

BayREN September Forum

CEC Guidance in Energy Code Interpretations

September 24, 2014

On September 24, 2014, the Bay Area Regional Energy Networks conducted a Regional Forum providing an opportunity for local building department staff and building professionals to ask California Energy Commission staff about interpretations for enforcement of 2013 Title 24 Part 6 – the California Building Energy Efficiency Standards. Information and details of the full event can be found at www.bayren.org/codes/regional-forums.

The questions and answers below summarize the Energy Code issues, discussion, and clarifications from this Forum. The questions and responses have been reordered to better group aligned topics. Answers that contain clarifications or additional information from what was shared during the Forum are noted. Any additional clarifications should be directed to the Energy Standards Hotline at: 1-(800)-772-3300 or Title24@energy.ca.gov.

Question Topics Include:

General Project Issues and Dates of Submission.....	1
Forms, Registries, and Compliance Software	3
Third Party Verification (HERS Raters and Acceptance Test Technicians).....	6
Building Envelopes and Fenestration.....	7
Lighting, Mechanical, and Water Heating Systems	9

General Project Issues and Dates of Submission

Q1. What date stamp determines the applicable code? If the building department has chosen to adopt a code early, does that adoption ruling supersede the application date?

Per Section 10-103(d); ".....enforcement agency determines in writing that the construction is designed to comply with the requirements of Part 6 that are in effect on

the date the building permit was applied for." Any project applying for a permit after July 1, 2014 will have to meet the 2013 standards.

In jurisdictions that adopted the 2013 Energy Standards prior to July 1, 2014, projects submitted after that early adoption date can still be locked in to the 2013 standards as long it meets the requirements of Section 10-103(d) as listed above.

Q2. How should revisions to projects permitted prior to July 1, 2014 be handled?

In general, if the permit application is prior to July 1, 2014, the project is locked into the 2008 Standards. However, the 2013 Standards may be triggered under specific scenarios, including:

- For a residential housing development with a master plan approved under the 2008 Standards, if there are changes that occur after July 1, 2014 to specific approved designs/models, those changed designs/models must meet the 2013 Standards, using the 2013 Forms.
- For a detached single family residential home permitted under the 2008 Standards, a change that adds square footage to the building would trigger the 2013 Standards.
- Typical changes to residential buildings permitted under 2008 Standards that would trigger the 2013 Standards include:
 - Additional square footage
 - Additional fenestration area
 - Additional mechanical systems

In short: substantial changes, proposed after July 1, 2014, that impact the modeled energy use of a building permitted under the 2008 Standards, will trigger the 2013 Standards for that specific building project.

Q3. Depending on the orientation and design of an existing home, it will be very difficult for certain additions and alterations (A+A) projects to comply with the 2013 Standards, even under the performance approach, which is rare for A+A. Solutions could lead to some very aesthetically unpleasing features in terms of window to wall (WtW) ratio, etc. What are your thoughts for how A+A projects can best comply with the 2013 Standards?

If the A+A project cannot meet the 2013 Standards on its own, then improvements in the existing building would have to be done to balance the energy efficiency deficit of the addition, If that doesn't happen, then drastic measures may have to be applied (including removing existing windows, adding insulation, etc.). The Standards strive to be considerate of the aesthetic value of windows and other features/improvements in A+A to address trade-offs, but at a certain point, it is not possible to make up for an inefficient A+A project.

Q4. How do the CEC T24 requirements pertain to relocatable Commercial Modular buildings (not re-locatable classrooms) versus those on a permanent foundation system?

The first thing to clarify is the definition of a modular building and whether the Standards are applicable:

- Modular buildings are temporary and are designed to be transported. As temporary buildings they do not have to meet Title 24, even if put on a foundation. If a permanent addition is added to the Modular building, that addition must meet Title 24.
- Relocatable school buildings and pre-fabricated/mobile homes are required to meet T24 at the point of manufacture.

Title 24 Part 6 only covers buildings designated in Occupancy Groups A, B, E, F, H, M, R, S, or U as defined in the 2013 California Building Code, Chapter 3. Only those occupancy groups listed in Title 24, Part 6 are covered by the Building Energy Efficiency Standards. There is no mention of “modular” commercial buildings or similar type of building in the definitions of the occupancy groups.

There is no mention of a permanent foundation in Exception 2 of Section 100.0(a) and the exception allows temporary buildings to be erected without complying with Section 100.0(a)1, 2, and 3 which means no Title 24, Part 6 construction permit is required. For example, there are other possible types of permits such as seismic, fire, and accessibility, which are not covered by the Energy Standards. Also group occupancy I and L are not covered under Title 24, Part 6.

Department of Housing and Community Development (which has oversight over Modular homes) refer to the CEC and Title 24 for both relocatable and non-relocatable modular buildings.

Forms, Registries, and Compliance Software

Q5. What kind of projects still cannot be entered into a HERS registry?

Any project that requires HERS verification must be registered with a HERS Registry.

CalCERTS is the only HERS provider currently approved for residential new construction and additions/alterations. The majority of measures that require HERS verification can be entered with CalCERTS.

As of September 8th, HERS Raters are able to upload existing conditions for existing plus addition plus alteration (E+A+A) projects. CalCERTS provides training information on the E+A+A and the new CF3R-EXC-20-H form on their website (www.calcerts.com/TrainingMaterials.cfm). The energy consultant must first upload the output file from the computer performance approach program to open a new project in CalCERTS. Next the CF3R EXC20 will need to be completed by a HERS rater through CalCERTS before the energy consultant can register the CF1R.

Q6. For projects that cannot yet be entered into a HERS registry, what action(s) does the CEC want building departments to take? Will these projects have to be entered at some later date?

The CF3R-EXC-20-H is functional in CalCERTS and the verification process is now in place so all projects can be entered in the HERS registry. All new or existing projects can now be uploaded to CalCERTS registry including the E+A+A.

Q7. Why do CEC forms still include the watermark stating, “For information and data collection only. Not valid until registered with a HERS provider,” even forms where a HERS provider is not relevant? When will this change? Are other changes still being made to these forms or are they stable now?

This is being corrected [in October 2014]. The watermark is being removed on forms required for additions less than 300sf or an addition that does not require HERS field verification.

Updates to remove the watermarks are in process for the following forms: CF1R-ALT-05-E, CF1R-ADD-02-E, CF2R-ALT-05-E and CF2R-ADD-02-E. These forms can be filled by hand with wet ink signatures and do not have to be registered. This is expected to be completed by December, 31, 2014.

Q8. For HERS measures and other measures that require verification (i.e., a CF3R), why do building departments need to collect an installation certificate, when there is also going to be a verification certificate?

An Installation Form (i.e., a CF2R) is important because it documents what the contractor/installer/technician certifies as correctly installed in the field. The HERS Rater will then use the CF3R to verify those installed measures and that they are functional.

If a HERS Rater notes a discrepancy between the CF2R and the actual installed measure, they will submit a correction request so that the Authority Having Jurisdiction (AHJ) can do their job correctly. It is the permit applicant’s responsibility to make all corrections.

Q9. In general, where can building departments go to get very specific information about what forms are needed for what and when? Specifically for HVAC jobs, what forms need to be filled out, when, and by whom?

In general, the best resource for this is either to place a call to the CEC Energy Standards Hotline (800-772-3300; Title24@energy.ca.gov) or use the ACE Forms Tool (energycodeace.com/2013-forms-ace-tool).

HERS Providers/Registry interfaces will also walk applicants through the required forms. The CF1R and MECH 01 forms will be part of all jobs, and will indicate the other required forms.

Q10. Are there forms that must be **collected** at inspection, or do they just need to be **verified** at inspection? If collection is necessary, what are the retention requirements?

Section 10.103 requires that Building Energy Efficiency Standard forms to be posted at the building site but does not require that the forms be collected; collection is a policy decision of the authority having jurisdiction (AHJ) and retention would similarly be at the discretion of the AHJ.

Q11. Regarding the Commissioning forms for Nonres [Design Review Kickoff Certificate(s) of Compliance and Construction Document Design Review Checklist Certificate(s) of Compliance]. Are those required to be on plans? In general, should energy compliance documentation be done separately, or put on the plans? Are there draw backs or benefits to putting it on the plans?

Only the Compliance Certificates, NRCCs with 01s on the forms are required to be on the plans. The following Commissioning forms must be included on the plans:

- 2013-NRCC-CXR-01-E-CxDesignReviewKickoff.pdf
- 2013-NRCC-CXR-02-E-CxConstructionDocuments-General.pdf
- 2013-NRCC-CXR-03-E-CxConstructionDocuments-SimpleHvacSystems.pdf
- 2013-NRCC-CXR-04-E-CxConstructionDocuments-ComplexHvacSystems.pdf
- 2013-NRCC-CXR-05-E-CxDesignReviewSignaturePage.pdf

Q12. Are Performance forms also required to be on plans?

No, but any computer modeling using the Performance approach should have options to easily print forms that can be attached to the plans.

Q13. Is it possible to print out registered forms and attach them to plans?

While possible, based upon the status of the registries at this time, this might be difficult to do as a policy and is not required. It is not a good option at this point.

Q14. When will the HERS verification of existing conditions be ready for use in the registry?

Currently CalCERTS is the only provider that has this capability, but the functionality is limited. CalCERTS has an exception from the Energy Commission to get this completed by December 31, 2014.

Q16. What forms will the State look for starting in January 2015 as part of the requirements for the Nonresidential Data Registry?

This January 2015 date will need to be adjusted as there is no Nonresidential Data Registry provider identified at this time. Once established, all Certificates of Compliance and any form that documents commissioning will need to be registered. The Energy

Commission's Executive Director will make a decision to determine if forms must be resubmitted at a later time.

Q17. Is there anything to the rumor that EnergyPro is "on probation"? If so, what does it mean? Are there other compliance software updates to be aware of?

CEC lists approved computer compliance programs on its website (www.energy.ca.gov/title24/2013standards/2013_computer_prog_list.html).

CBECC V3 is currently approved for Residential and Nonresidential projects.

EnergyPro V6.3 is approved for Residential projects (including Multifamily Low rise Projects).

EnergyPro V6.2 is conditionally approved for Nonresidential projects pursuant to the alternate procedure or protocol, as an Alternative Calculation Method that building permit applicants may conditionally use until 5:00 PM on December 31, 2014 to demonstrate compliance with the nonresidential provisions of the Standards.

Q18. If someone uses CBECC V1 or V2 to model a project under the 2008 Standards, and then there's a change triggering the 2013 Standards, do the compliance calculations have to be re-run using CBECC V3? What about use of Energy Pro V6.2 for Nonresidential projects that have changes after December 31, 2014?

No, the applicant can re-run the calculations in the version of the compliance software used in the initial approved submission.

Third Party Verification (HERS Raters and Acceptance Test Technicians)

Q19. Can the full responsibilities for energy code compliance of HVAC change-outs be allocated to the HERS Raters?

In the eyes of the CEC, this would not be permissible. HERS Raters are specialty inspectors and they do not replace AHJ field inspectors or their duties. Ultimately the AHJ is responsible for energy compliance of HERS verified measures. The HERS Rater only verifies if the measure is functional (i.e., properly filled refrigeration charge, duct leakage verification). The verification adheres to HERS Regulations and Residential Appendices RA2 and RA3.

Q20. Is there an expiration date on HERS verified ducts? For instance, if an HVAC unit is replaced but the ducts had already been HERS tested, do they need retesting?

At this time there is no limitation on how long the duct tightness verification is good for. However, the CF3R (or old CF4R/Verification Form) must have been previously registered and a copy should be made available to verify the previous HERS test results.

Q21. What is the timetable for the triggers that will require acceptance testing for Nonresidential mechanical and lighting systems?

The CEC Acceptance Test Technician Certification Program (ATTCP) identifies providers certified to train technicians to perform acceptance testing for mechanical and lighting systems. Once a minimum of 300 technicians have been certified for each system type, then only these certified technicians will be allowed to perform these acceptance tests.

CalCTP has trained 300 individuals to be a Certified Lighting Control Acceptance Test Technician (CLCATT), triggering this requirement for lighting acceptance tests.

This threshold has not been met on the mechanical side for Certified Mechanical System Acceptance Test Technicians. Once it has, this certification will be required for all mechanical acceptance tests, but in the meantime these acceptance tests can be performed by non-certified third party professionals

The best way to find out for when these Certifications are triggered is to follow the CEC list serve (www.energy.ca.gov/efficiency/listservers.html).

Building Envelopes and Fenestration

Q22. Why does the CEC require residential envelopes so tight that mechanical ventilation is then also required?

As residential envelopes have become tighter, what used to be normal infiltration and exfiltration has been significantly reduced. In the meantime, we have introduced thousands of chemicals into our houses through building materials, cleaners, finishes, packaging, furniture, carpets, clothing and other products. The California Standards had always assumed adequate indoor air quality would be provided by a combination of infiltration and natural ventilation and that building occupants would open windows as necessary to make up any shortfall in infiltration. However, Commission-sponsored research on houses built under the 2001 Standards revealed lower than expected overall ventilation rates, that many occupants do not open windows regularly for ventilation, and that higher than expected indoor concentration of chemicals such as formaldehyde were present.

The 2013 Standards include mandatory mechanical ventilation intended to improve indoor air quality in homes with low infiltration and natural ventilation rates. The Energy Commission worked to align the 2013 Standards with the requirements of ASHRAE Standard 62.2-2010, including ASHRAE Addenda B, C, E, G, H, I, J, L, and N (www.techstreet.com/ashrae/lists/ashrae_standards.tmpl) with the following exceptions, which are not acceptable options for providing whole-building ventilation in California:

- Opening and closing windows
- Continuous operation of central forced air system air handlers of a central fan integrated ventilation system.

Q23. Since residential cool roofs are not a requirement in CZ 3, why are permit applicants required to submit the form?

The residential cool roofing form is not required in Climate Zones that do not require cool roofs (including CZ 3). Section 150.1(c)(11) and Table 150.1A clearly indicate roofing requirements by climate zone.

Q24. What are the requirements for radiant barriers in residential re-roof projects in Climate Zone 3?

For residential re-roofs, there is no requirement for a radiant barrier. However, radiant barriers are a Prescriptive requirement for all newly constructed roofs, regardless of climate zone.

Re-roofing projects on steep-sloped roofs in Climate Zones 10-15 do trigger cool roof requirements (see 150.2(b)1.H.i). Exceptions to this include installation of the following features considered to be equivalent:

- Air-space of 1.0 inch (25 mm) is provided between the top of the roof deck to the bottom of the roofing product; or
- The installed roofing product has a profile ratio of rise to width of 1 to 5 for 50 percent or greater of the width of the roofing product; or
- Existing ducts in the attic are insulated and sealed according to Section 150.1(c)9; or
- Buildings with at least R-38 ceiling insulation; or
- Buildings with a radiant barrier in the attic meeting the requirements of Section 150.1(c)2; or
- Buildings that have no ducts in the attic; or
- In Climate Zones 10-15, R-4 or greater insulation above the roof deck.

Q25. Section 140.3(a) Sections 5B and 5C specify an area-weighted value, but the Nonresidential Compliance Manual (NRCM), Sections 3.2.6 and 3.2.7, both say that each window must meet the U-factor and SHGC criteria. Can you clarify?

For residential, it is the weighted average for U factor and SHGC, and that average must meet the prescriptive requirements in Table 150.1-A.

For nonresidential it is more complicated (due to features such as curtain walls, site-built fenestration, etc.), but it is still possible to do a weighted average.

The compliance software can calculate this weighted average as long as the U-factor and SHGC are entered for each window. However, for nonresidential projects, the WtW ratio is still the limiting factor for each orientation. Provided the 40% WtW requirement for west facing fenestration is not exceeded, the weighted average requirements will apply regardless of the WtW ratio.

Q26. If a permit applicant wants a curtain wall all the way around, is that possible?

It is possible, but the applicant will need to be creative to meet the thresholds/requirements.

Q27. Would a west-facing curtain wall for a residential project be permissible?

According to the Prescriptive Approach in Section 140.3(a)5 of the 2013 Energy Standards, a project must have (1) a west-facing area no greater than 40 percent of the gross west-facing exterior wall area, or 6 feet times the west-facing display perimeter, whichever is greater; and (2) a total area no greater than 40 percent of the gross exterior wall area, or 6 feet times the display perimeter, whichever is greater. This allows fenestration to be placed in the west orientation prescriptively as long it meets the WWR or 6 times the west facing display in Section 140.3(a)5 and the efficiencies indicated in Table 140.3-B for curtain walls or store front. West orientation fenestration can be modeled in the performance approach as well.

High-rise multifamily will be a big challenge with these new requirements. New technologies and new techniques will be required. Triple silver coated windows are an example of a technology that can help facilitate creative solutions to compliance.

Q28. Can the compliance software model exterior window shading?

The software should be able to, but this is a question for the software providers.

Lighting, Mechanical, and Water Heating Systems

Q29. Projects that involve changing out more than 40 lighting fixtures require a permit. For projects that involve changing 40 or less fixtures (luminaire modification in place), how is the building department supposed to track this? What if this happens multiple times at one site, and as a result they change more than 10% of the existing fixtures?

It is not clear how to document this information, and there are not forms to track modifications in place for less than 40 fixtures. Additionally, it may be too much to ask AHJs to track the numbers of lighting changes. This modifications-in-place requirement could rely heavily on the integrity of permit applicants to provide accurate numbers and follow the requirement correctly.

Q30. What prescriptive lighting forms or other documentation should be filled out for building permit submittal to show Title 24 energy compliance as a luminaire modification-in-place?

None of the NRCC-LTI forms mention this compliance option.

A luminaire modification in place (replacing fewer than 40 fixtures) does not require a permit, or compliance documentation. The NRCC-LTI form is intended for new construction, and would not be used for a luminaire modification in place.

Q31. Section 120.6(c) Mandatory Requirements for Enclosed Parking Garages has different ventilation requirements for enclosed parking garages than does the California Mechanical Code. Title 24, Part 6, §120.6 seems to indicate that the parking garage shall have a ventilation rate of at least 0.15 cfm/ft² anytime the garage is occupied in addition to maximum CO levels.

- a) Do the Energy Standards require continuous ventilation rate of 0.15 cfm/ft² for enclosed parking garages in addition to an exhaust system that operates on detection of CO levels at or in excess of 25 ppm?
- b) Does this only apply to ventilation system designs that are 10,000 cfm or more?
- c) Are there exceptions to this requirement and if so, what are they?

Continuous ventilation at 0.15 cfm/ft² is required when the garage is scheduled to be occupied, regardless of exhaust systems that are triggered by CO level at or in excess of 25 ppm. Section 120.6.(c) only applies to ventilation systems where the total design exhaust rate for the garage is greater than or equal to 10,000 cfm. Exceptions include:

- Any garage or portion of a garage, where more than 20 percent of the vehicles expected to be stored has non gasoline combustion engines.
- Additions and alterations to existing garages where less than 10,000 cfm of new exhaust capacity is being added.

Q32. For High-Rise Residential dwelling units, the default ventilation rate used with Energy programs such as EnergyPro, as well as the default rate in the Energy Standards is 0.15 cfm per square foot. The Mechanical Code, which is also part of the Building Code, requires 0.06 cfm per square feet in the Breathing Zone calculation which is approximately 1/2 of the default rate. Keep in mind that some projects, due to sound regulations, mandate mechanical ventilation for the dwellings. What is the appropriate ventilation rate?

Appropriate ventilation rates vary by occupancy type and the expected number of occupants, and are referenced in Table 120.1-A in the Standards and in Tables 4-12 and 4-13 in Section 4.3.2 of the Nonresidential Compliance Manual.

Q33. Why doesn't the Energy Commission allow the use of ASHRAE 62.2 for High-Rise dwelling unit ventilation?

CEC plans to adopt ASHRAE 62.2 for all residential buildings in the 2016 Standards.

Q34. When are commercial EMS (Energy Management System) systems required? What specifically does an inspector need to look for in the field to verify proper installation and operation?

EMS at this time is not a required system for nonresidential projects so long as there are automatic shut-offs controls for both lighting and mechanical systems. EMS is one step above these requirements, and allows remote access and control energy systems within a building.

For field verification, the first question is if there is an EMS system. If present, the field inspector should verify that it is installed and the appropriate Acceptance Testing has been performed (per Section 13.86 of the Nonresidential Compliance Manual).

If there is not an EMS, the inspector should then be looking for the required lighting and mechanical controls (i.e., thermostats with 4 set-backs, lighting controls with override systems if the space is not occupied, etc.).

Q35. The energy code says that if you're replacing a residential water heater, it cannot be electric if there is natural gas on site. Please clarify whether an existing electric WH can be replaced with another electric WH even if natural gas is available, since switching from electric to natural gas would require a homeowner to extend a gas line, add venting, possibly relocate and/or raise the WH, and wait for that permit, all while they are presumably without hot water.

For newly constructed buildings installing a water heater with natural gas already plumbed, the applicant cannot install an electric resistance water heater (heat pumps are permissible).

For existing buildings this gets more complicated. If there is an existing natural gas water heater, the replacement must also be gas. If there is an existing electric resistance water heater, it can be replaced like-for-like under the prescriptive approach only if:

- a. No natural gas is available,
- b. A solar water heating system is installed,
- c. The water heater is located within the building envelope; and
- d. Recirculation pumps are not used; and
- e. The water heating system includes a solar water-heating system with a minimum SSF (Solar Savings Fraction) of 0.50.

When the primary water heater is a gas water heater, installing a solar water heater is not required for compliance purposes, even when small point-of-use electric water heaters are installed.

Adding multiple water heaters to a single family design will generally require performance calculation and result in an energy penalty in the water heating budget that must be offset elsewhere in the overall Title 24 compliance.

Q36. If you have a gas storage water heater and the line is sized for that existing unit, and you want to install a water heater with a larger gas line requirement, such as a tankless water heater, what do you need to do?

This will require a new natural gas line that is appropriately sized. There are a number of new requirements that have been integrated (and will be integrated) that are looking down the line to help facilitate increased efficiency goals and transitioning to net zero. Solar ready roofs are another example of this.