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# Energy Docs

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## Improving Energy Compliance of Central Air-Conditioning and Heat Pump Systems

My advice to fix the problem of work being done without code-required permits is as follows:

Launch a statewide billboard and social media campaign to drive the demand from the customer end by asking a simple question,

***“Did you know your AC replacement needs a permit from your local building department to be legal, safe and protect your investment?”***

As a state licensed General Contractor for the past thirty years with a business that focused on remodeling and home performance upgrades, I would always get client questions regarding permits and whether they were required for the work they were requesting. My response was always the same. I would ask these clients if they wanted the opportunity of obtaining the best return of investment from their upgrade in the future when they decide to sell.

I'd explain “You're going to have to answer a written question honestly when you sell your home, something along the lines of, ‘Was any work that required permits performed without obtaining one?’” I cannot remember a single client ever questioning the value of the permit process after that, despite the costs of plans and permits sometimes being thousands of dollars. Why? They understood it as an investment in the equity of their home and future peace of mind.

I think this clearly illustrates two things as the reason why something like 90%+ of the HVAC replacement projects are done without permits. The reasons are:

1. Customers *don't know* what work *requires* a permit
2. Customers ask *contractors* if a permit is required (Customers *don't* typically think to seek permit advice from building departments)

At the same time, at least three things are true and motivate customers:

1. Most customers value honesty higher than the total cost of permits
2. Customers want to avoid future time-of-sale problems/risk with their most valuable asset.
3. Customers want to enjoy the peace of mind that comes with having a third party inspect the contracted work for minimum health and safety agreement with the building code.

And from the perspective of the licensed contractor, two things incentivize the downplaying of the need for permits:

1. Contractors want to maintain control of as many project time and cost variables as possible so that the highest probability of being profitable exists.
2. Building inspections and HERS inspections cost money, and both shift project time and cost control away from the contractor.

So clearly a targeted message that simply answers the most common question, allowing *good* decisions to happen and *bad* advice to *not* be sought, makes sense.

Additionally, I suggest that the CEC and CSLB ask equipment manufacturers to partner with them by requiring a building permit number for any warranty part/labor replacement, and assist manufacturers in auditing a small percentage of those supplied numbers for validity. The manufacturer should be encouraged to disallow that contractor from future warranty credit in the event that any cheating was discovered as an effective enforcement, along with CSLB notification of violation and possible fine.

So once the problem of non-compliance is addressed and fixed, we need to look at the elephant in the room: the issue of why fully code-compliant and permitted systems deliver pathetic performance in California. Why is it that 100% of the systems tested on brand new CA homes were miserable performance failures? I'm referencing our newest and best research, the 80 brand new home CEC report in 2011 by Wilcox, Chitwood, et al. <http://www.energy.ca.gov/2012publications/CEC-500-2012-062/CEC-500-2012-062.pdf> 100% of these homes were built *with* a building permit, complied with Title 24, and passed *all* required inspections- all across the state. All of the things we all think ensures a "good" HVAC system were done, but the result was a miserable performance failure.

One hundred percent of those heating and cooling systems failed the most basic requirement, to simply operate within the (massively broad) manufacturer's performance operating envelope for the maximum allowable pressure against the air handling unit (AHU), blower, or furnace fan. 100% were above the 0.50" water column limit, and only 19 out of 69 systems (28%) passed the Title 24 minimum airflow and maximum fan energy requirements, while all others failed.

How's that for a grade for the efficacy of all Title 24 code compliance and HERS verification requirements? Does a grade between 0-28% justify the cost of permits and all required special (HERS) inspections? Certainly not, in my opinion.

It's studies like these, plus first-hand knowledge from admissions from HVAC contractors of why they continue to cut corners, even after learning how to do things correctly, that have inspired me toward finding ways to educate and help homeowners avoid these frauds. My goal is to expose the HVAC wizard, so many in the industry who are hiding behind the curtain, using fancy labels, smoke and theater to conceal the ugly performance truth of their installations by selling oversized equipment shackled to pathetic distribution systems. The 'curtain' in this case is the difficulty of measuring true performance of systems and comparing it to labeled efficiency and performance values that the customer paid for. The HVAC contractors that have learned about home performance but don't do it, know that as long as the curtain exists, they can continue business as usual, while ratepayers and the state pay the performance price for their decision.

How do we expose the wizard and increase the performance of residential HVAC systems statewide, protect our environment and increase the quality of life for California residents? I believe it's finally happening through technology and the introduction of constant commissioning and performance monitoring systems like the TruEnergy® System. I've been working with Truveon corporation as a paid consultant because I believe in the change that this system will soon bring to the HVAC industry.

State licensed HVAC contractors can now install a patented on-board-diagnostic (OBD) system in combination with all HVAC systems of any major brand. TruEnergy® systems track the actual energy efficiency of HVAC systems using continuous, cloud-based performance diagnostics and patented closed loop control processes, immediately notifying the operator and/or responsible HVAC contractor when any performance faults occur.

How does this factor into an environmental and quality of life benefit? Through built-in fault-indicator and performance trending tools, the software alerts all installation deficiencies that typically are undetectable at the installation/HERS verification time- yet still occur over longer periods of time, like refrigerant leaks. These preventable failures are avoided by strategic use of technology, preventing expensive environmental harm in

the process of saving energy and money. Imagine being alerted to a refrigerant leak by an email sent from a device- how cool and smart is that?

My belief is that we now have the technological advances to enable the elimination of things that don't work- like HERS inspections- and replace them with continuous commissioning systems that alert performance faults and degradation, providing an alternative and improved performance compliance pathway. One simple online HVAC permit like many other commenters have suggested, paired with only one building inspector visit to ensure that the alternate compliance OBD/FID device is installed and life/safety issues have been addressed, would mean huge efficiency gains from continuous commissioning and an efficient use of everyone's time and resources.

In summary, the sooner we provide the compliance pathway and incentive for customers and contractors to install constant commissioning systems like TruEnergy<sup>®</sup> to ensure real performance, with the building permit ensuring basic health and safety (plus warranty coverage), and then using billboards and social media to deliver the message to California residents that they do need a permit- well, that's when I believe we'll tear down the wizard's curtain for good, fixing the overall big picture problem of poorly performing systems that cause extensive damage to the environment and wallets of all California residents.

Respectfully,

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