Understanding the Residential HVAC Compliance Shortfall

A Western HVAC Performance Alliance White Paper

Prepared by:

WHPA Compliance Committee

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This work product contains draft content that has not yet been finalized and approved by the WHPA Compliance Committee nor approved by the WHPA Executive Committee as an official WHPA document. As such, this document is confidential and not to be distributed except for WHPA Committee review purposes.

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"[1] 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."[2]

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

[1] Existing Buildings Energy Efficiency Action Plan, California Energy Commission, December 2016, p 23
[2] *Ibid* p 21

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 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."[3]

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%.[4] 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.[5] 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.[6]

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

[3] "Help Consumers Realize the Value of Compliance". White Paper. Statewide Codes & Standards Program Compliance Improvement Advisory Group. September 2013.
[4] Enforcement of T-24 Compliance Pertaining to Residential Alterations, Steve Mohasci, August 2006, p 4.
[5] HVAC Permitting: A Study to Inform IOU HVAC Programs. Prepared for Pacific Gas and Electric Company by DNV GL. August 2014. p. 1-3.
[6] HVAC Permit Compliance Study Results, Center for Sustainable Energy, Sep-Oct 2014

permit rate lies between the two estimates we developed as part of this study (8% and 29%)."[7] 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, 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 ~~Leveraging other data sources~~ to identify unpermitted work. Additional study should be conducted to determine the feasibility of using multiple sources of data, such as ~~what is~~information available from filed permits, records maintained as part of DOE's enforcement of regional equipment standards[8], statistical analysis of total numbers of structures cross referenced to average age and average equipment life expectancy, ~~home inspections, energy ratings,~~ or benchmarking ~~data~~ 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.

Commented [PK1]: Comment from Dave Dias: If a home owner or contractor doesn't want to pull a permit are they going to get home inspection or energy rating?

Commented [WW2R1]: Paragraph approved as edited during 10-17-17 meeting.

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

[8] 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.

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[9], 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.[10] 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.[11] 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.[12] 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 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 ~~in order to~~to reach the majority of contractors who are not actively

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

[10] https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf~~HVAC Permit Compliance Survey Results, Center for Sustainable Energy, October 2014~~, p 41

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

[12] *Op. cit.* p 7

pulling permits while the latter would need government action to change requirements for license renewal.

While ~~these tools~~contractor education ~~go~~ may likely have a positive impact on permit rates, the challenge still remains that jurisdictions implement permit requirements differently. ~~long way towards educating stakeholders on the current compliance process, they are only part of the solution. There are other parts to this equation – specifically~~Therefore, ~~the need to simplify~~ the process ~~and the~~ also needs to be simplified and ~~standardized~~ ~~the process~~ 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.[13] 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[14].

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

[13] https://energycenter.org/sites/default/files/docs/nav/buildings/contractors/cool-comfort/Survey%20Data%20Results_%20CSE%20Site_Nov.%202014.pdf, ~~*Op. cit.*~~ p 72

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

Commented [PK3]: Comment from Lea Haro: A standardized process is a good suggestion to assist buildings departments and the 10% that are attempting to comply. Are there suggestions for tools that target the 90%?

Commented [WW4R3]: Page 5 edits based on 10-17-17 meeting discussion

Commented [PK5]: Comment from Dave Dias: I have talked to a lot of contractors that have stated to me that getting a permit is somewhat burdensome but it's part of doing business. They wish something could be done to penalize the contractors who don't follow the law.

Commented [WW6R5]: Considered handled in discussion of other White Paper content as of 10-17-17 meeting discussion

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.[15]

Process Standardization

There are 593 individual jurisdictions that are responsible for managing the local permitting process for mechanical change-outs[16]. 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, ~~M~~many ~~m~~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

[15] Note that much of this work will likely dovetail with the efforts of the Online Permitting Working Group.
[16] Western HVAC Performance Alliance Online Permitting for Residential HVAC Installations – An Industry Roadmap, Compliance Committee, December 2015, p 1

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[17]. This model posits that in order to change, one must have the **A**wareness of the need for change, a **D**esire to participate and support the change, **K**nowledge on how to change, the **A**bility to implement required skills and behaviors and then **R**einforcement 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 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[18]. In a report prepared several years ago by the WHPA[19] it was estimated that approximately 230,000 residential HVAC systems are sold in California annually.[20] 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[21]. ~~Anecdotally, contractors place the price of compliance as high as $1,000.~~ At ~~even half~~ this price, the impact to consumers could ~~near~~ 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~~Additionally,~~ building departments ~~would~~ who would need to increase their capacity to deal with such a high volume of permits. These additional costs ~~which~~ could ~~further~~

Commented [PK7]: Comment from Dave Dias: Is there a study that shows this number?

Commented [PK8R7]: As stated this is an anecdotal number that has been mentioned in committee calls. To be conservative, we took half the number, or $500, to estimate cost impacts. The point of this statement is to illustrate the economic impact of 80% compliance. If there is a better number to use, we can revise.

Commented [WW9R7]: Edited per 10-17-17 meeting discussion.

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

[18] *Op. cit.* p 72

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

[20] 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.

[21] 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.

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 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 ~~blocked~~prevented[22] 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.

[22] 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.

Commented [PK10]: HERS Rating = $350; Permit = $200 plus contractor time to do all of this and added time to actually do the work necessary to comply.
Actual study needed

Commented [WW11R10]: See below comment. **Where is the "actual study needed" portion incorporated into the comments?**

Commented [PK12]: Comment from Lea Haro: I recently heard that an industry (possibly manufacturers) perspective is that building departments do not have the authority to inspect unpermitted work sites. While I disagree with this perspective and don't know how widespread this perception, I wonder if these types of perceptions need to be addressed.

Commented [WW13R12]: Vetted during 10-17-17 discussion

Commented [PK14]: Comment from Dave Dias: Most homeowners haven't got a clue what needs to be permitted. It's the contractor's responsibility

Commented [WW15R14]: The suggested solution of an equipment label clarifying permit requirements for homeowner education was vetted during 10-17-17 discussion. Counter arguments were that most homeowners would not see the equipment label since contractors take it out of the box, and that it would take a lot of internal collaboration across departments at the manufacturer level to ensure it happens

Commented [PK16]: Comment from Lea Haro: Can you elaborate on the legal blocks they are experiencing?

Commented [WW17R16]: Resolved with addition of footnote #22 per 10-17-17 discussion

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, 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 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.
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.

Commented [PK18]: Comment from Lea Haro: This document is addressed to the contractor. I agree there should be more emphasis on permitting. Something that emphasizes the value of permitting should also be addressed to the consumer. What about a discussion of consumer perceptions – consumers have concerns about pulling permits – cost, being caught for other unpermitted work, unintended consequences?

Commented [WW19R18]: Resolved through the addition of bullet #2 per 10-17-17 discussion

Commented [WW20]: VETTING DISCUSSION STOPPED HERE 10-17-17

Commented [PK21]: Comment from Lea Haro: Current HERS regulations state that HERS field verification and diagnostic testing must be performed by an independent third party. If technology emerges that could conduct these verifications in an accurate and reliable way, then that may be worthwhile exploring.

Commented [PK22]: Comment from Lea Haro: These statements are true. Is there a suggested solution to capture the 90% that are not complying? Would exploring methods to identify unpermitted work be too much like serial number tracking?

6.7. **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.

7.8. **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."[23] 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[24]. 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[25]. Any such incentive effort should be integrated with a clear value proposition for each stakeholder (see Gap #4).

8.9. **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

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

[23] Advice Letter 3853-G/5090-E, Pacific Gas and Electric, June 2017, p 3

[24] 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.

[25] To address the current stock of unpermitted systems, an amnesty period should be considered that allows homeowners a given amount of time to bring their systems up to Title 24 standards. Incentives could be used to offset part of the homeowner's cost of compliance.

Commented [PK23]: Comment from Lea Haro: Are these questions that the compliance committee still needs to explore? Other countries have this in place, that is the owner is responsible to bring a property up to code if work has been done without a permit. It does hold up real estate transactions.

Commented [PK24]: Comment from Lea Haro: Perhaps an incentive program in conjunction with a program to bring old work into compliance. Does anyone know the results of the CSLB's 2014 Ambassador program pilot in Santa Clara County?

Commented [PK25]: Comment from Roy Eads: Value is only provided when a person has a choice. Obtaining the required building permit is not a choice. Due to lack of enforcement and limited risk of repercussion, the current choices are permit or no permit. If the "no permit" choice is removed from the equation, there is no perceived value. A valid permit becomes a necessity, and it cannot be shopped for better pricing or value. When permitting is the norm, it becomes a cost of doing business. Non-permitting should never be an option.

Commented [WW26R25]: Reply from Bob Barks: This is an incomplete analysis of value. Perceptions have value. Opinions have a value. Yes, it is a cost of doing business, but that doesn't negate an inherent value that is separate from the cost of doing business. A nice office building for a contractor is a cost of doing business, but does that nice office provide an impression of value to the consumer. Does it create a sense of professionalism or quality that results in better or higher sales? I would recommend no changes to the gap 4 discussion below.)

Commented [PK27R25]: Comment from Dave Dias: I agree with the comment from Roy Eads

include defective installation, safety hazards for homeowners and installation contractors, higher energy usage (and thus higher energy costs), and higher maintenance costs."[26] 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."[27] 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."[28] 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.[29]

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,

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

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 savings will provide customers with a compelling reason to implement quality maintenance or quality installation."[30]

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."[31] 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[32] 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[33], the result is a further downward pressure on price.

Commented [PK28]: Comment from Dave Dias: Check with CSLB on this number but I believe it's more like 11,500 of which 56% don't have worker comp.

Commented [PK29R28]: Per footnote, this 7,471 just represents residential contractors and came from the referenced study.

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."[34]

[30] *Op. cit.* p ES-9
[31] *Op. cit.* p ES-4
[32] 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).
[33] 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).
[34] California HVAC Contract & Technician Behavior Study, Phase II, CALMAC Study ID SCE0375.01, EMI, April 2015, p 18

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:

- "Big Box" retail stores that sell HVAC installation services should be "forced" to require that their subcontractors pull a permit for every project. Big Box stores can and should take a more active role in educating the consumer about the types of projects that require a permit. Perhaps the retail outlet can be leveraged as a channel to issue building permits when customers purchase a new HVAC system.
- 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.
- Consider various "carrots and sticks" to force compliance. Make the financial penalty for noncompliance hurt and provide appropriate incentives that will motivate the desired action and level the playing field for all market participants (also see Gap #3).
- 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.

Commented [PK30]: Comment from Lea Haro: Are there successful pilots that can be mentioned here?

Commented [PK31]: Comment from Roy Eads: A stakeholder should not require incentive to follow the law. Weighing the risk of non-compliance is the motivation. The penalty should outweigh any potential gain from non-compliance.

Commented [PK32R31]: Comment from Dave Dias: I agree with Roy Eads

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.