WHPA Work Product Summary

DATE: April 9, 2014

INITIATING BODY: WHPA HVAC in Whole Building Education Committee

WORK PRODUCT NAME: HVAC in Whole Building Performance Education Industry Roadmap

TYPE OF ACTION REQUESTED: ☒ **VOTE** ☐ **GUIDANCE** ☐**OTHER**: The Initiating Body requests that the WHPA Executive Committee (EC) review the referenced Work Product and vote to (1) approve the Whole Building Education Committee's planned efforts to develop a more detailed roadmap, including a recommended workforce tier-level competency model, (2) initiate other recommended actions discussed in this Roadmap, and (3) escalate this Roadmap as deemed appropriate. Should the EC not approve the work product in its entirety, it is requested that the EC provide clarification on which portions are and are not approved with reasons explained for any exceptions as well as direction for any next steps.

APPROVAL HISTORY

COMMITTEE: WHPA HVAC in Whole Building Education Committee (CLEESP Goal 3.3)

☐ **BY CONSENSUS** ☒ **BY VOTE**

TALLY: An email vote to confirm approval of the motion made at the March 28, 2014 Committee meeting to escalate the Industry Roadmap to the WHPA Executive Committee was conducted with the 15 voting members. The motion carried with 14 approvals, 1 abstention and 0 opposed votes cast as follows:
APPROVE: HVACRedu.net, Green Mechanical Council, CalCERTS, HVAC Excellence, Weiland Consulting, FAMCO, HVACRedu.net, CEC, PIPE Trust Fund, BPI, Home Energy Magazine, CLEAResult, Efficiency First California, NCI.
ABSTAIN: Tre'Laine Associates

DATE: The email vote was completed on April 2, 2014.

WORK PRODUCT OBJECTIVES: For the quickest return and impact on energy efficiency, the initial target for HVAC/Whole Building Education efforts should be focused on the existing building stock. Improving the efficiency of existing stock to a reasonable level will take years of effort. Transforming what seems to be a reluctant workforce to achieve an adequate competency level to reach established energy efficiency goals will also take years of effort and a considerable budget commitment. The Committee's goal to develop a tiered competency model that focuses on existing buildings will provide the basis from which an HVAC industry workforce-centric whole building curriculum can be developed. To help ease the path forward for the HVAC workforce's awareness of whole building design, the Committee has created this high level Roadmap that defines outcomes for educational training programs with the goal of yielding the quickest solution to the process. The Roadmap details barriers to achieving the Strategic Plan 3-3 goals, recommended solutions to those barriers, and suggested resources that can be utilized to overcome them where appropriate. The recommendations are grouped into three primary categories:

- State and Local Government
- Contractors / Technical Workforce
- Educator and Education

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When evaluating this Roadmap, the following documents should also be considered for their overarching and/or complimentary information:

1. The UC Berkeley California Workforce Needs Assessment: http://www.irle.berkeley.edu/vial/publications/ca_workforce_needs_assessment.html
2. The recommendations identified in the WHPA WE&T Certification Working Group Gaps Report: http://performancealliance.org/Portals/4/Documents/WEandTCert-Gaps-ReportandSummaryv2.pdf

CA ENERGY EFFICIENCY PLAN STRATEGIC GOAL ALIGNMENT:

☐ GOAL 1 ☐ GOAL 2 ☒ GOAL 3 ☐ GOAL 4

CEESP HVAC GOAL STRATEGIES: Strategic Plan HVAC Goal 3: Building industry design and construction practices that fully integrate building performance to reduce cooling and heating loads.

Strategy 3-3: Accelerate HVAC Related Aspects of Whole Building Design in the Educational and Professional Communities

Short Term Milestone 3-3-1 (SUGGESTED REVISION)

- Develop Continuing Education Programs. Begin Curriculum use.
  - o Key Actions

-> Identify educational and other training institutions/organizations (public, private) for HVAC whole building curriculum (Timeline – Ongoing)

-> Identify HVAC and whole building competencies K12-Advanced Degrees (Timeline – Ongoing)

-> Index HVAC & Whole Building competencies to educational tier levels: K12 to Advanced Degrees (Timeline – Ongoing)

-> Overhaul existing curriculum to achieve competency outcomes at tier levels for HVAC role in whole building (Timeline – Ongoing)

-> Expand curriculum to target schools and other training institutions/organizations (Timeline – Ongoing)

Mid Term Milestones: Expand statewide. Develop university degree level programs.

BENEFITS: The solutions presented in this Roadmap will help to (1) improve involvement by the CSLB, California State Legislature and state energy agencies to ensure that energy and whole building design is adequately addressed in contractor licensing requirements and that minimum technician competencies are established within the HVAC trade, (2) improve statewide building official competencies, (3) increase Contractor knowledge of building performance principles, (4) provide the existing technician workforce with better understanding of and hopefully more desire to enhance their career opportunities with credentials, (5) lead to proper education and training for contractors on “How to Sell” energy efficiency to their customers, (6) encourage service technicians and industry sales/marketing workforce to belong to an “industry group” that would enhance communications, (7) make training programs and resources more affordable, accessible or promoted to those interested in career development, (8) establish a statewide forum for HVAC educators to interact and discuss issues related to Whole Building Design and energy efficiency education and training programs, (9) increase the State education communities’ involvement in the implementation of the California Energy Efficiency Strategic Plan, (10) focus on tier-level competencies and “stackable” credentials for both entry-level and experienced HVAC industry professionals to improve proficiency levels and improve curriculum development, and (11) enhance workforce awareness of available quality training and educational resources and the needed reliable information to differentiate those training resources.

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OUTSTANDING ISSUES / DEBATES / MINORITY VIEWS: (1) There was overall agreement that the best approach would be to identify competencies rather than evaluate curricula. This Roadmap does not specifically address these competencies, but rather lays out a recommended process to establish a career lattice that will map out how HVAC industry workforce individuals can take educational achievements, technical skills, and expertise to the next level of excellence. The Committee's long-term goal is to identify and arrange competencies for both entry-level and experienced HVAC industry workforce in a subsequent document. (2) A specific Solution to Barrier 4b will be reassessed in future Committee meetings and potential documentation as needed (addendum or the second version roadmap). (3) The Committee is aware that they will need to be "member supported" rather than "staff supported" for the remainder of 2014 and is prepared to continue forward in that capacity pending EC feedback on this Work Product. The Committee seeks to regain staff support as soon as possible.

POTENTIAL AUDIENCE: WHPA HVAC in Whole Building Education Committee, WHPA Executive Committee, WHPA Council of Advisors, WHPA Compliance Committee, WHPA WE&T Committee, WE&T Commercial Sector Strategy Committee, WHPA Plan Revision Working Group, Public and Private Education, Curriculum Developers, Instructors, IOUs, CEC, and CPUC.

MOTION: The following multi-tiered motion for approval by the EC was made by Jeremy Reefe (SDG&E) and seconded by Bob Baker (ASHRAE):

1. That the "HVAC in Whole Building Performance Education Industry Roadmap" dated March 31, 2014 be "Endorsed[1]" as an official WHPA Report.
2. The "WHPA Work Product Summary" is updated to reflect the final vote of the Executive Committee and included as a preface to the above referenced report.
3. The above referenced report is posted at the WHPA website on: (a) the homepage in the "WHPA Work Products" section, and (b) Whole Building Education Committee page listed under "Meeting Notes and Supporting Documents."
4. That the Recommendations presented in the above referenced report be prioritized and acted upon as specific tactics that support the WHPA's strategic goals.
5. That the Whole Building Education Committee is encouraged to focus its near-term efforts on "cataloging, evaluating and enhancing competencies for both entry-level and experienced HVAC industry professionals."
6. That WHPA Staff draft a letter of appreciation from the Executive Committee to members of the Whole Building Education Committee and email it to them.

VOTE TALLY: On April 9, 2014, there was a unanimous AYE vote on the above motion. The motion CARRIED. The voting members present for the vote were ACCA, AHRI, ASHRAE, CEC, CPUC, HARDI, IHACI, PG&E, SDG&E.

FURTHER ACTIONS REQUIRED: Once this Roadmap is approved by the WHPA Executive Committee, the Whole Building Education Committee will focus its efforts on cataloging, evaluating and enhancing competencies for both entry-level and experienced HVAC industry professionals.

NEXT STEPS: There are a number of recommended solutions to the identified barriers for the WHPA Executive Committee to consider, many of which may require additional resources in the future. While it is strongly encouraged that the detailed report be reviewed to ensure understanding of the full impact, the main points include the following:

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1. The WHPA Executive Committee should actively encourage the CSLB (Contractors State Licensing Board) to become a WHPA member.
2. The WHPA Executive Committee should explicitly approve a list of industry-valued credentials for posting on the WHPA website (based on the attached existing HVAC Credentials List) and the needed maintenance for the list to remain current.
3. The WHPA Executive Committee should actively promote the comprehensive list of training resources that exists at the www.performancealliance.org website.
4. The WHPA Executive Committee should initiate a membership campaign to recruit educators into the WHPA and link these new members with relevant Committee activities.
5. The WHPA Executive Committee should convene a Committee or Working Group to articulate a clear value proposition for HVAC whole-building design and energy efficiency training and credentials.
6. The WHPA Executive Committee should spearhead an effort to develop education and training on "How to Sell" energy efficiency.
7. The WHPA Executive Committee should establish a Committee or Working Group that is tasked with developing an intensive HVAC Mechanical Inspector Whole Building Training program for building officials, initiating outreach efforts with Community College Districts throughout the State to integrate the program into existing training, and initiating dialog between Public Educational Institutions and Private Industry Education and Training and Credentialing Providers to discuss pathways for integration into their programs.
8. The WHPA Executive Committee should reconvene the Marketing Committee and leverage its member resources to:
    a. Develop and release a coordinated customer awareness campaign that addresses HVAC energy and non-energy benefits (e.g. comfort/productivity, health and safety), code compliance and the benefit of Whole Building approaches, in addition to a parallel campaign focused on contracting companies.
    b. Develop and coordinate oversight of a marketing campaign that highlights the importance of licensed contractors and a credentialed workforce.
    c. Develop a communication strategy that reaches service technicians and industry sales/marketing workforce with consistent and frequent messages about the importance of energy efficiency and how they specifically impact California's energy future.
9. The WHPA Executive Committee should launch an effort to develop a Title 24 training module and deploy this module by leveraging the many channels that the WHPA membership provides.
10. The WHPA Executive Committee should establish a Committee or Working Group to consider an annual benchmarking/scorecard process that identifies those training programs that support the tier-level competency model developed by the Whole Building Education Committee.
11. The WHPA Executive Committee should support an initial meeting with key stakeholders (including regulatory staff and WHPA staff) participating in the Commercial/Residential ZNE Action Plans and with WHPA stakeholders, some of whom are already involved in ZNE activities, to discuss ways to actively collaborate to ensure the needs of ZNE building design, construction and operation take into account the requirements for appropriate training and/or credentialing for HVAC industry workforce stakeholders.
12. The WHPA Executive Committee should lead an effort to establish a statewide industry consortium focused on integration of the tier-level competencies (once developed by the WHPA Whole Building Education Committee) into the California educational system, and identification of implementation budget requirements.

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13. The WHPA Executive Committee should lead efforts to develop an authoritative statewide advisory group for HVAC Educational and Training Institutions Providers.

There are also some recommended solutions to the identified barriers for IOU ownership. The main points include the following:

1. The IOUs should only require licensed contractors who employ credentialed technicians to be allowed to participate in their Calculated, Deemed and Third-Party incentive programs.
2. The IOUs should continue to provide workforce development funding and work with industry stakeholders to provide course subsidization and individual scholarships.
3. The IOUs should enhance their existing training programs and resources by working closely with industry instructors to provide support for technicians with industry-recognized credentials or those seeking credentials for the first time that indicate competency to prospective employers.

STAFF SYNOPSIS: Implementing the above recommendations will require the creation of several new Committees and require the EC to execute certain defined tasks. It is anticipated that this effort will require additional staff resources to support.

HVAC in Whole Building Performance Education Industry Roadmap

A WHPA Report dated April 9, 2014

Acknowledgements

This Industry Roadmap was developed by the Western HVAC Performance Alliance's HVAC in Whole Building Education Committee with the following participants:

Chris Compton (HVACRedu.net) – **Committee Chair**
Barbara Hernesman (CalCERTS) – **Committee Vice-Chair**
Pepper Hunziker (Tre'Laine Associates) – **Committee Vice-Chair**
Mark Cherniack, Wendy Worrell (WHPA Staff) - **Scribe**
Stan Johnson, Emily Rogers (Air Conditioning Contractors of America)
Dale Gustavson (Better Buildings, Inc.)
Tiger Adolf, Michelle Nochisaki (Building Performance Institute, Inc.)
Bill Brown (Brownson Technical School)
Jerry McGuire (California Center for Sustainable Energy)
Pedro Gomez, Sam Lerman (California Energy Commission)
Conrad Asper, Chris Cone (Efficiency First California)
David Davis (FAMCO)
Steve Allen, Jerry Weiss (Green Mechanical Council)
Tom White (Home Energy Magazine)
Renee Tomlinson, Howard Weiss (HVAC Excellence)
Mark Ouellette (ICF International)
Susie Evans (IHACI)
Rick Hatlen (JJATC Air Conditioning and Refrigeration)
Erik Emblem (Joint Committee on Energy and Environmental Policy)
Bob Barks (Madera County)
Scott Johnson (National Comfort Institute)
Charles Segerstrom (Pacific Gas and Electric Company)
Tom Morton (PIPE Trust Fund)
Ryan Lamberg (RL Consultants, Inc.)
Patrick Murphy (Quinn-Murphy Consulting – formerly with Refrigeration Service Engineers Society)
Brian Maloney, Sarah Schiller (CLEAResult – formerly Resource Solutions Group)
Ed Hegwood (Rocky Mountain Education Center)
Jeremy Reefe (San Diego Gas & Electric)
Kevin Colin (ServiceWrkx)
Gary Johnson (Southern California Gas Company)
Bart Weiland (Weiland Consulting – Training)

Background: HVAC-Integrated Whole Building Design

The Western HVAC Performance Alliance ("WHPA") Whole Building Education Committee ("Committee") was established to create an organized long-term strategic roadmap to identify workable solutions in support of growth for HVAC and Whole Building businesses while supporting California's energy efficiency, economic, and environmental goals. By applying innovative HVAC education, training, techniques and best practices, building owners will experience enhanced satisfaction though a clearer understanding of health, safety, comfort and energy efficiency in homes and buildings by the incorporation of HVAC with whole-building design-as-an-interactive system. The Committee focused on identifying barriers preventing the adoption of whole building design from the perspective of three different stakeholder groups: 1) state and local governments; 2) contractors and technicians; and 3) educators. Each of the barriers identified under these groups are paired with recommended solutions that the Committee strongly believes are required to foster an environment where whole building design can succeed.

State and local governments are important components of the Whole Building education process because they are the ones that establish the codes and regulations that govern HVAC installations and they ensure compliance with those codes. These codes and regulations have significant impact on contractor and technician behavior and without the appropriate regulation of whole building solutions the effective implementation for such solutions is compromised. The overarching topic of codes and compliance is best left to others, but this Committee felt it was important to address government from a competency-based perspective to ensure that those responsible for code enforcement have the educational and training infrastructure necessary to support effective compliance. While there may be some overlap with the WHPA Compliance Committee's work, it is assumed that the Executive Committee is positioned to synthesize common themes that are produced by the various WHPA Committees as they pertain to compliance and then develop a cohesive strategy and resulting tactics that can be implemented to have the maximum benefit on improving compliance levels.

Most of the Committee's discussion in developing this Roadmap was centered on the needs of the contractors, technicians and other specific industry related supporting workforce including among others, sales and marketing personnel, and code inspectors. There was agreement that the best approach would be to identify competencies rather than evaluate curricula. Therefore, the Committee's long-term goal is to identify and arrange competencies for both entry-level and experienced HVAC industry workforce.[1] This Roadmap does not specifically address these competencies, but rather lays out a recommended process to establish a career lattice that will map out how HVAC industry workforce individuals can take educational achievements, technical skills, and expertise to the next level of excellence. A career lattice provides a pathway for an individual entering and/or advancing within an industry with a consistent group of related jobs that often include a pictorial representation of the job progression in a career as well as detailed description of the education, training, work experience, and industry recognized credentials that facilitate movement between jobs. The workforce guidelines and assessment will be based on "best practices" built off of a collaborative process involving many Subject Matter Experts ("SMEs") who have worked to identify formal knowledge and credentialing approaches. Industry workforce training programs provide a systemization of knowledge that seek to identify the Job Tasks Analysis ("JTAs") and Knowledge, Skills and Abilities ("KSAs") educational, performance goals, objectives, competencies and outcomes.

To be successful, the workforce tier-level competency model[2] will need to be developed through the lens of market-based solutions that will demonstrate value to the individual learner, the educational community and the contractor/business owner. This model will provide guidance for HVAC instructional design/curriculum development professionals to produce curriculum that captures the agreed upon HVAC workforce knowledge and credentialing approaches that consider the whole building as a complete interactive system.

[1] 'Industry workforce' refers here and elsewhere in the document to the contractors, technicians and other specific industry-related supporting workforce including distributors, system designers, sales and marketing personnel, and code inspectors as well as others.

[2] Workforce Competency Framework is the building block that promotes an understanding of the skillsets and competencies that are essential to educate and train a global workforce. One 4 Tier Competency Model identifies:

- Tier 1 Group: Foundational eligibility requirements/Personal effectiveness/Academic and Workforce readiness.
- Tier 2 Group: Workforce competencies, teamwork, customer focus, problem-solving, decision making, working with tools, technology, reporting processes.
- Tier 3 Group: Industry related competencies, all competencies specific to Industry sector representatives.
- Tier 4 Group: Occupational related competencies with specified Knowledge, Skills and Abilities (KSAs) for individuals entering and/or advancing in their industry related career.

Tier level models can be modified and expanded according to the specific industry KSAs and variations.

Goals, Strategies, and Milestones

California recognizes the need for and the value of the educational process to achieve the energy efficiency levels sought statewide. The California Energy Efficiency Strategic Plan ("Strategic Plan") refers to the educational process for the existing workforce and next generation workforce throughout the document. The HVAC workforce's awareness of whole building design is beginning to increase; however conventional structures and ducted HVAC systems still predominate. Buildings designed with the whole building concept have not made enough gains to be considered commonplace. Therefore, the ability to familiarize and exercise the workforce with HVAC/ Whole Building concepts is limited at best. The shift from decades of conventional construction practices to a whole building design approach will require immediate short-term exercises and long-term engagement with the entire value chain of those involved including: building owners, building operators, architects, designers, builders, engineers, scientists, educators, appraisal/real estate professionals, state and local building officials, utilities, contractors, technicians and other specific related industry workforce.

For the quickest return and impact on energy efficiency, the initial target for HVAC/Whole Building Education efforts should be focused on the existing building stock. Improving the efficiency of existing stock to a reasonable level will take years of effort. Transforming what seems to be a reluctant workforce to achieve an adequate competency level to reach established energy efficiency goals will also take years of effort and a considerable budget commitment. The Committee's goal to develop a tiered competency model that focuses on existing buildings will provide the basis from which an HVAC industry workforce-centric whole building curriculum can be developed.

While existing buildings remain the priority, strategies to support California's zero net energy ("ZNE") goals in new residential construction by 2020 and for new nonresidential construction by 2030, also must include building strong workforce competency models for the next generation of designers, builders, architects as well as others in high performance, highly energy efficient building operations-related support industries. It is critical to help identify new skills that the HVAC industry workforce may require to achieve the high level of energy performance in all types of ZNE buildings. Key stakeholders involved in the WHPA along with those involved in the CPUC's Commercial and Residential ZNE Action Plans, should discuss ways to actively collaborate to ensure the needs of ZNE building design, construction and operation take into account the requirements for appropriate training and/or credentialing for HVAC industry workforce stakeholders. This collaboration will help determine what follow up activities are seen as critical to ensure integrated, optimized HVAC performance for ZNE buildings.

> ***RECOMMENDATION**: The Whole Building Education Committee recommends that the WHPA Executive Committee support an initial meeting with key stakeholders (including regulatory staff and WHPA staff) participating in the Commercial/ Residential ZNE Action Plans and with WHPA stakeholders, some of whom are already involved in ZNE activities.*

The HVAC industry has finally begun to turn to the Whole Building approach and Whole Building concepts are gaining momentum at the leadership levels of the industry. Fortunately, work is already underway and the U.S. Department of Energy (DOE) and others (e.g. HVAC Workforce Development Foundation) are leading national efforts focused on HVAC education. For example, the DOE has recently developed six specific JTAs for commercial and federal building personnel to enhance professional skills; enable industry to identify an appropriately skilled workforce; and allow training providers to ensure the highest quality products possible. However, despite such momentum throughout the leadership and policy ranks, history shows that this momentum will take a significant period of time to trickle down to the practitioners in the field.

To help ease the path forward the Committee has created this Roadmap that defines outcomes for educational training programs with the goal of yielding the quickest solution to the process. The Roadmap details barriers to achieving the Strategic Plan 3-3 goals (see Table 1 and Table 2), recommended solutions to those barriers, and

suggested resources that can be utilized to overcome them where appropriate. The recommendations are grouped into three primary categories:

- State and Local Government
- Contractors / Technical Workforce
- Educator and Education

Table 1: California Energy Efficiency Strategic Plan Vision, Goals, Strategies, and Milestones Related to HVAC Aspects of Whole Building Design in the Educational and Professional Communities.

"Big Bold" HVAC Strategy: Heating, Ventilation and Air Conditioning (HVAC) will be transformed to ensure that its energy performance is optimal for California's climate.

Strategic Plan HVAC Vision: The residential and small commercial heating, ventilation, and air conditioning (HVAC) industry will be transformed to ensure that technology, equipment, installation, and maintenance are of the highest quality to promote energy efficiency and peak load reduction in California's climate.

Strategic Plan HVAC Goal 3: Building industry design and construction practices that fully integrate building performance to reduce cooling and heating loads.

Strategy 3-3: Accelerate HVAC Related Aspects of Whole Building Design in the Educational and Professional Communities

Short Term Milestones:

- Develop continuing education programs. Begin curriculum use.

Mid Term Milestones:

- Expand statewide. Develop university degree level programs.

Table 2: The California 3-3 Action Plan Provides Additional Detail to the HVAC/Whole Building Initiative

HVAC Action Plan: Milestone 3-3-1 (SUGGESTED REVISION)

- Develop Continuing Education Programs. Begin Curriculum use.
  - Key Actions
    - Identify educational and other training institutions/organizations (public, private) for HVAC whole building curriculum
      - Timeline - Ongoing
    - Identify HVAC and whole building competencies K12-Advanced Degrees
      - Timeline - Ongoing
    - Index HVAC & Whole Building competencies to educational tier levels: K12 to Advanced Degrees
      - Timeline - Ongoing
    - Overhaul existing curriculum to achieve competency outcomes at tier levels for HVAC role in whole building
      - Timeline - Ongoing
    - Expand curriculum to target schools and other training institutions/organizations
      - Timeline – Ongoing

Barriers and Recommended Solutions

STATE AND LOCAL GOVERNMENT

1. **BARRIER: Insufficient involvement by the Contractors State Licensing Board (CSLB),[3] California State Legislature and state energy agencies to ensure that energy and whole building design is adequately addressed in contractor licensing requirements, and that minimum workforce competencies for technicians are established within the HVAC trade. (Title 24 is not a training guide *per se*, but provides the framework to define the necessary competencies to develop training.)**

   SOLUTIONS:

   a. **The WHPA Executive Committee should lead an effort to establish a statewide industry consortium.** The purpose of this consortium will be to discuss the tier-level competencies developed by this Committee and discuss how these competencies can be appropriately addressed at all levels of the California educational system and to identify budget requirements to implement integrated whole building design education.
   b. **The WHPA Executive Committee should explicitly approve a list of industry-valued credentials** based on the attached WHPA Credentials List[4] spreadsheet. These credentials should be posted on the WHPA website and kept current to maintain their relevance.

2. **BARRIER: Lack of statewide building official competency.**

   SOLUTIONS:

   a. **The WHPA Executive Committee should establish a Committee or Working Group that is tasked with developing an intensive HVAC Mechanical Inspector Whole Building Training program for building officials.** This Committee/Working Group should be chaired by CALBO and/or International Association of Plumbing and Mechanical Officials (IAPMO) and shall consist of members representing the CEC,

END USER AND CONSUMER BEHAVIOR

Recognizing that consumer behavior is not within the scope of what this Committee intended to address, consumers have a significant influence on whether or not an integrated Whole Building Design education can be successful. Without consumers demanding such an approach from the design/build industry, contractors and technicians will not seek to achieve the education and credentials required to achieve California's energy vision.

***BARRIER:** Difficulty in creating customer (owner, builder, developer, investor, tenant) interest to invest in energy efficiency and the related comfort improvements that result.*

***SOLUTION:** The WHPA Executive Committee should reconvene the Marketing Committee and leverage its member resources to develop and release a coordinated customer awareness campaign that addresses HVAC energy and non-energy benefits (e.g. comfort/productivity, health and safety), code compliance and the benefit of Whole Building approaches. A separate campaign focused on contracting companies should also be launched in parallel with the consumer campaign. The contractor-focused campaign should showcase successful companies who have implemented high performance HVAC systems as part of a whole building retrofit. The WHPA website can be used as a repository where Whole Building information and tools can be stored and an online forum created where contractors and consumers can discuss their experiences.*

[3] Though the CSLB has actively participated in WHPA Committees since inception in 2009, the agency has not become a member. The Whole Building Education Committee recommends that the WHPA Executive Committee actively encourage the CSLB to become a WHPA member.

[4] The WHPA Credentials List format was initially created in July 2012 by the WHPA Credentialing Working Group Chaired by Chris Compton. The HVAC in Whole Building Education Committee began the current process of updating the spreadsheet content in March, 2014.

national licensing/credentialing organizations, trade unions, code development and training organizations statewide, and nationally as appropriate. The course will be developed for applicability across the 537 code authorities in California.

b. Once the Mechanical Inspector Whole Building Training is developed, the WHPA Executive Committee should:

   i. Initiate outreach efforts with Community College Districts throughout the State that have existing construction and specialty trade-related educational and training programs to ensure that they are aware of this training program and then work with them to integrate as much of this training as possible into their existing programs.
   ii. Initiate dialog between Public Educational Institutions and Private Industry Education and Training and Credentialing Providers to discuss pathways towards building an integrated tier-level competency model into their existing educational and training programs.

It is imperative that the new and next generation inspectors understand the importance of effective enforcement of the energy codes. New and next generation inspectors must demonstrate the industry knowledge, skills and abilities to ensure code enforcement activities.

ADDITIONAL RESOURCES:

- Bay Area Regional Energy Network (BayREN) for possible details around codes as they have codes and standards curriculum and education systems offered in the Bay area.
- Sheet Metal Workers (SMWIA) or Joint Committee on Energy and Environmental Policy JCEEP for understanding of technician applicable codes
- Cal SMACNA for education on building code changes and Standards updates through Chapter sponsored programs.
- Codes, Standards and Regulations programs to leverage existing Title 24 and other training currently offered for building Departments and inspectors

CONTRACTOR / TECHNICAL WORKFORCE

3. **BARRIER: Contractor's lack knowledge of building performance principles.** Contractors need to be well versed in building performance and fully understand all aspects of the principles of building science, and the whole-building relationship of HVAC, Envelope, and Building requirements in Title 24 Building Energy Efficiency Standards, California Building Code, California Mechanical Code and California Green Code to the specific work they perform.

   SOLUTION: The WHPA Executive Committee should launch an effort to develop a Title 24 training module and deploy this module by leveraging the many channels that the WHPA membership provides. A common program is required to ensure that a consistent message is being delivered to contractors. The existing Title 24 training offered by the IOUs can be utilized and/or modified with existing and new Title 24 comprehensive industry-related Title 24 plus performance training programs. The key is delivering a coordinated program through multiple channels to reach as many contractors as possible. This effort should be closely aligned with the work being done by the Compliance Committee to ensure consistency with their efforts.

4. **BARRIER: There is a general apathy among the existing technician workforce to enhance their career opportunities with credentials.** This apathy is a result of several factors including:

a. Customer demand for Whole Building Design is low creating minimal business opportunities for the contractor and thus presenting no clear business need to encourage credentialing for their technicians;
b. Facility managers have low awareness about their building's energy usage and the impact that the HVAC system contributes to this overall usage and thus do not understand how paying for service by a credentialed technician will provide any real benefit to them;
c. Employers do not encourage their technician workforce to participate in continuing education and/or obtain credentials because pay rates would increase with enhanced knowledge and their business cannot justify these higher salaries and do not understand the real cost to their business in low-quality work or the profit potential for quality workmanship that can be provided by credentialed technicians;
d. Technicians who are being asked to obtain additional certifications must do so on their own time and do not see the value in doing so without a clear explanation of what they get in return; and
e. Employers are afraid that employees will take employer provided education to other job opportunities and thus the risk of spending money on training is too great.

SOLUTIONS:

a. **The WHPA Executive Committee should convene a Committee or Working Group to articulate a clear value proposition for HVAC training and credentials.** This value proposition can be integrated into the sales (see Solution for Barrier #5) and communications (see Solution for Barrier #6) efforts as they are implemented. The Whole Building Education Committee can assume the responsibility for developing this value proposition as part of its future efforts if so desired.

"HVAC companies that have successfully expanded their business model to include Building Performance demonstrate a compelling value proposition. They show the benefits of investing in staff skill development through credentialing programs and expanding services to grow the market among existing as well as new customers. Articulating the core value proposition of the HVAC-to-Building Performance model and supporting company success stories comprise the basis for a coordinated "campaign" to promote the integration of whole building performance services. With a well-crafted value proposition and examples, whole building performance supporters can change the conversation within their own networks, and beyond by identifying existing industry communities where this topic is relevant and putting it on their radar." Chris Cone, Efficiency First California

b. The IOUs should only require licensed contractors who employ credentialed technicians to be allowed to participate in their Calculated, Deemed and Third-Party incentive programs. These contractors should be required to document an annual continuing education process for their technicians in order to ensure their continued participation in IOU programs. This continuing education process can also be used as a platform to deploy training needs that are documented by other WHPA efforts such as the CQM, FDD and Compliance Committees. These program participation requirements should be consistent statewide and will provide a necessary "carrot" to encourage contractors to employ credentialed technicians. Requiring technicians to achieve and maintain a minimum level of competency will provide a necessary "stick" to ensure that technicians have the appropriate knowledge, skills and abilities to deliver the quality services envisioned by the California Energy Efficiency Strategic Plan.

c. **The WHPA Executive Committee should launch a WHPA Marketing Committee[5] with the goal of developing and coordinating oversight of a marketing campaign that highlights the importance of licensed contractors and a credentialed workforce.** (See also Solution under Barrier #6 and sidebar titled End User and Customer Behavior.) This campaign should be launched in a coordinated fashion with these other related Recommendations with the purpose of: 1) informing contractors about why it is important to hire credentialed technicians; 2) encouraging technicians to seek professional level certifications by demonstrating a real value proposition to them (see Solution (a) above); and 3) informing consumers about the benefit of hiring contractors who employ a credentialed workforce. This marketing campaign should ultimately seek to celebrate the true professionals in the HVAC industry.

5. **BARRIER: Contractors lack proper education and training on "How to Sell" energy efficiency to their customers.**

   SOLUTION: **The WHPA Executive Committee should spearhead an effort to develop education and training on "How to Sell" energy efficiency.** This recommendation is similar to one made by the WE&T Sales Force Working Group and a 2014 goal recently adopted by the Executive Committee to develop sales training and estimation tools warehouses and host a sales trainer teleconference. An interactive approach that brings SMEs who know how to sell energy efficiency to the table to help contractors sell efficiency is a critical piece to making widespread efficiency a reality. These SMEs can provide contractors with an experiential demonstration on how to present an energy efficiency application to their customers and provide contractors with real life solutions rather than talking points. This would allow contractors to feel the difference and increase their understanding of the comfort benefits to the customer. The IOUs can host sales trainings at their Energy Centers.

6. **BARRIER: Service technicians and industry sales/marketing workforce typically do not belong to an "industry group" that would enhance communications.**

   SOLUTION: The WHPA Executive Committee should launch the Marketing Committee with a goal of developing a communication strategy that reaches service technicians and industry sales/marketing workforce with consistent and frequent messages about the importance of energy efficiency and how they specifically impact California's energy future. Technicians need to be reached directly through multiple channels including social media. The WHPA should be at the forefront of this messaging strategy and develop a proactive approach to reaching technicians by leveraging the collective horsepower of its more than 200 industry members. Industry organizations need to break down the barriers between organizations and find common goals to ensure they are all addressing their members/customers/ individuals that come to the various groups for information with the same content. (See also Solution (c) under Barrier #4.)

7. **BARRIER: Training programs and resources are not always affordable, accessible or promoted to those interested in career development[6]. Additionally, many do not perceive enough value in continuing**

[5] Marketing Committee members should be comprised of a broad cross-section of industry stakeholders including members from the workforce development community in order to gain as much perspective as possible. The Marketing Committee should work in a collaborative manner with all WHPA Committees and Working Groups to ensure that the marketing-related needs for these individual groups are addressed in a comprehensive marketing strategy/plan.

[6] Those interested in career development could include the entry-level workforce – whether currently unemployed or underemployed – and the existing workforce seeking to move up the professional career lattice.

education to pay for training out of their own pocket. Oftentimes, contracting firms do not compensate technicians for training or for upgrading skills and in some cases may even dock pay for missing work to attend a daytime training class.

SOLUTIONS:

a. **The IOUs should continue to provide workforce development funding and work with industry stakeholders to provide course subsidization and individual scholarships** for workforce development that will enable entry-level and existing workforce to participate in training and credentialing programs at little to no cost to the participant.
b. **The IOUs should enhance their existing training programs and resources by working closely with industry instructors to provide support for technicians with industry-recognized credentials or those seeking credentials for the first time that indicate competency to prospective employers.** The IOU Energy Centers provide a great opportunity to those seeking to gain or enhance their skills. However, the training offered needs to go farther to build stronger, tested technician competency. The IOUs should use the tier-level competency model that is ultimately produced by this Committee and engage the HVAC industry in an advisory capacity to ensure that their training provides a launch point for entry-level technicians.
c. **The WHPA Executive Committee should convene a Committee or Working Group to articulate a clear value proposition for HVAC whole-building design and energy efficiency training and credentials.** (See also Solution (a) under Barrier #4.) A true value proposition needs to be established so that technicians understand that there is value in obtaining professional credentials. This value proposition must be effectively communicated to technicians through multiple channels (see also Solution under Barrier #6).
d. For entry-level students, programs in California should adhere to curriculum design driven by minimum competencies identified by the Whole Building Education Committee.

Educator and Education

8. **BARRIER: Lack of a statewide forum for HVAC educators to interact and discuss issues related to Whole Building Design and energy efficiency educational and training programs.**

   SOLUTION: The WHPA Executive Committee should lead efforts to develop an authoritative statewide advisory group for HVAC Educational and Training Institutions Providers. The mission of this advisory group should be to advocate for a common set of workforce competencies, standards of performance for technical skills and abilities, and standard evaluation criteria for educational programs and student performance.

   Participants in this advisory group should include representatives from organizations that teach HVAC Industry related subjects, such as: K-12 schools, community colleges, regional occupational and adult education programs, trade schools, private/proprietary schools, pre-apprenticeship training, joint apprenticeship training centers, IOU energy centers, universities, workforce development services, government officials, manufacturers, distributors, building energy service providers, and other interested stakeholders. The participating organizations might be institutionally accredited, programmatically accredited, or offer specialized training that might not necessarily fit the “accreditation model” for education. Once approved by the WHPA Executive Committee, the Whole Building Education Committee can expand the list of invitees.

9. BARRIER: Lack of involvement by the State educational community in implementation of the California Energy Efficiency Strategic Plan.

SOLUTION: The WHPA Executive Committee should initiate a membership campaign to recruit educators into the WHPA and link these new members with relevant Committee activities. This recruitment effort will bring educators to the table as part of the overall energy efficiency dialog and better engage them in the statewide process. It will also help create channels to disseminate WHPA work product into the State education system and improve the overall level of trade-based education.

ADDITIONAL RESOURCES:

The following organizations can be leveraged to assist in this recruiting process and to help disseminate the tier-level competency model developed by this Committee:

a. The California Community Colleges Chancellor's Office
b. Building and Construction Trade Department (of AFLCIO) for Multi Craft (MC3) curriculum
c. County Offices of Education (to assist implementation of HVAC and Whole Building and Design Education Programs in Secondary Education)
d. State Education Department K-12
e. Adult Education Superintendent
f. CalCERTS, Inc.
g. Joint Journeyman Apprenticeship Training Center (JJATC)
h. California Workforce Investment Board - Green Collar Jobs Council
i. Building Performance Institute, Inc.
j. IHACI
k. NCI
l. IOUs

10. **BARRIER: Specific curriculum offered by educational institutions is typically confidential and thus assessing individual curricula is not a viable approach.**

SOLUTION: Once this Roadmap is approved by the WHPA Executive Committee, the Whole Building Education Committee will focus its efforts on cataloging, evaluating and enhancing competencies for both entry-level and experienced HVAC industry professionals. Through this effort, the Committee will establish proficiency levels with a scoring system for each HVAC industry professional technical level and establish a common definition for terms such as "HVAC" and "Building Performance". The approach should be to identify competencies rather than assess existing curriculum which is often proprietary and not sharable even in the public school realm. The Committee does not propose creating new competencies, but rather working in a collaborative process to catalog the existing industry competencies that are publically available through resources such as: K-12 STEM Programs, Pre-Apprenticeship and Apprenticeship Programs, and Post-Secondary Associate, 4-Year, Master's Degree Programs, and published professional personnel certification and credentialing JTAs and KSAs. The approach for which those competencies would be identified, indexed and cataloged follows the "stackable" credential model that provides job progression in a career with detailed description of the education, training, work experience and industry recognized credentials that facilitates movement between jobs and leads to wage increases and will support and provide a career lattice as described previously[7] for the HVAC Building Performance workforce. Competencies would be assembled in an ascending order beginning with a solid foundation. As they ascend the ideal index points would be existing industry credentials that could be achieved based upon the competencies developed. Proficiency levels will be developed based on an

[7] IBID, pg. 2, Footnote 2.

existing proficiency model (to be determined) with competencies appropriately adjusted to the proper focus.

11. **BARRIER: The HVAC workforce has a low awareness of available quality training and educational resources and lacks reliable information to differentiate those training resources.**

    SOLUTIONS:

    a. **The WHPA Executive Committee should actively promote the comprehensive list of training resources that exists at the www.performancealliance.org website.** This list should be continually reviewed and updated to ensure accurate information is provided.
    b. **The WHPA Executive Committee should establish a Committee or Working Group to consider an annual benchmarking/scorecard process that identifies those training programs that support the tier-level competency model developed by the Whole Building Education Committee.** Given the fact that this competency model will support the lead up to the 2020 residential ZNE goal, the WHPA can take a leadership role and act as an independent resource to identify training programs that support California's energy efficiency mission. This scorecard process will prove valuable to HVAC industry technical professionals who are considering training resources.

Additional Information

While not directly included in the Barriers and Solutions above, there is some additional overarching information to consider when evaluating this Roadmap.

The 2011 report from the Donald Vial Center for Employment in the Green Economy at the University of California, Berkeley, provides a detailed look across the entire HVAC industry workforce employment sector at the education and training needs that will be required to support California's public policy goals for energy efficiency and the environment. The importance of a competent workforce was also emphasized when the CPUC established a statewide energy efficiency WE&T stakeholder group to address workforce issues and goals related to its own Energy Efficiency Strategic Plan.

1. *The UC Berkeley California Workforce Needs Assessment:* ***http://www.irle.berkeley.edu/vial/publications/ca_workforce_needs_assessment.html***
2. *The UC Berkeley WE&T Appendix: K12 Inventory:* ***http://www.irle.berkeley.edu/vial/publications/WET_AppendixL_K12Inventory.pdf***

The recommendations identified in the WHPA WE&T Certification Working Group Gaps Report dated January 15, 2014 are complimentary to the proposed solutions in this HVAC in Whole Building Performance Education Roadmap.