CLEAN JOBS ILLINOIS

Clean Jobs Workforce Network Program

Clean Jobs Curriculum Framework

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Contents

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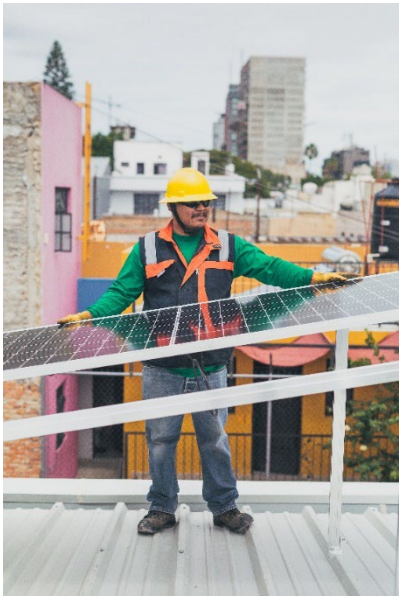
We thank the many clean energy employers, industry leaders, community-based organizations, and workforce and training providers who provided input on the curriculum framework and who reviewed drafts and provided feedback. Your input was invaluable.

INTRODUCTION

Background



The Illinois Climate and Equitable Jobs Act (20 ILCS 730) establishes several new workforce programs, administered by the Illinois Department of Commerce and Economic Opportunity (DCEO), to expand the clean energy workforce in Illinois and accelerate the adoption of clean energy sources, electric vehicles, and energy efficiency efforts. The largest of these programs is the Clean Jobs Workforce Network Program. This program will consist of 13 Workforce Hubs run by community-based organizations to provide clean jobs training and a career pipeline for equity eligible individuals and displaced energy workers.

The main objective of the Clean Jobs Workforce Network Program is to increase access to and opportunities for education, training, and support services to help program eligible individuals succeed in the labor market generally and the clean energy sector specifically.

Equity is foundational to the CEJA legislation as a whole and to the Clean Jobs Curriculum Framework in particular. Those who deliver the curriculum should uphold the core values of Diversity, Inclusion, Accessibility, and Equity (collectively referred to as “DIAE”).

CEJA requires that the Clean Jobs Workforce Network Program hubs (“Workforce Hubs”) utilize a standard Clean Jobs Curriculum Framework (“curriculum framework”), developed through a stakeholder process to identify the career pathways and training curriculum needed for participants to be skilled, work ready, and able to enter clean energy jobs. The Workforce Hubs will implement the curriculum framework to provide training; certification preparation; job readiness; skill development, including soft skills, math skills, technical skills; certification test preparation, and other development needed, to program participants.

The curriculum framework:

- Identifies the core training curricular competency areas needed to prepare people to enter clean energy and related sector jobs.
- Identifies a set of required core cross-training competencies to provide a foundation for pursuing a career composed of multiple clean energy job types.
- Integrates broad occupational training to provide career entry into the general construction and building trades sector and any remedial education and work readiness support necessary.

- Identifies on-the-job training formats, where relevant, and identifies suggested trainer certification standards, where relevant.
- Recommends best practices to ensure equity and cultivate safe, dynamic, enjoyable, successful working environments for all.

The legislation's inclusive definition of "clean energy jobs" includes jobs in the solar energy, wind energy, energy efficiency, energy storage, solar thermal, green hydrogen, geothermal, electric vehicle industries, other renewable energy industries, industries achieving emission reductions, and other related sectors including related industries that manufacture, develop, build, maintain, or provide ancillary services to renewable energy resources or energy efficiency products or services, including the manufacture and installation of healthier building materials that contain fewer hazardous chemicals. Clean energy jobs also include administrative, sales, other support functions within these industries and other related sector industries.

Curriculum framework development

Clean energy jobs and training inventory

The Clean Energy Jobs and Training Program Inventory Report informs the design of the Clean Energy Jobs Curriculum framework to be used by the Workforce Hubs. This report assesses existing clean energy training and skills development programs in Illinois. It evaluates industry employment trends to identify in-demand career opportunities for clean energy workforce training participants. Finally, it identifies best practices and programmatic gaps that will need to be addressed to support the industry requirements of in-demand clean energy occupations. Public input on this report and its findings was requested through a Request for Information process. The report was revised based on this feedback. Key highlights include:

- A list of in-demand clean energy jobs in Illinois, based on data from the Department of Labor and the Illinois Department of Employment Security. In-demand jobs included those in renewable technologies (solar and wind), automotive electric vehicle technologies, electrical, green building construction and maintenance, and the manufacturing of clean energy technologies.
- Training, skill and knowledge requirements for in-demand clean energy jobs. The report outlines top employability skills, technical skills, and knowledge requirements as well as technical skill gaps in clean energy training.
- Workforce system challenges, including 1) a lack of communication and coordination; 2) a lack of awareness and/or negative perceptions of clean energy jobs; 3) workforce trainees with inadequate skills for emerging clean energy jobs; and 4) failure to reach and support diverse, underserved populations.
- A clean energy training program inventory that identifies 1,157 training programs for clean energy-related jobs in Illinois.
- Curriculum framework recommendations, such as which jobs to prioritize and what skills to be taught.

- Program delivery recommendations, including gathering more data on clean energy jobs and training and increased collaboration among training providers, employers, and other stakeholders.

Stakeholder outreach and engagement

DCEO's implementation team conducted a stakeholder engagement process in the fall of 2022 to inform the development of the curriculum framework. The stakeholder engagement process comprised six virtual and in-person listening sessions, 15 individual interviews or meetings, submission of written feedback, and administration of an online survey. 381 people attended listening sessions, and 161 people completed the survey. Of the stakeholders who provided race and ethnicity information, 103 were white, 52 were Black or African American, and 15 were Hispanic or Latino. Stakeholders discussed training priorities, curricular recommendations, and significant programmatic supports to guide CEJA implementation. Key findings include the following:

- Training priorities. Stakeholders indicated that solar and electrical jobs were most in-demand, followed by HVAC and building maintenance, wind, and automobile (electric vehicle focus).
- Training outcomes. Stakeholders highlighted the need for programs to provide well-rounded and flexible training so graduates can apply to a variety of jobs and advance in their careers. They agreed that short, stackable, industry-recognized, and employer-sought certificates would best serve program participants.
- Curriculum content. Stakeholders wanted curriculum to be holistic, not just focused on the technical aspects of the job. In discussing technical skill needs across different clean energy jobs, stakeholders centered safety, basic construction skills, and electrical basics. They recommended aligning curriculum with established, respected curricula and certifications.
- Curriculum delivery. Stakeholders emphasized hands-on and contextualized learning, as well as different learning and delivery methods to account for the diversity of adult learning preferences. They preferred flexibility in program delivery to reach equity eligible individuals.

Compilation of curriculum framework

After analyzing the results of the stakeholder engagement process and the Clean Energy Jobs and Training Program Inventory report, the curriculum framework was compiled by an expert team including representatives from DCEO, the University of Illinois, the Illinois Community College Board, Southern Illinois University at Carbondale, Northern Illinois University, Western Illinois University, and Governor's State University. The curriculum framework consists of 1) a bridge program curriculum outline; 2) a set of job-specific curricula; and 3) general standards and minimum requirements for inclusion of other clean energy training programs and work-based learning to be offered through the Clean Jobs Network Program.

The team shared drafts of the clean jobs curriculum framework with clean energy employers, representative community-based organizations, industry leaders, and training providers. A Diversity, Equity, and Inclusion committee was formed to provide feedback on the framework and program design. Committee members included community-based organizations that serve equity eligible

communities, community college equity initiative leaders, minority-led business owners, and more. This committee met biweekly for 3 months to provide feedback. The framework was modified based on all feedback.

Overview of the curriculum framework

The curriculum framework is intended to be used as a set of guidelines, standards, and minimum requirements for curricula offered by education and training providers through the Clean Jobs Workforce Network Program Hubs (Workforce Hubs). As such, the framework outlines the overall program objectives, content, and certifications and provides recommendations and guidelines for how the curriculum should be taught, but it is not intended to be a detailed curriculum. The table below describes what the curriculum framework does and does not do.

Table 1: Curriculum framework: What it does and does not do

The curriculum framework *does* . . .	The curriculum framework *does not* . . .
Provide a set of objectives and main topics that must be covered. Examples and resources are provided for reference, but training providers can select the specific training materials and curriculum they want to use.	Provide detailed lesson plans and tell programs exactly what should be taught.
Allow training providers to teach additional content or offer additional certifications, beyond the required topics and certifications.	Limit the content that can be taught.
Provide suggestions for the learning environment and equipment needed, how long the program should take, and how skills and knowledge should be assessed.	Require that programs deliver the curriculum in a certain way.
Provide instructor credential, knowledge and skill requirements and recommendations.	Tell programs *who* should teach the program.
Allow Workforce Hubs to select the job-specific training curricula that best matches the workforce needs in their region.	Require that the Workforce Hubs teach all the job-specific training areas.
Provide a training framework for a few of the most in-demand entry-level clean energy jobs in Illinois. Hubs may propose training for other in-demand clean energy jobs, if desired.	Provide a training framework for all clean jobs in Illinois.
Allow flexibility in training delivery. It allows participants to test out of portions of the curriculum and be placed in a variety of existing or new clean energy training programs or on-the-job training, depending on their needs and interests.	Require that all participants follow the same training and career path.

The figure below describes the main elements of the Curriculum Framework and how it should be delivered. It provides a high-level overview of how the curriculum framework works and how people flow through the program, from enrollment to job placement. The different components of the

curriculum framework (pre-assessments, bridge program, job-specific training options, and transition services) will be described in more detail below.

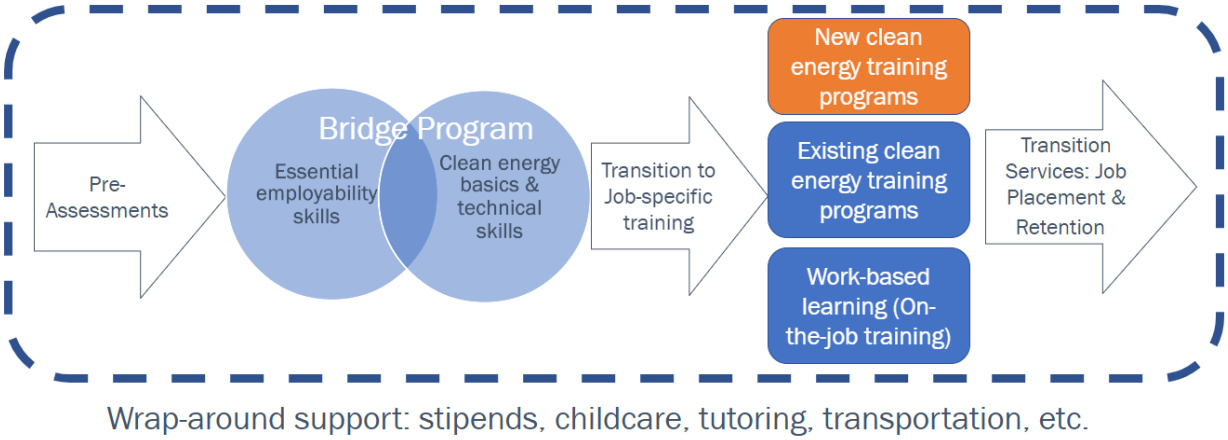


Figure 1: Overview of Clean Jobs Curriculum Framework

Bridge program training

The bridge program is a portion of the overall clean energy jobs curriculum framework (see Figure 1 above) that provides training in essential employability skills and clean energy basics to help participants succeed in an array of clean energy industries and workplaces. It prepares participants for the job-specific technical training options that follow the bridge program.

Job-specific training options

Following the completion of the bridge program, participants will be directed to different job-specific training options. Hubs must offer at least two different job-specific training options, based on the employment needs in their area and connections with employers.

Workforce Hubs will help transition participants into these training options and support them throughout their training. Workforce Hubs should select at least 2 job-specific training options to grow the clean energy workforce in their region. Options include:

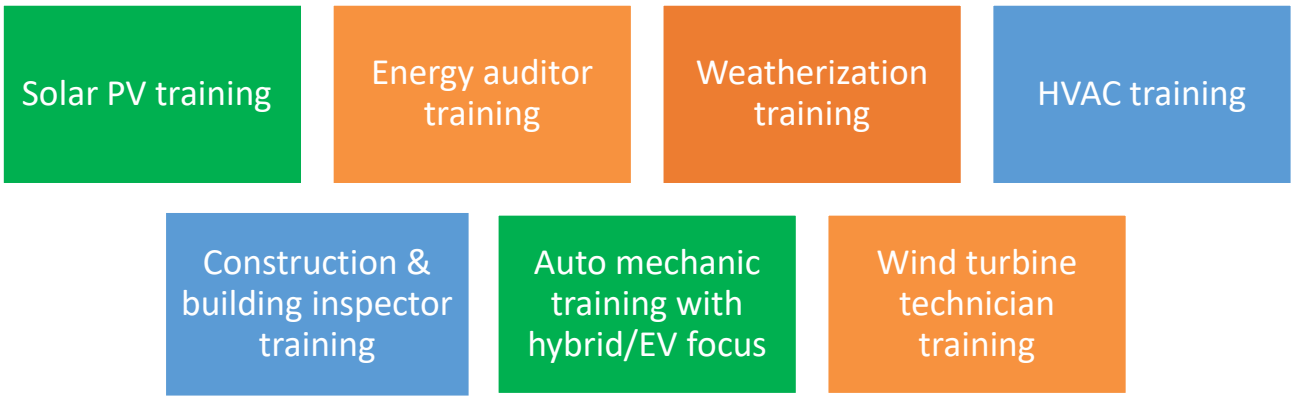


Figure 2: Job-specific training options

The curriculum framework contains requirements and training guidelines for each option, with guidance on program delivery and content to be taught. Training providers must align their curriculum with these guidelines and requirements. Workforce Hubs should select the job-specific training options based on regional job needs and training gaps. Hubs that propose to offer this training must align their curriculum with these frameworks.

Workforce Hubs may also propose to develop a new training program for clean energy jobs *not* included in the list of specialties. They will be required to document:

- The need for training in this area (including job demand, existing training programs, employer partnership)
- Learning objectives
- Instructional hours
- Credentials and certifications
- Work-based learning opportunities
- Content taught

Existing clean energy training programs and on-the-job training

Workforce Hubs may propose to direct participants to existing, successful clean energy training programs after they complete the bridge program. To do so, Workforce Hubs must document:

- The curriculum topics, objectives, and certification exams covered in the existing training program.
- Any training program accreditations and the experience and credentials of the instructor(s).
- Program outcomes from at least one calendar year (percentage of participants who complete the program, percentage of participants who pass a certification exam, percentage of participants who are placed in jobs, demographics of participants, etc.).
- Relationships with clean energy employers to facilitate job placement after training program completion, as demonstrated through memorandums of agreement.

Program funds may be used to cover tuition, books, fees, and stipends for equity eligible individuals who are participating in the Workforce Hubs. All other wrap-around supports should also be available to program participants through the barrier reduction funds. Workforce Hubs should work with the training programs to facilitate job placement after program completion.

Workforce Hubs are also encouraged to connect participants to on-the-job training (OJT) opportunities with clean energy employers. Participants may be directed to these opportunities after they complete the bridge program or during or after they complete the job-specific training.

On-the-job training is a “hire-first” training model in which the employer agrees to hire, train, and retain the individual upon successful completion of the training program. Hubs that wish to connect people to on-the-job training opportunities with employers must document:

- The skills that will be taught during the on-the-job training.
- Connections to employers to provide on-the-job training or apprenticeships, as demonstrated through memorandums of agreement.

Wrap-around supports and transition services

The Workforce Hubs will provide Energy Transition Barrier Reduction funds and services to program participants throughout their training and beyond to help reduce barriers to successful program completion. Workforce Hubs will also provide stipends to participants. Following the completion of the job-specific training, the Workforce Hubs will work with employers to place participants in jobs. They will also provide certification testing support. Transition services and wrap-around supports are not described in this curriculum framework but will be required elements to be addressed by Workforce Hubs. More information about these supports and transition services will be provided in the Notice of Funding Opportunity.

Audience

Illinois residents who are aged 18 and above can enroll in the Clean Jobs Workforce Network Program. Participant placement will be prioritized as follows:

- One-third of program placements are for people residing in an area that is BOTH an R3 area and an environmental justice community.
- One-third of program placements are for people who reside in EITHER an R3 area OR an environmental justice community. Preference will be given to applicants who face barriers to employment, such as low educational attainment, prior involvement with the criminal legal system, language barriers, and applicants that are graduates of or current members of the foster care system.
- Priority for the remaining placements must be given to displaced energy workers and their family members or persons who face barriers to employment, such as low educational attainment, prior involvement with the criminal legal system, language barriers, and applicants that are graduates of or current members of the foster care system.

“Equity investment eligible person” or “eligible person” is a person who would most benefit from equitable investments by the State designed to combat discrimination and foster sustainable economic growth. Specifically, eligible persons mean:

- persons whose primary residence is in an equity investment-eligible community; or
- persons who are graduates of or currently enrolled in the foster care system; or
- persons who were formerly incarcerated.

“Equity investment eligible communities” are the geographic areas throughout Illinois that would most benefit from equitable investments by the State, which are designed to combat discrimination and foster sustainable economic growth. Specifically, equity investment-eligible communities include the following areas:

- R3 Areas as established pursuant to Section 10-40 of the Cannabis Regulation and Tax Act (410 ILCS 705), where residents have historically been excluded from economic opportunities, including opportunities in the energy sector. Eligible R3 Areas are defined in the R3 service map (https://r3.illinois.gov/eligibility). Criteria for defining R3 Areas include rates of gun injury, unemployment, child poverty, incarceration with Illinois Department of Corrections, and historic disinvestment; and
- Environmental justice communities, as defined by the Illinois Power Agency pursuant to the Illinois Power Agency Act (20 ILCS 3855), but excluding racial and ethnic indicators, where residents have historically been subject to disproportionate pollution burdens, including pollution from the energy sector. For more information on the criteria and for a map that defines these areas in Illinois, refer to the Illinois Solar For All webpage on Environmental Justice Communities (https://illinoissfa.com/environmental-justice-communities).
- The Equity Investment Eligible Community Map (https://energyequity.illinois.gov/resources/equity-investment-eligible-community-map.html) defines the areas that satisfy the criteria above for either R3 Areas or Environmental justice communities.

Participants may include new workers or reskilled workers or those with experience in another industry.

Equity focused program culture

Workforce Hubs should utilize an equity lens when delivering the Clean Jobs Curriculum to program-eligible participants by upholding the core values of Diversity, Inclusion, Accessibility, and Equity (DIAE). Welcoming others and making room for difference not only helps create a dynamic, creative, productive workplace, but it also encourages a comfortable and enjoyable environment for all. Recognizing, embracing, and celebrating difference can foster a safe, supportive, and successful environment for disadvantaged and underserved groups that have been and continue to be subject to prejudice and systemic discrimination. Programs that embrace such a culture have better outcomes.

Core equity values, as described in the Illinois Office of Equity "Illinois Toward Equity Action Framework," include the following:

- **Diversity** is the representation of people from a variety of backgrounds and experiences. This includes race, ethnicity, and gender, but also other traits and characteristics that encompass difference.
- **Inclusion** means authentically bringing representatives of disadvantaged and underserved individuals and/or groups into processes, activities, and decision/policy making in a way that shares power and influence. To be inclusive means more than having these individuals and groups in the room; it means listening to them and taking their input seriously in a way that can impact decisions. True inclusion brings an empowered sense of belonging to each individual within a group or organization.
- **Accessibility** is the degree to which an environment, service, or product is understandable, meaningful, and useable by as many people as possible. According to the Office for Civil Rights

at the U.S. Department of Education, accessibility is "when a person with a disability is afforded the opportunity to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability in an equally integrated and equally effective manner, with substantially equivalent ease of use." The Office of Equity extends accessibility beyond disability to include the creation of financially, technologically, and linguistically accessible systems, resources, and services so that all can thrive in a society.

- Each of these three foundational elements contributes to **Equity**: The state, quality, or ideal of being just, impartial, and fair. Equity must also be both structural and systemic and comprised of a robust infrastructure and dynamic process that produce equitable ideas, power, and resources. Equity is NOT the same as equality; equality implies everyone gets the same, whereas equity allows an accounting for each person's individual needs.

Commitment to these values means upholding them in all elements of the workforce program and intentionally pursuing policies and practices to support all program participants and team members. The recommendations below provide specific guidance on centering equity in the delivery of the Clean Jobs Curriculum.

Staffing

- Develop a set of written DIAE principles for your organization. Consider seeking expert help.
- Make sure that all policies, procedures, and processes are in writing and are aligned with the DIAE principles. This can be a reference to make sure that you are following your intentions and can also be used for accountability. Consider seeking expert help.
- Identify and recruit instructors, mentors and coaches who are from disadvantaged and underserved groups and have shared or similar experiences with potential participants.
- Ensure ALL program staff are trained on Diversity, Inclusion, Accessibility, and Equity.
- Ensure ALL program staff model behaviors aligned with equity values and practices.

Recruitment and intake

- Ensure program rules, guidelines, and policies do not inadvertently marginalize a group (for instance, "you must be able to lift 100 pounds to apply for the program").
- Make all program requirements easily accessible.
- Actively outreach to and recruit diverse groups. If they have historically been underrepresented, do not expect them to come and show up. Leverage trusted partners, including staff from similar backgrounds and community leaders.
- Nurture the program's existing diversity. Word of mouth is a very powerful tool.
- Ensure compensation for participation and access to supportive and transition services are equitable.
- As early as the program orientation, instructors and facilitators should take the time to learn who the participants are and how they self-identify with respect to their specific groups.

- Identify and leverage strengths in diverse participants and build on those strengths. Consciously acknowledge all sexes, genders, and ethnicities in educational settings. Positively affirm contributions and inquire about relevant personal experience.
- Use supportive communication that frames participants as members of a professional community (the clean energy industry), not just a participant in a program.
- Validate participants' self-worth, inherent ability, and creativity to help counter "imposter syndrome" and respond positively and affirmatively to their internal questions, "Am I supposed to be here?" "Do I belong here?" "Can I be successful here?"
- Strengthen the voices of underrepresented groups by participating in meaningful engagement, problem-solving, and empowerment with participants who have not historically had power in the current environment (the clean energy industry).

Training

- Encourage participants to incorporate their current body of knowledge and utilize their lived experiences and personal expertise to achieve personal success.
- Recognize, welcome, and elevate participant contributions in the training room, worksite, and program environment as a whole.
- Develop genuine and quality relationships between and among all levels of staff and program participants. Encourage mutual trust.
- Show participants how their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Tell relatable stories during training.
- Intentionally communicate positive cultural and social messages regarding their career choice in the clean energy industry and emphasize the value of participants' contributions to the industry.
- Be willing to discuss and address difficult/taboo topics and work to find equitable solutions. Acknowledge in the curriculum, among staff, and on worksites the environmental and historical factors that impact underrepresented groups.
- Eliminate exclusionary practices within the learning environment and on worksites (for example, negatively singling out participants, overlooking or ignoring certain participants, verbally insulting or marginalizing membership in certain groups, or otherwise discounting participants).
- Provide additional instruction, coaching, mentoring, and sponsorship, as needed, for individuals who require supplementary or different supports to be successful.
- Represent diverse cultures in instructional materials and curricula, in physical spaces, and in online and print materials.
- Proactively and equitably share insights and wisdom, as well as influence and power, with all participants to develop skills, confidence, and leadership. Be aware of the ways some groups may be inadvertently singled out (for example, choosing a male to serve as a team leader for all group projects).
- Provide participants with multiple ways to demonstrate knowledge and capability. Not all ways of learning and means of assessment have been a significant part of everyone's educational background.
- Through work-based learning opportunities or mentorships, connect participants with employers from R3 and/or EJ communities and businesses that are certified through the Business Enterprise Program to help participants feel a sense of belonging within the industry.

BRIDGE PROGRAM FRAMEWORK

The bridge program is a portion of the overall clean energy jobs curriculum framework (see Figure 1) that provides training in job readiness skills and clean energy basics to help participants succeed in an array of clean energy industries and workplaces. It prepares participants for the job-specific technical training options that will be taught after the bridge program. The bridge program training should be taught before starting job-specific technical training, though aspects may be taught concurrently with the technical training component.

Workforce Hubs must provide all elements of the bridge program training, as described below. The bridge program should be tailored to participants' needs, based on the results of a set of pre-assessments.

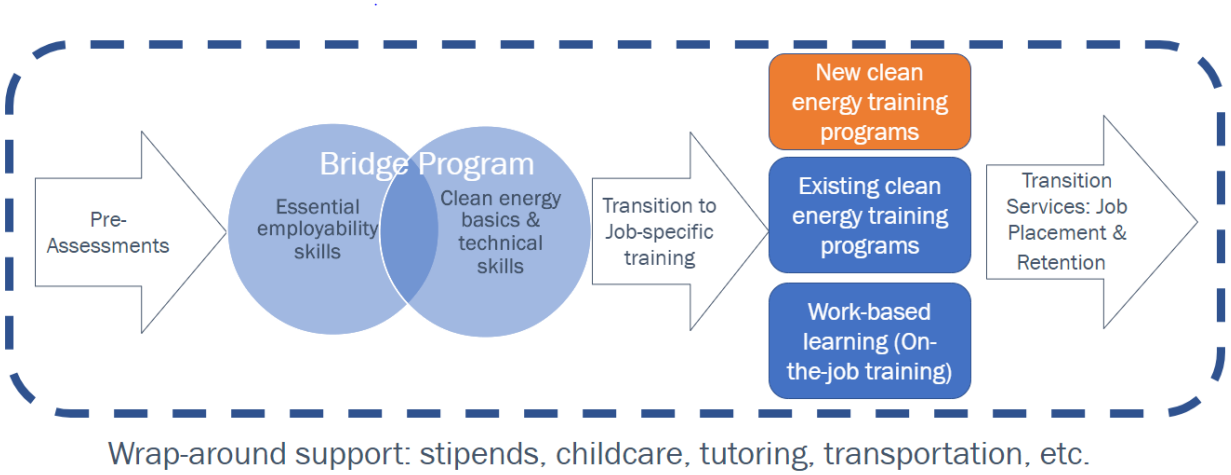


Figure 3: Overview of Clean Jobs Curriculum Framework

Pre-assessments

Prior to beginning the bridge program training, Workforce Hubs will help participants complete the following pre-assessments, as shown in the pre-assessment diagram below.

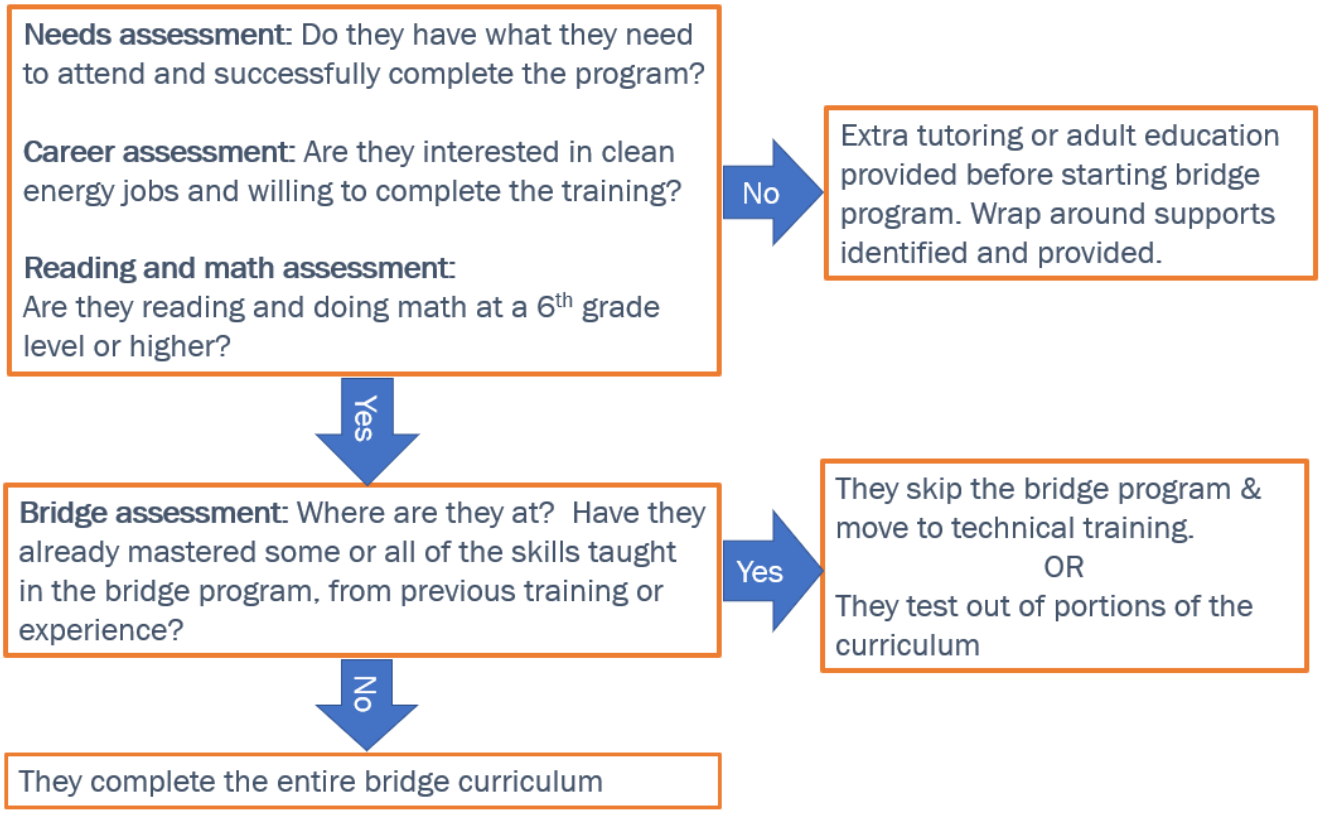


Figure 4: Bridge Program Pre-assessment Components

There are four aspects of pre-assessment.

- **Needs assessment:** The purpose of this assessment is to identify the wrap-around supports needed to for participants to attend training and successfully complete it. Enrolling participants should be connected to the Energy Transition Barrier Reduction Program to ensure that needs are met throughout the training program. Grantees will be required to utilize a standard needs assessment questionnaire.
- **Career assessment:** The purpose of this assessment is to explore participants' interests in clean energy jobs. If the potential participants decide not to pursue the training, the Workforce Hubs should help to direct them to other programs or resources that more closely match their interests or skills. Grantees will be required to utilize a standard career assessment questionnaire.
- **Reading and math assessment:** Participants will receive a reading and math assessment (using a standard test such as TABE or ALEK) to assess their reading and math level. Participants are required to have a reading and math level of 6th grade or higher before beginning the bridge program. To participate in the solar or energy auditor job-specific training options, they must have an 8th grade reading and math level or higher by the time they complete the bridge program. If participants do not have an 6th grade reading and math level or higher, Workforce

Hubs should provide access to tutoring or adult education programs to receive additional math or reading instruction before beginning the bridge program. If participants plan to participate in the solar or energy auditor job-specific training option following the bridge program but do not have an 8th grade math and reading level, the Workforce Hubs should provide access to tutoring or instruction to help participants meet this requirement. See Illinois ABE/ASE Math and Language Arts Modules for example adult basic education curriculum participants may receive.

- **Bridge program assessment:** Participants will complete a bridge program pre-assessment to measure their proficiency in the essential employability and clean energy basics skills addressed in the bridge program. The pre-assessment should provide a baseline of where participants are at, identify areas where extra support is needed, and allow participants to test out of some or all elements of the bridge program if they have already demonstrated proficiency. See these sample pre-assessments.

Bridge program training overview

Training outcomes

Upon completion of the bridge program, participants will have the personal effectiveness, workplace, and clean energy basics skills to proceed to job-specific technical training program(s) in a clean energy career field of their choosing.

Workforce Hubs must offer bridge program training that covers the following content areas: essential employability skills and clean energy basics.

Learning environment and format

Workforce Hubs should offer classrooms with computer access, proper lighting, acoustics, equipped to accommodate group activities, and space to move about comfortably. The learning environment should accommodate individuals with disabilities such as hearing loss or diminished vision, and any instructional materials, where applicable, should reflect the broad potential diversity of those enrolled. It is recommended that the bridge program training be offered in person, but some elements may be offered online.

Skill development and practice should be integrated into coursework. Participants should work individually and in diverse groups. Training should be contextualized to demonstrate how bridge program skills are needed in typical clean energy jobs. Essential employability skills should be integrated into clean energy basics training to demonstrate how these essential skills can support their ability to perform clean energy tasks.

Throughout, Workforce Hubs should create a trusting and supportive environment in which participants feel a sense of belonging to and significance of the clean energy industry. Workforce Hubs must reinforce and build from participants' existing knowledge and strengths. The learning environment is a place where participants know their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Instructors should share relevant examples and tell relatable stories during training.

Undergirding this environment is a willingness to discuss and address difficult topics and work to find equitable solutions. Workforce Hubs should acknowledge in the curriculum and among participants the environmental and historical factors that impact underserved and disadvantaged groups. Exclusionary practices have no place within the learning environment.

Work-based learning components

Work-based learning components should also be included in the bridge program, in partnership with clean energy employers. Work-based learning (WBL), as defined by the State of Illinois, provides participants with the opportunity to engage and interact with industry experts (employers), while learning to demonstrate essential employability and technical skills necessary for today's workforce. WBL is defined in Perkins V legislation as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that foster in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction."

Work-based learning may include:

- Career awareness activities
- Career exploration activities, such as job-shadowing
- Workplace experience (hands-on work experience at a construction work site, supervised by an employer)

Workforce Hubs are required to provide work-based learning components as part of the bridge program, in partnership with employers or nonprofit organizations in their region. Workforce Hubs are encouraged to form work-based learning partnerships with employers from equity investment eligible communities, equity eligible contractors, and businesses that are certified through the Business Enterprise Program to help participants feel a sense of belonging within the industry.

Assessments

In addition to the pre-assessments described above, Workforce Hubs should utilize assessments during and after the bridge program training is complete to measure learning and identify need for further training. Workforce Hubs are encouraged to use standard assessments that are developed through evidence-based industry-recognized providers or certificate granting institutions. Additional instruction, coaching, mentoring, and sponsorship may be needed for individuals who require supplementary or different supports to be successful. Furthermore, a variety of different assessment strategies are encouraged to account for participants' unique learning styles. After all, not all ways of learning and means of assessment have been a significant part of everyone's educational background.

Suggested assessments during the training include:

- Reflective writing prompts
- Dialogue/informal interviews
- Aptitude tests/quizzes

Suggested assessments at the end of the training include:

- Role-playing on-the-job scenarios
- Formal demonstrations with evaluation by the instructor

Estimated program length

The duration of the bridge program training is 120-200 hours, depending on individual needs and the needs of participating employers.

Program size

Program size is flexible depending on the number of participants and their needs. Recommended cohort size is between 5 and 25 participants. The training can also be delivered as an open entry/exit program where participants enter and exit the program when they are ready and able to do so.

Instructor requirements

Instructors who deliver the clean energy basics curriculum must have an intermediate to advanced knowledge in construction, the building trades, manufacturing technology, or other clean energy related fields.

Instructional staff must have a strong connection to target populations and communities and be capable of cultivating a welcoming, inclusive environment. All staff, including instructors, must be trained on Diversity, Inclusion, Accessibility, and Equity and committed to upholding these values.

Instructors should know how to create learning objectives and learning evaluation criteria, facilitate conversations, involve participants, and communicate clearly. Instructors should be closely connected to administrative support staff to assist with support services, stipends, scheduling, etc.

1. Essential employability skills

Training objectives

At the end of this training, participants should be able to:

- Set personal and professional goals effectively, utilizing goal-setting skills.
- Demonstrate an understanding of what dependability and reliability mean in a workplace context and the behaviors that are associated with dependability and reliability.
- Develop a personalized time management plan that demonstrates how to productively complete assigned tasks.
- Evaluate various strategies for learning from challenges, setbacks, and failures, and apply them to achieve personal and professional goals.
- Develop effective resume writing and interviewing skills to facilitate successful job searches.
- Create a sound personal finance plan, encompassing budgeting, savings, and investments, among other elements.

- Implement effective job application practices, including resume writing and interview techniques, to facilitate successful job searches.
- Implement emotion management strategies to cope with challenges and achieve personal and professional goals.
- Enhance their communication skills, including active listening, conveying ideas, expressing information effectively, and being understood by colleagues and customers.
- Demonstrate their ability to work cooperatively with others, completing work assignments and achieving mutual goals.
- Utilize various digital tools, including email, keyboarding, word processing, and digital media, to complete job tasks and communicate courteously and directly.
- Interact with customers using role-play to understand their needs, answer questions, resolve issues, and nurture relationships effectively.
- Demonstrate critical thinking and problem-solving skills in a workplace context, using logical and reasoned analysis to address problems, identify root causes, implement appropriate solutions, and communicate solutions.
- Identify their legal right to work in an environment free of discrimination and harassment and understand how to address discrimination and harassment if it is experienced.
- Demonstrate the ability to communicate and work effectively across a range of abilities, cultures, and backgrounds, emphasizing diversity, equity, and inclusion.

Curriculum content (40 hours)

Workforce Hubs are encouraged to tailor instruction to participants' individual needs, based on assessment results.

At a minimum, the personal effectiveness training must cover the following topics:

1. **Goal setting:** Employ goal-setting skills to set personal and professional goals.
2. **Dependability and reliability:** Explain how commitment and follow-through can ensure team effectiveness and help to meet collective goals.
3. **Time management:** Develop a time management plan to accomplish assigned tasks.
4. **Adaptability:** Explain different strategies to learn from challenges, setbacks, and failures; apply these strategies to achieve personal and professional goals.
5. **Financial literacy:** Create a personal finance plan and explain how personal finances relate to employability.
6. **Getting a job:** Apply effective job application practices (including resume writing and interviews) to search and apply for jobs.
7. **Emotion management:** Practice recognizing and managing emotions to cope with challenges and achieve personal and professional goals.
8. **Verbal communication skills:** Participants should improve their ability to listen to others, convey ideas, express information, and be understood by colleagues and customers.

9. **Workplace writing skills:** Participants should practice using standard business English to write documents and messages to colleagues and customers that are clear, direct, and courteous.
10. **Teamwork skills:** Participants should practice working cooperatively with others to complete work assignments and achieve mutual goals.
11. **Digital communication skills:** Participants should practice using email, keyboarding, word processing, and digital media to complete job tasks and communicate directly and courteously.
12. **Customer service skills:** Participants should practice working with customers to understand their needs, answer questions, resolve issues, and nurture relationships.
13. **Critical thinking and problem solving:** Participants should practice critical thinking and problem-solving skills to generate and evaluate solutions as they relate to the needs of the team, customer, and company.
14. **Workplace rights:** Participants should understand their right to work in an environment free of discrimination and harassment and what to do if they experience discrimination or harassment.
15. **Diversity and inclusion:** Participants should practice diversity and inclusion strategies to communicate and work effectively across a multitude of abilities, cultures, and backgrounds.

All essential employability training should be hands-on and scenario-based when possible. It should be contextualized, integrated into clean energy basics, to demonstrate how these skills are needed in typical clean energy jobs. It should allow participants to practice skills, set goals, develop plans and demonstrate mastery.

Curriculum examples and resources

- Illinois Essential Employability Skills Framework and Self-Assessment
- Illinois workNet Job Skills Guide
- Revolution Learning and Development: Managing Yourself and Personal Effectiveness Training Course
- Illinois Adult Education: ABE/ASE Curriculum Project
- Northstar (digital literacy assessments and training)

2. Clean energy basics

Training objectives

After completing this training, participants should be able to:

- Identify job opportunities and analyze career pathways for their potential for growth and advancement in the clean energy industry.
- Develop a personalized clean energy pathway based on individual skills, interests, and credentials that leads to promising career advancement opportunities.
- Demonstrate safety practices in construction, electrical and solar fields, and understand safety regulations and codes.

- Explain the skills and responsibilities of construction workers and understand how they apply to the clean energy industry.
- Interpret basic construction drawings and their components and explain their relevance to clean energy installations.
- Discuss the main components of building materials and building envelope systems, and explain installation procedures and materials of building, as they apply to the clean energy industry.
- Explain the importance of energy use, indoor air quality, and durability of building materials in the clean energy industry.
- Demonstrate the use of basic hand and power tools and understand their proper use and maintenance in the context of clean energy installations.
- Explain the different types of energy, energy conservation, features of green buildings, and principles of sustainability or energy efficiency in the clean energy industry.

Explain basic electricity and clean energy fundamentals, including the principles of energy generation, transmission, and storage, and their applications in the clean energy industry. If participants will be learning portions of the clean energy basics curriculum in the job-specific technical training, those portions may be skipped to avoid duplication of efforts (e.g., they do not need to take OSHA 10 twice).

Curriculum content (80+ hours)

At a minimum, the clean energy basics training should cover the following topics:

1. **Introduction to clean energy careers** (At least 5 hours).
    a. Clean energy careers and pathways: Develop a personalized clean energy career pathway leading to promising credentials and career advancement opportunities.
2. **Energy and sustainability fundamentals** (At least 5 hours).
    a. Clean energy definitions: Explain energy, clean energy, sustainability, energy efficiency, energy conservation, and climate change.
    b. Climate change: Explain how different clean energy careers will help with state and national climate goals.
    c. Sample curriculum guide for energy and sustainability fundamentals.
3. **Safety basics** (At least 10 hours). Training includes required certifications in OSHA 10 and First Aid/CPR.
    a. Safety compliance: Explain safety principles and regulations to maintain a secure work environment and how to comply with local, federal and jobsite health and safety demands.
    b. Personal protective equipment and safety practices: Demonstrate safety practices and proper use of PPE when navigating a construction environment.
    c. Working at height: Demonstrate safety practices when using ladders, applying scaffolding, safety harnesses, and rigging when navigating a construction environment.
    d. First aid/CPR: Demonstrate ability to administer emergency first aid and CPR and know when to call for help.

   e. Sample curriculum guide for safety basics.

4. **Building science principles** (At least 10 hours). The topics below align with the Building Performance Institute's Building Science Principles curriculum, though their actual Building Science Principles curriculum is more comprehensive and leads to a certification exam.
   a. Home performance and introduction to building science: Explain energy use in terms of building science
   b. House-as-a-System: Describe "House-as-a-System" and how the different components work together to impact energy use.
   c. Energy & the building shell: Identify the main envelope components and control layers. Describe how heat is transferred in and out of the building envelope.
   d. Residential heating, cooling, and ventilation: Describe whole-house mechanical ventilation systems and combustion science. Identify the main components of mechanical heating and cooling systems.
   e. Evaluation strategies: Explain evaluation strategies of house performance including building envelopes, mechanical systems, appliances, and lighting.
   f. Energy efficiency solutions: Describe common energy efficiency strategies to reduce home energy use.
   g. Sample curriculum guide for building science principles.
5. **Construction basics** (At least 40 hours). The construction topics below align with those in the NCCER Core Construction curriculum, though the NCCER Core curriculum is more comprehensive and leads to a certification exam.
   a. Intro to hand and power tools: Identify, correctly set up, and operate hand and power tools.
   b. Intro to schematics and blueprints: Understand how to read basic schematics and blueprints and how to differentiate among schematics needed for different trade areas.
   c. Intro to design and construction processes: Describe the basic design and construction concepts in a residential construction project. With minimal supervision, safely construct or install an authentic project.
   d. Intro to construction math and cost estimation:
      i. Apply measurement systems and scaling concepts to demonstrate proper use of measuring tools (time, temperature, distance, length, width, height, perimeter).
      ii. Demonstrate how to convert from one measurement to another and between decimals and fraction units.
      iii. Apply basic cost estimation principles to estimate labor and material costs.
      iv. Read and understand tables and graphs.
      v. Calculate perimeters, areas, and volumes of basic shapes and solids.
   e. Intro to materials handling: Use knowledge of material types, standard sizes and safe handling practices to identify and utilize materials needed for basic project types.
   f. Sample curriculum guide for construction basics.

6. **Electrical basics training** (At least 10 hours). The topics below align with those in the Journeyman Electrician exam, though the actual Journeyman Electrician training is much more comprehensive.
    a. Intro to electricity: Explain where electrical power comes from and how electricity works.
    b. Intro to direct current and alternating current: Explain the basic difference between AC and DC voltage.
    c. Intro to circuits: Describe how circuits work, the components of a basic circuit, and three basic types of circuits.
    d. Intro to conductors: Explain what a conductor is and provide examples of good conductors and poor conductors.
    e. Intro to electrical safety procedures: Describe how to protect against over-current and electric shock.
    f. Sample curriculum guide for electrical basics.

All clean energy basics training should be hands-on and scenario based when possible. It should be contextualized to demonstrate how these skills are needed in typical clean energy jobs. It should allow participants to practice skills, set goals, develop plans and demonstrate mastery.

JOB SPECIFIC TRAINING OPTIONS

A. Solar Photovoltaic Training

B. Energy Auditor Training

C. Weatherization Training

D. HVAC Training

E. Construction and Building Inspector Training

F. Auto Mechanic Training, Hybrid and Electric Vehicle Focus

G. Wind Turbine Installation and Maintenance Training

A. SOLAR PHOTOVOLTAIC TRAINING FRAMEWORK

The CEJA workforce solar photovoltaic training specialty is designed to prepare individuals for entry level jobs in the solar industry, including solar installer, solar sales representative, and solar site assessor or designer. This training curriculum framework focuses on the basic skills needed to understand, design, and assist in the safe installation of photovoltaic systems and should use both hands-on and classroom environment experiences. Upon completion of the training, individuals will be prepared to take the Photovoltaic Associate exam offered by the North American Board of Certified Energy Practitioners (NABCEP).

A-1. Demonstration of need for training

There is a great need for more solar energy workers in Illinois. In addition, equity requirements for solar employers will incentivize employers to hire trainees from the CEJA programs. Applicants should demonstrate the need for this training in their region by describing:

- The approximate number of job openings and current jobs in their region in solar installation, sales, and design.
- The potential benefits to equity investment eligible populations within the region.
- Existing solar training programs in the region and any training program gaps.
- The need for solar installation, sales, and design employees, as demonstrated through employer partnerships. Employers must express a need for new employees and a willingness to hire graduates of the program through a Memorandum of Understanding.

A-2. Training outcomes

Upon completion of the training, students should have obtained basic knowledge related to the design, sales, installation, and operation of Photovoltaic Systems. The students should also have received sufficient instruction to be prepared to take the North American Board of Certified Energy Practitioners (NABCEP) PV Associate Exam. Finally, the students should have sufficient technical and practical knowledge to be prepared to pursue employment opportunities in Solar Photovoltaic system installation, design, or sales.

A-3. Job(s)/roles trained by this training

- Solar Photovoltaic System Installer
- Solar Photovoltaic System Site Evaluator/Designer
- Solar Photovoltaic System Sales Representative

A-4. Career progression

- Solar PV Sales Representative and Site Assessor
- Solar PV Crew Chief
- Solar PV Project Manager
- PV System Inspector
- Solar Field Technician
- Solar Project Developer

For a more detailed solar career progression map, see the Interstate Renewable Energy Council's Solar Career Map

A-5. Prerequisites

Before beginning technical training, participants should:

- Be comfortable working in elevated spaces such as rooftops
- Be comfortable using hand and power tools and managing materials
- Be comfortable working in teams and individually
- Possess good communication skills
- Be capable of working 6-8 hours per day in the field (with occasional overtime)
- Have at least an 8th grade math level and reading level (tutoring/instruction should be provided to help people meet this requirement, if needed)
- Be able to use computers/tablets to communicate with clients and perform basic calculations
- Have OSHA 10 certification

By completing the bridge program, participants should have met these prerequisites.

A-6. Learning environment and format

It is strongly recommended that the technical training be offered as an in-person classroom and lab-based course, with extensive hands-on components. Classroom/lab should have enough workspace for students to work individually and in diverse groups. Access to either a computer lab or laptops is helpful to support student evaluation/testing and calculations. Portions of this curriculum may be taught using either synchronous or asynchronous e-Learning with the appropriate support systems.

Throughout, Workforce Hubs should create a trusting and supportive environment in which participants feel a sense of belonging to and significance of the clean energy industry. Workforce Hubs must reinforce and build from participants' existing knowledge and strengths. The learning environment is a place where participants know their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Instructors should share relevant examples and tell relatable stories during training.

Undergirding this environment is a willingness to discuss and address difficult topics and work to find equitable solutions. Successful programs will acknowledge in the curriculum and among participants the environmental and historical factors that impact underserved and disadvantaged groups. Exclusionary practices have no place within the learning environment.

A minimum of 10% of the curriculum hours should be devoted to work-based learning activities. Work-based Learning (WBL), as defined by the Illinois, provides participants with the opportunity to engage and interact with industry experts (employers), while learning to demonstrate essential employability and technical skills necessary for today's workforce. WBL is defined in Perkins V legislation as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that foster in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction."

Work-based learning may include:

- Career awareness activities
- Career exploration activities
- Workplace experience (hands-on work experience at a work site, supervised by an employer)
- Career development experience (On-the-job training, internship, or an apprenticeship)

Applicants are required to provide work-based learning components as part of their training. To meet this requirement, they are encouraged to partner with employers in their region, especially equity eligible contractors and businesses that are certified through the Business Enterprise Program. They are also encouraged to direct participants to work-based learning opportunities (including apprenticeships or on-the-job training) during or after they complete training.

A-7. Tools and equipment

The following tools and equipment are recommended:

- Basic construction tools (hammer, screwdriver, pliers, wire cutters, etc.)
- Access to power tools
- Access to diagnostic equipment
    - Multimeters
    - Insulation testing devices (e.g., megohmmeter)
    - Irradiance meter
    - Infrared thermometer (e.g., module, breaker, connection temperature measurement)
    - IV curve tracer
    - Battery capacity testing devices (e.g., load tester)
    - Hydrometer
- Course materials/books

- Access to demonstration PV systems / PV site installations or suitable props for hands-on activities
- Laptops, tablets and/or computer lab
- Software for rooftop PV system design and estimator of solar energy collection efficiency

A-8. Estimated training length

The training for the Solar PV Installer should involve at least 80 hours of instruction which may encompass in-person, on-line or hybrid instruction. This is in addition to the hours required for the bridge program instruction. Courses with more contact hours, hand-on activities and an instructor with significant current solar PV system installation experience can contribute to a better learning experience.

A-9. Training size

This training is recommended for cohorts of 10-15 students. Programs can also opt for an open entry/exit model, rather than a cohort model.

A-10. Instructor requirements

The curriculum must be administered by a NABCEP Associate Registered Training Provider. Instructors must have intermediate to expert-level knowledge of the curriculum modules in the Core Curriculum section below.

It is strongly recommended that the instructor have significant recent experience in Solar PV system design, sales, and installation. We recommend that the instruction team consist of:

- Lead instructor
- Facilitator, especially during labs
- Training admin/logistics support to assist with support services, stipends, scheduling

Instructional staff must have a strong connection to target populations and communities and be capable of cultivating a welcoming, inclusive environment. All staff, including instructors, must be trained on Diversity, Inclusion, Accessibility, and Equity and committed to upholding these values.

A-11. Training objectives

By completing this training, students will be able to:

1. Discuss the fundamental concepts of Solar PV systems, including key terminology and different system design options, and apply this knowledge to analyze different solar PV systems.
2. Analyze the landscape of Solar PV system installation, including consumer expectations, system capabilities, and long-term cost-benefit relations, and make informed recommendations based on this analysis.

3. Demonstrate an understanding of governmental regulations and local and state building codes, contract provisions, and construction standards relevant to Solar PV system installation, and comply with them in all aspects of the work.
4. Analyze how Solar PV system design parameters impact overall system performance and make informed decisions to optimize system design based on this analysis.
5. Use technical terminology specific to Solar PV system installation and testing to communicate with team members, customers, and other stakeholders.
6. Effectively and safely use all necessary tools and equipment to assist in the installation, testing, and maintenance of Solar PV systems, and identify potential safety hazards and appropriate safety measures.
7. Contribute effectively as a member of a diverse team to install and test Solar PV systems at various work sites and consider both individual and team safety requirements in all aspects of the work.
8. Effectively scaffold existing strengths, experiential knowledge, and newly established trusting relationships to pursue a meaningful career in the clean energy industry.

A-12. Curriculum content overview

The table below summarizes the five domains of content recommended for the Solar Photovoltaic Installer curriculum for Technical Skill. The curriculum and training should align with the *most recent* NABCEP Photovoltaic Associate Training Job Task Analysis and prepare students to successfully pass the NABCEP Photovoltaic Associate Certification exam. A summary of the tasks found in the Job Task Analysis is shown in the tables below. Up-to-date local or state-wide codes, requirements, design considerations, and economic considerations should be taught. Where applicable, instructional materials should reflect the broad potential diversity of those enrolled.

Table 2: Solar Photovoltaic Association Job Task Analysis Domains

Domain I: Application	Domain II: Sales & Economics	Domain III: Design
Application	Sales & Economics	Design
-Describe types of PV system applications -Identify key features and benefits of specific types of PV systems -List the key component of specific types of PV systems -Understand the safety concerns associated with different types of PV systems -List the advantages and disadvantages of PV systems compared to other electricity generation sources	-Determine necessary customer information to collect -Identify the customer's motivations to install solar -Estimate system size to meet the customer's financial objective -Identify information from the client on electricity usage relevant to stand-alone solar -Recognize how federal, state, and local policies and available financial benefits affect different PV markets -Identify financial risks associated	-Ensure equipment is appropriate for intended use -Identify relevant codes and requirements that impact PV design and installation, including local codes and requirements -Recognize electrical concepts & terminology -Identify factors impacting solar resource on design and performance -Identify equipment specification data -Describe the function of typical

	with PV systems -Identify common financing options and incentives -Identify predictable maintenance costs over the life of the system	components in PV systems -Explain PV system sizing considerations -Read an electrical diagram of a PV system -Recognize structural requirements of PV systems

Domain IV	Domain V
Installation	Maintenance and Operation
-Identify the elements of a complete site-specific safety plan -Identify the elements of the plan set -Identify the elements of racking installation -Identify the elements of electrical component installation -Identify the elements of energy storage component installation -Identify the elements of the system commissioning procedure	-Identify commonly used electrical test equipment and its purpose -Demonstrate the ability to analyze simple electrical circuits -Describe the effects of performance parameters that are commonly monitored for PV systems -Describe different types and elements of system performance monitoring equipment -Identify common factors that result in deviations from expected system performance -Describe typical maintenance requirements for PV systems -Identify the safety requirements for operating and maintaining different types of PV systems

A-13. Assessment methods

We recommend students be evaluated via the following:

- In-class exams
- In class/lab evaluation
- Training final proficiency and field exams

Additional instruction, coaching, mentoring, and sponsorship, may be needed for individuals who require supplementary or different supports to be successful. A variety of different assessment strategies, such as lab evaluation and demonstrated knowledge proficiency, are encouraged to account for participants' unique learning styles. Importantly, not all ways of learning and means of assessment have been a significant part of everyone's educational background.

A-14. Certification

Individuals who successfully complete the Solar PV Installer curricula should be prepared to take the NABCEP Photovoltaic Associate Certification exam if they wish to take the exam. Participants are not required to pass the exam to complete the program; participants may need to take the exam multiple times to pass. The Workforce Hubs should assist with test preparation and provide funds to cover the exams.

A-16. References and example curriculum

- NABCEP Associate Registered Trainings
- US Department of Labor's Renewable Energy Competency Model
- NCCER Solar Photovoltaic Systems Curriculum

B. ENERGY AUDITOR TRAINING FRAMEWORK

The CEJA workforce Energy Auditor (EA) training specialty is designed to prepare people for a career as an Energy Auditor and/or Quality Control Inspector for residential buildings. The course focuses on the basic skills needed to properly assess building performance in both a hands-on and classroom environment. Upon completion of the training, students will be prepared to challenge the Illinois Energy Auditor field exam, as well as the national BPI Energy Auditor certification exam and the BPI Quality Control Inspector sub-certification exam.

B-1. Demonstration of need for training

To receive funding to develop a new energy auditor training program, applicants will need to demonstrate the need for this training in their region. We recommend reaching out to employers and workforce development organizations in the region to better understand the employment and training needs.

To demonstrate need, applicants will need to, at a minimum, describe:

- The approximate number of energy auditor job openings and current jobs in your region.
- The potential benefits to equity investment eligible populations within the region.
- Existing energy auditor training programs in the region and any training program gaps.
- The need for energy auditor employees, as demonstrated through employer partnerships. Employers must express a need for new employees and a willingness to hire graduates of the program through a Memorandum of Agreement.

B-2. Training outcomes

Upon completion of the training, students will be prepared to take the exams for Illinois certification, as well as both the BPI Energy Auditor and Quality Control Inspector certifications. They will also be prepared to evaluate building performance utilizing a whole-house approach to make energy conservation decisions that incorporate occupant health and safety.

B-3. Job(s)/roles trained by this training

- Energy Auditor, Residential
- Quality Control Inspector, Residential
- Weatherization Specialist

B-4. Career progression

- Energy Auditor (residential, commercial, and multifamily)
- Quality Control Inspector

- Energy Services Coordinator
- Building Performance Instructor-Weatherization Technical Trainer

B-5. Prerequisites

Before beginning technical training, participants should:

- Be comfortable in confined spaces (attics, crawl spaces, etc.)
- Be comfortable using basic tools
- Be comfortable working in teams and individually
- Possess good communication skills
- Be capable of working 6-8 hours per day in the field (with occasional overtime)
- Have at least an 8th grade math level
- Be able to use computers/tablets to perform basic calculations

By completing the bridge program, participants should have these required competencies.

B-6. Learning environment and format

It is strongly recommended that the technical training be offered as an in-person classroom and lab-based course, with extensive hands-on components. Classroom/lab should have enough workspace for students to work individually and in groups.

Access to either a computer lab or laptops is helpful to support student evaluation/testing and calculations. Portions of this curriculum may be taught using either synchronous or asynchronous e-Learning with the appropriate support systems.

Throughout, Workforce Hubs should create a trusting and supportive environment in which participants feel a sense of belonging to and significance of the clean energy industry. Workforce Hubs must reinforce and build from participants' existing knowledge and strengths. The learning environment is a place where participants know their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Instructors should share relevant examples and tell relatable stories during training.

Undergirding this environment is a willingness to discuss and address difficult topics and work to find equitable solutions. Successful programs will acknowledge in the curriculum and among participants the environmental and historical factors that impact underserved and disadvantaged groups. Exclusionary practices have no place within the learning environment.

At least 10% of the curriculum hours should be work-based learning activities. Work-based learning (WBL), as defined by the Illinois, provides participants with the opportunity to engage and interact with industry experts (employers), while learning to demonstrate essential employability and technical skills necessary for today's workforce. WBL is defined in Perkins V legislation as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that foster in-depth, firsthand engagement with the tasks

required in a given career field, that are aligned to curriculum and instruction." Work-based learning may include:

- Career awareness activities
- Career exploration activities
- Workplace experience (hands-on work experience at a work site, supervised by an employer)
- Career development experience (On-the-job training, internship, or an apprenticeship)

Applicants are required to provide work-based learning components as part of their training, in partnership with employers in their region. To meet this requirement, they are encouraged to partner with employers in their region, especially equity eligible contractors and businesses that are certified through the Business Enterprise Program. They are also encouraged to direct participants to work-based learning opportunities (including apprenticeships or on-the-job training) during or after they complete training.

B-7. Tools and equipment

This training requires the following:

1. Tool belt
2. Basic construction tools set (hammer, screwdriver, pliers, wire cutters, etc.)
3. Access to power tools
4. Laptops and/or computer lab
5. Access to diagnostic equipment
    a. Blower door
    b. Digital manometer
    c. Infrared camera
    d. Combustion analyzer
    e. Combustible gas detector
    f. 4-gas monitor
    g. Exhaust fan flow meter
    h. Duct tightness assessment tools (e.g. duct blaster, pressure pan)
6. Dolly
7. Course materials/books
8. Access to demonstration buildings or suitable props for hands on activities (possible alternative compliance using VR or other digital means)
9. Access to a variety of functional water heating and HVAC appliances for combustion safety testing (possible alternative compliance using VR or other digital means)

Recommended: Airflow visualization tool (e.g. physical props, interactive digital software/interfaces, videos)

B-8. Estimated training length

The training for Energy Auditor (Residential) should involve a minimum of 200 hours of instruction, in addition to the bridge program training.

B-9. Training size

This training is recommended for cohorts of 10-15 students.

B-10. Instructor requirements

Instructors must have intermediate to expert-level knowledge of the curriculum modules in the Core Curriculum section below and possess BPI Energy Auditor and BPI Quality Control Inspector certifications.

Instructional staff must have a strong connection to target populations and communities and be capable of cultivating a welcoming, inclusive environment. All staff, including instructors, must be trained on Diversity, Inclusion, Accessibility, and Equity and committed to upholding these values.

We recommend that the instruction team consist of:

- Lead instructor
- Facilitator, especially during labs
- Training admin/logistics support to assist with support services, stipends, scheduling

B-11. Training objectives

By completing this training, students will be able to:

- Identify, evaluate, select, move, store, and supply construction and building material resources for all types of construction activities, and apply this knowledge to ensure timely and cost-effective completion of construction projects.
- Interpret, analyze, and compare data related to energy fuel types (e.g., propane, electricity, oil), energy consumption, and power units, and demonstrate an understanding of fundamental principles of energy and power concepts.
- Demonstrate an understanding of governmental regulations and local and state building codes, contract provisions, and construction standards relevant to construction activities, and comply with them in all aspects of the work.
- Assess building/unit components regarding energy consumption and health and safety-related issues and generate a proposed scope of work based on cost-effectiveness, client priorities, and/or other energy efficiency program requirements, and effectively communicate this to stakeholders.
- Practice basic accounting and cost estimating related to construction/retrofit and building operations and use this knowledge to inform decision-making related to energy efficiency upgrades.

- Generate a recommended scope of work, including the cost-effectiveness of the proposed work, and apply this knowledge to inform energy efficiency retrofit decision-making.
- Identify and calculate potential savings from green energy retrofits, including solar, electrification, and upgrades to high-efficiency retrofits, and use this information to inform decision-making related to energy efficiency upgrades.

B-12. Curriculum content overview

The table below presents the three domains of energy auditors content for Sector-Specific Technical Skills. Training must align with the Building Performance Institute's BPI-1200 Standard and include all knowledge and skills required to take the BPI Energy Auditor certification exam. House and duct leakage testing methods must align with the RESNET 380 Standard. Training on the development of the scope of work must align with NREL's Standard Work Specifications (SWS). Core training topics are listed below and should structure the curriculum outline.

Table 3: Energy auditor content domains

Domain I	Domain II	Domain III
Collection of Visual, Material, Dimensional, and Appliance Information about the Building for an Energy Audit	Diagnostic Testing of the Dwelling Unit for an Energy Audit	Evaluation of Collected Energy Audit Data to Determine the Scope of Work
-Document energy consumption -Document the building history -Conduct a physical/visual inspection -Collect health and safety data -Collect appliance and base load information -Identify a conditioned building enclosure -Collect mechanical ventilation data -Identify building insulation (attic, walls, and foundation/subspace) -Collect attic data -Collect wall data -Collect window and door data -Collect foundation/subspace data -Collect roof data	-Prepare the dwelling unit for the test(s) -Test the electric appliances -Conduct indoor air quality tests -Determine the safety and efficiency of combustion appliances -Determine air leakage of the building envelope -Determine the performance of HVAC distribution	-Evaluate the health and safety data -Evaluate the durability/structural integrity of the building -Evaluate the HVAC system -Evaluate the mechanical ventilation -Evaluate energy use -Evaluate the foundation/subspace -Evaluate the walls -Evaluate the attic -Evaluate the doors and windows -Use energy modeling software -Generate the recommended work scope

B-13. Assessment methods

We recommend students be evaluated via the following:

- In-class exams
- In class/lab evaluation
- Training final proficiency and field exams
- BPI Energy Auditor written and field exams

Additional instruction, coaching, mentoring, and sponsorship, may be needed for individuals who require supplementary or different supports to be successful. A variety of different assessment strategies, such as lab evaluation and demonstrated knowledge proficiency, are encouraged to account for participants' unique learning styles. Importantly, not all ways of learning and means of assessment have been a significant part of everyone's educational background.

B-14. Certification

The Energy Auditor training will prepare trainees to take the BPI Energy Auditor certification exam.

B-16. References and example curriculum

- ANSI/BPI-1200-S-2017
- Green Building Career Map
- Single-Family Energy Auditor Job Task Analysis

- Understanding by Design
- US Department of Labor's Renewable Energy Competency Model

C. WEATHERIZATION TRAINING FRAMEWORK

The weatherization training curriculum framework below is designed to prepare people for a career as a weatherization technician, weatherization field technician, or as a salesperson for a residential efficiency improvement organization. The curriculum should cover the basic skills needed by a weatherization technician to install upgrades to a home, through online or blended training with components of hands-on activities in a classroom, lab, or field environment. Upon completion of the training, students will be prepared to take the BPI Retrofit Installer Technician (RIT) exam and have a firm grasp of the skills and competencies needed to be successful in installing and/or selling energy upgrades.

C-1. Demonstration of need for training

To receive funding to develop an energy auditor training program, applicants will need to demonstrate the need for this training in their region. We recommend reaching out to employers and workforce development organizations in the region to better understand the employment and training needs.

To demonstrate need, applicants will need to, at a minimum, describe:

- The approximate number of energy auditor job openings and current jobs in your region.
- The potential benefits to equity investment eligible populations within the region.
- Existing weatherization training programs in the region and any training program gaps.
- The need for weatherization employees, as demonstrated through employer partnerships. Employers must express a need for new employees and a willingness to hire graduates of the program through a Memorandum of Agreement.

C-2. Training outcomes

Upon completion of the training, students will be prepared to take the BPI RIT exam and apply for an entry-level position. They will have a firm grasp of the skills and competencies needed to be successful in installing and/or selling energy upgrades.

C-3. Job(s)/roles trained by this training

- Weatherization installation technician
- Weatherization marketing & sales
- Construction laborer with a retrofit focus

C-4. Career progression

- Weatherization installation supervisor
- Weatherization Crew Leader
- Weatherization field trainer

C-5. Prerequisites

Before beginning technical training, participants should:

- Be comfortable in confined spaces
- Be comfortable using basic tools
- Be comfortable working in teams
- Be capable of working 6-8 hours per day in the field (with occasional overtime)
- Have at least a 6th grade math level
- Be able to use computers/tablets to perform basic calculations
- Be able to work in all types of housing stock in most weather conditions

By completing the bridge program, participants should have these required competencies.

C-6. Learning environment and format

It is strongly recommended that the technical training be offered in an in-person classroom and lab-based format, with extensive hands-on components. These exercises should represent "real world" fieldwork to best prepare students for their future tasks.

Access to either a computer lab or laptops is helpful to support student evaluation/testing and calculations. Portions of this curriculum may be taught using either synchronous or asynchronous e-Learning with the appropriate support systems.

Throughout, Workforce Hubs should create a trusting and supportive environment in which participants feel a sense of belonging to and significance of the clean energy industry. Workforce Hubs must reinforce and build from participants' existing knowledge and strengths. The learning environment is a place where participants know their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Instructors should share relevant examples and tell relatable stories during training.

Undergirding this environment is a willingness to discuss and address difficult topics and work to find equitable solutions. Successful programs will acknowledge in the curriculum and among participants the environmental and historical factors that impact underserved and disadvantaged groups. Exclusionary practices have no place within the learning environment.

At least 10% of the curriculum hours should be work-based learning activities. Work-based learning (WBL), as defined by the Illinois, provides participants with the opportunity to engage and interact with industry experts (employers), while learning to demonstrate essential employability and technical skills

necessary for today's workforce. WBL is defined in Perkins V legislation as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that foster in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction." Work-based learning may include:

- Career awareness activities
- Career exploration activities
- Workplace experience (hands-on work experience at a work site, supervised by an employer)
- Career development experience (On-the-job training, internship, or an apprenticeship)

Applicants are required to provide work-based learning components as part of their training, in partnership with employers in their region. To meet this requirement, they are encouraged to partner with employers in their region, especially equity eligible contractors and businesses that are certified through the Business Enterprise Program. They are also encouraged to direct participants to work-based learning opportunities (including apprenticeships or on-the-job training) during or after they complete training.

C-7. Tools and equipment

This training requires the following:

- Diagnostic equipment specific to weatherization
- Tools to measure and record data
- Access to power tools
- Laptops and/or computer lab
- Tools and equipment to install specific energy upgrades
- Basic hand tools
- Course materials/books

C-8. Estimated training length

The training for Weatherization Installers and Technicians should involve a minimum of 200 hours which may encompass in-person, on-line, or hybrid instruction.

C-9. Training size

This training is recommended for cohorts of 15-20 students. Student outcomes should include taking the RIT exam and taking active steps towards job placement.

C-10. Instructor requirements

Instructors must have intermediate to expert level knowledge of the curriculum modules in the Core Curriculum sections below.

It is recommended that the instructor have strong ties to the target communities and populations served. Instructor certification requirements could include but are not limited to BPI HEP Home Energy Auditor (EA), BPI HEP Quality Control Inspector (QCI), BPI HEP Retrofit Installer Technician (RIT), BPI HEP Crew Leader (CL), BPI Air Leakage Control Installer (ALCI), BPI Healthy Home Evaluator (HHE), State Weatherization certification or other technical training certification relating to the housing, construction or home energy field.

Instructional staff must have a strong connection to target populations and communities and be capable of cultivating a welcoming, inclusive environment. All staff, including instructors, must be trained on Diversity, Inclusion, Accessibility, and Equity and committed to upholding these values.

We recommend that the instruction team consist of:

- Lead instructor
- Facilitator, especially during labs.
- Training admin/logistics support to assist with support services, stipends, scheduling

C-11. Training objectives

To design and deliver curricula to address each of the following sector-specific technical competencies and sub-competencies via instruction and assessment of the learner's proficiencies, the learners should demonstrate their mastery of the following training objectives:

- Explain modern weatherization measures, including their purpose, benefits, and impact on energy efficiency, occupant health, and safety.
- Demonstrate the ability to read and follow a work order to complete a set of energy upgrade tasks, and effectively communicate progress and issues to stakeholders.
- Display knowledge of fundamental principles of energy savings by comparing the existing system or systems with the proposed upgrades or repairs and identify opportunities for cost-effective energy savings.
- Prioritize and map out the work to be done in a timely and effective manner, taking into consideration the needs of the building occupants, budget constraints, and other relevant factors.
- Follow industry guidelines for safety, occupant and worker health, and energy savings, and apply this knowledge to ensure that the work is done safely and effectively.
- Use diagnostic equipment to verify the savings or performance of the work performed and apply this knowledge to identify potential issues and opportunities for improvement.
- Identify potential savings from retrofits, including solar, electrification, and upgrades to building efficiency, and use this information to inform decision-making related to energy efficiency upgrades.

C-12. Curriculum content overview

The table below presents Weatherization Installers and Technicians and its career progression towards Crew Leader for Sector-Specific Technical Skill Tier 5 which are recommended in the training. The scope of work must also align with NREL's Standard Work Specifications (SWS).

Domain I	Domain II	Domain III
Weatherization installers and technicians' basic tasks	Weatherization installers and technicians' intermediate	High Level Task: Weatherization Crew Leader
-Maintain safety -Prepare for the job (before arriving at job site) -Prepare and maintain tools and materials on-site -Prepare and maintain job site -Identify materials and staffing needs -Prepare homeowner/occupants for the scope of work -Determine readiness of the job site for the scope of work -Install windows and doors -Install baseload measures -Clean all debris and work materials from the job site	-Locate and verify access to specific work areas -Protect interior/exterior of house (e.g., with drop cloths, poly, Tyvek booties, pressurizations) -Worksite safety and fall protection -Install roof penetrations and weatherproofing -Install or repair vapor retarders -Energy efficiency upgrades -Identify and report deviations from scope of work -Conduct diagnostic testing -Adjust scope of work as needed to reflect current conditions	-Develop Plan to Execute Scope of Work -Prepare and Maintain Job Site -Implement Scope of Work -Verify work orders, create change orders, and inspect completed work

C-13. Assessment methods

We recommend students be evaluated via the following:

- In-class exams
- In class/lab evaluation
- Final exam including hands on demonstration

Additional instruction, coaching, mentoring, and sponsorship, may be needed for individuals who require supplementary or different supports to be successful. A variety of different assessment strategies, such as lab evaluation and demonstrated knowledge proficiency, are encouraged to account for participants' unique learning styles. Importantly, not all ways of learning and means of assessment have been a significant part of everyone's educational background.

C-14. Certification

Training must include all knowledge required to challenge BPI RIT, State Weatherization certification or other technical training certification relating to the housing, construction, or home energy field.

C-15. References and example curriculum

1. Green Building Career Map

2. NREL Job Task Analysis: Retrofit Installer Technician
3. Understanding by Design
4. US Department of Labor's Renewable Energy Competency Model
5. Weatherization Crew Leader Job Task Analysis
6. Weatherization Standardized Curricula: Weatherization Assistance Program

D. HVAC INSTALLER & TECHNICIAN TRAINING FRAMEWORK

The CEJA workforce HVAC installer training specialty is designed to prepare people for a career as a HVAC technician and/or a career in HVAC sales. The course covers the basic skills needed by an HVAC technician to install and service basic HVAC systems in both a hands-on and classroom environment. Upon completion of the training, students will have a firm grasp of the skills and competencies needed to be successful in an entry level position installing, servicing and/or selling HVAC systems and be prepared to take the EPA Universal exam (Section 608 Technician Certification), as well as other NATE certification or HVAC Excellence exams.

D-1. Demonstration of need for training

To receive funding to develop a new HVAC training program, applicants will need to demonstrate the need for this training in their region. We recommend reaching out to employers and workforce development organizations in the region to better understand the employment and training needs.

To demonstrate need, applicants will need to, at a minimum, describe:

- The approximate number of energy auditor job openings and current jobs in your region.
- The potential benefits to equity investment eligible populations within the region.
- Existing energy auditor training programs in the region and any training program gaps.
- The need for energy auditor employees, as demonstrated through employer partnerships. Employers must express a need for new employees and a willingness to hire graduates of the program through a Memorandum of Agreement.

D-2. Training outcomes

Upon completion of the training, students will be prepared to take the EPA Universal certification (Section 608 Technician Certification), as well as other NATE certificate or HVAC Excellence exams, and be qualified for an entry level position in the HVAC industry. They will have a firm grasp of the skills and competencies needed to be successful in installing, servicing, or selling HVAC systems.

D-3. Job(s)/roles trained by this training

- HVAC installer (residential)
- HVAC service technician (residential)
- HVAC marketing & sales

D-4. Career progression

- HVAC installation supervisor
- HVAC installation technician (commercial)

- HVAC service technician (residential)
- HVAC service technician (commercial)
- HVAC marketing/sales supervisor
- HVAC instructor

D-5. Prerequisites

Before beginning technical training, participants should:

- Have professional communication skills with other employees and clients
- Have the ability to read a wiring diagram and blueprints
- Have basic knowledge of a furnace, air conditioner, boiler, heat pumps and willingness to learn
- Be comfortable on ladders and in attics, crawlspaces, and rooftops
- Be comfortable using basic tools
- Be comfortable working in teams and individually
- Be capable of working 6-8 hours per day in the field (with occasional overtime)
- Have a 6th grade or higher math and reading level

By completing the bridge program, participants should have these required competencies.

D-6. Learning environment and format

It is strongly recommended that the technical training be offered as an in-person classroom and lab-based course, with extensive hands-on components. Classroom/lab should have enough workspace for students to work individually and in groups.

Access to either a computer lab or laptops is helpful to support student evaluation/testing and calculations. Portions of this curriculum may be taught using either synchronous or asynchronous e-Learning with the appropriate support systems.

Throughout, Workforce Hubs should create a trusting and supportive environment in which participants feel a sense of belonging to and significance of the clean energy industry. Workforce Hubs must reinforce and build from participants' existing knowledge and strengths. The learning environment is a place where participants know their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Instructors should share relevant examples and tell relatable stories during training.

Undergirding this environment is a willingness to discuss and address difficult topics and work to find equitable solutions. Successful programs will acknowledge in the curriculum and among participants the environmental and historical factors that impact underserved and disadvantaged groups. Exclusionary practices have no place within the learning environment.

At least 10% of curriculum hours should be spent on work-based learning activities. Work-based learning (WBL), as defined by the Illinois, provides participants with the opportunity to engage and interact with industry experts (employers), while learning to demonstrate essential employability and technical skills

necessary for today's workforce. WBL is defined in Perkins V legislation as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that foster in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction." Work-based learning may include:

- Career awareness activities
- Career exploration activities
- Workplace experience (hands-on work experience at a work site, supervised by an employer)
- Career development experience (On-the-job training, internship, or an apprenticeship)

Applicants are required to provide work-based learning components as part of their training, in partnership with employers in their region. To meet this requirement, they are encouraged to partner with employers in their region, especially equity eligible contractors and businesses that are certified through the Business Enterprise Program. They are also encouraged to direct participants to work-based learning opportunities (including apprenticeships or on-the-job training) during or after they complete training.

D-7. Tools and equipment

This training requires the following:

- Classroom or mobile HVAC lab
- HVAC Hand Tools such as Crescent Wrenches, Hammers, Screwdrivers, Pliers, Tape Measure
- HVAC Safety Tools such as Multimeter, Safety Goggles, Footwear
- HVAC Specialty Tools such as Thermometer, Reciprocating Saw, Caulking Gun, HVAC Software
- Laptops, tablets, and/or computer lab
- Course materials/books

D-8. Estimated training length

The training for HVAC Installer should involve a minimum of 140 hours which may encompass in-person, on-line, or hybrid instruction.

D-9. Training size

This training is recommended for cohorts of 15-20 students.

D-10. Instructor requirements

Instructors must have intermediate to expert level knowledge of the curriculum modules in the Core Curriculum section below. Instructors must have significant experience in HVAC system design, installation, and maintenance.

Instructional staff must have a strong connection to target populations and communities and be capable of cultivating a welcoming, inclusive environment. All staff, including instructors, must be trained on Diversity, Inclusion, Accessibility, and Equity and committed to upholding these values.

We recommend that the instruction team consist of:

- Lead instructor
- Facilitator, especially during labs
- Training admin/logistics support to assist with support services, stipends, scheduling

D-11. Training objectives

The learners should demonstrate their mastery of the following training objectives:

- Identify and evaluate basic and advanced HVAC systems (including heat pumps), and their components, operation, and efficiency.
- Display knowledge of fundamental principles of how HVAC systems (including heat pumps) operate, including basic HVAC troubleshooting, basic electrical concepts, and identification of energy fuel types (e.g., propane, natural gas, all electric systems), and apply this knowledge to analyze HVAC systems.
- Demonstrate an understanding of governmental regulations and local and state building codes, contract provisions, and construction standards relevant to HVAC systems, and comply with them in all aspects of the work.
- Assess building/unit components regarding energy consumption and health and safety-related issues and generate a proposed scope of work based on cost-effectiveness, client priorities, and/or other energy efficiency program requirements, and effectively communicate this to stakeholders.
- Practice basic accounting and cost estimating related to construction/retrofit and building operations and use this knowledge to inform decision-making related to HVAC upgrades.
- Generate a recommended scope of work, including the cost-effectiveness of the proposed work, and apply this knowledge to inform HVAC system retrofit decision-making.
- Identify and calculate potential savings from green energy retrofits, including HVAC systems and upgrades to high-efficiency retrofits, and use this information to inform decision-making related to energy efficiency upgrades.

D-12. Curriculum content overview

The table below presents four domains of content recommended for HVAC Mechanics and Installers' Sector-Specific Technical Skills, which are recommended for use in the training. Training should align with the NFPA 54 (National Fuel Gas Code) and ACCA QI-5 (HVAC Quality Installations) standard. The content should also align with NREL's Standard Work Specifications (SWS).

Table 4: HVAC content domains

Domain 1	Domain 2
Basic technical knowledge	Basic installation skills
-Demonstrate how to operate a basic residential HVAC system. -Identify and describe the function of system components of residential HVAC systems (e.g., furnace, air conditioner, coil, heat pump boiler, geothermal heat pump). -Demonstrate technical knowledge of sizing piping, wiring, fuses and breakers in residential heating and cooling systems. -Demonstrate knowledge of tools required in the HVAC trade and how to operate them.	-Demonstrate and describe installation techniques of residential natural gas heating, heat pump, and cooling equipment according to manufacturer's instructions. -Demonstrate and describe the procedures of measuring, cutting, and joining of copper tubing, black iron pipe, PVC pipe, and CVPC pipe. -Demonstrate and describe the procedures of measuring, cutting, and joining sheet metal. -Demonstrate the ability to troubleshoot HVAC systems -Demonstrate how to read blueprints and wiring diagrams. -Understand how to input and translate a load calculation program. -Follow the specs and P.M.I. of the equipment you are installing.

Domain 3	Domain 4
Work safety standards and practices	Customer service and sales
-Demonstrate and describe proper refrigerant techniques according to EPA 608 -Demonstrate and describe ladder and fall prevention safety in accordance with OSHA 29 CFR 1910 -Read and execute safety plan for HVAC system installation.	-Construct and deliver a sales presentation -Prepare an HVAC construction/remodel plan for a client -Explain the work order -Perform work order system -Assign work orders to other HVAC technicians -Follow through with technicians to verify work has been complete and work orders closed out properly -Work with outside vendors, engineers and consultants on projects affecting HVAC systems on buildings and incorporate their designs.

D-13. Assessment methods

Students should be evaluated via the following:

- In-class exams
- In-class/lab evaluation
- EPA Section 608 Certification exam
- N.A.T.E certification exams or HVAC Excellence exams.
- Final exam including hands on demonstration

Additional instruction, coaching, mentoring, and sponsorship, may be needed for individuals who require supplementary or different supports to be successful. A variety of different assessment strategies, such as lab evaluation and demonstrated knowledge proficiency, are encouraged to account for participants' unique learning styles. Importantly, not all ways of learning and means of assessment have been a significant part of everyone's educational background.

D-14. Certification

Training must prepare people to take the EPA Section 608 Certification exam.

We recommend that training prepare people for one or more of the following certification exams. Programs have the flexibility to select the exams that best meet their needs:

NATE certifications

- NATE Ready-to-Work certificate (fundamentals and safety)
- NATE Core Exam
- Specialty exam: Air to Air Heat Pump (installation or service)
- NATE Certified HVAC Professional exams (5 exams: HVAC Fundamentals, Electrical and Controls, Comfort and Airflow, Installation, and Service).

HVAC Excellence Employment Ready certifications:

- Air conditioning
- Basic refrigeration and charging procedures
- Electrical
- Electric Heat
- Heat Pumps/Geothermal Heat Pumps
- Building Automation Systems

D-15. References & example curriculum

- ACCA QI-5 (HVAC Quality Installations) standard.
- EPA refrigerant certification
- Green Building Career Map
- NFPA 54 (National Fuel Gas Code)
- Understanding by Design
- US Department of Labor's Renewable Energy Competency Model

E. CONSTRUCTION AND BUILDING INSPECTORS

The CEJA workforce construction and building inspector training specialty is designed to prepare people for a career as a construction inspector and/or as a building inspector. The course prepares students to investigate building components, building integrity, safe operation of mechanicals and appliances, and health and safety issues. Upon completion of the training, students will have a firm grasp of the skills and competencies needed to be successful construction and building inspectors and be prepared to challenge the State of Illinois Licensed Home Inspector exam.

E-1. Demonstration of need for training

To develop this training program, applicants will need to demonstrate the need for this training in their region. We recommend reaching out to employers and workforce development organizations in the region to better understand the employment and training needs. To demonstrate need, applicants will need to, at a minimum, describe:

- The approximate number of construction and building inspector job openings and current jobs in your region.
- The potential benefits to equity investment eligible populations within the region.
- Existing construction and building inspector training programs in the region and any training program gaps.
- The need for new employees, as demonstrated through employer partnerships. Employers must express a need for new employees and a willingness to hire graduates of the program through a Memorandum of Agreement.

E-2. Training description

The CEJA workforce construction and building inspector training specialty is designed to prepare people for a career as a construction inspector and/or as a building inspector. The course trains on the basic construction skills needed by an inspector to thoroughly investigate building materials, its integrity, safe operation of mechanicals and appliances, as well as health and safety training through on-line or blended training, field training, and classroom environment. Upon completion of the training, students will have a firm grasp of the skills and competencies needed to be successful in inspections, or building maintenance, and be prepared to take the State of Illinois Licensed Home Inspector exam.

E-3. Training outcomes

Upon completion of the training, students will be prepared to take the State of Illinois Licensed Home Inspector exam and/or apply for an entry level position in as a construction or building inspector.

E-4. Job(s)/roles trained by this training

- Licensed Home Inspector
- Property/ Building Maintenance Professional

E-5. Career progression

- Energy Auditor/ Building Analyst Professional
- Weatherization Installer and Technician
- Quality Control Inspector

E-6. Prerequisites

Before beginning technical training, participants should:

- Be comfortable on ladders and rooftops
- Be comfortable using basic tools
- Be comfortable working independently and in teams
- Be capable of working 6-8 hours per day in the field (with occasional overtime)
- Be able to do math and read at an 8th grade level or higher
- Be able to use computers/tablets to perform basic calculations
- Be prepared to learn new techniques and terminology
- Have the necessary soft skills for effective communication

By completing the bridge program, participants should have these required competencies.

E-7. Learning environment and format

It is strongly recommended that the technical training be offered as an in-person classroom and lab-based course, with extensive hands-on components. Classroom/lab should have enough workspace for students to work individually and in groups.

Access to either a computer lab or laptops is helpful to support student evaluation/testing and calculations. Portions of this curriculum may be taught using either synchronous or asynchronous e-Learning with the appropriate support systems.

Throughout, Workforce Hubs should create a trusting and supportive environment in which participants feel a sense of belonging to and significance of the clean energy industry. Workforce Hubs must reinforce and build from participants' existing knowledge and strengths. The learning environment is a place where participants know their cultural values, current knowledge, and experiences are transferable and reflected in the clean energy industry. Instructors should share relevant examples and tell relatable stories during training.

Undergirding this environment is a willingness to discuss and address difficult topics and work to find equitable solutions. Successful programs will acknowledge in the curriculum and among participants the

environmental and historical factors that impact underserved and disadvantaged groups. Exclusionary practices have no place within the learning environment.

At least 10% of the curriculum hours should be work-based learning activities. Work-based learning (WBL), as defined by the Illinois, provides participants with the opportunity to engage and interact with industry experts (employers), while learning to demonstrate essential employability and technical skills necessary for today's workforce. WBL is defined in Perkins V legislation as "sustained interactions with industry or community professionals in real workplace settings, to the extent practicable, or simulated environments at an educational institution that foster in-depth, firsthand engagement with the tasks required in a given career field, that are aligned to curriculum and instruction." Work-based learning may include:

- Career awareness activities
- Career exploration activities
- Workplace experience (hands-on work experience at a work site, supervised by an employer)
- Career development experience (On-the-job training, internship, or an apprenticeship)

Applicants are required to provide work-based learning components as part of their training, in partnership with employers in their region. To meet this requirement, they are encouraged to partner with employers in their region, especially equity eligible contractors and businesses that are certified through the Business Enterprise Program. They are also encouraged to direct participants to work-based learning opportunities (including apprenticeships or on-the-job training) during or after they complete training.

E-8. Tools and equipment

This training requires the following:

- Tool bag
- Basic inspection tools set (ladder, screwdriver set, measuring device, digital camera, flashlight, outlet polarity tester, non-contact voltage tester etc.)
- Access to power drill
- Laptops and/or computer lab
- Course materials/books

E-9. Estimated training length

The training for Construction and Building Inspectors, Residential should involve a minimum of 80 hours which may encompass in-person, on-line, or hybrid instruction.

E-10. Training size

This training is recommended for cohorts of up to 10-15 students. Student outcomes should include taking the State of Illinois Licensed Home Inspector and job placement.

E-11. Instructor requirements

Instructors must have intermediate to expert level knowledge of the curriculum modules in the Core Curriculum section below.

Instructional staff must have a strong connection to target populations and communities and be capable of cultivating a welcoming, inclusive environment. All staff, including instructors, must be trained on Diversity, Inclusion, Accessibility, and Equity and committed to upholding these values.

We recommend that the instruction team consist of:

- Lead instructor
- Facilitator, especially during labs
- Training admin/logistics support to assist with support services, stipends, scheduling

E-12. Training objectives

- Identify, evaluate, and determine current and potential issues of a building's shell, including roof type and condition, chimneys, flashing, exterior building cladding, site drainage, vegetation, and grading pitch at perimeter, and apply this knowledge to assess building integrity and safety.
- Display knowledge of fundamental principles of electrical components, including height of electrical line from utility to mask (service entrance), electric panel or breaker box type and condition, outlet polarity, amperage, wire size and type, and condition of light fixtures, and apply this knowledge to assess electrical safety and functionality.
- Inspect for egress, including window and door operation, and apply this knowledge to assess occupant safety and accessibility.
- Evaluate plumbing components at hot water heater, faucets, showerheads, and proper drainage configurations, and apply this knowledge to assess plumbing safety and functionality.
- Determine the safety and functionality of installed appliances such as oven, refrigerator, dishwasher, and kitchen ventilation (e.g., microwave vent or range hood), and apply this knowledge to assess occupant safety and comfort.
- Evaluate the condition of the heating system(s), ensuring heat is supplied to all living and sleeping areas, and apply this knowledge to assess occupant safety and comfort.
- Assess building/unit components regarding integrity, function, and health and safety-related issues, and generate a detailed report regarding recommendations and hazards discovered at the time of inspection, and effectively communicate this to stakeholders.
- Practice basic accounting and cost estimating related to construction/retrofit and building operations and use this knowledge to inform decision-making related to repair or retrofit options.
- Use building inspector software to generate a report, including recommendations of professionals (e.g., roofing, electrical, plumbing professionals) as a guide to repair function or safety issues found, and effectively communicate this to stakeholders.

E-13. Curriculum content overview

The table below presents Construction and Building Inspectors tasks for Sector-Specific Technical Skill (Tier 5) in three levels which are recommended to address in the training. The scope of work must also align with NREL's Standard Work Specifications (SWS).

Table 5: Construction and Building Inspector Content Domains

Domain I	Domain II	Domain III
-Knowledge of building components -Ability to identify and describe them and their functions. -Collect exterior, interior, attics, basement/ crawlspace, mechanical ventilation data -Document the building history. -Conduct a physical/visual inspection.	-Ability to determine whether a building is safe to occupy. -List hazards such as tripping, cutting, electrical, falling, presence of mold, asbestos, potential radon etc.	-Generate a report using home inspector software. -Address each section of property. -List deficiencies and include photos. -Recommend qualified professional(s) for repairs.

E-14. Assessment methods

We recommend students be evaluated via the following:

- In-class exams
- In class/lab evaluation
- State of Illinois Licensed Home Inspector exam
- Final exam including hands on demonstration

Additional instruction, coaching, mentoring, and sponsorship, may be needed for individuals who require supplementary or different supports to be successful. A variety of different assessment strategies, such as lab evaluation and demonstrated knowledge proficiency, are encouraged to account for participants' unique learning styles. Importantly, not all ways of learning and means of assessment have been a significant part of everyone's educational background.

E-15. Certification

Training must include all knowledge required to challenge the Home Inspector Exam.

E-16. References and example curriculum

- ANSI/BPI-1200-S-2017
- Green Building Career Map
- Understanding by Design
- US Department of Labor's Renewable Energy Competency Model
- Weatherization Standardized Curricula: Weatherization Assistance Program

F. HYBRID/EV TECHNICIAN TRAINING RECOMMENDATIONS

There are relatively few training programs and standard curricula available to prepare people to service and repair hybrid and electric vehicles, in part because technologies are evolving quickly, electric vehicle technologies are often proprietary, and the electric/hybrid vehicle demand is still low in many areas. Therefore, what follows is a set of recommendations, rather than a standard curriculum framework for this focus area

Due to the growing demand for electric and hybrid vehicles in Illinois, Workforce Hubs, especially those hubs located in areas with a large demand for electric and hybrid vehicles, are encouraged to partner with existing automotive technician training programs to add hybrid/EV training components to their programs.

More and more municipalities in Illinois are electrifying their bus fleets, and there is a large demand in Illinois for bus and truck mechanics with training to diagnose, service, and repair these larger vehicles as well. Workforce Hubs that work with bus and truck technician training programs are encouraged to add hybrid or electric vehicle training components to their programs.

Training to maintain and repair hybrid and electric vehicles is typically approached as an advanced training topic, after technicians have mastered basic diagnosis, service, and repair topics (e.g., engine repair, automatic transmission, manual drive train & axles, suspension & steering, brakes, electrical/electronic systems, heating & air conditioning, and engine performance).

However, there is a growing need for *all* technicians to learn some electrical and safety basics so that they can safely service electric and hybrid vehicles.

For automotive training programs that wish to add an EV training component to their program, we offer the following recommendations:

- For all programs: Make sure your program has a strong electrical training foundation (such as a course on automotive electrical/electronic systems). This course could be adapted to include electric vehicle topics (see below).
- For all programs: Provide safety training for working with high voltage electric and hybrid vehicles, based on industry standards.
- Consider adding an advanced course that addresses basic maintenance and repair of hybrid and electric vehicles.
- Integrate hybrid and electric vehicle topics in other courses as relevant.
- Provide hands-on training on actual hybrid and/or electric vehicles or simulators, if possible, through connections with Original Equipment Manufacturers (OEMs).

- Develop strong connections to repair shops and dealerships servicing hybrid and electric vehicles.

Workforce Hubs may request program funds to develop and deliver a new hybrid/EV training component for an existing automotive program. Workforce hub program funds may be requested for training instructors to deliver the curriculum and for purchasing vehicles, simulators, learning materials, and other equipment. Training providers are encouraged to leverage industry partnerships and other funding sources to purchase vehicles and equipment as well.

F-1. Curriculum recommendations

Hybrid/electric vehicle curriculum should be developed through strong employer and industry input and based on industry standards, such as ASE standards.

Developing EV safety curriculum

The ASE Education Foundation's most recent 2023 Medium/Heavy Truck Program Standards includes a new "Electrified Vehicle High Voltage Safety" section under Electrical/Electronic Systems. The tasks in this section are also applicable for Automobile Programs and can be used to guide curriculum development on EV safety. The ASE Education Foundation expects to add these tasks to Automobile Program Standards soon.

The first five tasks in the Electrified Vehicle High Voltage Safety section are now required for all ASE accredited Truck Training Programs, including Inspection, Maintenance, and Minor Repair programs at high schools:

1. Demonstrate knowledge of hazards related to high voltage system/electric vehicles, including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations.
2. Demonstrate knowledge of high voltage system and component coloring, warning labels, lights, signage, and lock-out/tag-out procedures.
3. Demonstrate ability to identify which components and circuits contain high voltage.
4. Demonstrate knowledge of steps needed to assess possible hazards prior to servicing a high voltage/electric vehicle, including awareness of automatic systems that may operate while the key switch/ignition is off.
5. Understand limitations on which systems, components, and circuits of a high voltage/electric vehicle a technician is capable of safely servicing based on their level of training and qualification.

Tasks 6-10 below are now required for all ASE accredited Truck Service Technology programs and Master Truck Service Technology programs.

6. Demonstrate knowledge of special multimeters, insulated tools, and other test equipment required for use in high voltage/electric vehicle circuits.

7. Demonstrate knowledge of personal protective equipment (PPE) required for use in high voltage/electric vehicle circuits.
8. Demonstrate knowledge of proper procedures used to disconnect/isolate the high voltage traction battery.
9. Demonstrate knowledge of the use of a live-dead-live test to verify isolation of the high voltage traction battery.
10. Demonstrate knowledge of the testing and verification of ground circuit isolation between vehicle chassis ground and the high voltage circuits components.

We recommend that all training programs incorporate these high voltage/electric vehicle safety tasks into their existing electrical coursework or develop a separate class to address these topics.

Developing advanced EV service and repair curriculum

Programs that wish to go beyond these safety basics should consider adding a course that prepares students for ASE Light Duty Hybrid/Electric Vehicle Specialist (L3) exam. This exam is regularly updated to meet the changing demands of the industry. Updates for the 2023 version are currently underway and are expected to be available in the fall of 2023. A task list and sample questions for the older version can be found here.

Here are a few curriculum options to consider to prepare people for the ASE L3 exam:

- Electric and Hybrid Vehicles, 1st edition (Pearson, 2022). By James D. Halderman and Curt Ward. This training is appropriate for a 3rd or 4th semester course in electrical systems, though it can be used as a standalone curriculum as well. It is aligned with the ASE L3 exam and is part of the Pearson Automotive Professional Technician Series.
- Advanced Electric Drive Vehicle Education Program (National Alternative Fuels Training Consortium, 2013). Though the NAFTC is currently revising the curriculum to address battery electric vehicles in greater depth, the basic components of the curriculum are still relevant. It is aligned with the ASE L3 exam.
- Light Duty Hybrid & Electric Vehicles, 1st edition (CDX Learning Systems, 2023). By Mark L. Quarto and Nicholas Goodnight. This curriculum, aligned with the ASE L3 exam, prepares students to be entry-level technicians and covers topics including hybrid/EV safety systems, battery chemistries, power conversion, motor operation, and interconnected network dynamics. A textbook and online curriculum with resources for an online course are both available.
- Electric Vehicles: A Systems Approach (G-W, 2024). By Sean Bennett. This curriculum provides foundational knowledge to safely service all types of electric vehicles, with a strong emphasis on high-voltage safety.

F-2. OEM partnerships

Automotive programs in Illinois have partnered with several different Original Equipment Manufacturers, including Rivian and Ford, to offer training on specific proprietary hybrid or electric vehicle technologies.

Training providers are encouraged, if feasible, to partner with an OEM to provide hands-on training on specific hybrid and electric vehicle technologies. These partnerships also provide excellent opportunities for trainees to receive on-the-job training and to find employment after completing the training program.

F-3. Equipment needs

Simulators, videos, and virtual reality technology can be used to provide training on high voltage safety basics. Hands-on training on actual hybrid and electric vehicles is also recommended. Work with a local OEM partner to explore training equipment and vehicles that can be used.

Training programs should also have personal protective equipment (safety glasses, HV class zero 1,000-volt gloves), HV digital volt ohm meters that can handle up to 1,000 volts, milliohm meters, electrical-insulated EV tools, and insulation testers.

G. WIND TURBINE CONSTRUCTION AND MAINTENANCE TRAINING RECOMMENDATIONS

Workforce Hubs, especially those in areas where wind farms have been or are being developed, are encouraged to support or develop new wind training programs to train participants for entry level wind turbine construction or maintenance jobs, such as wind technician. Workforce Hubs may connect participants to existing wind training programs or on-the-job training or apprenticeships offered by employers.

To develop a new wind training program, Workforce Hubs and their training providers must have strong connections to wind employers to assist with curriculum development, work-based learning opportunities, and job placement. There must also be a clear demand for wind technician jobs in the region where the training will be offered.

There are few standardized, up-to-date curricula and certifications for wind turbine technicians and installers, in part because technologies are often proprietary. Therefore, what follows is a set of recommendations for developing a new wind turbine technician training program, rather than a standard curriculum framework for this focus area.

G-1. Program design recommendations

In Illinois and elsewhere, there are a variety of wind training programs that vary in length and design. Some wind training programs are part of a larger renewable energy program at a community college or technical school. Associate degree programs and shorter vocational certificate programs are both feasible. Larger wind employers often train people on the job rather than requiring people to acquire the training beforehand.

Wind technician curriculum should be developed through strong employer and industry input and based on industry standards, to the extent that they are available.

Safety and electrical fundamentals training

Wind employers that operate in Illinois have indicated that electrical and safety fundamentals would be very helpful for entry-level technicians. We recommend that training programs consider offering a short certificate program that covers these fundamentals to prepare people for entry-level employment and on-the-job training offered by employers. These topics might include:

- Safety
    - First Aid/CPR
    - OSHA 10 and OSHA 30

    - ENSA Climb and Rescue
    - Safe lockout practices
    - NFPA 70E Arc Flash Safety
- Electrical fundamentals
    - Current, voltage and resistance in different configurations of electrical circuits
    - AC/DC
    - Transformers & circuits
    - Electromagnetism and induction
    - Components of electric motors

Longer training programs (such as a renewable energy associate degree program) that have greater access to wind turbine components and systems might cover additional topics, such as:

- Hands-on training on wind turbine components and systems
- Hands-on training on installation, operation, maintenance, troubleshooting, and repair of wind turbine electromechanical systems
- Training on components and process of electrical power generation and delivery systems

G-2. Curriculum examples

- Introduction to Wind Energy; Wind Turbine Maintenance Trainee Guide, Level 1, Volumes 1 and 2 (Contren Learning [Pearson], first edition, 2011). By NCCER.
- Volume 1 Key content areas: Intro to Wind Energy, Intro to Wind Turbine Safety, Climbing Wind Towers, Intro to Electrical Circuits, Electrical Theory, Electrical Test Equipment, and Electrical Wiring.
- Volume 2 key content areas: AC and 3-phase systems, circuit breakers and fuses, switching devices, wind turbine power distribution systems, fasteners and torquing, intro to bearings, lubrication, intro to hydraulic systems.
- Maintenance Fundamentals for Wind Technicians (Cengage, 1st edition, 2013). By Wayne Kilcollins. Topics include intro to wind energy, tower safety, workplace safety, lubrication, fluid power, bolting practices, test equipment, component alignment, down tower assembly, tower, machine head, drive train, generator, rotor assembly, external surfaces, developing a preventative maintenance program, wind farm management tools.

G-3. Learning environment and format

Technical training may be offered through in-person classroom and lab-based courses, with extensive hands-on components. Access to either a computer lab or laptops is helpful to support student evaluation/testing and calculations. Portions of this curriculum may be taught using either synchronous or asynchronous e-Learning with the appropriate support systems.

Tools and equipment may include:

- Basic handheld tools (hammer, screwdriver, pliers, wire cutters, etc.)

- Access to power tools
- Access to electrical diagnostic equipment
- Multimeters
- Battery capacity testing devices (e.g., load tester)
- Course materials/books
- Access to training towers or tower simulation stands
- Access to full body harnesses for high-elevation safety training
- Laptops, tablets, and/or computer lab
- Software for estimation of wind turbine power generation and efficiency
- Software for electrical malfunction diagnosis

G-4. Certification

Safety certifications recommended include:

- Climb and Rescue
- OSHA 10 and OSHA 30
- First Aid/CPR/AED
- NFPA 70E Arc Flash Safety

G-5. Other references

- Office of Energy Efficiency & Renewable Energy Career Map: Wind Technician
- Northwest Renewable Energy Institute: Wind Turbine and Telecom Technician Training Program
- O*NET OnLine: Wind Turbine Service Technicians

REFERENCES

Building Performance Institute, June 10, 2020, *Energy Auditor Certification Scheme Handbook*, https://www.bpi.org/sites/default/files/Quality%20Control%20Inspector%20Scheme%20Handbook/Energy%20Auditor%20Scheme%20Handbook.pdf

Clean Jobs Midwest, 2022. 2021 Illinois Fact Sheet. Clean-Jobs-Midwest-2022_Illinois.pdf (cleanjobsmidwest.com)

Illinois Community College Board and Education Systems Center at Northern Illinois University, August 2021. *State of Illinois Model Programs of Study Guide: Architecture, Construction, and Energy.* http://edsystemsniu.org/wp-content/uploads/dlm_uploads/2021/04/Model-Programs-of-Study-Guide-Architecture-Construction-and-Energy-20210908O.pdf

Illinois Community College Board and Education Systems Center at Northern Illinois University, October 2020. *State of Illinois Model Programs of Study Guide: Manufacturing and Engineering.* http://edsystemsniu.org/wp-content/uploads/2019/11/Model-Programs-of-Study-Guide-Manufacturing-and-Engineering-20201014.pdf

Illinois Department of Commerce and Economic Opportunity, Education Systems Center at Northern Illinois University, JFF, and JPMorgan Chase, 2022. *Recommended Technical and Essential Employability Competencies for College and Career Pathway Endorsements*. https://edsystemsniu.org/wp-content/uploads/2020/05/PWR-Report-April2020-Final.pdf

Illinois Department of Employment Security (IDES). "Employment Projections." https://ides.illinois.gov/resources/labor-market-information/employment-projections.html

Illinois Department of Transportation, August 1, 2022. "Illinois Electric Vehicle Infrastructure Deployment Plan." https://idot.illinois.gov/Assets/uploads/files/Transportation-System/Planning/drive-electric/Illinois%20State%20Electric%20Vehicle%20Plan.pdf

Interstate Renewable Energy Council (IREC), 10 February 2022. "Clean Energy Career Maps." https://irecusa.org/career-maps/

Interstate Renewable Energy Council (IREC), 25 Oct. 2022. "National Clean Energy Workforce Alliance." 25 Oct. 2022, https://irecusa.org/programs/the-national-clean-energy-workforce-alliance/

Interstate Renewable Energy Council (IREC), July 25, 2022. *National Solar Jobs Census 2021*. https://irecusa.org/resources/national-solar-jobs-census-2021/

Katz, Jennifer, 2012. *Teaching to Diversity: The Three-Block Model of Universal Design for Learning.*

Keyser, David, et al., 2022, *United States Energy & Employment Report*. Department of Energy Office of Policy, Washington, DC. U.S. Energy & Employment Jobs Report (USEER) | Department of Energy

Muro, Mark, et al. Brookings Institute, Metropolitan Policy Program, 2019, pp. 4–40, *Advancing Inclusion through Clean Energy Jobs.* https://www.brookings.edu/research/advancing-inclusion-through-clean-energy-jobs/

NABCEP, 2011. *Objectives and Task Analysis for a Professional Small Wind Energy System Installer*. https://www.smallwindtraining.org/wp-content/uploads/2011/12/0-2010-Small-Wind-Installer-Job-Task-Analysis.pdf

NABCEP, December 2017. *PV Installation Professional Job Task Analysis*. http://www.nabcep.org/wp-content/uploads/2017/12/NABCEP-PV-Installation-JTA-12-14-17.pdf

NABCEP, August 2018. *PV Technical Sales Job Task Analysis.* https://www.nabcep.org/wp-content/uploads/2018/12/NABCEP-PVTS-JTA-8-18.pdf

National Renewable Energy Laboratory, 2011. *Job Task Analysis: Energy Auditor*. https://www1.eere.energy.gov/wip/pdfs/51672.pdf

National Renewable Energy Laboratory, 2020. *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030.* https://www.nrel.gov/docs/fy22osti/81486.pdf

National Renewable Energy Laboratory, 2019. *Weatherization Crew Leader Job Task Analysis*. https://www.nrel.gov/docs/fy19osti/73578.pdf

New York State of Energy Research and Development Authority, 2022. *2021 New York Clean Energy Industry Report*. https://www.nyserda.ny.gov/About/Publications/New-York-Clean-Energy-Industry-Report

Pollin, Robert, et al. August 4, 2022. Job Creation Estimates Through Proposed Inflation Reduction Act; Modeling Impacts of Climate, Energy, and Environmental Provisions of Bill. Political Economy Research Institute, University of Massachusetts Amherst. https://peri.umass.edu/publication/item/1633-job-creation-estimates-through-proposed-inflation-reduction-act

Sederberg, R, et al., April 8, 2022. *Green Jobs Now: Illinois*. Working Nation. https://workingnation.com/wp-content/uploads/2022/03/Green_Jobs_Now_Illinois_Final_April_8_2022.pdf

Smart Energy Design Assistance Center, 2020. Energy Efficiency Workforce Stakeholder Outreach Report.

Smart Energy Design Assistance Center, 2019. Literature Review: Workforce Development and Diversification for the Ameren Illinois Market Development Initiative.

Truitt, Sarah, et al. 2022, pp. 1–145, *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. National Renewable Energy Laboratory (NREL). https://www.nrel.gov/docs/fy22osti/81486.pdf

US Department of Energy Office of Energy Efficiency and Renewable Energy. "Hydrogen and Fuel Cells Career Map." Hydrogen and Fuel Cells Career Map | Department of Energy

US Department of Energy Office of Energy Efficiency and Renewable Energy, n.d. *Job/Task Analysis for an Operating Engineer/Building Technician.* https://www1.eere.energy.gov/buildings/commercial_initiative/pdfs/operating_engineer_jta_comment.pdf

US Department of Energy Office of Energy Efficiency and Renewable Energy. "Wind Career Map." https://www.energy.gov/eere/wind/wind-career-map

US Department of Labor. "O*Net Online." https://www.onetonline.org/

US Department of Labor Career One Stop, 2018. "Advanced Commercial Buildings Energy Management Competency Model." https://www.careeronestop.org/CompetencyModel/competency-models/Advanced-Commercial.aspx

US Department of Labor Career One Stop, 2019, "Commercial and Industrial Construction Competency Model." https://www.careeronestop.org/competencymodel/competency-models/construction-commercial.aspx

US Department of Labor Career One Stop, 2018, "Energy Generation, Transmission and Distribution Competency Model." https://www.careeronestop.org/CompetencyModel/competency-models/energy.aspx

US Department of Labor Career One Stop, 2017, "Renewable Energy Competency Model." https://www.careeronestop.org/CompetencyModel/competency-models/renewable-energy.aspx

US Department of Labor Career One Stop, 2019, "Residential Construction Competency Model." https://www.careeronestop.org/competencymodel/competency-models/construction-residential.aspx

WIOA Works Illinois. 2022. "2022 WIOA Regional and Local Planning." https://www.illinoisworknet.com/WIOA/RegPlanning.