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Energy Solutions' Response to IRA Contractor Training RFI

Additional submitted attachment is included below.

Energy Solutions' Response to California Energy Commission's RFI on Inflation Reduction Act Contractor Training Program

Docket 23-DECARB-01

Submitted September 25th, 2023.

Energy Solutions respectfully submits comments on the California Energy Commission's (CEC) August 28, 2023, Request for Information on Contractor Training for Inflation Reduction Act (IRA) Residential Energy Rebate Programs. Energy Solutions implements multiple energy efficiency and decarbonization programs in California and nationwide, and leads the program implementation team for the Technology and Equipment for Clean Heating initiative ("TECH Clean California" or "TECH"), a statewide market transformation program driving adoption of heat pump space and water heating technologies, and submits these comments on behalf of the TECH Clean California Implementation Team ("TECH Implementation Team").

We recommend the Commission consider the following overarching comments while designing a strategy for implementation of the IRA contractor training program.

- **Distinguishing Between Contractors, Service Technicians, and Installers**. There are many professionals that will require training, and multiple different existing pathways through which workers can be trained and certified. For example, while licensing is applicable to contractors, contractors employ service technicians and installers with different scopes, different requirements, and different training opportunities. The Commission should ensure that that IRA Contractor Training funds are not allocated solely to the "contractor" level, but utilized to develop the skills of the technicians and installers that they employ.
- **Leverage Exisiting Channels.** There are a multitude of exisiting pathways through which different contractors, installers, and service technicians might receive education on various aspects surrounding heat pumps. Rather than creating a new training framework, the Commission should leverage exisiting training channels and efforts to minimize market confusion and duplication of work.

Specific responses to each of the questions posed by the RFI are below.

1. Please provide information on available state and federal residential energy contractor training and similar programs in California, including a list of organizations currently providing training, credentialing, and/or wrap around services. Please include references on:
    a. Residential (single-family and multifamily) and commercial energy auditor availability and readiness;
    b. Available skills assessment reports for existing education and training programs, such as on new energy technologies, latest best practices, or newly launching programs.

TECH Clean California Training Resources

TECH Clean California currently provides a variety of residential energy contractor trainings on heat pumps and heat pump water heaters (HPWHs) via classroom, live webinar, and on-demand trainings. TECH Clean California also partners with distributors, manufacturers, and the DOE to provide heat pump trainings through exisiting channels. Additionally, TECH Clean California provides hands-on experience via HPWHs distributed to contractors through our "Learn and Earn" program, and donations of heat pumps to colleges and trade schools. A summary of the various trainings and associated resources TECH Clean California provides is below, in addition to other training opportunities from industry leaders.

Contractor Trainings

TECH Clean California Associated Trainings

Interested participants can register for in-person courses or view select trainings online at the TECH Clean California Training Hub hosted by The Switch is On, which includes trainings from Frontier Energy, the Association for Energy Affordability (AEA), the ENERGY STAR Heat Pump Water Heater Manufacturer Action Council (ESMAC), and the National Comfort Institute (NCI).[1]

ESMAC and TECH Clean California have collaborated to provide effective HPWH trainings, an effective approach that integrates invaluable product knowledge from technology manufactures with insights and information from California Incentive programs. A.O. Smith's comment letter in this docket (TN #251994) further elaborates on the benefits of this approach.

Specific trainings hosted on TECH's Training Hub include:

- **Required Participating Contractor Onboarding Training (for the TECH Program).** *On-Demand*. These courses provide a foundational overview of TECH Clean California, information about the incentive submittal process and participation in TECH Clean California initiatives. Hosted by Energy Solutions and Frontier Energy.
- **Residential Space Conditioning and Water Heating (Single Family).** *Three day in-person course*. This course provides a robust introduction to residential building electrification and is designed for construction trade personnel at all levels (e.g., owners, sales managers, salespeople, installers, service technicians, and office support staff). Only enrolled TECH participating contractors may take this course. Hosted by Electrify My Home.
- **Installing Individual Heat Pump Water Heaters.** *Live webinar.* Provides an overview of heat pump water heaters, their associated code requirements, and design considerations (i.e., installation best practices). Hosted by AEA.
- **Multifamily Electrification 101.** *Live webinar*. Discusses the benefits of electrification, current policy and code and project development considerations for new and/or retrofit projects. Hosted by AEA.
- **Multifamily Electrification: Retrofit Applications and Electrical Assessments.** *Live webinar*. Provides participants with an understanding of how to approach an electrification retrofit and what constraints/opportunities are available for multifamily buildings through example projects. Hosted by AEA.

[1] https://switchison.org/contractors/training-hub/

- **Multifamily Electrification Retrofits for Property Owners.** *Live webinar*. This course provides property owners with the tools and understanding to approach a successful electrification retrofit. Hosted by AEA.
- **Thermostatic Mixing Valve Training Course.** *Live webinar***.** This course provides an overview of how thermostatic mixing valves (TMVs) increase energy efficiency and comfort for residents. TMVs are code in many jurisdictions and a program requirement for California's HPWH programs, including TECH Clean California. Max Rohr of Caleffi Hydronic Solutions presents on how to install and use TMVs for heat pump water heater systems in existing homes. Hosted by AEA.
- **Introduction to Heat Pump Water Heater Education** (Partnership with ESMAC). *Live webinar*. Supplies participants with an overview of the TECH program, ENERGY STAR, and HPWHs. The course focuses on technology features and benefits, appropriate applications, energy efficiency comparison to other water heater types, installation techniques and best practices, service support and warranty, proper maintenance, troubleshooting, and selling strategies.[2]
- **Central Heat Pump Water Heater – Advanced Design and Installation (Multifamily).** *Live webinar*. This training is for contractors, MEPs, and installers interested in further developing their understanding of CHPWH systems, design, sizing, and installation. Hosted by AEA.
- **Multifamily Central Water Heating Field Training.** *Four hour in-person training*. This training is an in-field exploration of two central water heating systems and provides an opportunity for participants to see installations in the field, learn about design and operations from consultants, design teams, and manufacturers. Hosted by AEA.
- **Airflow Testing and Diagnostics**. *Eight hour in-person training*. This training opportunity is intended for HVAC contracting firm owners, managers, and technicians. It provides technical training on performing static pressure testing, how to professionally install static pressure test ports, and how to measure and interpret static pressures. Hosted by NCI.
- **Residential HVAC System Performance and Electrification.** *2.5 day in-person training*. A two-day advanced certification in Residential System Performance and a special half-day training focused on applying participant knowledge and skills to residential HVAC electrification. Hosted by NCI.
- **Refrigerant Side Performance.** *Two day in-person training*. This residential and commercial certification class provides students with real-world lessons and hands-on training based on proven techniques and approaches to refrigeration-side issues. Hosted by NCI.
- **High-Performance HVAC Design and Redesign for Electrification**. *Three day in-person training*. Participants learn to accurately complete four stages of system design using NCI and ACCA Manuals J, S, D, and T. Hosted by NCI.

TECH also allows participants to access ItsAboutQ's Online HVAC Training program, which provides free and online training opportunities for contractors to prepare of its Technical Core

[2] https://aea.us.org/wp-content/uploads/2023/06/TECH-Clean-California-ESMAC-Introduction-to-Heat-Pump-Water-Heater-Education.pdf

Assessment and NATE technician certification.[3] Courses are offered in both English and Spanish.

EnergyCodeAce™ Trainings

There are several trainings relevant to heat pump modeling, installation and permitting available on the EnergyCodeAce™ website.[4] EnergyCodeAce™ strives to make it faster and easier for each market actor in the compliance supply chain to effectively comply with California's building energy code (Title 24, Part 6) and appliance efficiency standards (Title 20) to help realize the full benefits of the Statewide Codes and Standards Program's advocacy efforts. The program is funded by California utility customers under the auspices of the California Public Utilities Commission and implemented by Pacific Gas and Electric Company, San Diego Gas and Electric and Southern California Edison in support of the California Energy Commission.

Utility-Sponsored Trainings

The various California utilities and RENs also offer utility-sponsored training center opportunities for interested participants related to heat pump HVAC and water heater technology.[5] Each opportunity is free and utilities and RENs consistently update their respective training calendars.

Air Conditioning Contractors of America (ACCA) Trainings

The Air Conditioning Contractors of America (ACCA) also hosts several educational opportunities for contractors/installers to participate in. The ACCA offers several different types of trainings for interested individuals, which provides participants with up-to-date information on the latest standards and certificates. There are following trainings that contractors/installers can take part in:[6]

- In-Person Trainings
    - **Residential HVAC In-Person Certificate Program** – A three day course covering Residential Design for Quality Instillation for contractors, technicians, design and utility personnel, wholesalers, energy commission officials, licensing and code officials, and other interested individuals.
    - **Light Commercial HVAC In-Person Certificate Program** – A four day class covering Residential & light Commercial design for Quality Instillations. Participants receive a five-year ACCA Certificate.
    - **Practical HVAC** – A three day course catering to service technicians, sales advisors, production managers, and installers offering a hands-on approach while providing on real-world instillation experiences.
    - **Manual J® in A Day** – A program designed for HVAC professionals that provides participants all the information necessary to intelligently use a computer-based system and calculate heat loss/gain calculations.
    - **Manual S® in A Day** – A program covering the fundamentals of residential equipment selection and becoming code compliant and deliver predictable comfort.
    - **Manual D® in A Day** – A course that covers the fundamentals of residential duct design.

[3] https://techcleanca.com/resources/additional-training-providers/itsaboutq/
[4] https://energycodeace.com/training
[5] https://techcleanca.com/resources/utility-training-centers/all/
[6] https://www.acca.org/certification

    - **Airflow Class in a Half Day** – A half day course that provides the foundation of airflow measurement in the field.
    - **Technician and Client Communication Training** – A course designed to prepare technicians to refine their customer communication skills to allow technicians to exude trust and likability by providing a affable first impression when conversing with customers.
    - **Residential HVAC Design with Wrightsoft** – A two day course that walks attendees through all the essentials using Wrightsoft's Right Suite Universal Tool (but not their mobile tools). The course is hands-on and starts with software setup, proceeding with load calculation, equipment selection, and duct design process.
- Live Virtual Training
    - **Design Essentials** – Participants are provided an opportunity to expand their knowledge in HVACR basics, with individual live virtual course covering a different topic in the HVACR industry.
    - **Residential HVAC System Design by RightTek** – A four-part series conducted over four days online for beginner HVAC contractors and introduce proper residential system design overview and installation procedures based on the ACCA Standard 5 – Quality Instillation manual. Course topics include overviews of Manual J, Manual S, Manual D, and HVAC Quality Instillations.
    - **RightTek Training** – Virtual courses that cover different topics in the HVACR industry that run about two hours each.
    - **Tech Rehab** – A technical series with many real-life examples for HVAC contractors focusing on system performance, diagnosing equipment, the benefits of indoor air quality equipment, sizing of ducts, and other HVAC topics.
    - **Consistency is Key** – A course providing participants with maintenance and documentation procedures in HVAC industry companies.
- On-Demand Training
    - Technical Training:
        - **Qtech – Affordable HVAC Training & Certification** – Several individual online courses built around ACCA standards that allow users to learn at their own pace and on their own time.
        - **Residential HVAC Online Certificate Program** – Like the Residential HVAC In-Person Certificate Program, except for individuals unable to attend the in-person course. The program is built around three modules that include video and audio presentations.
        - **Light Commercial HVAC Online Certificate Program** – A program designed for HVAC professionals working to calculate the heat loss/gain for commercial buildings, as well as, designing the ducted distribution systems for these structures.
        - **A2L Refrigerant Training** – This training is designed to help HVAC professionals prevent ignition while working with A2L refrigerants and educate participants on the best safety practices to keep them and their clients safe.
        - **EPA 608 Certification Test Prep** – A self-paced program that helps aid participants' efforts to become certified under the refrigerant recovery and recycling program of the United States Environmental Protection Agency (EPA).
    - Skills Training:

        - **ACCA Service Excellence Bundle** – A set of courses that are ideal for HVAC employees who interact with customers (i.e., CSRs, dispatchers, technicians, installers, and office staff).
        - **HVAC Code Essentials** – A three part course for code officials that cover residential HVAC design as required in Section M1401.3 (Equipment and Appliance Sizing) and Section M1601.1 (Duct Design) of the International Residential Code. Specifically, the three courses cover load calculations, residential equipment sizing, and residential duct system design.
        - **HVAC for Office & Sales Staff** – A self-paced online program that explains the basics of HVAC equipment, how important the HVAC contracting industry is, and how vital the role of each employee is in running a successful contracting company.
        - **Training and Client Communication Training** – A course designed to prepare technicians to refine their consumer communication skills.
- Private Training
    - ACCA offers private sessions for interested companies in any of the technical or skills trainings mentioned above (the form to sign up is hosted here)

TECH's "Learn and Earn" Program

TECH offers free HPWHs to participating contractor firms who complete training in its "Learn and Earn" program. Participants are required to take the ESMAC training and a HPWH manufacturer installer training to obtain this free unit. To date, the program has provided 241 units to qualifying participants. To receive these units, participating companies must work directly with their preferred distributor (via TECH), determine which models and sizes will make up their order(s), and provide the program with information on the number of sales/installations leads at the participating firm to receive a unit. After a unit is installed, participants are required to provide pictures and details of the installation process directly to TECH.

The "Learn and Earn" program is designed to ensure that sales and installation leads of participating firms receive direct experience with the significant benefits of HPWHs and make it as easy as possible for recipients to receive a free HPWH. Distributors are required to use a unique purchase order numbering system, which eliminates any potential opportunity for individuals or firms to game the system. Eligible recipients, after receiving a free HPWH, can confidently relay their satisfaction and experience using a HPWH directly to potential customers interested in purchasing a unit. This allows customers to make their decision to electrify a portion of their home from a more informed standing and can receive answers to technical questions directly during their initial interaction with sales/installation staff. The Learn and Earn program is a unique and successful model because it conforms to the existing operations of the HPWH supply chain, which allows for seamless integration of all market actors, from distributors to installers.

Donations to Colleges and Trade Schools

TECH has so far donated 44 heat pump units to Joint Apprenticeship and Training Centers/Committee (JATCs), Colleges, Trade Schools, and CBOs to support heat pump training. Reaching the upcoming generation of installers that are just beginning their journey in the skilled trades is an important piece of the workforce effort.

Faculty Heat Pump "Train the Trainer" Events

Alongside heat pump equipment donations to training centers, TECH is partnering with lead heat pump manufacturers to facilitate faculty "Train the Trainer" events to incorporate heat pump technologies into the curriculum of statewide HVAC and plumbing programs. These faculty "train-the-trainers" events allow faculty to educate the incoming workforce and offer instructions for participants to impart their newfound knowledge onto local workforces. However, integrating industry leaders into larger efforts to bolster a new generation of trade school/college faculty will require significant financial resources and institutional support to expand these offerings to a larger cohort of participants. Faculty members at trade schools and colleges need significantly increased financial support to develop their respective curriculums, upgrade their training labs with the newest and modern equipment, attend critical industry events to provide their students with the most up-to-date information, and financing the program accreditation process, just to name a few examples.

Distributor & Manufacturer Coordination

TECH works directly with partners to add clean space and water heating training to dealer events, distributor meetings, "counter days," and associate websites. TECH also sponsors trainings at The Institute of Heating and Air Conditioning Industries, Inc (IHACI) Annual Trade show in Pasadena and the Plumbing Heating Cooling Contractors of the Greater Los Angeles Area (PHCC) Flow Expo in Pomona. Trainings are largely focused around introducing heat pump technologies and their value proposition.

Other TECH Resources

During TECH's 2022 Quick Start Grant program cycle, Richard Heath & Associates, Inc (RHA) was awarded funding to develop a best practices manual for HPWH instillation.[7] This open-source document could act as a standardized foundation for contractor training for HPWHs. This field guide is piloted by a small group of contractors located within SoCalGas's service territory who serve households that directly benefit from the California Energy Savings Assistance program (ESA).

TECH has also partnered with the Switch is On to develop a training hub for participants to access additional on-demand, online, and in-person training opportunities.[8] Currently, the only training opportunities are those listed previously (see Contractor Trainings), but more resources populated by NEEA, AWHI, EnergyStar, Pacific Northwest National Laboratory (PNNL), manufacturers, and others will be available for interested parties in the future. Examples of upcoming trainings will include courses on whole home retrofits, pre-electrification planning, and panel optimization strategies.

Available Skills Assessments

The Department of Energy's (DOE) Building Science Education Solution Center (BSESC) provides free and on-demand training materials specifically for heat pump and HPWH technologies, by occupation and by technology, as well as a list of DOE-recognized programs and certifications for each.[9]

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[7] https://rhainc.com/wp-content/uploads/2023/09/RHA-Best-Practices-for-the-Retrofit-Installation-of-Heat-Pump-Water-Heaters-2023.pdf
[8] https://switchison.org/contractors/training-hub/
[9] https://bsesc.energy.gov/

Heat Pumps: There are several DOE-recognized certifications for Heat Pump installation and comfort advising. The North American Technician Excellence (NATE) Certification offers Heat Pump Service Specialty and a Heat Pump Installation Specialty certification. Similarly, HVAC Excellence offers two recognized certifications, one for Heat Pump Service and one for Heat Pump Installation. SMART Local Union No. 265 Training Program is also a recognized program. Additionally, while it is not yet recognized on the BSESC, the Building Performance institute maintains an AC & Heat Pump Professional certification.

Heat Pump Water Heaters: While there are no certifications listed on the BSESC's website for HPWHs, ESMAC's HPWH installer training was recently approved for recognition on the BSESC's website. This is the same training that is currently offered by TECH, in partnership with ESMAC, to TECH participants.

There are also existing HPWH installer programs managed by manufacturers where individuals can become certified to work on and manage HPWH projects. However, because these programs do not share a unified curriculum, this pathway could result in significant discrepancies in knowledge base amongst "qualified" individuals. Standardization of HPWH certifications should require a formal certification from a respected authority, like the DOE, as an industry baseline.

The CEC should continue to monitor the BSESC website for other upcoming industry training opportunities from PNNL and other organizations, and disseminate notifications to firms working in on HPWHs on the publication of new opportunities.

BSESC currently offers the following online and on-demand training modules on HPWHs:

- Introduction to HPWHs – Includes information on how HPWHs operate and create hot water more efficiently than conventional gas/oil or electric element water heaters, in addition to extoling the benefits of HPWHs for consumers and sellers.
- Decision Guidance on HPWH – Provides guidance and information on how to select the ideal HPWH unit that best meets the needs of a residence.
- Installation of HPWHs – Addresses the process of acquiring permits, preparation for HPWH installation, and how to initially start a HPWH and maintain it over a unit's lifetime.
- Load Shifting – Introduces information on the concept of load shifting for HPWHs and the communication devices/connection ports that enable it on a unit.

Energy Assessments: There are several DOE-recognized certifications for the energy assessment occupation, including the American Society of Heating, Refrigeration, and Air-Conditioning Engineers' (ASHRAE) Building Energy Assessment Professionals (BEAP) certification, the Association for Energy Engineers' (AEE) Certified Energy Auditor certification, the Building Performance Institute's (BPI) Home Energy Professional Energy Auditor certification, and the Residential Energy Services Network (RESNET) HERS® Rater certification.

2. If IRA Contractor Training funds are used to supplement existing workforce development programs in California, which programs are most closely aligned with the goals of the IRA Contractor Training Program?

The goal of the TECH program is to instigate increased market transformation of heat pumps in California by identifying and remedying the gaps and barriers preventing accelerated adoption. One of the major barriers that TECH has identified to heat pump adoption statewide is the lack of a properly trained workforce. TECH's contractor training model is focused on dramatically impacting the adopting of clean space and water heating technologies, as well as instilling best practices that lead to high customer satisfaction. TECH Clean California's numerous contractor training initiatives are outlined in our response to Question 1. TECH's workforce development goals are aligned with the IRA Contractor Training Program's goals of working to reduce the cost of training contractor employees by providing the necessary tools for contractors and their employees. TECH's workforce development trainings were created to spur the clean hearing market in California through statewide strategies, create scalable models through regional pilots, and inform the long-term building decarbonization framework of California, which aligns with the overarching goals at the foundation of the IRA Contractor Training Program.

The CEC could utilize funds to supplement WE&T activities that TECH has instigated. With these funds, the CEC has an opportunity to augment TECH's existing efforts through channels that are already developed, enabling these strategies to scale up to reach communities that are not currently participating or that TECH Clean California is unable to reach. This strategy would help to accelerate the adoption of heat pumps in California while also expanding the pool of eligible contractors to receive training and certifications to install this technology.

The TECH Team has listed several comprehensive recommendations in Section 3 of this our response. We believe that aligning the IRA Contractor Training Program with both TECH and the statewide QHVAC program, as well as current utility programs, would be the most beneficial and cost-effective option to ratepayers and taxpayers. We advise the Commission to avoid duplication of efforts and potential market confusion by leveraging exisiting initiatives and channels.

We highly recommend the CEC partner with key industry stakeholders that are actively developing trainings in the space and build upon what already exists. Key stakeholders include: ENERGY STAR, Heating, Air Conditioning Refrigeration Distributors International (HARDI), the Air Conditioning, Heating, and Refrigeration Institute (AHRI), product manufacturers, Air Conditioning Contractors of America (ACCA), Institute of Heating and Air Conditioning Industries (IHACI), Plumbing Heating Cooling Contractors Association (PHCC), Electric & Gas Industries Association (EGIA), HVAC Excellence, United Association of Journeymen Apprentices of the Plumbing and Pipe Fitting Industry (UA), NATE, Women in HVACR, and the Building Performance Institute (BPI).

3. What gaps in existing workforce development programs in California can be addressed through the IRA Contractor Training Program? What is the current supply of qualified skilled energy efficiency workers compared to the projected future demand?

There are several different types of professionals that will require training, and multiple different pathways in which workers could be trained and certified. Importantly, service technicians, installers, and contractors will all likely benefit from different targeted trainings.

1) **Technicians** – Specialize in system maintenance and repairs. Should receive specific training on the value and specifics of system maintenance and be presented examples of commonplace repairs that they will likely encounter.

2) **Installers** – Install new products like HVAC and water heaters. Should be trained on installation specifics, such as load calculations, refrigerants, optimal zoning and unit placement, air flow/ductwork optimization, and complimentary shell measures.
3) **Contractors** – Hold the Contractor State License Board (CSLB) licenses for work in specific trades. Contractors should receive training on customer economics and value proposition (sales training), diagnosing customer comfort use issues, and how to offer the right products and technologies that meet the customer's needs.

Gaps in Existing Workforce Development

The gaps in the existing workforce development can be categorized into four topics:

1. **Pipeline**: The flow of new workers into the skilled trades.
2. **Electrical Panel Training**: Panel optimization is necessary for electrification efforts, but trainings on electrical service upgrades can often be overlooked.
3. **Accessibility**. Training infrastructure exists but can be inaccessible to potential trainees. Accessing training from the few major training centers in CA often requires travel and lost work days for contractors.

Pipeline

Around the globe, there are increasing shortages of new workers entering the skilled trades. Fewer individuals view the trades as a viable employment opportunity that can be sustainable for several years. Yet, the demand and push for building electrification is accelerating. This dichotomy presents a significant challenge for California to meet its mandated greenhouse gas emission reduction goals, especially when considering goals attributable to decarbonizing the building sector.

The estimated investments required to electrify 100 percent of California's existing and new buildings – a goal aligned with Governor Brown's 2018 Executive Order B-55-18, which calls for California to be carbon neutral (zero net GHG emissions) by 2045 – would require over 100,000 full time workers in the construction industry.[10] To ensure that all residential retrofit projects in California meet industry performance and quality standards, California would need to accelerate the school-to-employment pipeline to incentivize 26,000-39,000 individuals to enter the workforce.[11]

Ensuring that recruitment efforts are extensive and lead to legitimate employment opportunities is the first step to solidifying this pipeline. Companies should utilize all opportunities to connect with soon-to-be graduates about jobs pathways available and collaborate with trade schools to develop curriculum that will position graduates to enter the workforce quickly. However, the CEC should also consider how to strengthen support past the recruitment phase and expand to incoming students/faculty, those currently enrolled in a program, and students about to graduate and are starting to seek employment.

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[10] California Building Decarbonization Workforce Needs and Recommendations. https://innovation.luskin.ucla.edu/wp-content/uploads/2019/11/California_Building_Decarbonization.pdf
[11] California Building Decarbonization Workforce Needs and Recommendations. https://innovation.luskin.ucla.edu/wp-content/uploads/2019/11/California_Building_Decarbonization.pdf

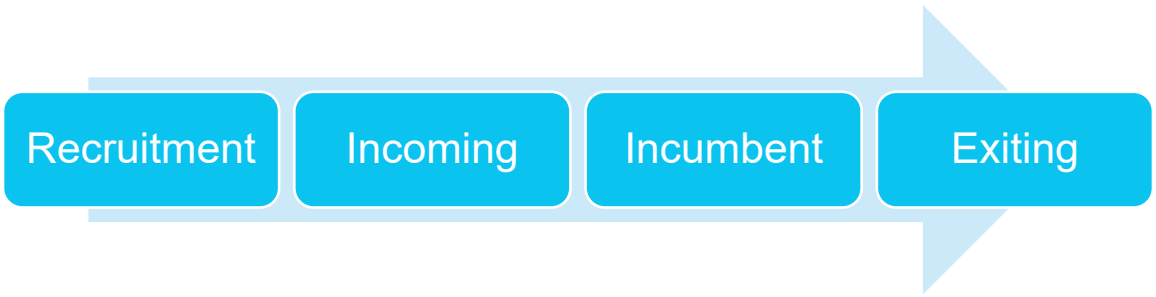

Figure 1. Four stage depiction of the recruitment and training pipeline for new members of the workforce. Each stage requires different interventions.

Recruitment

Start Awareness Early

Impressions of the trades start young and should be reinforced at the high school level. School projects to learn subjects such as load calculations and "a day in the field with a technician" would help young people determine if there is a home in the trades for them. Students leaning towards a career in environmental studies should be especially encouraged and made aware that not all these jobs involve a desk and sitting at a computer all day – the next generation of environmental experts will be the ones working in the field and changing their communities by helping others experience the benefits of clean energy and clean technologies.

Scholarships for Trades

An identifiable gap in the market adoption is the diminished "pipeline" of younger workers entering the trades.[12] More scholarships should be made available to all persons who wish to explore a career in the trades, especially in disadvantaged communities (DACs). Program outreach should start at the late high school level (i.e., Junior and Senior) and reach out to teenagers interested in science and environmental studies. Scholarship opportunities should reiterate that these are the trades workers of the future, can lead to good-paying jobs, and are readily available for anyone interested.

Industry Support for Career and Technical Education (CTE) Programs

Of note, on March 29, 2022, several industry trade associations (i.e., AHRI, ASHRAE, GEO, HARDI, IGSHPA, PHCC, and RSES) submitted a letter to Congress in support of legislative proposals to increase funding for existing career and technical education (CTE) programs, as well as policies that would provide affordable tuition options for individuals who complete qualifying heating, ventilation, air conditioning, and refrigeration (HVACR) technician training and certification programs.[13] The letter requested that policymakers support and encourage students who choose to enroll in community college, or other CTE programs, that prepare and qualify individuals for careers as HVACR technicians and potentially small business owners by providing these students with affordable tuition options. These trade associations asserted that this approach would incentivize individuals who are considering a career in the HVACR and

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[12] "You Bring HVAC Systems to Life!", https://www.contractingbusiness.com/residential-hvac/article/20870955/you-bring-hvac-systems-to-life

[13] http://newsmanager.commpartners.com/ahri/downloads/April%202022/Workforce%20Development%20Letter%20-%20Support%20for%20Community%20College%20and%20CTE.pdf

water heating industry. Support for affordable tuition options would also work to establish an adequate labor supply for both manufacturers and the public. Qualified contractors who complete the required licensure and certification programs, can help maximize the safety, energy efficiency, and consumer comfort of installed equipment by ensuring equipment is properly installed and functioning as designed. Individuals who pursue these careers can see many benefits that include stable employment, good wages and benefits, avoidance of student debt, and the opportunity to begin working while training.

Incoming

Provide Instructors with Professional Training

Trade school and college faculty who are teaching this new generation of workers should be required to incorporate new-generation heat pump technologies into their curriculum. However, instructors may not have the most recent technology to use as hand-on examples of their curriculum for the current cohort of students. The CEC should facilitate collaboration between employers and trade school faculty to incorporate trainings prior to the academic year, similar to trainings incoming contractors/installers must undergo to receive their respective certifications. Additionally, it would be beneficial for these trade schools and colleges to establish formal lines of communications with manufacturers, industry partners, and trade associations for up-to-date support and information on training opportunities for faculty and students to enroll in.

Align Curriculum with Industry Competencies and Standards

Current and upcoming trade school curriculum should be updated to meet the changes required in the current marketplace. The CEC should work with trade schools and colleges to update their curriculums and ensure that they are aligned with the newest standards and regulations set by the United States Department of Energy.

Incumbent

Outfit Training Laboratories with New-Generation Heat Pump Equipment

The CEC should require that training laboratories in trade schools and colleges are supplied with current generation heat pump equipment. Older models might be useful to educate students on the basic functions of heat pump equipment within an academic setting, but newer models can help ensure that graduates are comfortable with the newest technologies and can respond to any potential technical issue they might encounter when employed.

Creating and Subsidizing Internships

Paid internships can be a valuable way for students to gain real-world experience and develop their passion for their industry. The CEC should explore creating and subsidizing an internship program for HVAC with plumbing companies who adopt heat pump technologies. This would allow potential employers to collaborate directly with trade colleges/schools and begin laying the foundation for students to transition almost immediately after graduating into the work force. Trade colleges/schools could work in partnership with employers to develop educational courses that students could utilize during their internship, securing real world application of their educational work.

Support On-the-Job Training Opportunities in Academic Institutions

There are only a few community colleges in California that offer installation courses in their respective curriculums. However, these academic institutions do not offer on-the-job training opportunities in conjunction with the course, leaves students at a disadvantage when determining whether to pursue a career in the trades. Academic theory and practice within a

classroom setting can only go so far to prepare students for the trade. The CEC should consider utilizing funds from the IRA Contractor Training Program to offset a portion of the costs for industry employers that express interest in collaborating with trade schools and colleges to implement on-the-job training opportunities as a core requirement of a student's academic journey.

Identifying Industry Partners to Enhance the Program and/or Create a Program Advisory Committee

The CEC should bring together trade schools, industry partners, and CBOs to create an advisory committee that monitor and evaluate the rollout of the state's Contractor Training Program and make recommendations on improvements if/when necessary.

Exiting

Uniting Program Graduates with Industry Leading Employers

A major issue for program graduates is finding employment within a reasonable timeframe after graduation. The CEC should require trade schools and colleges to host a certain number of networking events between students and potential employers every school year. Programs can be evaluated based on the number of students that are employed after six months of graduation. Retired HVAC professionals could also be recruited to provide field QA services and field mentoring so that less institutional knowledge is lost.

Create a Central Data Repository for Contractors and Customers

Currently, manufacturing and industry training opportunities and educational materials are scattered and housed on different websites. This makes finding the appropriate information challenging and confusing to someone without years of industry experience. Customers hope for the most seamless experience possible and recent graduates are often overloaded with the information thrust upon them post-graduation. The CEC should work with industry leaders and academic institutions (i.e., trade schools) to develop a central data repository of information for existing contractors and customers to access with up-to-date information on training opportunities, industry-approved educational materials, and certifications, in addition to socializing extensively in all available venues.

Subsidizing Kits for New Workers

Individuals close to graduating from trade colleges/schools could be provided with subsidies for the tools they are expected to have on their first day on the job. Tool requirements can be a substantial financial barrier for students trying to enter the workforce. Subsidized tools would allow students to begin working immediately after graduating, while also removing an additional financial burden for students and their future employers.

Electric Panel Optimization Training

Electrical panel optimization is perhaps the single largest gap in existing training opportunities available for technicians, installers, and contractors in preparing the workforce for building electrification. Decarbonization efforts across California will result in a significant increase in household electric load for many homes, requiring an upgrade to service panels. Not all electric panels across the state will require upgrades in the short term, but as decarbonization efforts ramp up across the state, so will the need for electric panel upgrades.

Furthermore, utility constraints on panel approvals and service line upgrades can create a bottleneck for addressing panel optimization. A limited pool of qualified workers only exacerbates the issue. Training installers in electrical panel optimization is vital to the successful electrification of California, particularly in census tracts with older homes vintages.

Accessibility to Training

Additional funds from the IRA Contractor Training program could be used to enhance the accessibility of existing program trainings. Existing trainings can often be geographically constrained, which presents a significant barrier for potential trainees for which an in-person training is not within a feasible proximity. The CEC could utilize IRA funds to support improving the accessibility of existing training programs, perhaps via a mobile training unit.

For example: California's adoption of HPWH technologies has been highly constrained by insufficient installer training and a lack of familiarity with the product. Technology does not change rapidly within the plumbing industry, unlike in HVAC or other trades that manage a constant influx of new technology and advanced materials. Encouraging appropriately licensed plumbing contractors to take additional training related to heat pump water heating has been particularly challenging for TECH. The primary reason is that plumbing business models are driven by volume. By taking installers out of the field to attend a training, the contracting company will have to absorb a revenue loss. To overcome this barrier, the IRA Contractor Training program could subsidize trainees or contractors at a reasonable rate of, for example, $300 a day per contractor/installer.

We suggest these trainings could be delivered through the existing network of Community Action Partnerships (CAPs) and the CEC could partner with TECH and other stakeholders to build out training centers / mobile training centers that would serve all of California. The CAPs would be able to recruit from deep within their respective communities and focus on contractors working in disadvantaged areas. They could also for the beginnings of a pipeline effort to offer internships, a “day on job” for small groups of students to get a feel for the work, and entire class projects volunteering to help upgrade homes of disabled or disadvantaged residents (e.g., partnering with local groups such as Habitat for Humanity or other block grant groups).

Increasing the accessibility of trainings by bringing training directly to communities and subsidizing workers to enable them to attend would overcome perhaps the most critical existing gap in workforce training efforts in California.

4. What certifications should be funded through contractor training for residential energy rebate programs in California to support the purpose of this funding and lead to good-quality jobs? As stated in the guidance from the U.S. Department of Energy on this topic: good-quality jobs are jobs that pay sustaining wages with wage progression, benefits, access to paid leave, opportunities for career advancement through training and education, adequate staffing, safety and health protections, nondiscriminatory and harassment-free workplaces that promote Diversity, Equity, Inclusion, and Accessibility (DEIA) and, to the strongest extent possible, a platform for worker voice that supports all workers and ensures fair pay and safe working conditions.

It is important to distinguish between licensing and certifications. Contractors are licensed; individual workers (technicians and installers) are certified. Certifications for technicians and installers provide a pathway to stable employment and higher compensation, however, for these certifications to lead to "good quality jobs," these certifications must be valued by customers. A public awareness campaign highlighting to customers that advanced certifications of their employees could be highly valuable in this regard.

Currently, the industry provides several worthwhile credentials and trainings for contractors and their employees across California. However, there is a substantial opportunity for the Commission to create "bridges" among a fragmented training program landscape.

Increasing Access to Credentials

There are existing industry-recognized credentials that exist within and support the HVAC marketplace (e.g., NATE, UA Star Certification, HVAC Excellence Certification, etc.). The CEC should continue to support these existing credentials and consider how they can be enhanced and accelerated by the development of trainings under the IRA Contractor Training program. However, is not currently an industry recognized credential for HPWHs, although one is being discussed by ESMAC and BPI.

Below is the list of examples of industry credentials:

- NATE Industry Competency Exams
- HVAC Excellence Employment Ready
- BPI Air Conditioning & Heat Pump Professional
- UA Star Certifications
- NATE Certification with Heat Pump Service Specialty
- NATE Certification with Heat Pump Installation Specialty
- HVAC Excellence Heat Pump Service
- HVAC Excellence Heat Pump Installer

There may be different paths (e.g., apprentice programs or other certification pathways) to continue developing the school-to-workforce pipeline for HPWH workforce development. We recommend that the CEC's support should involve staff developing desired KSA outcomes that are applicable (new to industry to very experienced), attainable, and accessible to all. These KSA outcomes should be included as an additional requirement for certification.

The CEC should work to assist individuals in obtaining these credentials, in addition to subsidizing trainings to make them more available and readily known to installers. We recommend that subsidization should cover the cost of sitting for these exams, as well as training time spent in trainings that lead to the credentials. We suggest that this subsidization total $300 dollars per day per attendee.

5. What data is available to demonstrate that the proposed certifications in your response to Question 4 align with the skills and needs of California, meet energy workforce demands, and prepare that workforce to deliver energy efficiency, electrification, and clean energy improvements?

The Home Energy Rating System (HERS) providers approved by the CEC should be able to offer some meaningful insights into this question. HERS providers can provide the CEC with insight into what are the appropriate steps for installers must undertake for a project to receive verified field performance, under California's Building Energy Efficiency Standards, and the process of securing a registered certificate from a HERs rater.[14] Currently, two entities have been approved by the CEC to train and certify HERS raters for the 2022, 2019, 2016, and 2013 Energy Codes: CalCERTS, Inc. and CHEERs, Inc.

6. What performance metrics and numerical targets should California use to measure impact throughout the 48-month period of performance of DOE funding sought by the CEC to provide contractor training for the IRA residential energy rebate programs?

The CEC should consider the following performance metrics and numerical targets during the DOE performance period to gauge success and impact of the IRA residential energy rebate program funding:

General Metrics

- The number of people sitting for certification(s)
- Capacity of training courses (and percent filled)
- The number of individuals taking test per day/week/month
- The number/percent of individuals that successfully passed their certification test
- Number of credentials earned by participants
- The rate of employment of trainees post-graduation
- A program's California Contractors State License Board (CSLB) number to quantify installs directly attributable to the program
- Amount of college programs receiving accreditation
- Quantity of faculty getting credentialed to teach a related training program
- Number of accredited schools providing certifications

Equity Metrics

To determine equity benefits, many of the metrics that could be used to measure success of the program could be furthered segmented to measure the impact (and relative impact as required by Justice40) delivered to equity communities. Many metrics describe above could measure impacts in Disadvantaged Communities (DACs)[15] or participation by contractors who reside or deliver services in DACs, for example:

- Percent of training offerings within DACs vs. non-DACs
- The number of people sitting for certification(s) who reside in Disadvantaged Communities (DACs)[16]
- Number of trainings delivered in DACs
- Participants residing in DACs who receive trainings as delivered by Community Action Partnerships (CAPs)

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[14] https://www.energy.ca.gov/programs-and-topics/programs/home-energy-rating-system-hers-program/home-energy-rating-system

[15] As defined by the federal Climate and Economic Justice Screening Tool to align with Justice40 https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

[16] As defined by the federal Climate and Economic Justice Screening Tool to align with Justice40 https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

- Number and/or percent of certified individuals who speak a language other than English
- The number of individuals that successfully passed their certification test who reside in or primarily service DACs
- The rate of employment of trainees post-graduation in companies that reside in or primarily service DACs
- Number of contractors/installers primarily providing services in DACs, income-qualified housing, etc.

Existing Metrics

The CEC should also consider utilizing already existing performance metrics and numerical targets during the DOE compliance period for the IRA Contractor Training program. Examples of existing metrics are:

- Pre/post-test assessments of training participants
- Competency-based assessments of training participants
- Transition time between training activities (i.e., number of individuals from a pre-apprenticeship program hired by a union or private firm)

7. In the Community Benefits Plan required as part of the CEC application for DOE funding for contractor training for IRA residential energy rebate programs, how should the program ensure the delivery of measurable community and jobs benefits, and: 1) support meaningful community and labor engagement; (2) invest in America's workforce; (3) advance diversity, equity, inclusion, and accessibility; and (4) contribute to President Biden's goal that 40 percent of the overall benefits from certain federal investments flow to disadvantaged communities under the Justice40 Initiative.

To achieve meaningful benefits in alignment with the goals of Justice40, the IRA Contractor Training program will need to substantially invest in programs that achieve benefits in disadvantaged communities. Justice40 requires that 40% of benefits flow to disadvantaged communities, as opposed to 40% of investments. Because exisiting infrastructure often enables more cost-effective benefits in non-DAC areas, benefits to DAC often require more investment, meaning that a majority of program funding should be allocated to achieving benefits in DACs. These benefits can be measured by metrics proposed in Question 6.

Leverage Community Action Agencies (CAA) and Community Action Partnerships (CAP)

California's regional Community Action Agencies (CAA) and Community Action Partnerships (CAP) present an ideal existing framework that the CEC should leverage to expand existing offerings and maximize the impacts of the IRA residential energy rebate contractor training program. CAAs and CAPs are local non-profit and government organizations that provide a variety of services towards lifting people out of poverty. They are deeply embedded within their local communities and have existing relationships with contractors, including many contractors outside of those who traditionally participate in utility programs. The CAPs are also closely tied to local economic development efforts. Working with CAPs can help distribute resources to a far greater range of areas well outside the easy travel times to IOU training centers. Furthermore, CAPs have strong connections with local and regional Community-Based Organizations (CBOs), that are trusted by their respective communities and can provide additional insight to

specific needs of the community. Guidance from experienced administrators will help build capacity at local CAPs and streamline their operations to work within the reporting requirements of large programs, and not bog down the operations of CAP partners so they can do the work they do best.

Mobile Training Units

Existing contractor trainings are often hosted at IOU training centers or educational centers that may be prohibitively far for trainees located in more remote or underserved communities. The CEC should consider initiatives that would result in the deployment of mobile training units, in partnership with the CAPs, to deliver in-person trainings directly to communities. A mobile training unit strategy would lower the barriers of participation (i.e., time, money, geographic location, etc.) of many potential trainees and could result in more potential installers, technicians, and contractors integrating into the credential pipeline. Mobile trainings could be hosted at commonly visited locations (e.g., a local high school) that community members are familiar with and likely already travel to on a regular basis. These mobile training units would also provide a more accessible opportunity for individuals to receive the necessary accreditation certificates (e.g., HVAC Excellence) to begin taking on heat pump work opportunities.

Build or Empower Additional Training Centers

The CEC should consider allocating funds towards constructing additional training centers dedicated to facilitating increased heat pump workforce development. Existing training available in a proposed region would be integrated into one singular location with experienced faculty to deliver trainings to students and the workforce (i.e., train faculty members who then are prepared to train the current/future cohort of students, as well as interested DIY community members). A facility would provide participating students and faculty with the tools, networking opportunities, and hands-on experience necessary to begin a successful career in heat pump installation. However, this option is only viable depending on location and success of existing heat pump-related programming.

Alternatively, the CEC could equip existing non-profit training centers to better provide trainings and accommodate an influx of trainees. We suggest the CEC evaluate existing training facilities and programming, identify gaps, and allocate additional funding to prioritized needs.

Funding Internships and Externships

IRA Contractor Training program funds should also be directed towards supporting internships/externships for anyone interested in/already involved in an electrical trade to gain real-world experience. These can take the form of union and non-union companies providing apprenticeships and internships/externships. Manufacturers and distributors also have programs that allow for a select number of internships/externships for participating students or trainees. Funds from this program should go towards covering the costs associated with these internship/externship programs. Additionally, funding could also be utilized by faculty to help educators cover the associated costs with obtaining their teaching credentials.

Funding could be used to develop a program to deploy these funds to CAPs for students to receive on-the-job training specific to HPWH training. However, schools and contractors would likely be unable to manage this program and would need the intervention of a third-party to administer this program.

8. Input on other topics welcomed.

The following issues (coordination on retrofits that require multiple contractors and simpliciation of the permitting process) are a policy / governance issues unlikely to be addressed by the IRA Contractor Training Program. However, we wanted to elevate the topic to the CEC as both are substantial considerations when evaluating logistical barriers related to contractors.

Coordination on Retrofits that Require Multiple Contractors

The lack of coordination between contractors working on retrofit projects continues to affect the utility-landscape and creates an ongoing backlog that delays California's push toward electrification. Currently, a heat pump installation requires a contractor with an HVAC license, as well as an electrician to complete aspects of the installation. Specialty licensed contractors are unable to work together on complex projects without a B (General) license. A contractor who obtains a B license can complete all different aspects of a job necessary to transition a residential unit towards all-electric. However, only 16% of contractors enrolled or participating in TECH have the B license, creating a logistical issue resulting in a backlog of partially completed projects that need only a few more hours to finish, costing time and money for customers and contractors. Yet, these companies are not uniformly represented.

As of July 2023, 104,709 B licenses have been issued in California. California needs more B license contractors to participate in California's push for electrification. The CEC can help accomplish this by developing an expedited system to issue B licenses to interested and qualified contractors. The CEC should also consider options that could make it easier for B license holders to take on the majority of a project's tasks without additional coordination, such as when the project falls within the parameters of an emergency replacement setting.

Simplification of Permitting Process

The CEC should deliberate what efforts can be made to simplify the overall permitting process for HVAC installation, as permitting can present a substantial barrier to installing heat pumps. Ideally, the permitting process should ensure that installers are able to act during emergency replacement scenarios and ensure full satisfaction of the end customer promptly and effectively.

The Center for Sustainable Energy ("CSE") previously surveyed local building departments and found that only 30% use a checklist or a reference tool to ensure that appropriate compliance documentation is provided with the permit application.[17] The CSE survey also found that for 50% of the cases, permit applications are either unaccepted by local building departments or returned due to incompleteness associated with the Title 24 requirements.

The CSE survey determined the following as the most significant barriers to permit compliance in residential alterations:

1. 86% of contractors and HERS raters attributed it to the cost to homeowners and contractors.
2. 39% attributed it to the lack of knowledge/understanding of the permit process.
3. 63% attributed it to the lack of knowledge/understanding of the energy code.
4. 36% attributed it to the determination of applicable requirements.

[17] https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf

5. 74% attributed it to the compliance forms/paperwork.