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WHPA Comments on CEC's Request for Promotion of Regulatory Compliance of Central Air-Conditioning and Heat Pumps Systems

Additional submitted attachment is included below.

Western HVAC Performance Alliance Inc. (WHPA)
Physical Address: 29991 Canyon Hills Road, Suite 1709-303, Lake Elsinore, CA 92532 Mailing Address: 524 San Anselmo Avenue, Suite 109, San Anselmo, CA 94960
951-244-6400 info@whpa-inc.org

August 20, 2018

By CEC Electronic Commenting System

Commissioner Andrew McAllister
California Energy Commission
Docket Unit, MS-4
Docket No. 2017-EBP-01
1516 Ninth Street
Sacramento, CA 95814

RE: Docket 2017-EBP-01: WHPA Comments on CEC's Request for the Promotion of Regulatory Compliance in the Installation of Central Air-Conditioning and Heat Pump Systems

Dear Commissioner McAllister:

Western HVAC Performance Alliance Inc. (WHPA) respectfully submits the following comments and proposed short-term and long-term solutions for consideration towards Docket 2017-EBP-01 to the California Energy Commission (CEC) on the Workshop for Promotion of Regulatory Compliance in the Installation of Central Air Conditioning and Heat Pumps.

As Stated in our attached 8/2/2019 comments in Exhibit 1(A), WHPA has an extensive research library of past work products representative of the immense institutional knowledge and perspectives the WHPA has to offer, many of which were incorporated into activities of the CEC [including the *Existing Buildings Energy Efficiency Action Plan 2016 Update* (EBEE- AP)], the California Public Utilities Commission (CPUC), the California Investor Owned Utilities (IOUs), and other interested parties. This body of research focused on subjects that cut across all four (4) goals of California Energy Efficiency Strategic Plan Goals (CEESP) and resulted in several work products with a myriad of recommendations relevant to the above referenced topic, as consolidated from input and efforts of our broad and diverse stakeholder membership body.

Below (pages 2-37; 39-47) is a series of recommendations and relevant WHPA work products, along with a summary of actionable next steps (page 38) to aid the CEC in promotion of regulatory compliance in the installation of central air conditioning and heat pumps.

The primary documents referenced below are:

From the Compliance Committee:
- Report #08: Understanding the Residential HVAC Compliance Shortfall 11-8-17
- Report #12: HVAC Compliance Definition Matrix 6-26-17

From the Online Permitting Working Group:
- Report #07: Feasibility of Online Permitting 11-8-17

From the Existing Buildings Energy Efficiency Action Plan (EBEE) Committee:
- Report #21: Recommended Pathways to Implementation for CEC's Existing Buildings Energy Efficiency Action Plan (EBEE-AP) Sub-Strategies 1.5.1, 1.5.2, 1.5.3, 1.5.5, 3.3.1 12-14-16

WHPA also previously discussed the Serial Number Tracking (SNT) topic over a period of years and has developed a draft white paper and pro and con argument position papers that were escalated to the prior WHPA governing body, but no official work products have been approved. The current WHPA governing body is reviewing those documents and developing a release plan during their Board meeting

on August 23, 2018. Once approved for release, those SNT documents will be uploaded to the docket for reference.

About WHPA

Western HVAC Performance Alliance Inc. (WHPA) is a California nonprofit public benefit corporation providing, conducting and promoting research and education focused on energy efficiency, environmental quality, and sustainability through the HVACR lens.

WHPA launched in 2009 in response to the portion of the California Energy Efficiency Strategic Plan (CEESP) that reads*: "An HVAC Advisory Group should be chartered to involve high-level HVAC industry stakeholders—such as manufacturers, distributors, and contractors—to coordinate industry sponsorship of and participation in HVAC strategies. Membership should also include other key players, such as the CPUC, Energy Commission, utilities, building owners/managers, consumers, and the Federal government."*

As a nonprofit public benefit corporation, WHPA continues to work as a guiding light for California stakeholders to educate and drive present and future HVACR energy efficiency initiatives and benefit consumers. This includes facilitated communication and action as a broad and diverse stakeholder advisory group whose collective expertise informs the development and implementation of efficiency strategy, policy and programs focused on topics such as HVAC Energy Efficiency and Demand Response, Emerging Technology, the HVACR Industry, HVACR Community Engagement, Consumer Outreach, Codes and Standards, Public Policy, and Workforce Education & Training.

WHPA appreciates the opportunity to provide comments on this important issue.

Best regards,

Elsia Galawish
Executive Director
Western HVAC Performance Alliance Inc. (WHPA)
415-482-1079 Office
415-342-8907 Mobile
Galawish@WHPA-Inc.org

Western HVAC Performance Alliance Inc. (WHPA)
Physical Address: 29991 Canyon Hills Road, Suite 1709-303, Lake Elsinore, CA 92532 Mailing Address: 524 San Anselmo Avenue, Suite 109, San Anselmo, CA 94960
951-244-6400 info@whpa-inc.org

I. Proposed Pathways to Implementation of EBEE AP Committee Work Products Recommendations

Sub-Strategy 1.5.1: "Improve Clarity and Ease of Use: *Develop approaches to simplify implementation of BEES for existing buildings by unifying definitions with industry practice, by clarifying code requirements, and through the use of expert systems or other navigation tools."*

Recommendations:

From "Product Requirements" LENS

1. Combine all codes and standards references related to BEES into a clearinghouse of resource information (portal) with appropriate cross referencing for access by stakeholders, such as contactors, consumers, and building departments/local governments.
   - Incorporate language options and applicable Uniform National Codes (UNC) for buildings.
   - To enhance understanding that the portal offers additional value beyond data, reward (e.g. provide access to/discounts for training and 3rd party inspections) those who register, thereby showing commitment to the process.
   - Work with Utilities to determine the viability of using EnergyCodeAce and its surrounding foundation as a clearinghouse starting point.

   Milestones: TBD with focus on Customer Requirements and Value

   Performance Metrics/Responsible Parties: TBD

From "Process Requirements" LENS

2. For Code Compliance, assign liability and responsibility to the Owner with some responsibility by the Contractor and Engineer.
   - The Customer/Consumer to confirm that closing/final permit has been provided.
   - Innovative technology to be used for simpler reporting processes.
   - Research to be completed on enabling laws and regulations to determine how this can be initiated by Authorized Official Department(s) and/or State Insurance Board; and/or Insurance industry, etcetera.

   Milestones: SB 1414 (2017 and beyond) reviewed and reflected in recommended actions.
   - *60 days: Legal review of legislation and regulation to provide a definitive report engaged by CEC.*
   - *Six (6) months: Plan and cost of implementation determined.*
   - *Nine (9) months: Workshops among stakeholders to determine potential for necessary code changes and enforcement implications organized.*
   - *18 months: Enabling legislation/regulation to put the recommendation in place based on sufficient support passed.*

   Performance Metrics/Responsible Parties: Key parties responsible for implementation include Owners (Business and Homeowner), CSLB, the Dept. of Insurance, and the Code officials working group.

3. Build a pilot program incorporating current industry accepted "technology solutions" or emerging technologies to help the transaction process with the Distributor, Contractor, Building Inspector/Special Inspector and Owner/Consumer to confirm equipment history,

assuming the stakeholders identified above are participating and responsible. *(This is also applicable to Sub- Strategy 1.5.5, Recommendation 2.)*

- State Agencies to establish appropriate scanning systems and technology approaches.
- Consumer targeted advertising to clarify which distributors, contractors, building inspectors/special inspectors are reaching compliance and doing things correctly.
- Distributors to drive market awareness by carrying scanned items only or explicitly identifying the difference.

Milestones:

- *Six (6) months: Stakeholder up-skill training developed.*
- *Six (6) months: Stakeholder feedback gained.*
- *Nine (9) months: Detailed plan established.*
- *Two (2) to four (4) years: Program launched and adopted by participating manufacturers/distributors.*
- *Scanning/acknowledgement steps for database tracking assigned.*
- *Scanned steps to determine progress toward full scanning achievement evaluated.*
- *Scanning achievement graded*
- *Programs developed around steps where scanning falters.*

Performance Metrics/Responsible Parties: Metric: Percentage tracking of installations where full scanning is accomplished. Responsible implementation parties include State Agencies, Industry Manufacturers, and Distributors.

Further Evaluation Recommended: While the above recommendation #3 had consensus approval from the majority of WHPA stakeholders involved in its development, both distributor and HVAC manufacturer association stakeholders expressed that the recommendation "still causes concern" and that it is "too difficult to implement, confusing the players (schools, industrial, other distributors)".

From "Process and Product Requirements" LENS

4. Use a single source permit for installation for HVAC change-outs (similar to the solar industry) for use in the Residential and Small Commercial areas. This is perceived as easier to develop and use for online execution.
   - Research the solar permitting process for applicability of a mirroring approach.
   - Conduct contractor and distributor workshops to gain input and feedback on ideas and pitfalls
   - Pilot the initiative in a few jurisdictions.
   - Complete and present a cost/benefit analysis to support the initiative.

Milestones:
Q4 2016 – Q1 2017: WHPA Compliance Online Permitting Working Group's contractor and jurisdictional surveying, and solar permitting process research completed.
Q2 – Q4 2017: WHPA Compliance Online Permitting Working Group's legislative and regulatory policy issues affecting online permitting, minimum legal requirements for a building permit, contractor and jurisdictional survey results, best practices in online permitting, and feasibility of online permitting research completed.

Performance Metrics/Responsible Parties: TBD

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951-244-6400 info@whpa-inc.org

Feasibility of Online Permitting Memo is included below for easy reference.

Memorandum

Feasibility of Online Permitting

To: WHPA Executive Committee
From: WHPA Online Permitting Working Group
Date: October 16, 2017
Re: Feasibility of Online Permitting

The Compliance Committee of the Western HVAC Performance Alliance (WHPA) has been tasked with providing input to the California Energy Commission (Energy Commission) about "the compliance gap" that exists within the market for alterations to mechanical systems in existing buildings. The Committee's primary focus has been on the permitting process with part of the discussion centered on online permitting.

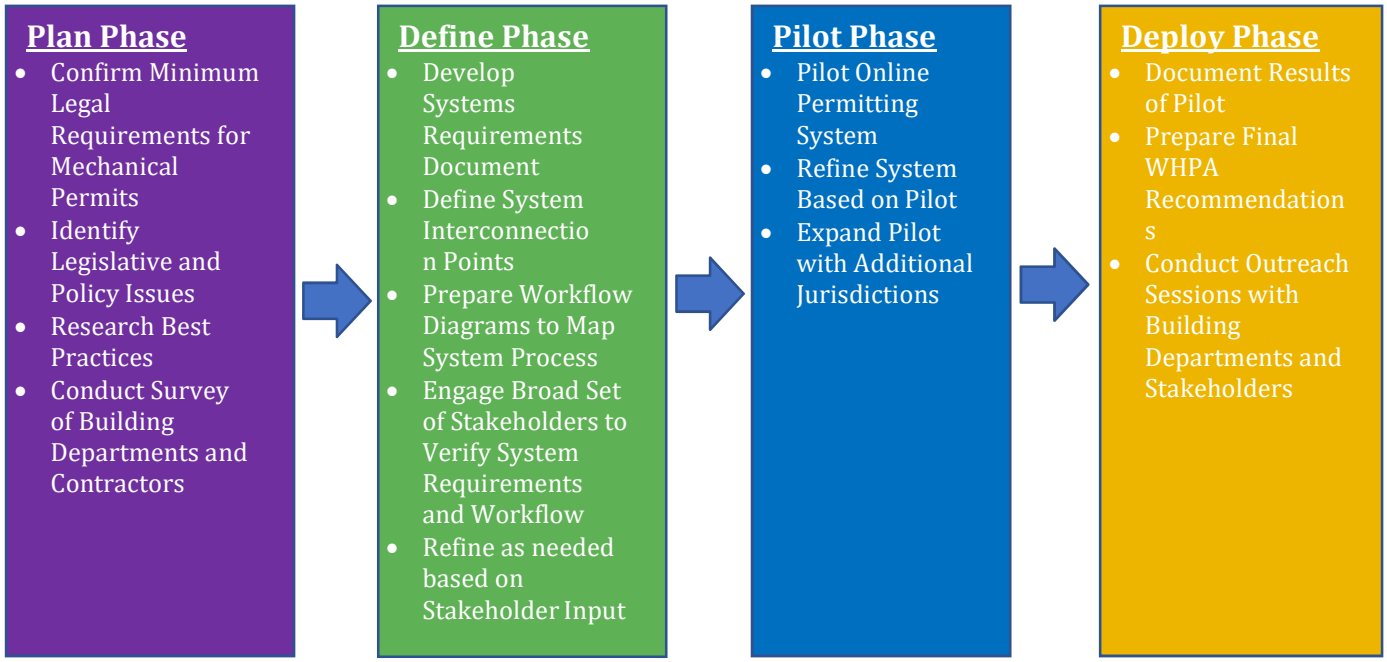
Given the fact that current compliance rates are estimated to be the same as ten years ago at less than 10% this seemed to merit further study to determine whether technology could be applied. In 2006, Mohasci[1] estimated compliance rates between 2.7% and 4.9% while more recently in 2017, DNV GL estimated compliance rates between 8% and 29%[2].

To fully address the topic of improving compliance rates, the Compliance Committee established the Online Permitting Working Group (OPWG) that was tasked with studying the feasibility of implementing a statewide online permitting system (OPS) for heating, ventilation and air conditioning (HVAC) alterations. To this end, the Committee developed a work plan, the *Online Permitting for Residential HVAC Alterations, An Industry Stakeholder Roadmap*. The "Roadmap" directs the OPWG to oversee four project phases: Plan, Define, Pilot, and Deploy (Figure 1).

[1] Enforcement of T-24 Compliance Pertaining to Residential Alterations, Steve Mohasci, August 2006, p 4.

[2] Draft Report: 2014-2016 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I Report, DNV GL, June 2017, p. 4.

Figure 1: Action Items to meet Goal 1-1 of Strategic Plan



For the Planning Phase, the OPWG researched, discussed and prepared the following five work products:

- *Legislative & Regulatory Policy Issues*
- *Minimum Legal Requirements for a Building Permit*
- *WHPA Review of Best Practices in Online Permitting*
- *2017 WHPA Online Permitting Jurisdiction Survey Results*
- *2017 WHPA Online Permitting Contractor Survey Results*

This *Feasibility of Online Permitting Memo* summarizes the five work products listed above and presents the OPWG's assessment if a statewide online permitting system for HVAC change-outs[3] is needed and is feasible in California.

Background

The Compliance Committee recently began preparing a White Paper entitled *Understanding the Residential HVAC Compliance Shortfall* in response to the Energy Commission's interest in better understanding why high rates of permit compliance are so elusive in California:

> "When the California Energy Efficiency Strategic Plan was first released in 2008, it was identified that less than 10 percent of HVAC systems obtain legally required local building permits. Nearly 10 years later, little has changed and the number of permitted systems are still well below California's goal of 50% by 2015 and 90% by 2020."

At the time of writing this memo, that White Paper was still in development, but provides some additional information suggesting that online permitting may help close the compliance gap. Specifically, the White Paper lists five "specific gaps" addressing why the majority of residential HVAC replacement work continues to remain unpermitted, which are:

[3] Change-outs were defined as either: (1) alterations that include new/replacement HVAC components or (2) alterations that include entirely new or replacement HVAC systems (that is, all HVAC equipment and ducts are new/replaced).

1. Insufficient Data
2. Insufficient Tools
3. Lack of Effective Enforcement
4. Low Stakeholder Value Proposition
5. Motivating Behaviors.

This document further defines each of these gaps and suggests actions to reduce the contribution of each gap to the compliance shortfall. However, the remedies suggested for four of the five gaps are not workable in the short term.

The solution to **Insufficient Data** is to consider a data-driven approach to compliance and then put this information in the hands of jurisdictional authorities to help them perform their duties more effectively.

Lack of Effective Enforcement is the result of a current system that relies on several stakeholders to play an assumed role, but has little leverage to ensure these roles are actually carried out, and there is even disagreement as to whether municipalities have legal authority for enforcement. Persuading 593 independent entities to do anything that doesn't directly benefit their agency is problematic – at best.

Low Stakeholder Value Proposition and **Motivating Behaviors** are difficult to influence because they require changing attitudes of industry participants and the public and would require a long-term strategic public outreach and continuous marketing campaign to have any positive impact.

Given the difficulty of addressing these four more abstract gaps, the OPWG focused its efforts on the more explicit fifth gap, **Insufficient Tools**. One potential tool that can help simplify and standardize the permitting process is statewide deployment of a common online permitting platform.

This addresses many issues identified in the other four gaps, and is customizable for the purpose of reducing the compliance gap. While there are issues to be worked out in its implementation, an Online Permitting System for HVAC alterations embraces technology already available and is a critical component of a larger statewide plan to improve the energy efficiency of California's existing buildings. The extreme diversity of permitting systems and requirements is chaotic and unmanageable for the average contractor or property owner. A user-friendly online permitting system that implements a standardized process will help simplify the process for all users.

Successful deployment of an OPS will require careful change management and extensive stakeholder outreach. To this end, it is recommended that state regulatory and legislative bodies fund, or find a mechanism to fund, a division under CSLB that would provide guidance and/or advocate for permit compliance education and training for contractor licensees, jurisdictions, and the public. The goal of such training should be to reduce misunderstanding of code requirements, compliance and reduction of possible fraudulent activities in the market. This could provide a more level playing field for navigating the multitude of regulations and laws in place to police the construction industry in California. This division could actively involve industry stakeholders to gain better insight as to how current regulations impact construction trades and unintentionally result in lower compliance rates.

Following is a summary of the five memos produced as a result of the WHPA's Compliance Committee's evaluation of online permitting systems.

Memo 1: Minimum Legal Requirements for a Building Permit

Assembly Bill 2335 (AB 2335, 2008) outlines minimum requirements for a building permit, which apply throughout California regardless of jurisdiction. All 105 municipalities contacted in the study

also require submittal of a Certificate of Compliance document (CF-1R) in addition to the requirements of AB 2335. For mechanical alteration permits, many municipalities require information above and beyond what is required in AB 2335 and the CEC approved energy documents for a mechanical permit (CF-1R) but these vary widely.

This memo suggested that, for an OPS, the following three fields be added to the CF-1R to satisfy AB 2335 requirements for a building permit:

- Property owner's name
- Property owner's mailing address
- Property owner's telephone number

The memo suggested these fields be added to the CF-1R form for consistency and to reduce redundancy.

Memo 2: Legislative and Regulatory Policy Issues

The OPWG found three legislative measures to be relevant to improving the energy efficiency of existing buildings:

- AB 802 – Normalized Metered Energy Consumption and tracking thereof
- SB 350 – Doubling Energy Efficiency by 2030
- SB 1414 – HVAC alteration permit closure

The OPWG evaluated these three measures for their purpose and potential implications for an online permitting system. Only SB 1414 pertains specifically to HVAC alterations.

In summary, the memo concludes:

> ". . . permitting and compliance are typically treated as secondary issues in existing legislation with the possible exception of SB 1414, which treats several aspects of compliance more directly. However, in order to achieve the significant improvements to compliance rates envisioned by the California Energy Efficiency Strategic Plan, a more concerted legislative effort will likely be required."[4]

Memo 3: Review of Best Practices in Online Permitting

The purpose of this memo was to "identify online permitting systems that are currently in use and document best practices from these systems . . ."[5] This study did not evaluate each available online permitting system currently in use or available today. Rather, it is more a survey of several of the existing online permitting systems.

The memo is based on a review of the resources listed below:

- California Solar Permitting Guidebook[6]
- Green It Forward – Imperial Valley Streamlined Online HVAC Permitting Pilot Program[7]
- Energy Code Ace Application Guidelines[8]
- Recent examples of OPS implementations
  - State of Oregon
  - City of San Francisco

[4] Legislative and Regulatory Policy Issues, WHPA Online Permitting Working Group, March 2017, p. 2

[5] Review of Best Practices in Online Permitting, WHPA Online Permitting Working Group, September 2017, p. 1 [6] https://energycenter.org/sites/default/files/docs/nav/policy/research-and- reports/Solar_Permitting_Guidebook_2017.pdf

[7] https://www.greennet.com/media/case_study/EnergyCloud.Online.Permitting.Best.Practices.pdf

[8] https://energycodeace.com/content/resources-ace/file_type=application-guide

- Input from jurisdictions that currently utilize and OPS (online permitting system)
- Contractor and Jurisdictional Surveys

The OPWG developed 20 conclusions from the resources reviewed. Those most pertinent to online permitting systems include:

- A single Online Permitting System should be developed and made accessible for all jurisdictions statewide to maintain procedural consistency and expedite the permitting process with standardized data. It should be easy for Building Departments to use and should integrate with current systems and processing by allowing an open API interface. This work may be of value to additional online permitting activities;
- Standardization has served to decrease permit time and increase utilization for many jurisdictions in the state;
- The system should be 100% online including payment of fees, thus significantly reducing the need for in- person application and management at the building department by permit applicants; and
- The system should integrate with other state-implemented systems (e.g. HERS registries) and agencies (e.g. CSLB for license verification) to facilitate permit approvals;
- A funding mechanism must be a part of this implementation.
- Implementation should be managed to minimize the potential for cost overruns;

The last item on the above list deserves particular attention. Several people involved in implementing OPS projects told harrowing stories about cost overruns, unmet schedules, and disappointing deployments. (These projects involved implementing comprehensive online permitting systems, not just HVAC alteration permits.)

Memo 4: 2017 WHPA Online Permitting Jurisdiction Survey Results

This survey assessed the status of individual jurisdictions' online permitting systems (OPS) and their receptivity to a statewide OPS specifically for HVAC alterations. Of the 532 individual "contacts," 59 (11%) of building jurisdiction representatives responded (11%. While this response rate is low, the OPWG considers that responses for which the majority of respondents agreed are credible. Examples include:

- Of the 43 respondents, 81% (n=35) indicated that if an "apply for permit system" were made available, they would expect personnel within the jurisdiction to fully embrace it.[9]
- Overall, building department permit processors, other building department staff, contractors, and the general public have responded positively to the OPS, with 29 of respondents giving ratings of three (positive) or four (very positive).[10]
- Over half (59%) of respondents who answered this question indicated that it would be desirable for the State of California to provide a statewide "apply for permit system" that could be redirected to their jurisdiction's website.[11]

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9 Online Permitting Jurisdiction Survey Results, Online Permitting Working Group, August 2017, p.2

10 *Ibid* p.2

11 *Ibid*, p.2

Memo 5: 2017 WHPA Online Permitting Contractor Survey Results

This survey was emailed to 1822 HVAC contractors in California who held valid C-20 licenses. Only 45 contractors responded to the survey, and not all 45 addressed every question. Like the jurisdictional survey, the results are not statistically significant, but are revealing. Two of the most interesting results include:

- Of the 35 contractors who responded, 89% (n=31) want a standardized permitting system across California. This is something the Air Conditioning Contractors of America (ACCA) and Institute of Heating and Air Conditioning Industries, Inc. (IHACI) have been advocating.[12]
- Of the 36 contractors who responded, 86% (n=31) indicate that a completely online HVAC permitting system would save them time in their day-to-day activities.[13]

Contractors also mentioned that an online permitting system would streamline the permitting process and increase productivity.

Conclusion

The OPWG's conclusion is that an online permitting system targeted for HVAC alterations is feasible and it will improve the poor compliance rates in California. Our research shows that a carefully designed and implemented OPS system will be welcomed by both the HVAC industry and building departments. Further, our analysis suggests a statewide OPS is one of the very few definable methods of reducing the compliance gap.

Fortunately, California's private sector and jurisdictions have implemented online permitting systems several of which are in use or have undergone successful field trials.

It also appears that implementation of a standardized system can be done at low or no cost to individual municipalities. The contractor survey revealed that contractors are sensitive to added cost related to an OPS. OPWG members suggest that such costs would be far less than contractors now spend on obtaining permits. Similarly, an OPS would not only reduce municipalities' cost of permitting HVAC alterations, but are likely to see an increase in municipal revenues from permitting HVAC alterations.

Perhaps most importantly, a statewide OPS would be a big step toward improving compliance rates because it would establish consistent rules across the state that can be verified with technology on a real-time basis. It would help change the "culture" of non-compliance that has fostered much of the conversation in the Compliance Committee since its inception. A system that is used consistently across California would establish a base from which standardized training and enforcement activities could be built. Use of public funds for education and outreach could be leveraged to off a cost-effective education and outreach effort. Overall, a statewide OPS would level the playing field and provide clarity so that contractors will better understand what is required to conform with governing codes and this lack of clarity was stated as a barrier by more than 90% of building industry.[14]

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12 Online Permitting Contractor Survey Results, Online Permitting Working Group, August 2017, p.2

13 *Ibid* p. 2

14 Codes and Standards Compliance Improvement Program Years 2013-2014 Process Evaluation Final Report, CALMAC Study ID CPU0129, DNV GL, April 2016, p 12

Recommendations Continued -

From "Process Requirements" LENS

5. Implement agency initiation of a state-wide self-certification program that enacts self-certification for Title 20 and 24, including high efficiency equipment with QR/barcode/FDD and pilot. This includes (1) self-certification with (random) quality control inspections [30% of projects][1] with those failing losing self-certification credentials, (2) mandatory Title 20 and 24 training for certification/credential for those failing third party inspections, with loss of credential until re-training is successfully completed, and (3) self-certification for eligible high efficiency equipment.

   Milestones:
   - *Six (6) months: Governor's Office of Planning and Research direction for state-wide self- certification program initiated.*
   - *One (1) year: Implementing agency determined. Program implementation initiated.*
   - *CEC's 2019 Title 24 CASE Process timeline factored into planning:*
     - *Q1 2017 – Complete data collection and analysis*
     - *Q2 2017 – Support CEC Rulemaking*
     - *Q4 2017 – Complete CASE reports and finalize code proposals.*

   Performance Metrics/Responsible Parties: Metric: Number of self-certified contractors. Key Implementation Parties: State Agencies.

From "Process Requirements" LENS

6. Distributors sell to licensed contractors with proof of license, and proof of Title 20/24 credential.
   - Research enabling laws and regulations to determine "how this can be initiated".
   - Draft enabling legislation and the implementation process for distributors willing to be engaged in pilot programs.

   Milestones: Enabling laws and regulations researched. Enabling legislation drafted. Pilot program implementation process drafted.

   Performance Metrics/Responsible Parties: TBD

Further Evaluation Recommended: While the above recommendation #6 had consensus approval from the majority of WHPA stakeholders involved in its development, a distributor stakeholder cautioned that the recommendation will never happen because of sell through issues. It was suggested that it could occur if put to general contractors but not to Title 20. The need to identify which "licensed contractor" is being referenced in the recommendation was suggested.

[1] The "[30% of projects]" notation is a place marker that can be adjusted. A number needs to be included for quality control. If done correctly, it is believed self-certification can work, however, a pilot would need to be done to confirm that assertion.

Sub-Strategy 1.5.2 Review BEES for Cost-Effectiveness: *Confirm that BEES requirements are cost-effective when applied to existing buildings using careful review, industry engagement, and BEES modifications where needed.*

Overarching Comment: Energy efficiency cost-effectiveness is measured by comparing the benefits of an investment with the costs. Cost-effectiveness tests are used for energy efficiency program evaluation. Is the lens of cost-effectiveness the appropriate measure to use outside of program evaluation? Consider limiting use of the term within the utility framework, and not using the term in the larger marketplace where cost-effective is only a part of the larger value determination by various stakeholders.

Recommendations:
Review the following recommendations in light of the WHPA HVAC Energy Savings and DEER Committee meeting discussion inserted at the end of the Sub-Strategy 1.5.2 section.

From "Process and Product Requirements" LENS

1. Factor the costs of administration and enforcement of standards, the costs of industry installation and compliance, the costs of measurement and verification (M&V), and the costs to clarify market confusion into properly resourcing[2] of pilot programs since stakeholders (consumers, contractors, building departments/budgets) consider these factors important for participation and implementation.

    - Define cost effectiveness for each decision-maker, so that it includes the factors appropriate to measure for that specific stakeholder.

    Milestones: Stakeholder cost effectiveness factors identified.

    Performance Metrics/Responsible Parties: TBD

Further Evaluation Recommended: While the above recommendation #1 had consensus approval suggestion from the majority of WHPA stakeholders involved in its development that it be incorporated into Sub-Strategy 1.5.5 as it relates to market behavior, that suggestion was deleted by the Certifying Body stakeholder representative who felt it was felt it was a "stand alone" recommendation and not duplicative of other content after reviewing it against other recommendations made by WHPA and in the 2016 Update Plan.

From "Process and Product Requirements" LENS

2. Write standards that are enforceable, not just cost-effective. Considerations:
    a. Credibility in Standards requires cost-effectiveness that is visible and tangible to the marketplace.
    b. Users recognize the "value" of energy efficiency savings and energy efficiency codes.
    c. Real world standards, not just concepts, need to be written to align closer to what the workforce is actually applying and practicing in the field.
    d. Standards should align with both new construction and existing retrofits.
    e. Vet standards through a diversity of market stakeholders, including manufacturers, contractors, and building officials, before approval.

[2] "Proper(ly) source(d)(ing)" means identifying funding to do the action, or properly allocating the funding as required to support the activity".

Milestones: TBD

Performance Metrics/Responsible Parties: TBD

Further Evaluation Recommended: While the above recommendation #2 had consensus approval suggestion from the majority of WHPA stakeholders involved in its development that it be partnered with Sub-Strategy 1.5.2 Recommendation #1 above for incorporation into Sub- Strategy 1.5.5, that suggestion was deleted by the Certifying Body stakeholder representative who felt it was a "stand alone" recommendation and not duplicative of other content after reviewing it against other recommendations made by WHPA and in the 2016 Update Plan.

From "Product and Process Requirements" LENS

3. Advertise scale and cost of noncompliance. *(This is also directly applicable to Sub-Strategy 1.5.3.)*

    - Articulate why building efficiency is a health and safety issue within the code, not just "saving energy", so that users recognize the full value of code and energy savings, and to garner Chief Building Official (CBO) support and/or enforcement.

    Milestones:

    - *Information about health issues and damage to the HVAC industry when you use bad actors, damage to city government when you don't pay for a permit, inability to sell your house without going back and getting a permit, and insurance impacts even if it wasn't about the HVAC unit detailed.*
    - *Sub-Strategy 1.5.3 Recommendation ideas for communication, avenues for communication and how to pay for it (Regional hubs) reviewed.*
    - *Talking points from facts that HVAC insiders rehash, but that don't get seen outside stakeholder meetings and HVAC association documents defined.*

    Performance Metrics/Responsible Parties:

Further Evaluation Recommended: While the above recommendation #3 and its milestones had consensus approval suggestion from the majority of WHPA stakeholders involved in its development that it was appropriately placed with Sub-Strategy 1.5.2, the Certifying Body stakeholder representative found the content duplicative after reviewing it against other recommendations made by WHPA and in the 2016 Update Plan. Suggestion was subsequently made to partner the recommendation with Sub-Strategy 1.5.3, Recommendation #1 and Sub- Strategy 1.5.5, Recommendation #1.

WHPA HVAC Energy Savings and DEER Committee meeting discussion

While not made directly as input to the above list of recommendations, the following comments related to EBEE-AP Sub-Strategy 1.5.2 were made during the September 9, 2016 WHPA HVAC Energy Savings and DEER Committee meeting. It is recommended that the comments be reviewed to determine relevancy in the WHPA EBEE Committee's continued development of suggested pathways to implementation for the Sub-Strategy focus: "Review BEES for Cost Effectiveness".

The meeting included review of Figure 1: Sub-Strategy 1.5.2 Diagram developed by WHPA ES&DEER Committee Chair Rick Danks (ASHRAE) with the following explanation:

- The blue California graphic represents building energy efficiency standard content from CEC and other governmental agencies being imposed on existing building owners. The arrows above and below are forcing functions. Those going left to right encourage compliance with the energy standards. Those going right to left are viewed as impeding issues. The overall purpose was to get building owners through the dotted arrow on a path toward code compliance. The enforcing functions are not entirely complete, but it is a start.
- In looking at guidance back to the governing bodies and regulators, it struck the author that to account for enforcement and training, unless it is known how much energy it might take to get appropriate training and infrastructure in place, it might be a "zero sum game". While that is beyond the ES&DEER Committee's scope, it is something someone should consider.
- As always, incentives versus costs are returning drivers in return on investment.

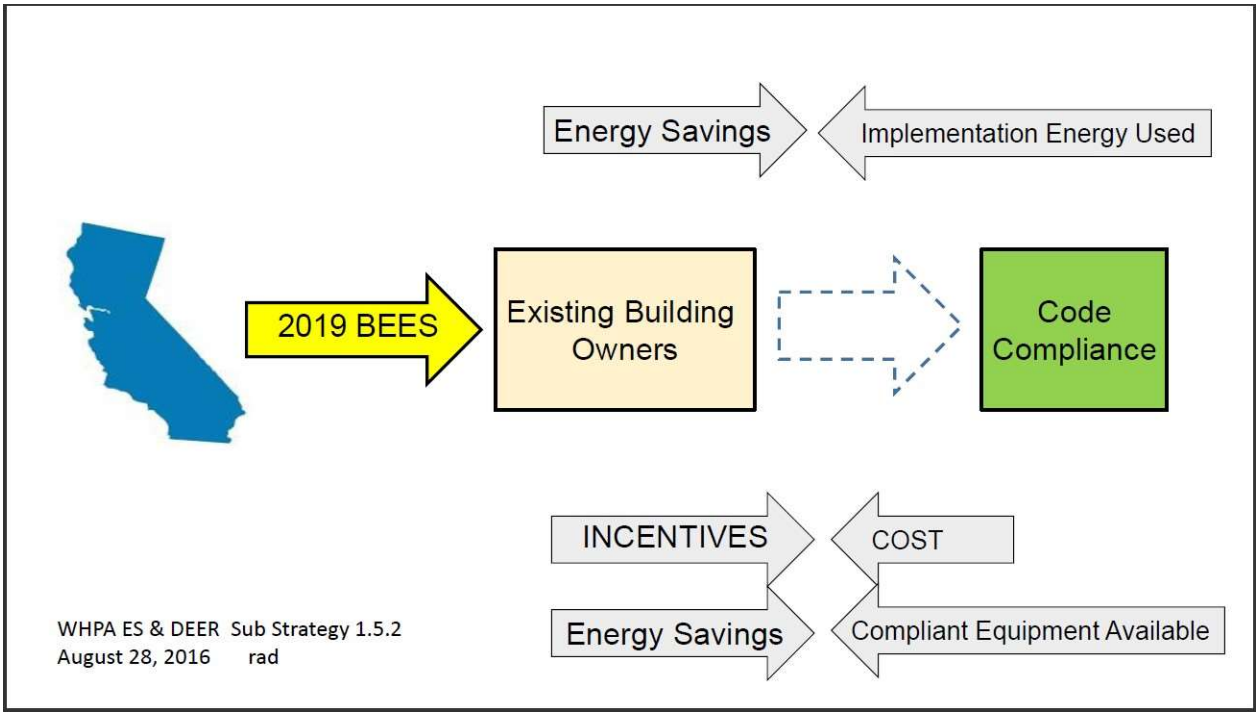

Figure 1: Sub-Strategy 1.5.2 Diagram developed by WHPA ES&DEER Committee Chair Rick Danks (ASHRAE)

1. Regarding cost effectiveness in relation to AB802, Rick Danks (ASHRAE) commented that it seems to revolve around consumers investing in HVAC replacement and the ability to pay for capital investment out of future reduced energy costs. He perceives that as a tough sell, especially if dealing with corporations that must answer to stockholders.
2. Skip Ernst (Daikin Applied) commented that, "If they already had acceptable paybacks, they would have already done them", and that "Most companies can get a better return on investment by being more efficient in their operations than by saving energy."
3. Rick Danks (ASHRAE) voiced concern about trying to sell "this" on improved health and safety. He sees energy efficiency as a competing priority with health and safety. Given that there are limited funds, he "struggles to find a way to sell that". His point is that "you can't make all three come true."
4. Skip Ernst (Daikin Applied) commented that it is very difficult to replace equipment until it becomes a maintenance issue as it is not deemed cost effective.

5. Don Langston (Aire Rite) and Bob Sundberg (BNB Consulting) clarified that there are a lot of steps to be done within the HVAC portfolio buckets before incentive/rebate funds are released.
6. Don Langston (Aire Rite) commented that modeling through DEER makes a lot of assumptions. The bottom line is that "field measurements, or looking at other established industry sources through ASHRAE and other organizations, seem to lose their way through the maze as they go to Sacramento". This is his opinion "looking through a keyhole".
7. Skip Ernst (Daikin Applied) confirmed that there is already compliant equipment that applies to Federal requirements for unitary equipment. IEER is commercial 6 ton or larger systems. It will be a Federal regulation in 2018 and 2019.
8. Don Langston (Aire Rite) commented that he likes Figure 1 (above) as a starting point, but would add a challenge on the right side for the bad assumption made that equipment put in previously was code compliant with a permit. He suggested adding a section under the "Code Compliance" box for "Assumption that Code Based", reminding that the code compliance rate has been verified as very low presently.

Sub-Strategy 1.5.3 Training and Communication: *Enhance communication, education, and interactions with local governments to ease compliance with and enforcement of the standards. Develop effective consumer communication materials to market non-energy benefits of compliance.*

Recommendations:
Review the following recommendations in light of the following SB 350 Responsible Contractor Language inserted at the end of Sub-Strategy 1.5.3 section

From "Product Requirements" LENS

1. Support the development of communication pathways for community outreach and education efforts to HVAC industry stakeholders from the building department all the way through to the health department about the benefits of energy efficiency, building performance and the value of compliance and permits. *(This is also directly applicable to Sub-Strategy 1.5.5)*

    - Ensure health department awareness, engagement and validation of the HVAC contractor's value in delivering and installing Energy Efficiency equipment that ensures families and businesses a healthy and safe environment.
    - Provide consumer awareness, plus contractor encouragement for compliance recognition by enabling building departments to provide lists (names) of HVAC contractors who got HVAC change-out permits.
        - Highlight compliant contractors on the overall contractor list for higher visibility.
        - Maintain the list in a centralized place.
    - Break out the health impacts of an improperly functioning HVAC system. (e.g.: Poor refrigerant charge causes XX. Ducts open to attics or basements sucks in rodent poop and mold. Unbalanced air causes XX.)
    - Use specifics to draw a clear picture for consumers about why they want their HVAC work to be installed correctly and checked, which comes with a permit.

    Milestones: Information (all of which exists in white papers) gathered, researched, and made common knowledge. Communications written in a way that is understood by the market. A single source of contact to coordinate established. Use of Regional Hubs (see later notes on Integrating Public/Private efforts along Mission/Goals) considered. Websites to use for publishing names of contractors who get permits identified. Communication identities clarified.

Possible sources of funding, such as Local Government Challenge Grants, Cap/Trade, or IOUs determined.

Performance Metrics/Responsible Parties: Effectiveness of coordination and ownership of coordination as demonstrated by usage metrics.

From "Process Requirements" LENS

2. Support the implementation of quarterly community engagement activities in each IOU territory where the community, consumers, contractors, building officials and other stakeholders are invited to a pre-release of new industry/manufactured technologies to enhance community engagement and provide opportunities for immediate participant feedback.

- Support the implementation of ongoing community engagement activities regarding new technology, existing energy efficient technology, and value and importance of building permits, and expedited building permits connected with sale. Host in home-improvement stores where the target market is shopping. Engage in home shows, local showrooms, traveling "dog-and-pony" shows.
- Consider including incentives for registering serial numbers on HVAC units and/or immediate issue of building permit (and/or have contractor available to install).

Milestones: Information defined for community engagement on topics such as HVAC technology, mini-split, duct improvements, building code, control technology, general health and energy savings. Engagement venues and vehicle(s) identified for use in each community. Community engagement coordinator identified. Funding source(s) identified with possible sources including manufacturing advertising dollars, utilities, cap/trade, and energy grants.

Performance Metrics/Responsible Parties: Community engagement statistics

From "Process and Product Requirements" LENS

3. Properly source funding and resources to bring project management and continuous process improvement into the base set of skills of local government employees. Encourage proper funding to local governments for focus on both energy efficiency in the market as well as on what is needed for health and safety. Identify the proper source of additional funding to upgrade departments by reinstating what may have been lost in the last construction downturn. *(This is also directly applicable to Sub-Strategy 1.5.5, Recommendation 1.)*

- Provide funding for skills, marketing, and people rather than ineffectively piling more work on existing departments, agencies, and organizations. Energy efficiency improvements for existing buildings (thru the lens of HVAC…) is not the expertise of existing agencies, departments, etcetera.
- Centralize regional grant writing through skilled staff.
- Determine the potential for using existing or emerging technology to identify ongoing history of which units got permitted and which did not.
- Establish a centralized location to manage Climate Action Plan documentation for counties as many rural counties do not have staff or staff expertise to do this.
- Identify models, such as County of Sonoma's sustainability division and regional Economic Development efforts, business improvement districts, and other public/private efforts.
- Reconfigure Building Departments by breaking out plan check/inspections between "Health and Safety" and a new function for "Energy Efficiency".

- Make new Energy Efficiency functions part of a Regional Energy Efficiency hub with public and private partnership. Source funding thru grants (possibly a Local Government Challenge grant).
    - Consider managing efficiency functions for larger regions by providing permit assistance, contractor training assistance, education coordination, and energy upgrade incentivizing that is customized for local region's climate/building stock/skill set/economy.

Milestones: Steps and processes developed. Models identified. Cheerleaders/drivers/people like those who formed WHPA identified. Business model created. Acceptance for business model with public and private entities built.

Performance Metrics/Responsible Parties: Funding and resource allocations

From "Process and Product Requirements" LENS

4. Offer a compliance path for 2019 code to follow the existing audit process - OR - use units with Fault Detection and Diagnostics (FDD).
    - Use technology to integrate FDD into residential HVAC units via public and private efforts with mutual goals and objectives toward the ultimate goal of having technology do the work, similar to how car on-board computers have changed the work of auto mechanics. (See the State Energy Efficiency Collaborative 2016 conference material, assessment tool.)
    - Determine goal viability for the extra FDD cost to be equal to the cost of audit.
    - Include the compliance path of FDD vs HERS in CEC 2019 Part 6; If the cost of FDD is significantly higher than audit, identify additional benefits of FDD.
    - Ensure training for installers and service/repair as an essential need.
    - Ensure means to confirm FDD for Building Permit.

***Recommended Next Steps:** Continue collaboration with WHPA FDD Committee subject matter experts for further development of milestones and performance metrics/responsible parties.*

Milestones: Collaborative efforts with manufactures to see the expectation that FDD will ultimately be required in all units, so the mass market will be there, established.

Performance Metrics/Responsible Parties: CEC (in progress)

From "Process and Product Requirements" LENS

5. Continue demystifying Energy Codes and Standards and increase navigational tool training for building departments/other local Government officials and contractors. Increase the time between code updates and/or increase training time for all stakeholders so the workforce is market ready when code cycle changes. *(This is also directly applicable to Sub-Strategies 1.5.5 and 3.3.1.)*

Milestones: Code update timeline established and communicated to stakeholders.

Performance Metrics/Responsible Parties: CEC (in process); Code update timeline versus training timeline statistics. Navigational tool training usage percentages.

From "Process and Product Requirements" LENS

6. Determine stakeholders' true code compliance baseline. Understand what is really going on in the market regarding compliance. *(This is also directly applicable to Sub-Strategy 1.5.5.)*

Recommended Next Steps: *Continue collaboration with WHPA Compliance Committee subject matter experts for further development of milestones and performance metrics/responsible parties.*

Milestones: HVAC Compliance Committee's HVAC Compliance Definition Matrix completion (see page 20).

Performance Metrics/Responsible Parties: WHPA Compliance Committee (in process)

From "Process and Product Requirements" LENS

7. Develop value propositions for energy efficiency compliance for the following stakeholders: Building Departments, Manufacturers, Distributors, Contractors, and Consumers[3]. Once defined, look for synergies and differences among value statements to inform stakeholder-specific messaging and training related to the value and cost of non-compliance. Using this as a foundation, develop stakeholder-specific advertising and training. *(This is also directly applicable to Sub-Strategy 1.5.2, Recommendation 3; Sub-Strategy 1.5.5, Recommendation 1; and to Sub- Strategy 3.3.1 overall.)*

Key Considerations:

- Develop a financial structure supportable over time and not dependent on shorter-term IOU programs, for cities to facilitate marketing messages and training to offset the current issue of building codes changing every three years without sufficient funding to support the code cycle changes.
- Identify workforce competencies and knowledge, skill and abilities (KSAs), plus appropriate industry credentialing for B.E.E.S. codes and compliance.
    - Make CEUs available to provide value to training completion.
- Compile and share HERS provider data on building department compliance.

Milestones: Stakeholder value propositions defined. Stakeholder value proposition definitions evaluated synergies and differences. Stakeholder specific advertising and training developed.

Performance Metrics/Responsible Parties: *Pre/post training surveying for understanding of stakeholder values*

SB 350 Responsible Contractor Language

The following key excerpts related to the Responsible Contractor language from SB 350 was provided by Jim Caldwell (CCCCO) on October 3, 2016.

SEC. 6.

Section 25310 of the Public Resources Code is amended to read:

[3] Consumers were added as key stakeholders due to the important role they play in the compliance decision- making process.

25310.

(c) (5) The energy efficiency savings and demand reduction reported for the purposes of achieving the targets established pursuant to paragraph (1) shall be measured taking into consideration the overall reduction in normalized metered electricity and natural gas consumption where these measurement techniques are feasible and cost effective.

SEC. 8.

Section 25943 of the Public Resources Code is amended to read:

25943.

(a) (3) The commission shall adopt, implement, and enforce a responsible contractor policy for use across all ratepayer-funded energy efficiency programs that involve installation or maintenance, or both installation and maintenance, by building contractors to ensure that retrofits meet high-quality performance standards and reduce energy savings lost or foregone due to poor-quality workmanship.

SEC. 16.

Section 399.4 of the Public Utilities Code is amended to read:

399.4.

(b) (1) Any rebates or incentives offered by a public utility for an energy efficiency improvement or installation of energy efficient components, equipment, or appliances in buildings shall be provided only if the recipient of the rebate or incentive certifies that the improvement or installation has complied with any applicable permitting requirements and, if a contractor performed the installation or improvement, that the contractor holds the appropriate license for the work performed.

(d) (2) Authorize pay for performance programs that link incentives directly to measured energy savings. As part of pay for performance programs authorized by the commission, customers should be reasonably compensated for developing and implementing an energy efficiency plan, with a portion of their incentive reserved pending post project measurement results

Sub-Strategy 1.5.5 Understand the Compliance Shortfall:

Work with local governments (LG), manufacturers, and contractors to determine compliance gap and understand the role of permitting and the needs of building departments.

Recommendations:

Note that the following are a combination of recommendations from both the WHPA EBEE and Compliance Committees.

From "Process Requirements" LENS

1. Facilitate transformation of stakeholder mindsets to care about (value) energy efficiency compliance. *(This is also directly applicable to Sub-Strategy 1.5.3.)*

    - Consider breaking the process into specific, yet separate stakeholder/ market actors for Building Department/Officials, Manufacturers & Distributors, Consumers, and Contractors to take a deeper dive into how each group "VALUES" energy efficiency.
    - Identify synergies, uniqueness and separations to develop unique energy efficiency compliance value propositions for each stakeholder identified above.
    - Advertise scale and cost of non-compliance.
    - For code cycle updates, provide market actors with appropriate resources for training and credentialing on the value of energy efficiency compliance, with particular focus for Building Departments on marketing and training on the value and cost of non-compliance; and for the Consumer on framing the consumer energy efficiency conversation in terms of health and safety, as well as in terms of legal compliance (must obey).

    Milestones: Stakeholder value propositions identified. Scale and cost of non-compliance advertised to stakeholders. Value training and credentialing resources provided to market actors.

    Performance Metrics/Responsible Parties: TBD

From "Product and Process Requirements" LENS

2. Use existing or emerging automated and wireless tools or alike technologies to simplify the permitting process, including tracking and verifying permit opening and closing. *(This is supportive of Sub-Strategy 1.5.1, Recommendation 3.)*

    - Provide Smartphone/Tablet – or alike technology for use in the field.
    - Simplify population and submittal of all related forms in-the-field.
    - Develop navigational tools and codes and standards resources that are available online and through Smartphone and Tablet technologies.
    - Provide Local Government/Building Departments with funding resources, technologies and training necessary for implementation.
    - Develop a financial structure for the cities to facilitate marketing messages and Building Department training-needs to support overtime, not dependent on short-term IOU programs, but aligned closely with realized mechanics and benefits of the Rolling Portfolio.
    - Compile and share HERS provider data on building department compliance

    Milestones: Data already available from HERS Providers gathered. Online navigational tools and codes and standards resources developed.

Performance Metrics/Responsible Parties: Simplified material usage (e.g. forms, in-the-field materials, navigational tools).

From "Process Requirements" LENS

1. Determine the correct "carrot and stick" in the compliance process for the Building Department, Consumer and Contractor market actors.
    - Institute fees for non-compliance (the "stick").
    - Consider reviewing, adopting and instituting Local Government permit models, such as Los Angeles, City of Davis, Sonoma County and alike that are unique to the market.
    - Check permits at change of ownership or time of sale, instituting notification to building departments, along with non-compliance fees.
    - Level the playing field by disallowing unlicensed, unpermitted work to slip through without penalties (a "stick" and a consumer protection measure).

    Milestones: Local government models reviewed, adopted, and instituted. Non-compliance fees instituted.

    Performance Metrics/Responsible Parties: Permit statistics

Further Evaluation Recommended: While the above recommendation #3 had consensus approval from the majority of WHPA stakeholders involved in its development, both distributor and HVAC manufacturer association stakeholders expressed that the recommendation "still causes concern" and that there is a need to "make the end user/building owner responsible, take the policing off of the shrinking field of contractors and distributors".

It was suggested by the Certifying Body stakeholder representative after review of other 2016 Update concentrations that recommendation #3 above is also directly applicable to Sub-Strategy 1.5.7.

From "Process Requirements" LENS

2. Continue demystifying Energy Codes and Standards and increase navigational tool training for building departments/other Local Government officials and contractors. *(This is also directly applicable to Sub-Strategies 1.5.3 and 3.3.1.)*
    - Increase time between code updates and/or increase training time for all stakeholders to ensure the workforce is market ready when the code cycle changes.

    Milestones: Code cycle timeline defined. Training timeline defined.

    Performance Metrics/Responsible Parties: Code cycle change frequency. Training duration. Stakeholder participation statistics.

Western HVAC Performance Alliance Inc. (WHPA)
Physical Address: 29991 Canyon Hills Road, Suite 1709-303, Lake Elsinore, CA 92532 Mailing Address: 524 San Anselmo Avenue, Suite 109, San Anselmo, CA 94960
951-244-6400 info@whpa-inc.org

WHPA Compliance Committee "Understanding the Residential HVAC Compliance Shortfall" White Paper Work Product

Background

The California Energy Commission (CEC) issued the Existing Buildings Energy Efficiency Action Plan (Action Plan) in late 2016. The Action Plan is a 10-year roadmap to activate market forces and transform California's existing residential, commercial, and public building stock into high-performing and energy-efficient buildings. The Action Plan establishes several goals required to achieve its desired goals including increased government leadership in energy efficiency.

As part of this increased government leadership, the CEC identifies the need to 'work with local governments (LG), manufacturers, and contractors to determine [the] compliance gap and understand the role of permitting and the needs of building departments"[4] as an important step. The goal of this effort is to identify and remedy "circumstances that increase the difficulty of complying with the standards or that lead to noncompliance."[5]

The WHPA Compliance Committee was tasked to provide input to the CEC regarding perceived gaps that impact higher rates of code compliance. The Compliance Committee includes a broad cross section of HVAC industry professionals that bring different perspectives to the topic. For example, contractor members share their direct experience interacting with local building departments while applying for mechanical permits while building officials share their experience trying to enforce applicable governing codes. Thus, the Compliance Committee is uniquely qualified to address the compliance gap.

As part of its 2017 goal planning exercise, the Compliance Committee included a goal to provide input on the compliance gap by developing a white paper for the Existing Buildings Energy Efficiency Committee. This white paper provides the HVAC industry's perspective on why the majority of residential HVAC replacement work continues to remain unpermitted and provides recommendations on how to close the gap.

The specific gaps discussed by the Compliance Committee include:

1. Insufficient Data - Accurate data is required to determine the current compliance baseline. Existing data on the number of permits issued across the state needs to be catalogued and compared to equipment sales data to better define the problem, establish measurable goals regarding improvement and enact strategies to reach those goals.
2. Insufficient Tools - In general, the permit process has not kept up with technology. The current process is largely paper-driven and relies on in-person interactions with building department staff. Better use of cloud-based software and applications will improve the overall permit experience for contractors and customers. Online tools will facilitate better data access for all stakeholders.
3. Lack of Effective Enforcement - There is no real enforcement mechanism. Building Departments have limited resources in terms of staff, budget and access to information that allows them to effectively identify code violators, and in many cases, they simply don't have the legal authorization to do so. As a result, a culture has developed that views enforcement as nothing more than a "slap on the wrist." An effective enforcement mechanism is a top priority that needs to be addressed in order to achieve a marked improvement in compliance rates.
4. Low Stakeholder Value Proposition - There is very little perceived value for the various stakeholders to comply with the Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6). Due to the lack of an efficient enforcement mechanism, there is little risk for

[4] Existing Buildings Energy Efficiency Action Plan, California Energy Commission, December 2016, p 23
[5] Ibid p 21

contractors that do not comply with codes. In fact, there may actually be an incentive to not comply because pricing in the cost of permitting may actually cost the contractor work. Additionally, customers see little value in compliance because they are oftentimes looking for a quick, inexpensive solution to their physical need for comfort.

5. Motivating Behaviors - Much of the discussion by the Compliance Committee has involved assumptions as to why certain stakeholders don't value compliance. However, these assumptions are not necessarily backed up by factual data. Additional research and analysis into building departments, contractors and customers behaviors and perspectives related to permitting and code compliance may be useful.

Gap #1: Insufficient Data

Estimates of HVAC building code compliance indicate that California is not on track to meet the compliance goals set in the Existing Buildings Energy Efficiency Action Plan. The Contractors State License Board (CSLB) supports this assertion and has found that "many appliance installations and alteration projects are being performed without the required permits of the accompanying inspections and testing."[6]

Most of the estimates for compliance rates for residential replacement work are largely based on professional opinion and put the number at no higher than 10%. The initial estimate that fueled much of the emphasis on improving compliance rates was released in 2006 and estimated a range between 2.7% and 4.9%.[7] The highest compliance rate reported has been through the 2014 evaluation of the Codes and Standard and Residential Quality Installation programs which found permit rates of 38% for residential projects. However, the authors of this study indicated that the results were not generalizable because of small sample sizes.[8] Likewise, a Center for Sustainable Energy survey found that 38% of HVAC contractors believe that it is very common or common for permits to be pulled when required.[9]

The most recent and comprehensive compliance estimate was released in June 2017. The draft HVAC Permit and Compliance Market Assessment concluded that permit rates remain low and that "the true permit rate lies between the two estimates we developed as part of this study (8% and 29%)."[10] The large variance results from two different approaches used to estimate compliance rates. The "top- down" method paired state-level estimates of total HVAC units installed with statewide estimates of total permitted units. The "bottom-up" method relied on customer surveys that asked respondents to identify whether they changed out an HVAC unit in 2010 or later. While the gap between the two estimates indicates continued uncertainty, the report makes it clear that the state is far short of its goal of 90% compliance by 2020.

While baseline compliance rates are important to know, they only serve to measure progress against a follow-up study for comparison to determine if "the needle has moved." More effort is needed to identify practical methods for achieving 100% compliance. One such effort is to arm building inspectors with the data and information they need to enforce existing code. Without specific information as to where equipment is being installed, building departments have limited ability to locate unpermitted work. This information is required by law through the CF1R, CF2R and CF3R documents. However, this system does not capture the large numbers of equipment installed either without permit or proper documentation. Other possible sources or systems for acquiring the needed information is difficult or impossible to access as it requires multiple parties to share data and information they feel is proprietary, confidential or sensitive. A better mechanism needs to be developed to enforce current legal requirements. Alternately,

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[6] "Help Consumers Realize the Value of Compliance". White Paper. Statewide Codes & Standards Program Compliance Improvement Advisory Group. September 2013.
[7] Enforcement of T-24 Compliance Pertaining to Residential Alterations, Steve Mohasci, August 2006, p 4.
[8] HVAC Permitting: A Study to Inform IOU HVAC Programs. Prepared for Pacific Gas and Electric Company by DNV GL. August 2014. p. 1-3.
[9] https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf
[10] Draft Report: 2014-2016 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I Report, DNV GL, June 2017, p. 4

current legal requirements need to be reviewed for their appropriateness to current real world conditions and adapted to more closely match their potential for application in the market. Current systems are not working.

One potential solution is to consider an alternative data-driven approach that utilizes publicly available data rather than physical tracking of individual equipment. It is not clear what additional sources of data exist or which sources, if any, could even be used to identify unpermitted work. Additional study should be conducted to determine the feasibility of using multiple sources of data, such as information available from filed permits, records maintained as part of DOE's enforcement of regional equipment standards[11], statistical analysis of total numbers of structures cross referenced to average age and average equipment life expectancy, or benchmarking that can provide information about how homes perform in the real world.

Analysis of Big Data could inform jurisdictions on the scale of work being done in their area for comparison to in-house permit data, without violating privacy concerns. Methods of putting this information in the hands of jurisdictional authorities will need to be developed as most jurisdictions are not equipped for this level of analysis. Additionally, research on turning this type of analysis into a tool for compliance improvements is needed and must be coordinated with current CEC EBEE action plans.

Gap #2: Insufficient Tools

The current permit process for many jurisdictions in California requires a contractor to physically go to the local building department office, fill out a paper form and stand in line to submit their application. Additionally, there is much confusion as to what project information and supporting documentation is required with the applications and the supporting documentation requirements oftentimes vary by jurisdiction.

As discussed in a 2016 evaluation of the IOU's Codes and Standards Compliance Improvement Program[12], more than 90% of the building industry indicated that it is unclear what is required to comply with energy code, the compliance process has too many steps and energy code forms are too complex. Complexity of energy code forms was also cited by building departments, but at a slightly higher rate of 95% of those surveyed.

The Center for Sustainable Energy (CSE) surveyed local building departments and found that 70% do not use a checklist or reference tool to ensure that appropriate compliance documentation is provided with the permit application.[13] The survey also found that for 50% of permit applications, contractors do not provide the required Title 24 documentation.

Clearly there is a need for a better understanding of Title 24 requirements and supporting tools to help people comply. In fact, many of CSE's recommendations point to better tools and information.[14] Interestingly, such tools exist. Energy Code Ace is a program developed by the California IOUs to provide tools, online and in-person training and other resources for those who need to understand and meet the requirements of Title 24, Part 6 and Title 20. These tools are highly valued by those who use them. The Compliance Improvement Program evaluation report surveyed several hundred users of Energy Code Ace tools and the majority of respondents indicated that the tools were useful and helped them do their job more efficiently.[15] However, despite the existence of valuable tools and information, anecdotal comments from permit technicians indicate that many contractors are not well-informed about Title 24 requirements

[11] As of July 2016, new recordkeeping requirements for manufacturers, distributors and contractors went into effect to assist in the enforcement of DOE Regional Standards. However, these records are maintained at the individual company level and there is no provision to proactively report this data to DOE or any other entity.

[12] Codes and Standards Compliance Improvement Program Years 2013-2014 Process Evaluation Final Report, CALMAC Study ID CPU0129, DNV GL, April 2016, p 12

[13] https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf, p 41

[14] https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf, p 73

[15] Op. cit. p 7

and that much of the contractor's education happens in an ad hoc manner at the permit counter.

Therefore, one obvious way to address the compliance gap is to increase the usage of information resources, such as what is offered through Energy Code Ace. This can be accomplished informally by targeting more training opportunities throughout the state or formally by requiring Continuing Education Units (CEUs) in order for contractors to renew their license. The former would need marketing and outreach support to reach the majority of contractors who are not actively pulling permits while the latter would need government action to change requirements for license renewal.

While contractor education may likely have a positive impact on permit rates, the challenge still remains that jurisdictions implement permit requirements differently. Therefore, the process also needs to be simplified and standardized across jurisdictions so contractors can expect the same permit requirements in whichever jurisdiction they work. In addition, there is also a need to define what additional tools are needed to assist building departments effectively enforce Title 24. Finally, once an improved compliance process is implemented, it will be necessary to implement a change management process to ensure that impacted stakeholders fully embrace the change and results will be realized.

Process Simplification

The CSE study analyzed residential HVAC compliance trends in order to promote effective HVAC permit streamlining strategies among building departments. The study found that 52% of contractors and HERS raters indicated that compliance forms were one of the biggest barriers to compliance.[16] One of the first items addressed by the Compliance Committee after it was established in 2009 was to simplify HERS compliance forms. CF1R-ALT was drafted by the Compliance Committee and collapsed all the information on the CF1R form that pertained to an HVAC change-out on a single page form. This was an early example of process simplification, but the creation of the CF1R-ALT is just a single step in the overall compliance process.

In order to have a significant positive impact on the current compliance rate, a broader look at the entire end-to-end compliance process is needed, including IT systems. HVAC industry stakeholders should work in a collaborative effort to complete a thorough evaluation of the "As Is" process and make specific recommendations for a streamlined "To Be" process. This process should be simple, but sufficiently document adherence with Title 24. This process improvement step should consider not only near-term changes, such as additional form simplification, or requiring forms at different stages in the process, but also wholesale changes to the status quo. Once complete, the "To Be" process can then be used to inform the definitional phase of an Online Permitting Business Requirements Document[17].

The key stakeholders in such a collaborative effort should include the CEC, CALBO/local building departments, HVAC contractors, and homeowners as they represent those directly impacted by the compliance process. Once a simplified compliance process is created and a method of integrating permitting and code required documentation is developed in a seamless system, IT development professionals should be engaged to ensure the process can be implemented through a cost-effective IT solution. This broader group can then explore the launch of sufficiently scoped and funded pilots to test the process.[18]

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16 https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf, p 72

[17] For more context, please refer to the WHPA Online Permitting for Residential HVAC Installations Industry Roadmap.

18 Note that much of this work will likely dovetail with the efforts of the Online Permitting Working Group.

Process Standardization

There are 593 individual jurisdictions that are responsible for managing the local permitting process for mechanical change-outs[19]. Given that contractors serve a customer base that span many of these jurisdictions, there is a need for a standard process with regards to compliance that is used consistently across jurisdictions. Input provided by contractors participating in the Compliance Committee provides anecdotal information that the requirements to document compliance with Title 24 is not applied equally across jurisdictions. For example, some jurisdictions require certain HERS compliance forms while others do not.

Similar to the process simplification step, a concerted effort needs to be deployed to ensure that Title 24 compliance is implemented consistently. Energy code documentation already required offers a model for standardized permit requirements. Additionally, many of the tools developed by Energy Code Ace can be used in this effort, but will require greater outreach to ensure these tools are put in the hands of the people who need them (i.e. anyone who might touch a permit). Additionally, online permitting is another opportunity that may simplify the process and is being addressed separately through the Online Permitting Working Group.

A standardized permitting process will also enable CSLB to integrate process-oriented questions into their contractor testing requirements. Testing at the time of licensure is a good opportunity to confirm understanding about permit requirements, as well as penalties and consequences associated with noncompliance. Including such questions will drive further education on permit requirements as applicants will need to better understand the process as they prepare for the examination.

Enforcement Tools

Insufficient enforcement is a function of a lack of tools being made available to agencies. Jurisdictions do not have access to information that will help them effectively enforce permit requirements. Without access to information as to where unpermitted work is actually occurring, building departments simply do not have the resources to look for such projects. Additionally, it is not clear that even armed with comprehensive data, jurisdictions would have the resources to fully enforce code. The larger questions are who is responsible for code enforcement and who will pay for it?

Responsibility for code compliance lies with many entities. The Compliance Committee recently prepared a Compliance Definition Matrix that summarizes all the roles involved with compliance. The next iteration of this Matrix should be expanded to include a list of tools and resources any particular entity would need to carry out their responsibility.

Change Management

Process improvement alone will not change compliance rates. Thoughtful engagement with the broader HVAC community will be required. The Change Management profession commonly uses the Prosci ADKAR model to guide organizational change[20]. This model posits that in order to change, one must have the Awareness of the need for change, a Desire to participate and support the change, Knowledge on how to change, the Ability to implement required skills and behaviors and then Reinforcement to sustain the change.

The HVAC workforce must be met "where they are at" to gain buy-in to move permitting to a regular and

[19] Western HVAC Performance Alliance Online Permitting for Residential HVAC Installations - An Industry Roadmap, Compliance Committee, December 2015, p 1

[20] https://www.prosci.com/adkar/adkar-model

accepted responsibility of the trade. This includes building department staff who have an equal responsibility to enforce energy code compliance along with public health and safety. Cost also needs to be considered when looking towards an improved permitting process.

The cost of achieving 80% compliance by 2021 has not been well documented, but the CSE Compliance Survey found that 60% of contractors and HERS providers indicated that the cost of compliance is one of the biggest barriers to compliance[21]. In a report prepared several years ago by the WHPA[22] it was estimated that approximately 230,000 residential HVAC systems are sold in California annually.[23] So, how much will it cost to achieve 80% (i.e. approximately 180,000 systems) fully permitted and code compliant systems?

Discussion within the Compliance Committee estimates the price of compliance to be at least $550. This includes an average cost of $350 for a HERS rating and $200 for a mechanical permit[24]. At this price, the impact to consumers could approach $100,000,000. This does not include the additional costs incurred by the contractor to stand in line at the building department or waiting for the inspector at the job site nor does it include costs incurred by building departments who would need to increase their capacity to deal with such a high volume of permits. These additional costs could drive up the societal cost of compliance even further. Additional study is needed to determine a more accurate cost estimate for compliance and the financial impact on consumers.

Conversely, on the benefit side, higher rates of compliance would increase the volume of HERS verifications and thus create a more viable market where competition drives down the price of a verification. Additionally, building departments would see increased revenue from more permit fees that would support additional staff and resources which could result in better delivery of services and drive higher contractor participation. Higher contractor participation could drive down the compliance premium charged to customers as contractors become more familiar with the processes and compliance forms.

Clearly, a more in-depth analysis of the cost/benefit of compliance needs to be conducted for better understanding of what type and quantity of resources need to be deployed in order to achieve California's goal.

Gap #3: Lack of Effective Enforcement

One thing that most everyone can agree on is the need for better enforcement of existing codes. However, disagreement exists about who is ultimately responsible for enforcement. The status quo today is an environment where:

- Homeowners are often uninformed of permit requirements or simply want the job done as quickly and cheaply as possible and therefore do not want the hassle of permits.
- Contractors look at compliance as optional and weigh the cost for compliance versus noncompliance

[21] Op. cit. p 72

[22] Western HVAC Performance Alliance Program Design Recommendations for 2013-2014 Residential Upstream HVAC Equipment Incentive Program, Residential Upstream Working Group, June 2013, p 6.

[23] The Residential Upstream Working Group paper actually indicates that "[a]t best, 30,000 A/C units > 13 SEER are sold annually in California" and that "87% of California ducted A/C sales are 13 SEER." This information can be used to deduce that 13% of units sold are greater than 13 SEER. This can then be expressed algebraically as (1.00- 0.87)x = 30,000, or 0.13x = 30,000, where x represents the number of units sold. Solving for x results in an estimate of 230,769 ducted A/C units sold annually in California.

[24] The costs provided were based on the collective experience of the Contractor, HERS Raters and Codes and Standards Official members of the Compliance Committee. HERS costs were further validated through a web search for California-based HERS raters (e.g. http://www.1stchoicehersrating.com/pricing-2/) and the permit costs for several California cities including Los Angeles, Sacramento and Chula Vista.

based on market dynamics - if the customer does not want to pay and there are no penalties for non-compliance, then why comply?

- Building Departments are the legal authority when it comes to permit compliance, but they simply do not have the budget, resources and tools to effectively help increase compliance to the standard set by the State and are legally limited[25] from even getting certain information necessary to carry out their duties (see Gap #2).
- Manufacturers and distributors are involved with the sale of HVAC products, but not with the installation of those products and thus have little influence over permitting.
- Utilities provide rebates and incentives to participants who purchase and/or install products that comply with program requirements; oftentimes these participants are equipment distributors who are not involved with permitting (see previous).
- Regulatory agencies such as the CPUC, CEC and CSLB operate under a well-defined legislative authority that establishes their role in code enforcement.

Achieving significant increases in compliance rates requires a real change to the status quo. An effective process is one in which all stakeholders take ownership of the issue and "have some skin in the game." If only one part of the process is addressed (e.g. consumer education) at the expense of a holistic approach to the issue, then any measurable improvement will be dampened. Some of the larger issues that need to be addressed include:

1. **Facilitating legislative action to enable CSLB to better enforce contractor permitting requirements.** This could be done by requiring that all home improvement contracts include declarative language to be signed by both the contractor and the purchaser as to who is responsible for the permit. This will provide needed clarity between the homeowner and contractor as to who is responsible for the permit. In addition to this declarative statement, energy code requirements should be explicitly included in the home improvement contract to help ensure that the homeowner is fully aware of the compliance requirements.
2. **Creating and/or updating state publications related to permit requirements.** For example, the CSLB publication "Contracting for Success" should be revised to include a greater emphasis on permitting. Currently, the publication only mentions permits in passing, but should include more about the legal requirements for permits.
3. **Creating a Customer information piece distributed through alternative channels.** A collaborative effort with CEC, CSLB and local jurisdictions should be explored where the CEC and CSLB would jointly prepare materials targeted to homeowners that describe permitting requirements for home improvement projects including HVAC. These materials could be placed in big box home improvement stores (i.e. Home Depot, Lowes, Sears, Costco, etc.) using local building department staff and/or distributed through HOAs, social media, etc.
4. **Rethinking the compliance process.** Currently, the CF1R is required at the time of permit application to document project specific details. Once the system is installed, additional compliance forms are required and registered by a HERS rater. Could this form-based process be improved to enable contractors to have some sort of self-certification and verification piece that uses modern technology? An accurate and reliable technology that overcomes concerns about impartiality would be required for this to be a viable solution, but it is an option that is worth exploring.
5. **Initiating a collaborative data exchange between stakeholders.** In today's world, "big data" is commonplace and when used effectively can accurately predict consumer behaviors. It is likely that this same level of data analytics can be used to better track permitted versus unpermitted

[25] The International Code Council publishes a reference guide titled "Legal Aspects of Code Administration" which informs the building official of legal aspects of administering and enforcing building codes as well as legal aspects of the profession. This reference is available for purchase at http://shop.iccsafe.org/legal-aspects-of-code- administration-2002-edition.html.

work, but it will require a more effective exchange of data between various stakeholders while maintaining privacy and confidentiality. The CF1R captures a lot of project data, but this is only available for projects that have been issued a permit. Building departments simply cannot enforce code requirements equitably unless they know where unpermitted work is occurring. There is a need to explore currently available and future data sources that become available to be used by jurisdictions to identify unpermitted work.

6. **Rethinking the existing penalty structure for contractors who perform work without a permit.** There is not a strong enough "stick" to discourage contractors from doing work without a permit. For example, reduced warranties or higher prices for equipment installed without a permit may be an appropriate stick. Also, stiffer financial penalties should be considered and the revenue generated from these penalties used to help fund other compliance activities.
7. **Evaluating whether real estate transactions are an appropriate way to catch unpermitted work.** Does the sale of a home offer an opportunity to inspect the site for any unpermitted work? Who is responsible for bringing the site up to code when a property transfers ownership? What are the legal and financial impacts between the buyer and seller? There are many such questions that need to be further explored to determine if enforcing compliance through real estate transactions is a viable approach.
8. **Considering an incentive program to encourage permitted work.** The IOUs Code Compliance pilots have met with limited success. In its June 13, 2017 Advice Letter requesting approval to discontinue its Code Compliance program, PG&E stated that "[t]he lack of [program] uptake demonstrates that an incentive program is not the most effective mechanism to increase permitting rates."[26] Clearly, this approach did not work, but that doesn't mean incentives will not work. It has already been demonstrated that the financial impact for higher compliance rates could reach $100 million not including costs to building departments and other stakeholders. Perhaps a new approach should be considered to jumpstart an aggressive compliance improvement effort that addresses the multiple "touches" in the compliance process. It has already been proven that compliance does not work when it is left solely to contractors. A better solution may be to consider all the players involved with compliance such as homeowners, contractors, building departments, HERS raters and provide motivating incentives (both monetary and nonmonetary) for each party to encourage a desired behavior[27]. These incentives can be used to address compliance for future change-out work, as well as the large population of unpermitted work that exists today[28]. Any such incentive effort should be integrated with a clear value proposition for each stakeholder (see Gap #4).
9. **Ensuring that proper fees are in place for building departments to recover costs**. Many building departments are not adequately funded and thus cannot sufficiently perform their duties. Others set their permit fees too low and thus cannot afford to ensure compliance beyond basic life and safety issues. A solution is needed to ensure building departments receive consistent and adequate funding to fully enforce all state and local codes. The Online Permitting Working Group has discussed adopting statewide minimum permitting fees as a potential best practice.

If enforcement tools and commitment to improvements are not going to be provided and implemented, questions need to be addressed about what level and types of compliance will be properly supported.

Gap #4: Low Stakeholder Value Proposition

[26] Advice Letter 3853-G/5090-E, Pacific Gas and Electric, June 2017, p 3
[27] Such an incentive approach should not be solely the responsibility of the utilities as they have specific cost- effectiveness and other regulatory requirements to meet in order to implement an incentive program.
[28] Several ideas discussed within the Compliance Committee include: 1) an amnesty period that allows homeowners a given amount of time to bring their systems up to Title 24 standards. This would address the current stock of unpermitted systems; 2) Low/zero percent interest loans or other financial incentives for homeowners to be used by homeowners to offset costs incurred to bring existing systems to code. Regardless of the approach, a funding mechanism would be needed to pay for such an incentive program.

Consumers, contractors, and the community at large do not understand the life safety and energy issues that result from unpermitted work. "The potential downsides of non-permitted installations may include defective installation, safety hazards for homeowners and installation contractors, higher energy usage (and thus higher energy costs), and higher maintenance costs."[29] Further, unpermitted systems could also impact homeowner insurance rates and/or claims as many insurance companies may charge higher rates or reject claims without the requisite proof of permitting.

The reality is that many customers in the market for HVAC change outs cannot quantify the value proposition of these benefits. Their system has failed, it is in the middle of summer and they are uncomfortable. They are not looking at a long-term investment; they want a quick replacement and they want to spend as little as possible since they will likely sell their home in a few years. Compliance is simply an inconvenience and cost that impacts their ability to address their immediate issue of being uncomfortable. The best-case scenario is that customers will install a high efficiency unit with the thought of recovering their cost when they sell the home, but they do not realize that nameplate efficiency does not equal delivered efficiency.

Likewise, there is little value proposition for contractors to pull a permit. Their livelihood depends on selling services to homeowners. If the customer wants an inexpensive system installed immediately to alleviate comfort issues, why would they risk a sale by quoting additional time and money to pull a permit - especially when there is little risk for not doing so? Moreover, many contractors do not understand the benefits of complying with Title 24 and thus see little value in the process.

The issue of value proposition is not new as it was discussed at length throughout the Strategic Plan process. In fact, the Strategic Plan included the following near term action for the 2009-11 time period: "Develop operating and lifecycle data on economic and comfort benefit."[30] Additionally, the CEC identified in their Strategic Plan to Reduce the Energy Impact of Air Conditioners that "forcing more high-quality practices through Title 24 Building Energy Efficiency Standards and training will not be successful or sustainable unless…customers would have an easy way to demand, expect, and recognize when quality installations and maintenance have occurred."[31] Finally, a California HVAC Contractor & Technician Behavior Study suggested that "[quantifying] savings that can be expected from maintenance and installation activities that are performed according to industry standards will help contractors, technicians, and customers to see the benefits of quality maintenance and quality installation.[32]

Ten years removed from these discussions, little has been done to quantify the value of a properly designed, installed and maintained system. The Compliance Committee suggests that there is an immediate need to revisit the original text in the CPUC and CEC Strategic Plans and the recommendations provided in the Contractor & Technician Behavior Study and implement the direction provided therein. It is imperative that a clear value proposition be established for properly designed, installed systems that are fully compliant with industry standards and applicable national, state and local codes.

If there is a strong value proposition, the market will change its behavior. If there is not a strong value proposition, then low compliance rates will persist as they have for decades. As the Contractor &Technician Behavior Study stated "[a]lthough quantification of savings may be difficult and perhaps not even possible, it is worth undertaking this effort, because quantifying savings is a key route to justifying programs based on the standards. Quantification of savings will help convince contractors and technicians that quality maintenance and quality installation are compelling products/services to recommend, and quantified

[29] Draft Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I - Report, June 2017, p.1.
[30] California Energy Efficiency Strategic Plan, California Public Utilities Commission, January 2011, p 57
[31] Strategic Plan to Reduce the Energy Impact of Air Conditioners, California Energy Commission, June 2008, p 13. 29
[32] California HVAC Contract & Technician Behavior Study - Final Report, CALMAC Study ID SCE0323.01, EMI, September 2012, p 17

savings will provide customers with a compelling reason to implement quality maintenance or quality installation."[33]

Gap #5: Motivating Behaviors

The California HVAC Contractor & Technician Behavior Study found that "a majority of contractors believe that the primary barrier to implementing high quality installation services is that customers are not willing to pay for it, while almost one-third reported a lack of contractor or technician knowledge. When asked about barriers to implementing high quality installation services, 62% of the contractors indicated that their customers simply did not want to pay for it."[34] This cost-conscious mentality drives contractor behavior.

Consider that there are roughly 7,471 licensed C-20 contractors actively working in the residential HVAC market in California[35] and there are approximately 230,000 residential HVAC systems sold annually. Therefore, the average residential contractor installs about 30 units per year, or one system every 1.7 weeks. Given that such a large pool of contractors is competing for a shrinking market[36], the result is a further downward pressure on price.

In the Phase II California HVAC Contractor & Technician Survey, "[t]he barrier most frequently mentioned by interviewees was the difficulty of selling the value proposition of QI/QM in a highly commoditized, price-driven market. Four interviewees described participating contractors being consistently underbid by non-QI/QM contractors…While some contractors are able to successfully convey the value proposition of QI/QM, and win work by selling quality instead of a low price, they are the exception in this competitive marketplace."[37]

In order to change contractor motivation, the playing field needs to be leveled. The market needs to get to a place where permits are issued for every HVAC change-out; this will require customers understanding the value of a permitted job and contractors competing on quality and not price.

One possible approach would be to utilize home inspectors as they are commonly used during real estate transactions. These inspectors can document the existence of permits for all major mechanical, electrical and plumbing systems and provide homeowners with an assessment of the potential financial impacts for not having a system installed to code. This will provide customers with motivating information to make the necessary improvements. Some other suggestions to motivate customers and contractors include:

- Increased cooperation between local jurisdictions and point-of-sale locations should be explored to inform contractors that permits are required for every installation. To accomplish this, program(s) with Big Box retailers or equipment distributors could be piloted to better enforce permitting requirements. For example, some potential pilot program ideas include:
    - Through the retail channel: 1) retailers could provide permit materials to customers with every HVAC installation sale, 2) retailers could report all retail sales to the building department so they could follow up directly with contractors, or 3) permit officials could provide training about permit requirements to retailer's participating subcontractors.

[33] Op. cit. p ES-9
[34] Op. cit. p ES-4
[35] The California HVAC Contractor & Technician Behavior Study identifies roughly 8,210 active C-20 contractors in California (p E2-2) and that 91% of these contractors work in the residential market (p ES-2).
[36] Itron's California Residential Efficiency Market Share Tracking - HVAC 2005, December 2006 places the number of residential units sold in California as high as 560,800 units in 2005 (see p 3-4).
[37] California HVAC Contract & Technician Behavior Study, Phase II, CALMAC Study ID SCE0375.01, EMI, April 2015, p 18

  - Through the distribution channel: 1) local jurisdictions could provide training to contractors at distributor locations through periodic "lunch and learns", 2) point-of-sale information could be displayed highlighting permit requirements, or 3) distributor sales personnel could remind contractors about permit requirements with every sale.

- Big Box retailers should be encouraged to take a more active role in educating the consumer about the types of projects that require a permit. Consumer information on permit requirements could be displayed at sales kiosks. Retail sales associates could discuss permit requirements with consumers in order to demystify the process. Retailers could advertise within the store that all systems sold are permitted which can further be used to differentiate themselves from the majority of contractors that do not pull permits.
- When a contractor bids on a job, the owner should sign a disclosure document that clarifies the responsibility for permitting. This should be done on a standard state-issued form that would then be uploaded in a common registry so results could be tracked.
- Require disclosure language on all home improvement contracts that makes it clear that a permit must be issued for the project for the installation to be legal (also see Gap #3).
- Launch a statewide advertising campaign that explains the need for permitting. Highlight health and safety risks, as well as financial impacts (e.g. insurance companies not paying claims for unpermitted work) that could occur without proper permitting and inspection.
- Strengthen the legal and financial requirements for disclosing unpermitted home improvement projects during real estate transactions (also see Gap #3).
- Engage real estate professionals to promote efficiency during sales transactions; provide them with a standardized energy design rating that can be used to compare houses against a ZNE baseline.
- The financial penalty for noncompliance should outweigh any potential gain from noncompliance. To accomplish this, a "carrots and sticks" approach should be considered. In terms of "sticks," increased fines for contractors that are found to do unpermitted work should be explored, as well as offering bounties to contractors and others that report unpermitted work. In terms of "carrots," California could help buy down the high cost of liability insurance for contractors that pull permits and work with lending institutions to offer low/zero interest loans for homeowners who complete work with all appropriate permits.
- Properly assess the societal benefits of permitted work such that proper incentive levels can be used to facilitate necessary market actions. The current incentive structure of the Code Compliance Pilots has proven to have little impact on increasing compliance as they are too low to offset the cost of compliance.
- Establish performance baselines for individual homes so homeowners would better understand their current performance and then help them establish goals to meet a desired level of energy performance.

Conclusion

California has set specific goals to significantly increase the rate of compliance for residential HVAC change-outs. When the California Energy Efficiency Strategic Plan was first released in 2008, it was identified that less than 10 percent of HVAC systems obtain legally required local building permits. Nearly 10 years later, little has changed and the number of permitted systems are still well below California's goal of 50% by 2015 and 90% by 2020.

There are a number of gaps preventing higher rates of compliance including: 1) Insufficient Data; 2) Insufficient Tools; 3) Lack of Effective Enforcement; 4) Low Stakeholder Value Proposition; and 5) Motivating Behaviors. Many of these gaps can be addressed directly by the CEC while others will need a more collaborative discussion amongst HVAC industry stakeholders.

Perhaps the greatest gap of all is the lack of proactive communication between local jurisdictions, CSLB and contractors. As an industry, we need to foster discussion beyond just when there is a problem and find a way to have these parties work together on a regular basis. It will take some level of funding to realize this level of collaboration, especially for building departments who are already struggling to operate within their current budgets, but without a dedicated team of professionals addressing these gaps on an ongoing basis, California's aggressive compliance goals will likely not be met.

Sub-Strategy 3.3.1 Priority Sectors, Systems, and Workforce Categories:

Using subject matter expert panels, set priorities for building segments most likely to scale up soon for efficiency adoption, and identify which building systems and trades need the most improvements.

Overarching Comment:

Increase HVAC customer value optimization as a priority to achieve Energy Efficiency (EE)-integration and satisfaction by building owners, workforce services and consumers. Recommendation is made to increase stakeholder innovation and engagement to decrease EE-HVAC barriers to participation; increase participation to serve data-driven targets and customized assessment; and increase partnership to integrate outreach, funding resources, workforce development, technologies, emerging technologies and products, inter-generational workforce skill-sets, proctored performance and mentoring through processes that support "the one-stop shop" for local, regional and statewide engagement.

- The overarching focus is the Pipeline Development to Support goals of K-12/Post-Secondary Adult Continuing Education (PACE)/Incumbent/Transitioning/Exiting workforce.

***Recommended Next Step**: Align next steps for the WHPA Existing Buildings Energy Efficiency Action Plan Committee/Exploratory Working Group to focus specifically on the CEC EBEE-AP Update Draft Plan, CPUC Business and Implementation Plan, IOU CAEECC, CCCCO Doing What Matters, SB 350 goals, Local Government Sustainable/Energy Goals as it relates to Industry product, technologies and workforce development.*

Recommendations:

(*Also see SUB-STRATEGY 3.3.1 Exhibit 2: J. CALDWELL (CCCCO) COMMENTS SUBMITTED DIRECTLY TO CEC for Strategy 3.3: High Performance Workforce and Education, which were incorporated as new Sub-Strategy concentrations in the CEC's 2016 Update Draft.)*

***Recommended Next Step**: Sub-Strategy 3.3.1 Exhibit 2 comments should be prioritized and supported by the WHPA WE&T Committee and the WHPA EBEE Committee, particularly for alignment of WE&T specific to SB 350 goals as a priority for 2017-2019.)*

From "Process Requirements" Lens

1. Increase availability of and accessibility to HVAC-Residential and Nonresidential WE&T programs and activities to gain greater geographical, socioeconomic reach and support of diverse learning styles, leveraging examples such as the universal design approach[38] or alike designs, etcetera.
    - Offer HVAC WE&T opportunities through diversified adult instructional format(s).
    - Support Innovation of WE&T Private and Public Partnerships of Industry Stakeholders utilizing "Community Tool Box" model(s) such as MAPP (Mobilizing for Action through Planning and Partnerships). Explore applicable MAPP concepts for WHPA Existing Buildings Energy Efficiency Action Plan Committee (EBEE) focus to address goals and objectives for Sub-Strategies prioritized "through the lens of HVAC".

[38] **Design for Learning** (**UDL**) is an educational framework based on research in the learning sciences, including cognitive neuroscience, that guides the development of flexible learning environments that can accommodate individual learning differences. (https://en.wikipedia.org/wiki/Universal_Design_for_Learning)

- Increase support for and by Local Government and Building Departments addressing Building Standards, Code Compliance "through the lens" of integrating and prioritizing Health, Safety and HVAC-EE performance optimization as it relates to residential and nonresidential consumer health & safety.
- Utilize Contractor Association membership(s) for WE&T up-skilling of incumbent and existing workforce development and market scalability.
- Partner with industry for "road shows" to optimize stakeholder education through training trailer(s).

Milestones:

- *Target audiences, delivery mechanisms, and locations to serve identified*
- *Service delivery aligned with audiences and executed.*

Performance Metrics/Responsible Parties:

- *Program participation and demographic distribution measures*

From "Process and (potential) Product Requirements" Lens

2. Take a holistic approach to HVAC WE&T by supporting technical, non-technical and crosscutting elements of learning and development across the **workforce** lifecycle. (K-12, Post-secondary adult continuing education, Incumbent, Transitioning and Exiting)

- Align activities to support capacity and capability building around industry products, technologies and workforce quality and employability.
- Leverage WHPA work products as relevant and applicable for strategic planning and implementation (e.g. WHPA WE&T Committee HVAC Career Lattice).
- Increase awareness of Private and Public Industry WE&T programs and funding resources.
- Deliver HVAC WE&T offerings through innovative and diverse instructional platforms, such as online, hybrid, face to face (F2F), webinars, YouTube videos, podcasts, hands- on, lab, proctored field training, etcetera.

Milestones:

- *WHPA WE&T HVAC Career Lattice completed.*

From "Process and (potential) Product Requirements" Lens

3. Leverage and increase support for Private and Public WE&T Partnerships' focused on "real-world" skill-sets, creating pathways to HVAC whole-systems approach, "High-Performance" and/or "Performance-Driven" outcomes. Mobilize for Action cross-cutting projects to incorporate and leverage activities that seek to promote residential and nonresidential HVAC Whole Building WE&T next-steps.

- Promote interconnected statewide HVAC WE&T activities that support technical and non-technical knowledge, skills and abilities development, industry-valued credentials, HVAC career lifecycle and performance goals:
  - Interconnect Energy Commission EBEE-AP Goals, Code Cycle Updates, CPUC Business and Implementation Plans, IOU WE&T program goals and the Private & Public Providers' HVAC life-cycle adoption from entry-level through up-skilling of existing workforce and exiting workforce.

- Prioritize accessibility and workforce adoption of "Industry BEST-PRACTICES", mobilize stakeholder input of industry barriers, and optimize quality, dependable, performance services by contractors and technicians.
    - Scale Residential and Nonresidential HVAC WE&T program(s) by including proctored performance education and measurable outcomes. Seek to include HVAC-Lifecycle workforce preparation, trade fundamentals, code cycle updates and Code, Standards & T-24 Compliance, fundamental business practices, and Industry-valued "Best Practices" that support the uptake of **whole building by design[39] and ZNE** retrofits.

Milestones: Ongoing Business and Implementation Planning process: (e.g. reporting quarterly and annually)

- *Process maps of "pathways for HVAC whole-systems approach, "High-Performance" and/or "Performance-Driven" Workforce Education and Training" systems diagramed.*
- *Process diagrams evaluated by stakeholders [Feedback-loop] of IOU rate-payer funded WE&T programs.*

Performance Metrics/Responsible Parties: Trainings offered. Credentials earned. CEU (Continuing Education Units) earned. Pre/post test average. Mentoring/coaching occurrences. Partner pathways. Partner collaborations (Adult Education, trade programs and schools, colleges, universities, ROPs, WIBs, EDD-ETP pre-apprenticeship/apprenticeship programs, and Veteran Affairs). Duration of program rollout as part of ongoing stakeholder feedback loop.

- *HVAC Career Lifecycle here is expressed and inclusive of (1) K-12, (2) Post-secondary adult continuing education, (3) Incumbent, (4) Transitioning (e.g. trade transition, returning veterans, etc.), (5) Exiting (leaving the workforce due to any number of reasons including retirement).*
- *The intent of using the HVAC Career Lifecycle as a reference is to help identify areas across the learning spectrum that are in need of support, and to strategically develop scaffolds that potentiate quality Trade-skills and career- lattice advancement and industry opportunities.*

From "Process Requirements" LENS

4. Integrate WE&T support in IOU HVAC program design, development, implementation and evaluation phases. (*Code and EM&V also recommended to be included in this process)

- Leverage industry training organizations and SME (Subject Matter Expert) instructors to identify performance criteria, Industry-valued KSAs and credentials to meet specific IOU program performance metrics and ensure evaluation method alignment with IOU program theory.
- Increase partnership with industry training organizations and SME instructors to assist

[39] See the following reference links for more information about Whole Building Design: https://www.wbdg.org/ https://www.wbdg.org/design/
https://www.wbdg.org/search.php#stq=Residential+HVAC&stp=1&facets%5Bpage%5D%5B%5D=Collection&facets%5Bpage%5D%5B%5D=Agency
https://www.wbdg.org/search.php#stq=Retro-commissioning+HVAC&stp=1&facets%5Bpage%5D%5B%5D=Collection&facets%5Bpage%5D%5B%5D=Agency
http://wbdg.org/resources/netzeroenergybuildings.php

with WE&T activities that drive desired Industry-valued skill sets.

- Use performance and WE&T evaluation criteria to serve as the rubric to show proof of competency and capability of:
  - Theoretical understanding via a knowledge assessment.
  - Practical application via a hands-on performance assessment.
- Implement field verification strategies that leverage the performance criteria rubric as a means for QA/QC/HVAC-EE Quality Outcomes.

Milestones: Ongoing Business Planning process (e.g. reporting quarterly and annually)

- *IOU HVAC program design, development, implementation and evaluation phases diagramed and defined for sharing with WE&T.*
- *WE&T valuation of IOU program design for opportunities to integrate evaluated.*
- *Integration plan developed.*
- *Integration plan executed.*

Considerations: *CEC EBEE-AP WE&T Goals; IOU Statewide WE&T Business and Implementation Plan goals, objectives and needs assessment; Local Government Sustainable Energy Coalitions on strategies and challenges; CPUC Energy Efficiency Goals and Rolling Portfolio policies, mechanics, programs, and evaluation; and Program Theory Logic Model (PTLM) Support.*

Performance Metrics/Responsible Parties: Alignment with IOU HVAC PPMs. Execution on time and within budget.

Further Evaluation Recommended: While the above recommendation #4 had consensus approval from the majority of WHPA stakeholders involved in its development, comments received during the voting process from an Energy Efficiency Program Consultant and the WHPA WE&T Co-Chair IOU representative raised concerns that it may be a "bit too prescriptive (even for a recommendation) at this point". They both expressed the desire to "ensure that we give our IOU HVAC Programs managers/owners something that may be a bit easier to interpret and flexible for consideration of implementation."

II. Proposed Actionable Short-Term Activities

1. **Compliance Process Logic Model Mapping:** As part of #2 below and using the Exhibit 1(B): WHPA Compliance Definition Matrix[40] as a basis, conduct a series of logic model refinement and process mapping sessions to ensure the current state of compliance practices and processes are captured and that it encompasses all players in the compliance arena, so that their roles are better understood. This process will identify bottlenecks, misunderstandings, and misalignment in compliance activities among stakeholders and inform whether it aligns with what is being realized. Activities include:

   - Mapping key compliance processes.
   - Identifying changes to be made to the process, associated barriers and costs to those changes and updating logic model.

Outcomes: An inclusive updated compliance logic model that represents the various compliance processes that is understood by all parties concerned.

2. **Statewide Collaborative Planning Sessions** (California): Facilitation of a series of charrettes in collaboration with CEC Energy Division Staff that includes all affected stakeholders to identify and recommend tactics and solutions and reach consensus on how to proceed forward as a full HVACR industry unit and not as individual stakeholders pointing fingers at each other.

   The goal is to take all existing research including WHPA work products from a vision through alternative concepts, to a preferred pathway-to-implementation framework, and finally develop a feasible plan to present to the CEC for implementation.

   - Consolidate results of all research, studies, and workshops and prioritize feedback/recommendations to develop a year-to-year roadmap for implementation of recommendations. Delineate what is feasible in the short term versus long term.
   - Assess the cost and impacts of prioritized recommendations/tactics on all stakeholders.

Outcomes: A comprehensive year-to-year plan-enabling and supportive documentation of real time workable solutions that represent a feasible "Pathway to Implementation" of strategies and tactics to overcoming barriers to compliance with the Energy Standards in the installation of central AC/HP in residential and small commercial building.

   - **Pilot Study** to test existing recommendations (prioritized) and determine associated costs to develop, implement, enhance, and maintain recommendations for increasing compliance with the Energy Standards and weigh the impacts to key stakeholders.

[40] See link to Exhibit 1(B) HVAC Compliance Definition Matrix in WHPA's 8/2/2019 Docket 2017-EBP-01 Comments

Western HVAC Performance Alliance Inc. (WHPA)
Physical Address: 29991 Canyon Hills Road, Suite 1709-303, Lake Elsinore, CA 92532 Mailing Address: 524 San Anselmo Avenue, Suite 109, San Anselmo, CA 94960
951-244-6400 info@whpa-inc.org

WHPA 8/20/2018 Comments – Docket 2017-EPB-01
Exhibit 1(A): WHPA 8/2/2019 Docket 2017-EPB-01 Comments

August 2, 2018

By CEC Electronic Commenting System

Commissioner Andrew McAllister
California Energy Commission
Docket Unit, MS-4
Docket No. 2017-EBP-01
1516 Ninth Street
Sacramento, CA 95814

RE: Docket 2017-EBP-01: WHPA Comments on CEC's Request for the Promotion of Regulatory Compliance in the Installation of Central Air-Conditioning and Heat Pump Systems

Dear Commissioner McAllister:

Western HVAC Performance Alliance Inc. (WHPA) respectfully submits the following comments towards Docket 2017-EBP-01 to the California Energy Commission (CEC) on the Workshop for Promotion of Regulatory Compliance in the Installation of Central Air Conditioning and Heat Pumps.

Recommendations from WHPA Research Library
WHPA has an extensive research library of past work products representative of the immense institutional knowledge and influence the WHPA has to offer, many of which were incorporated into activities of the CEC [including the *Existing Buildings Energy Efficiency Action Plan 2016 Update* (EBEE-AP)], the California Public Utilities Commission (CPUC), the California Investor Owned Utilities (IOUs), and other interested parties. WHPA recommends specific review of the following most recent reports for recommendations relevant to the above referenced topic as consolidated from input and efforts of our broad and diverse stakeholder membership body:

From the Compliance Committee:
- Report #08: Understanding the Residential HVAC Compliance Shortfall 11-8-17
- Report #12: HVAC Compliance Definition Matrix 6-26-17

From the Online Permitting Working Group:
- Report #07: Feasibility of Online Permitting 11-8-17

From the Existing Buildings Energy Efficiency Action Plan (EBEE) Committee:
- Report #21: Recommended Pathways to Implementation for CEC's Existing Buildings Energy Efficiency Action Plan (EBEE-AP) Sub-Strategies 1.5.1, 1.5.2, 1.5.3, 1.5.5, 3.3.1 12-14-16

WHPA will be submitting further comments with more detailed actionable next steps, including recommendation for an interactive logic model for California process flow as a first step after WHPA's

attendance at the August 3, 2018 CEC Commissioner Workshop on Promotion of Regulatory Compliance in the Installation of Central Air Conditioning and Heat Pumps.

WHPA Work on Serial Number Tracking (SNT)

In reply to public comments made about implementation of an equipment tracking system as a possible solution, please note that WHPA has taken no position on the subject of Serial Number Tracking (SNT). WHPA has previously discussed the topics over a period of years and has developed a draft white paper and pro and con argument position papers that were escalated to the WHPA governing body, but no official work products have been approved. Any related votes noted in prior public comments related only to developing body escalation votes for report review.

About WHPA

Western HVAC Performance Alliance Inc. (WHPA) is a California nonprofit public benefit corporation providing, conducting and promoting research and education focused on energy efficiency, environmental quality, and sustainability through the HVACR lens.

WHPA launched in 2009 in response to the portion of the California Energy Efficiency Strategic Plan (CEESP) that reads*: "An HVAC Advisory Group should be chartered to involve high-level HVAC industry stakeholders—such as manufacturers, distributors, and contractors—to coordinate industry sponsorship of and participation in HVAC strategies. Membership should also include other key players, such as the CPUC, Energy Commission, utilities, building owners/managers, consumers, and the Federal government."*

As a nonprofit public benefit corporation, WHPA continues to work as a guiding light for California stakeholders to educate and drive present and future HVACR energy efficiency initiatives and benefit consumers. This includes facilitated communication and action as a broad and diverse stakeholder advisory group whose collective expertise informs the development and implementation of efficiency strategy, policy and programs focused on topics such as HVAC Energy Efficiency and Demand Response, Emerging Technology, the HVACR Industry, HVACR Community Engagement, Consumer Outreach, Codes and Standards, Public Policy, and Workforce Education & Training.

WHPA appreciates the opportunity to provide comments on this important issue.

Best regards,

Elsia Galawish
Executive Director
Western HVAC Performance Alliance Inc. (WHPA)
415-482-1079 Office
415-342-8907 Mobile
Galawish@WHPA-Inc.org

Wendy Worrell
Assistant Director
Western HVAC Performance Alliance Inc. (WHPA)
951-244-6400 Office
949-246-4985 Mobile
Worrell@WHPA-Inc.org

Western HVAC Performance Alliance Inc. (WHPA)
Physical Address: 29991 Canyon Hills Road, Suite 1709-303, Lake Elsinore, CA 92532 Mailing Address: 524 San Anselmo Avenue, Suite 109, San Anselmo, CA 94960
951-244-6400 info@whpa-inc.org

Exhibit 1(B): Link to HVAC Compliance Definition Matrix

To be used as the foundation for the proposed Compliance Process Logic Model Mapping:

Report #12: HVAC Compliance Definition Matrix 6-26-17

Exhibit 2: *SUB-STRATEGY 3.3.1* - J.CALDWELL COMMENTS SUBMITTED DIRECTLY TO CEC

Energy Construction & Utilities
California Community Colleges
Workforce & Economic Development

Workforce Barriers to Meeting California's Energy Efficiency Mandates

Mounting evidence indicates that workforce quality has become a barrier to Energy Efficiency goals for the built environment set by AB 32 in 2006[41]. SB 350, the Clean Energy and Pollution Reduction Act of 2015, calls for a doubling of these goals, potentially creating thousands of new jobs but adding further concern about workforce quality related to achieving the state's mandates. California needs a plan to meet the SB 350 workforce challenge.

Current Situation

Lack of Qualified Workers Leads to Poor Energy Efficiency

California employment totaled approximately 321,000 Energy Efficiency workers in 2015. Just under three-quarters of firms (73%) report difficulty finding qualified workers in 2015; two in 10 employers report that hiring was "very difficult." The top two reasons for difficulty were lack of experience, training, or technical skills (44%), and insufficient qualifications, certifications, or education (31)[42].

Heating, Ventilation and Air Conditioning HVAC) is a good example of the workforce barrier. 40% of the Energy Efficiency workforce is employed in HVAC positions[43]. The California Energy Commission estimates that up to 50% of new HVAC systems and up to 85% of replacement systems are not installed and maintained to a quality level of specification[8]. Significant capacity shortages exist. The state's training institutions supply about half of the 2,000 new HVAC workers needed annually[44].

[41] UC Berkeley UC Berkeley Don Vial Center on the Green Economy, Workforce Issues and Energy Efficiency Programs: A Plan for California's Utilities, 2015
[42] Advanced Energy Economy, *California Advanced Energy Employment Survey 2016*
[43] Energy Market Innovations, Inc., *HVAC Educational Needs Assessment*, submitted to Southern California Edison August 2012
[44] California Community Colleges Centers of Excellence, 2016

Ownership of the Workforce Challenge is Fragmented

Community Colleges, certified Apprenticeship programs, private training institutions, and community-based organizations all provide Energy Efficiency workforce training.

Major utilities offer high-quality training and the California Workforce Development Board provides funds to train youth, veterans, and career-transitioning workers. All of these operate with separate funding streams, and none map their training programs specifically to workforce priorities associated with SB 350.

The Opportunity

Policy Convergence

SB 350 rulemaking is paralleled by implementation of several other policies:

- AB 758 Existing Buildings Energy Efficiency Action Plan
- AB 802 Energy Efficiency (Benchmarking for Commercial Buildings)
- Title 24 Energy Efficiency Building Code, 2016 Standards
- Business plan filings with the CPUC by the Investor Owned Utilities

These policies align to create new standards for Energy Efficiency performance, raising the bar for workforce quality.

Funding Convergence

Major funding streams create opportunities for 2016-17 and beyond:

- $200M in California Community College Strong Workforce Funds that help bridge the skilled workforce gap of 1.5M workers across all sectors in 2025
- Workforce Development Board allocation of funds from the Federal Workforce Innovation and Opportunities Act
- $30M in ratepayer funding for the Investor Owned Utilities (IOUs) Workforce Education & Training programs
- $15M in the California Energy Commission's Electric Program Investment Charge for "Market Facilitation", including workforce development

Industry Alignment

Industry alliances are coalescing around SB 350 workforce priorities:

- A statewide Energy, Construction, & Utilities Sector industry advisory council co-chaired by the Building Owners & Managers Association (BOMA) and the California Community Colleges
- The Western HVAC Performance Alliance (WHPA), an association of 200+ HVAC manufacturers, distributors, contractors, utilities, and educators
- The California Advanced Lighting Controls Training Program (CALCTP) industry advisory panel chaired by the UC Davis California Lighting Technology Center
- A coalition of industry, Labor, education, and community advocates advising the CPUC on

workforce provisions in the IOUs proposed 2017 business plans
- Pending launch of the BOMA "Zero Net Ready Challenge" to incentivize Energy Efficiency investments in commercial buildings
- An initiative by the International Facility Management Association (IFMA) to bridge the annual shortage of an estimated 6,000 Facility Managers in California

As illustrated above, industry is engaging in multiple, but isolated, collaborative efforts with educators, Labor, and community-based organizations to meet the SB 350 workforce challenge. This convergence of opportunities, along with emerging industry alliances, creates a strong platform for a new workforce development framework.

Elements of the Solution

No one organization can "own" the SB 350 workforce challenge. However, proper integration and structuring of existing alliances can produce an effective framework through shared ownership. This structure can be made real by incorporating alliance stakeholders into a legal entity that is chartered to meet the challenge and given authority to braid funds from multiple sources in fulfilling that charter.

Characteristics

The key is strategic initiatives squarely focused on the SB 350 workforce challenge and executed through the "braiding" of multiple funding streams in a synchronized manner across all stakeholder organizations – utilities, community colleges, certified apprenticeship programs, private training institutions, Workforce Development Boards, and community-based organizations. Success factors include but are not limited to:

- Governance that produces synchronization of initiatives and resources
- Authority through access to funding that supports the initiatives
- Research into strategic use of funds by occupation and geography
- Application of evidence-based models and innovation to create new ones
- Common accountability and metrics applied to workforce outcomes
- Reliable assessment of workforce outcomes on achieving SB 350 mandates
- Measurable impact on the economy, job creation, and social equity

Stakeholder Engagement
A loose alliance of stakeholders offers potential as the initial basis for a legal entity that can successfully develop and execute initiatives:

Figure 1. Current Stakeholder Alliances

These stakeholders currently partner with the California Community Colleges on workforce initiatives focused on Energy Efficiency in commercial buildings. Many of these partnerships extend to initiatives with the utilities, the CPUC, and the CEC.

Stronger integration of the above partnerships is needed through labor market research and strategic development rather than one-off projects that characterize these relationships. Deeper engagement of Workforce Development Boards, Economic Development Agencies, and community-based organizations would complete the alliance.

Funding

Significant funding siloes already exist that support programs among entities charged with workforce development. At a minimum, they need to be synchronized for maximum leverage in developing the SB 350 workforce. Optimally, the siloes would give way to a more strategic funding method. While strategically braiding these funding, streams may be adequate to drive marginally greater impact, additional resources are needed make a quantum improvement in the workforce quality required for SB 350. Funding is needed to:

- Research the labor market to directly address SB 350 workforce priorities
- Prioritize investments across occupational categories and geographies
- Design and execute regional initiatives that can be replicated statewide
- Innovate in building evidence-based models that deliver meaningful outcomes
- Track workforce performance and impact on clean energy and pollution reduction mandates, economic development, job creation, and social equity
- Provide the state with meaningful data that can help drive policy

The absolute value of investment needed for these functions is currently being quantified, and will be refined through stakeholder and policymaker dialog.

Facilitation

An attractive option for facilitating alignment of stakeholder engagement and strategy development is the California Community Colleges' *Doing What MATTERS for Jobs and the*

Economy[45] framework. Within this framework, a 10-person team managing the Energy, Construction, & Utilities (ECU) Sector[46] has built working relationships with the stakeholders shown in Figure 1, which initially could enable the alliances necessary for meeting the SB 350 workforce challenge. Additionally, this team can provide meaningful data to alliance partners about success factors (page 3) that are part of its current initiatives.

The ECU Sector team will facilitate Strong Workforce funding to the California Community Colleges to align with priorities identified by industry, educators, Workforce Development boards, Economic Development Agencies, and Community Based organizations. Facilitation will occur within a regional framework and in collaboration with regional conveners as mandated by Strong Workforce terms and conditions. While the ECU Sector Team will begin the facilitation process, it is important that this alignment effort be integrated into regional planning conducted by the Workforce Development Boards and Economic Development Agencies.

Initial facilitation began in July 2016 and will continue through annual approval cycles for the Strong Workforce Fund.

A process has not been defined for developing and funding a legal entity chartered to meet the SB 350 workforce challenge. This process likely will be managed through an effort parallel to but coordinated with Strong Workforce funding allocation to the colleges.

Value Proposition

The ECU Sector Team proposes to partner with Economic Development Agencies to position its initiatives for meeting the SB 350 workforce challenge within the following economic context:

- *Increasing investments in high performance commercial buildings*

  … Reliably meeting economic objectives of enhancing asset value, reducing operating costs, and increasing occupancy rates
  … Though installation, operation, and maintenance by a workforce that meets California's quality and compliance standards

- *Minimizing GHG emissions and energy usage in commercial buildings*

  … Managing the evolution of technology in high-performance buildings that cost-effectively achieves Zero Net Energy over time
  … Enabled by a workforce that evolves at the rate of technological progress, applying new competencies in building automation, distributed energy resources, and energy analytics

- *Creating family-wage jobs and assuring social equity*

  … Increasing numbers of members of underserved populations in high-demand, high wage, high-skill Energy Efficiency career fields
  … Supported by career pathways especially designed for entry by at-risk and

[45] www.doingwhatmatters.cccco.edu
[46] www.ECUsectorDWM.com

underserved populations

- *Funding these initiatives from existing sources*

  … Accessing ongoing funding streams from multiple sources to integrate workforce investments for maximum impact
  … Aligning investments across currently-siloed organizations to match industry's strategic workforce priorities

- *Building on existing stakeholder alliances*

  … Leveraging relationships across the spectrum of stakeholders to link their economic goals to Energy Market Transformation strategies
  … Creating an economic perspective on strategic development of the workforce

- *Measuring impact and making refinements*

  … Applying the Community College System's currently-available metrics and reporting systems and linking to economic, GHG, and energy use reduction outcomes reporting
  … Continuous innovation in developing and applying evidence-based models for meeting the SB 350 workforce challenge

Next Steps

The ECU Sector Team proposes to meet with key stakeholders of the Southern California Leadership Council to explore development of a regional model through which this value proposition can be delivered.

Through these preliminary conversations, if successful, a regional strategy can be developed, including as many elements of the Value Proposition as appropriate.

Contact

Jim Caldwell
Sector Navigator and Statewide Director
Energy, Construction, & Utilities
Doing What MATTERS for Jobs and the Economy
An Initiative of the California Community Colleges

Phone: 925.899.2665
Email: jcaldwell@workforceincubator.org
Website: www.ECUsectorDWM.com