech has a comprehensive list of courses, programs, partnerships, funding sources, incubators, and other resources for student entrepreneurs at the University of Maryland.

²⁸ "About the Institute," Maryland Energy Innovation Institute, accessed January 9, 2024. <https://energy.umd.edu/about-institute>.

²⁹ "Maryland's Climate Tech Pre-Accelerator: Summer 2023," Maryland Energy Innovation Accelerator, accessed January 9, 2024. <https://mdeia.org/pre-accelerator>.

³⁰ "Launchpad," Maryland Energy Innovation Accelerator, accessed January 9, 2024. <https://mdeia.org/launchpad>.

³¹ "Accelerator," Maryland Energy Innovation Accelerator, accessed January 9, 2024. <https://mdeia.org/accelerator>.

³² "Maryland Technology Enterprise Institute (Mtech)," A. James Clark School of Mechanical Engineering, accessed January 9, 2024. <https://www.mtech.umd.edu/>.

Appendix A: Labor Market Sources

Federal Sources

The U.S. Energy & Employment Jobs Report (USEER)

Source: <https://www.energy.gov/policy/us-energy-employment-jobs-report-useer>

The USEER summarizes national and state-level energy jobs based on a survey of U.S. energy sector employees. The data is available publicly on a per country basis and the report compares trends with previous years and analyzes the current status of the workforce. The 2023 Report, containing data from 2022, was released at the end of June in 2023; a new report with the previous year's data can be expected around this time each year.

In this report, USEER data was used to evaluate the current workforce.

The National Center for Education Statistics (NCES)

Source: <https://nces.ed.gov/ipeds/>

The National Center for Education Statistics (NCES), the primary statistical agency of the U.S. Department of Education provides data on colleges, universities, technical, and vocational institutions in the U.S.

In this report, this source provided pipeline information for trade schools in Maryland.

The U.S. Bureau of Labor Statistics

Source: <https://www.bls.gov/oes/>

The U.S. Bureau of Labor Statistics tracks many metrics including inflation & prices, pay & benefits, unemployment, employment, workplace injuries, occupational requirements, productivity, and spending & use time.

In this report, the U.S. Bureau of Labor Statistics is used to evaluate labor market trends.

State Sources

Maryland State Education Association: Career and Technical Education (CTE)

Source: <https://marylandeducators.org/career-and-technical-education/>

The Career and Technical Education is an available pathway for 11th and 12th grade high school students to gain experience in the CTE fields.

In this report, data from this source was used to estimate the number of students currently enrolled in relevant CTE programs.

Maryland Department of Labor

Source: <https://www.labor.maryland.gov/>

The Maryland Department of Labor publishes information on the workforce in the state.

In this report, presentations from the Maryland Department of Labor were used to get the number of apprenticeships in the State.

Appendix B: Energy Efficiency Workforce Organizations

Table adapted from the Maryland 2021 Clean Energy Industry Report with amendments to include updates and additional sources, non-relevant sources were removed.³³

Table 4 Energy Efficiency Workforce Organizations

Program	Provider	Program Type	Occupational Focus	County
BPI Certification Training	A Hight On Homes	Private Consulting/Training Firm	Building Analyst	Calvert
HVAC & Refrigeration Training in Baltimore	All State Career Maryland	Technical School	Building Analyst	Baltimore City
Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician	All State Career Baltimore	Technical School	HVAC	Baltimore City
Engineering Transfer	Anne Arundel Community College	Community/ Junior College	Engineering	Anne Arundel
Noncredit HVAC Electrical Apprentice	Anne Arundel Community College	Community/ Junior College	HVAC	Anne Arundel
OCA-358 EPA Section 608 Universal Certification	Anne Arundel Community College	Community/ Junior College	HVAC	Anne Arundel
HVAC Apprenticeship	Associated Builders and Contractors (ABC)	Trade Association	HVAC	Anne Arundel
Section 608 Technician Certification - CFC Refresher Class and Testing	Association of Air Conditioning Professionals	Trade Association	Building Analyst	Montgomery
Heating, Ventilation, & AC	Carroll County Career and Technology Center	Vocational High School	HVAC	Carroll
Green Interior Design Specialist	Cecil College	Community/ Junior College	Construction	Cecil
NCCER HVAC/R - Level 1	Cecil College	Community/ Junior College	HVAC	Cecil

³³ "Maryland 2021 Clean Energy Industry Report." 2022. MEA. [https://www.naseo.org/data/sites/1/documents/publications/2021%20MDCEIR%20FINAL\[50\]\[57\].pdf](https://www.naseo.org/data/sites/1/documents/publications/2021%20MDCEIR%20FINAL[50][57].pdf).

Program	Provider	Program Type	Occupational Focus	County
HVAC/R Apprenticeship	Cecil College	Community/ Junior College	HVAC	Cecil
Plumbing/HVAC Technology	Cecil County School of Technology	Vocational High School	HVAC	Cecil
BPI Building Analyst and Envelope Professional*	Civic Works	Non-Profit Organization	Building Analyst	Baltimore City
Energy Retrofit Training*	Civics Works Center for Sustainable Careers	Non-Profit Organization	Construction	Baltimore City
Energy Audit	College of Southern Maryland	Community/ Junior College	Energy Management	Charles
Energy Management - A Small System Approach	College of Southern Maryland	Community/ Junior College	Energy Management	Charles
Energy Systems Technology, AAS	College of Southern Maryland	Community/ Junior College	General Clean Energy	Charles
Renewable Energy Classes and Customized Training (available upon request)	Community College of Baltimore County	Community/ Junior College	General Clean Energy	Baltimore City
HVAC/R Technician, Continuing Education Certificate	Community College of Baltimore County	Community/ Junior College	HVAC	Baltimore
Advanced HVAC and Energy Technology Certificate, Credit Certificate	Community College of Baltimore County	Community/ Junior College	HVAC	Baltimore
Building Automation Systems, Credit Certificate	Community College of Baltimore County	Community/ Junior College	HVAC	Baltimore
Heating, Ventilation and Air Conditioning (HVAC) & Energy Technology, Associate of Applied Science	Community College of Baltimore County	Community/ Junior College	HVAC	Baltimore
Basic HVAC and Energy Technology Certificate, Credit Certificate	Community College of Baltimore County	Community/ Junior College	HVAC	Baltimore
Visible Emissions Evaluator Classes	Community College of Baltimore County	Community/ Junior College	Energy Management	Baltimore

Program	Provider	Program Type	Occupational Focus	County
HVAC/R Technician, Continuing Education Certificate	Community College of Baltimore County	Community/ Junior College	HVAC	Baltimore
EPA Prep Class and Testing Section 608 Certification for Air Conditioning and Refrigeration	Cropp Metcalfe Academy	Private Consulting/Training Firm	Building Analyst	Montgomery
BPI BUILDING ANALYST/ENVELOPE PRO TRAINING	Elysian Energy	Private Consulting/Training Firm	Building Analyst	Prince George's
EnergyScore® BPI Certification Training Classes	Energy Score	Private Consulting/Training Firm	Building Analyst	Baltimore
BPI Building Analyst Certification Training	Everblue training	Private Consulting/Training Firm	Building Analyst	Baltimore City
HVAC Certificate	Frederick Community College	Community/ Junior College	HVAC	Frederick
HVAC Letter of Recognition	Frederick Community College	Community/ Junior College	HVAC	Frederick
Residential Energy Services Network (RESNET)	Green Training USA	Private Consulting/Training Firm	Energy Management	Montgomery
BPI Building Analyst Training & Certification	Green Training USA	Private Consulting/Training Firm	Building Analyst	Montgomery
BPI Envelope Training & Certification	Green Training USA	Private Consulting/Training Firm	Building Analyst	Montgomery
HEATING, AIR CONDITIONING & REFRIGERATION TECHNOLOGY	Harford Technical High School	Vocational High School	HVAC	Harford
Construction Management - Certificate (Career)	Howard Community College	Community/ Junior College	Construction	Howard
Heating, Ventilation, Air Conditioning & Refrigeration (HVACR)	Howard Community College	Community/ Junior College	HVAC	Howard
HVAC Apprentice	James Vito, Inc.	Apprenticeship	HVAC	Montgomery

Program	Provider	Program Type	Occupational Focus	County
Air Conditioning, Refrigeration & Heating Technology — Columbia	Lincoln Tech	Technical School	HVAC	Howard
BLDG 182 - Renewable and Sustainable Energy Technologies	Montgomery College	Community/ Junior College	General Clean Energy	Montgomery
HVAC Area of Concentration, Building Trades Technology Degree	Montgomery College	Community/ Junior College	HVAC	Montgomery
HVAC Certificate	Montgomery College	Community/ Junior College	HVAC	Montgomery
Herbert J. Hoelter Vocational Training Center: HVAC/R Training*	National Center on Institutions and Alternatives	Non-Profit Organization	HVAC	Baltimore
Building Construction Technology	North American Trade Schools	Technical School	Construction	Baltimore City
HRVAC Technology	North American Trade Schools	Technical School	HVAC	Baltimore City
BPI Building Science Principles	Prince George's Community College	Community/ Junior College	Construction	Prince George's
BPI Building Analyst	Prince George's Community College	Community/ Junior College	Building Analyst	Prince George's
BPI Envelope Professional	Prince George's Community College	Community/ Junior College	Construction	Prince George's
Maryland Home Improvement Contractor License Exam Preparation	Prince George's Community College	Community/ Junior College	Construction	Prince George's
Sustainable Energy and Workforce Development Program	Prince George's Community College	Community/ Junior College	Construction	Prince George's
Carpentry	Prince George's Community College	Community/ Junior College	Construction	Prince George's
Building Maintenance Engineer	Prince George's Community College	Community/ Junior College	Construction	Prince George's
HVAC/R	Prince George's Community College	Community/ Junior College	HVAC	Prince George's
Heating, Ventilation, & Air Conditioning (HVAC)	Thomas Edison High School of Technology	Vocational High School	HVAC	Montgomery
HVACR technician	Wor-Wic Community College	Community/ Junior College	HVAC	Wicomico

Program	Provider	Program Type	Occupational Focus	County
EPA-Approved Refrigerant Containment Course and Test	Wor-Wic Community College	Community/ Junior College	Building Analyst	Wicomico
Heating, Ventilation, Air Conditioning & Refrigeration	Worcester Technical High School	Vocational High School	HVAC	Worcester
Energy Professional Training*	Power52 Energy Institute	Non-Profit Organization	General Clean Energy	Howard
Building Operator Education Program	Southern Maryland Electric Cooperative	Cooperative Corporation	Construction	Charles
Construction Supervision – AAS and Certificate	Baltimore City Community College	Community/ Junior College	Construction	Baltimore
HVAC Mechanic Certificate	College of Southern Maryland	Community/ Junior College	HVAC	Charles
Building Operator Training Program	Baltimore Gas and Electric	Publicly Owned Company	Construction	Baltimore
Electrical Apprenticeship	Baltimore Joint Apprenticeship Training Committee (JACT) – IBEW and NECA	Union Apprenticeship	Electrical	Baltimore
UA Local 486 Plumbers & Steamfitters Apprenticeship	UA	Union Apprenticeship	Plumbers, Gasfitters, HVACR	Baltimore
UA Local 486 Plumbers & Steamfitters Apprenticeship	UA	Union Apprenticeship	Plumbers, Gasfitters, HVACR	Washington, DC
AGC Edge Virtual Course	AGC Maryland	Union Training	Construction	All
Heating & Air Conditioning Contractors (HACC) of Maryland Apprenticeship Program	HACC Maryland	Trade Association	HVACR	Anne Arundel

*Focus on LMIOU Communities