

HVAC Permit and Code Compliance Market Assessment - MAPC

Presentation Outline

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Study Background and Purpose

Study Background

- Scoped as part of the 2013-2014 Energy Efficiency EM&V Roadmap
- Study under scope since early 2014
- Received input from CPUC expert consultants, the IOUs, the CEC
- Now seeking public comments

Study Purpose

- Provide more information to help tackle the problem of non-compliant HVAC changeouts
- Help design IOU programs: incentives, training, outreach
- Test methods and approaches to determine compliance rates for HVAC changeouts

Study Objectives

Identify standard practices for California residential and nonresidential HVAC:

- Compliance with building HVAC standards and permit requirements,
- Attitudes and barriers to permitting and compliance,
- Correlation between permitting and compliance with codes and standards, and
- Effectiveness of Home Energy Rater (HERS) verification processes.

Study Scope

Installations

- The study will examine:
 - Projects under 2008 code that are
 - Entirely new or complete replacement space-conditioning systems or
 - Altered space-conditioning systems.
- The study will not examine:
 - Projects under 2005 or 2013 code
 - High-rise buildings
 - New construction
 - Additions with HVAC changeouts
 - Buildings exempt from permit process

Equipment Types

(Not an exhaustive list)

- Central heating and cooling systems (gas, electric, or propane)
- Furnaces
- Heat pumps
- Single phase (residential) and three phase (commercial) packaged rooftop and split systems
- Water-sourced heat pumps & evaporative cooled air conditioning

High-level Research Questions

RQ 1: What percent of projects obtained required building permits and complied with building energy efficiency standards (Title 24, Part 6)?

Method: Develop a top-down and bottom-up permit rate estimate

RQ 2: How does compliance differ for permitted and non-permitted projects?

Method: Evaluate recent HVAC changeouts for permitting through field inspections and through data previously collected in the field.

RQ 3: What barriers exist for HERS raters? Examine barriers, awareness of code requirements and inspection processes. Identify training that could help raters to improve compliance with Title 24 HVAC requirements.

Method: Surveys with experienced HERS raters.

RQ 4: How compliant are HERS rater certified projects?

Method: Evaluate HERS registry submittals.

High-level Assessment Task Summary

- Determine residential permit & compliance rates (total 200 units/dwellings) with onsite field testing.
- Conduct detailed performance testing and whole house data collection on a subsample (10 dwellings out of 200).
 - The whole house data collection *could* inform future case studies.
- Nonresidential compliance includes an analysis-only method with the option of collecting field data.

- Develop Bottom-up Permit Rate
- Develop Top-down Permit Rate
- Perform HERS Rater Surveys/Interviews
- Evaluate HERS Registry Submittals

RQ 1: What is the Permit Rate?

Estimate the HVAC Permit Rate Using Two Methods

Top-down Permit Rate:

- Estimate total number of permits issued for HVAC changeouts during a given time period.
- Estimate total number of units sold during a given time period.
- Several exclusions apply: nonresidential sales exempt from permit process, new construction projects.

Data & Methods:

- Potential sources currently considered:
- AHRI National data, HARDI, past DOE reports
- Building Depts. CIRB
- Stock replacement model informed with saturation study data.
- (Optional: Wholesale Distributor IDIs)

RQ 1: What is the Permit Rate? (Continued...)

Estimate the HVAC Permit Rate Using Two Methods

Bottom-Up Permit Rate

- Identify a percentage of projects permitted.
- Apply saturation study sample weights and extrapolate results back to the population.
- Method is limited to IOU customers (SDG&E, SCE, PG&E, SCG).

Data Sources

- 2009 Residential Saturation Study
- 2013 Commercial Market Share Tracking Study
- If needed (general population)

RQ 2: How does Permitting Impact Compliance?

General Approach:

1. Identify a sample of dwellings and nonresidential buildings with recent HVAC changeouts.
2. Collect/measure Title 24 mandatory and prescriptive requirements through field data or previously collected field data.
3. Evaluate compliance by Title-24 measures as compared to code (compliant, non-compliant).
4. Determine dwelling/nonresidential buildings' permit status.
5. Compare differences in compliance by measure for permitted and non-permitted projects.

RQ 2: Compliance Bins:

Permitted & Compliant

Completes Permitting Process
Meets Title 24 compliance requirements
(duct leakage, air flow, sizing
and refrigerant charge)

Permitted, Not Compliant

Completes Permitting Process
(Signed off without meeting all compliance
requirements)
Does not meet Title 24 compliance requirements
(over sized, leaky ducts, low refrigerant)

Not Permitted, Compliant

Does not pull permit
(Does not pull permit but meets
code requirements)
Meets Title 24 requirements
(duct leakage, air flow, sizing
and refrigerant charge)

Not Permitted, Not Compliant

Does not pull permit
(Does not pull permit meets code requirements)
Does not meet Title 24 requirements
(over /improper sizing, leaky ducts, refrigerant
not fully charged)

RQ 3: Evaluate Effectiveness of HERS Raters

- California Home Energy Rating System (HERS) program was initially implemented to address issues of poorly-performed construction and equipment installations in residential applications.

Assumption: HERS raters provide quality-assurance services that verify correct HVAC installation and assure excellent HVAC performance.

Study to examine:

- How do outside influences from contractors, customers and building departments influence the service that raters provide?
- How does price pressure from competing raters with unregulated fees impact service?
- Do these influences degrade the quality of the service raters provide and if so how frequently does this occur? Assess reasons or barriers as to why HERS raters may not perform the work correctly or as thoroughly as necessary by identifying trends in the HERS registry data reviewed and surveys with HERS raters.

RQ 3 Continued... Evaluate Effectiveness of HERS Raters

Task Interviews & Online Surveys:

- Conduct interviews with HERS raters to explore systematic issues, identify problems that may be present in certain climate zones, building departments, hiring contractors, under the T24 code period, or by raters themselves.
- Planned sample approximately 60 surveys (potentially more, depending upon access to email addresses).
- Researchers will request information from HERS registry to identify raters with frequent submittals.
- Researchers will request participation in survey from raters serving various regions in the state.

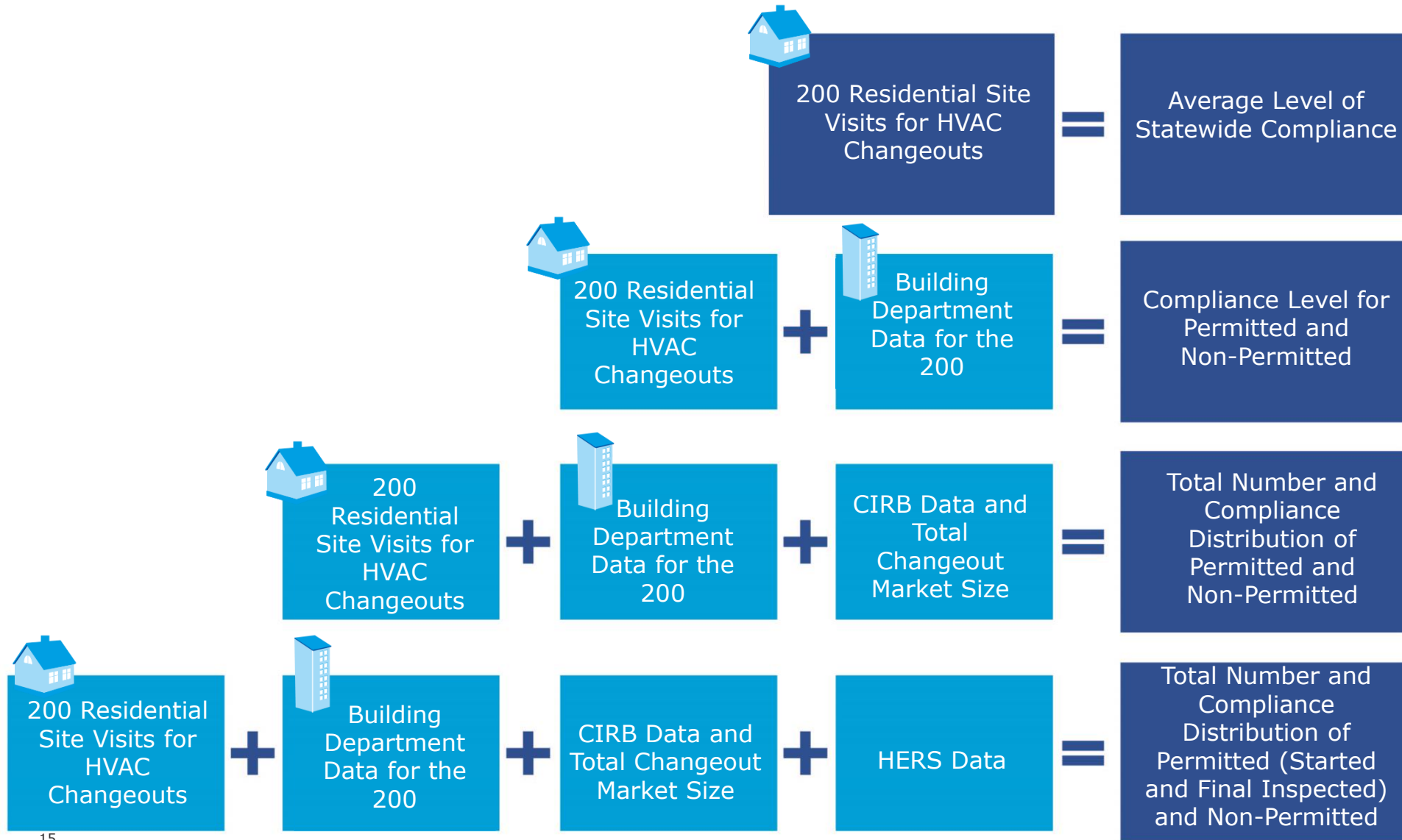
RQ 4: Evaluate Comprehensiveness of HERS Registry Submittals

Examining previous assumptions, the study will evaluate registry submittals to determine if HERS inspections on HVAC installations produce the intended outcome of a HERS-compliant residence by analyzing inputs from the HERS rater registry.

Examples include:

- Identify any trends associated with any particular climate zones, building departments, raters or contractors where verification activities are systematically not performed.
- Assess the percentage of HERS raters that may only do a subset of the required verification activities.
- Identify the frequency of rater-submitted test results that indicate a system did not pass or was out of compliance with Title 24 requirements.
- Determine what percent were resubmitted with a passing rate and what percent were not.

Overview of Residential Data Collection and Outcomes



Proposed Schedule

February 2015 - Finalize research plan

May 2015 -Collect & Report Nonresidential Data for Memo

August 2015 - Phase1: Res. Compliance Testing and Permit Analysis Qty. 100 units

November 2015 - Phase2: Res. Compliance Testing and Permit Analysis Qty. 100 units

November 2015 - Phase3: Res. RCA Testing Weigh-in Method on Subsample

January 2016 - Develop Bottom-up Permit Rate

January 2016 -Develop Top-down Permit Rate

October 2015 - HERS Rater Interviews

December 2015 - Evaluate Efficacy of HERS Rater Submittals

June 2016 Present and deliver final report

Memos and interim deliverables

- **Memo # 1 /April 2015**
- Proposed methodology for determining compliance and weighting of prescriptive measures (following stakeholder meeting).
- **Memo # 2 /May 2015**
- Results from analysis-only Nonres permit and compliance analysis
- **Memo # 3 /August 2015**
- Residential permit & compliance rate at 50% completion & assessment of the need for additional data.
- **Memo #4/October 2015**
- Define variables of interested in HERS registry described analysis methods.

Next Steps

- Public comment period and release of final research plan
- Comments instructions
 - Go to <http://www.energydataweb.com/cpuc/> .
 - Select the search tab and then select Portfolio Cycle 2013-2014 and search text 'HVAC6' (no quotes). Click the search button and you will see the files for downloading.
 - Comments should be uploaded to the website by clicking “comment” on the plan by **5pm on February 11, 2015.**
 - In order to post comments, you will need to register on the site with an id and password.

To access the audio recording – available until 03/04/2015

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Thank You.

**CPUC Manager Paula Gruending,
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