

# Meeting Notes



Notes from 2022 Title 24, Part 6 Code Cycle  
Utility-Sponsored Stakeholder Meeting for:

## Multifamily HVAC & Envelope

Posted September 5, 2019

### Meeting Information:

**Meeting Date:** August 22, 2019

**Meeting Time:** 8:30 am – 11:15 am

**Meeting Host:** California Statewide Utility Codes and Standards Team

### Meeting Agenda:

Time	Topic	Presenter
10 minutes prior to call	Live Attendee Poll	
8:30 – 8:35 am	Welcome & Meeting Ground Rules	Alanna Torres (Energy Solutions)
8:35 – 8:45 am	California Energy Commission Introduction	Payam Bozorgchami (California Energy Commission)
8:40 – 8:45 am	Utility Team Welcome & Overview	Kelly Cunningham (Pacific Gas and Electric)
8:45 – 9:45 am	<u>CASE Presentation I</u> : Multifamily Indoor Air Quality	Marian Goebes (TRC)
9:45-10:45	<u>CASE Presentation II</u> : Multifamily High Performance Envelope	Matthew Christie (TRC)
10:45 – 11:00 am	Wrap Up	

### Meeting Attendees:

First Name	Last Name	Email	Affiliation
<b>Statewide Utility Codes and Standards Team</b>			
<i>Utility Staff</i>			
Kelly	Cunningham	KACV@pge.com	Pacific Gas & Electric
Mark	Alatorre	M6AC@pge.com	Pacific Gas & Electric
Chris	Kuch	Christopher.Kuch@sce.com	Southern California Edison
John	Barbour	JBarbour@semprautilities.com	San Diego Gas & Electric
James	Kemper	James.Kemper@ladwp.com	Los Angeles Department of Power and Water
<i>Codes and Standards Enhancement (CASE) Team Members</i>			
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Simon	Lee	simon.lee@energy.ca.gov	California Energy Commission
<b>Other</b>			
Gypsy	Achong		2050 Partners
Rebecca	Everman		3M
Paul	Springer		Aerobarrier
Tom	Crowe		Aeroseal
Gary	Craw		Aldes
Christopher	Bender		Aldes
Stefan	Gracik		Alter Engineers
Stephen	Wieroniey		American Chemistry Council
Loren	Ross		American Wood Council
Manuel	De Santiago III		Associated Roofing Contractors of the Bay Area Counties (ARCBAC)

Kevin	Messner		Association of Home Appliance Manufacturers
John	Park		Association of Home Appliance Manufacturers
Karen	Kristiansson		Bay Area Metro
Dan	Johnson		Beyond Efficiency
Thomas	Culp		Birch Point Consulting
Patrick	Nielsen		Broan Fresh Air
Nick	Brown		Build Smart Group
Peggy	Jenkins		California Air Resources Board
Yirui	Liang		California Air Resources Board
Pat	Wong		California Air Resources Board
Zoe	Zhang		California Air Resources Board
Emily	Mills		California Association Sheet Metal and Air Conditioning Contractors' National Association (CAL SMACNA)
Chris	Walker		California Association Sheet Metal and Air Conditioning Contractors' National Association (CAL SMACNA)
Bob	Raymer		California Building Industry Association
Andrew	Kosydar		California Building Industry Association
Tom	Martin		California Department of Housing and Community Development
Daniel	Humphreys		California Department of Housing and Community Development
Gina	Ferguson		California State Treasurer's Office
Mike	Layton		California State Pipe Trades Council
Ward	Brady		Carrier
Diego	Salazar		Carrier
Marc	Connerly		Connerly and Associates
Tom	Paine		ConSol
Mike	Hodgson		ConSol
Jeffrey	Steuben		Cool Roof Rating Council

Skip	Ernst		Daikin Applied
Amy	Schmidt		Dupont
Darryl	DeAngelis		Ebtron
Tom	White		Eden Housing
Mark	Richards		Emery Mechanical Engineering
Meg	Waltner		Energy 350, Inc
Jeanne	Fricot		Energy Center
Alamelu	Brooks		Energy Solutions
Simon	Silverberg		Energy Solutions
George	Chapman		Energy Solutions
Kiri	Coakley		Energy Solutions
Kim	Zylker		Engineering 350
Mic	Patterson		Façade Tectonics
Steve	Nokleby		Fan Tech
Michael	Schaefer		First Housing
Gina	Rodda		Gabel Energy
Marty	Ward		GAF
Joe	McLain		General Electric
Michael	Weller		Glumac
Aniruddh	Roy		Goodman Manufacturing
Bryan	Magnuson		Greenheck
William	LeBlanc		Greentek
Palani	Ammasai		Hartzell
Tom	Phillips		Healthy Buildings Research
Steve	Mann		Home Energy Services
Bobby	Windmeyer		Home Ventilating Institute
John	Rose		Home Ventilating Institute
Mark	Lessans		Ingersoll Rand
Jeff	Staller		Itron
JR	Babineau		Johns Manville
David	Stephens		Johnson Controls
David W	Ware		Knauf Insulation
Gary	Romes		Knauf Insulation
Iain	Walker		Lawrence Berkeley National Lab
Brett	Singer		Lawrence Berkeley National Lab
Stephen	Selkowitz		Lawrence Berkeley National Lab

Miguel	Malabanan		Los Angeles Department of Power and Water
Armen	Saiyan		Los Angeles Department of Power and Water
Bruce	Severance		Mitsubishi Electric HVAC
Steven	Lefler		Modular Lifestyles
Duane	Davies		National Air Balance Company
Soph	Davenberry		National Energy Management Institute Committee
Christopher	Ruch		National Energy Management Institute Committee
Steven	Urich		National Fenestration Rating Council
Pierre	Delforge		National Resources Defense Council
Sean	Denniston		New Buildings Institute
Ralph	DiNola		New Buildings Institute
James	Lyons		Newport Ventures
Mike	Moore		Newport Ventures
Ola	Wettergren		Nice Designs
Roger	Hedrick		NORESKO
Judie	Porter		NORESKO
Rahul	Athalye		NORESKO
Sally	Blair		NORESKO
Curt	Rich		North American Insulation Manufacturers Association
Bronwyn	Barry		North American Passive House Network
Shawn	Mullins		Owens Corning
Jay	Murdoch		Owens Corning
Michael	Stelts		Panasonic
Russell	Pope		Panasonic
Lucas	Morton		Pete Moffat Construction
Michael	Hsueh		RDH Building Science
Megan	Cross-Wilkinson		RDH Building Science
Matthew	Friedlander		RenewAire
Arnold	Meyer		Resideo
Vrushali	Mendon		Resource Refocus
Nick	Montanarelli		Rmax
Ramon	Gutierrez		Rmax

Josh	Rasin		Sacramento Municipal Utility District
Kelly	Morairty		
Randy	Young		Sheet Metal Workers local 104
David	Dias		Sheet Metal Workers Local 104
Julia	Mariano		Siglers
Steve	Dubin		Sika USA
Charlie	Hellem		Sola
Matt	Matheny		Soler Palau
Nehemiah	Stone		Stone Energy Associates
Joseph	Briscar		Stone Matheis Xenopoulos & Brew, PC
Helen	Sanders		Techno Foam
Brandon	Bethke		Tempo Chemicals and Solutions
Beth	Braddy		Trane
Nelson	Dichter		UC Davis
Curtis	Harrington		UC Davis
Mark	Modera		UC Davis
David	Morgan		unknown
Josh	Hanson		US EcoLogic
Joel	Williams		US EcoLogic
Wayne	Allredge		VCA Green
Loic	Ares		Venmar
Stephen	Gatz		Whirlpool
Vivek	Joshi		Williams Furnace Parts
Mary Jo	Gentry		Williams Furnace Parts

## Key Points and Action Items

- a. Marian will follow up with Mike Moore
- b. Marian will follow up with Roger and Mike
- c. Marian will look into the language for non-exhaust range hoods
- d. Matt will reach out to Thomas Culp
- e. Matt will reach out to Nehemiah Stone and Lucas Morton for their data
- f. Matt will follow up with Bruce Severance on insulation

## Meeting Notes

### 1.1 Welcome and Meeting Ground Rules

- Alanna Torres (Statewide CASE Team) presented.

## 1.2 2022 Process Overview

- Payam Bozorgchami (California Energy Commission) presented.
- Kelly Cunningham (PG&E, Statewide Utility Codes & Standards Team) presented.

## 1.3 CASE Presentation I: Multifamily Indoor Air Quality

- Marian Goebes (TRC, Statewide CASE Team) presented
- Presentation available [here](#).

### 1.3.1 Submeasure A: Heat or Energy Recovery Ventilation (HRV or ERV) in Select Climate Zones

1. Aniruddh Roy (Goodman Manufacturing): Would the proposed HRV/ERV requirements apply to solely new construction multifamily buildings or existing as well?
  - a. Marian Goebes (TRC, Statewide CASE Team): They only apply to new construction.
2. Bob Raymer (California Building Industry Association): What is the cost of this measure?
  - a. Marian Goebes (TRC, Statewide CASE Team): We have not determined the cost yet but will in our analysis. We are only presenting the methodology for gathering cost information.
3. Bob Raymer (California Building Industry Association): Is this a proposed increase in stringency and cost for low-rise multifamily buildings?
  - a. Marian Goebes (TRC, Statewide CASE Team): Yes, there would be an increase in cost and an additional requirement, but only for climate zones where this measure is cost effective.
4. Gypsy Achong (2050 Partners): The other benefit of central ERV/HRV systems is the availability of more complex control systems e.g., economizer bypass, which may contribute to greater cost effectiveness.
5. Steve Mann (Home Energy Services): Wall penetrations with limited exterior surface square footage are also an additional per-unit barrier for ERV/HRV systems.
6. Bob Raymer (California Building Industry Association): I am concerned with this proposal to increase the stringency for low-rise multifamily since the Energy Commission agreed not to increase the stringency for low-rise multifamily and single family for 2023 in exchange for building industry support with the solar mandate taking effect in 2020. Will this be a mandate or compliance option? If this is a mandate, will this be offset by turning other mandates into compliance options? There are a lot of things you can do to add compliance options for low-rise multifamily and single family to address savings from moving compliance credits into the mandatory column from the last three updates. What is the Energy Commission's response to increasing the stringency of standards for low-rise multifamily?
  - a. Kelly Cunningham (PG&E, Statewide CASE Team): The Statewide CASE Team is aware of this issue, thank you for pointing this out. We do not want to invest in proposals that ultimately do not have a future of being adopted. Stringency is impacted for one of two options. Stringency is not affected for the compartmentalization option.
7. Bronwyn Barry (North American Passive House Network): We saw in the reach code study that in many climate zones where the HRV makes sense it offers the ability to eliminate other heating systems. That is my understanding of Steve Mann's analysis. It may appear to be a cost increase but could lead to net savings. It could be a net benefit and cost reduction. This is from the passive house study.

- a. Bob Raymer (California Building Industry Association): That is exactly the kind of response that I was hoping to get. We are looking for compliance credits to incentivize electrification for example. It is hard to eyeball early on and looked like an increase in stringency. We will try to calculate the entirety of the standard. If this is a net decrease in cost, we are certainly open to that and we will keep an open mind.
  - b. Bronwyn Barry (North American Passive House Network): I understand but it could make things easier and cost effective. I have seen it in other regions where they are including this in multifamily and the cost of code compliance is actually lower.
8. Darryl DeAngelis (Ebtron): What exhaust systems will be captured? Bathroom? Kitchen hood? Other recovery effectiveness is impacted by airflows.
  - a. Marian Goebes (TRC, Statewide CASE Team): We are looking at bathroom and kitchen, not dryers.
9. Mike Moore (Newport Ventures): Is the Statewide CASE Team planning to do an analysis with an unbalanced system as the reference system?
  - a. Marian Goebes (TRC, Statewide CASE Team): No, we are not because this is framed to go with balanced ventilation. We do have an unbalanced system with the draft analysis and can look to see if that is cost effective for any climate zones where projects are doing compartmentalization. Preliminary estimates show unbalanced systems have lower cost effectiveness.
10. Meg Waltner (Energy 350, Inc): Is this analysis using preliminary 2022 time-dependent valuation (TDV) of energy or 2019 TDV?
  - a. Marian Goebes (TRC, Statewide CASE Team): This preliminary analysis uses 2019 TDV.
11. Wayne Alldredge (VCA Green): Have you analyzed the cost between compartmentalization and balanced HRV installation?
  - a. Marian Goebes (TRC, Statewide CASE Team): We took a quick pass looking at an unbalanced system and compartmentalization. Our analysis finds that the compartmentalization path is less expensive, but it depends on factors like the length of ductwork and which HRV/ERV system.
12. Nick Brown (Build Smart Group): Do cost-effectiveness calculations for the 2022 code cycle use time-of-use electricity rates where applicable?
  - a. Elizabeth McCollum (TRC, Statewide CASE Team): Nick, we encourage you to attend the October 18th workshop being held by the Energy Commission to understand the 2022 metrics.
  - b. Kelly Cunningham (PG&E, Statewide CASE Team): The 2022 TDV is not available to us yet.
13. Mike Moore (Newport Ventures): Can we get more information on the agreement between Energy Commission and the building industry regarding proposals that introduce more stringency? Is there a published document that we can reference?
  - a. Kelly Cunningham (PG&E, Statewide CASE Team): Mike, I would encourage you to contact the Energy Commission directly on this topic.
  - b. Payam Bozorgchami (California Energy Commission): Currently there is not a document to reference. In the interim, it was described at the adoption hearing at the Energy Commission, I will check for actual documents.
  - c. Bob Raymer (California Building Industry Association): In the May 8 adoption transcript, Chairman Weisenmiller and Commissioner McAllister said that the 2023 update will focus on high-rise multifamily, nonresidential, and existing buildings. More recently, Commissioners Hochschild and McAllister said that the Energy Commission is heading in this direction. Low-rise multifamily and single family do not get a pass but



instead the Energy Commission is looking at compliance incentives for electrification. This was said at the recent Berkeley forum.

- d. Payam Bozorgchami (California Energy Commission): I will look into this and send materials to the Statewide CASE Team to share with this group. I did not know about low-rise multifamily, I knew about single family.

### 1.3.2 Submeasure B: Central Ventilation Shaft Sealing

1. Darryl DeAngelis (Ebtron): Bathroom, kitchen, and dryers are on demand items, so effectiveness will change depending on what exhaust systems are operating. Balanced ventilation is a misnomer. The multifamily building flow in and out can be under constant change if you are not measuring and controlling to achieve balance. Items like constant airflow regulators do not do this.
  - a. Marian Goebes (TRC, Statewide CASE Team): It is true that balanced based on Title 24, Part 6 is not going to stay balanced as soon as you turn on an intermittent exhaust. But for most of the day, the system would be balanced in terms of exhaust and supply flow rates.
2. Mike Hodgson (ConSol): How would a code official confirm that HERS rating is completed if there is no HERS registry for nonresidential buildings?
  - a. Marian Goebes (TRC, Statewide CASE Team): There are 2019 requirements for HERS Raters for new construction high-rise units requiring balancing or compartmentalization. Compartmentalization is a HERS verified measure.
  - b. Sally Blair (NORESO): Mike, current HERS registries do cover nonresidential HERS measures.
  - c. Payam Bozorgchami (California Energy Commission): That is correct.
  - d. Steve Mann (Home Energy Services): Current HERS registries cover some nonresidential measures.
3. Darryl DeAngelis (Ebtron): Bathroom, kitchen and dryers are on demand and will affect cost effectiveness.
4. Referring to the first poll, Figure 1 in *Poll Results*:
  - a. Steve Mann (Home Energy Services): It depends on cost and design.
  - b. Gina Rodda (Gabel Energy): It is often a mixture of the two depending on penetrations.
5. Iain Walker (Lawrence Berkeley National Laboratory): For field testing of shafts, it would be better to do a pressurization leakage test because the uncertainties when combining all those air inlet flows will be bigger than the leakage limit.
6. Chris Walker (CAL SMACNA): Why would the HERS Raters be doing this duct leakage testing instead of certified mechanical acceptance test technicians?
  - a. Kelly Cunningham (PG&E, Statewide CASE Team): The Statewide CASE Team will not make this determination, it will be considered by the Energy Commission. This will be determined later as the measure develops.
  - b. Payam Bozorgchami (California Energy Commission): The Energy Commission is still evaluating this issue.
7. Roger Hedrick (NORESO): The energy savings will only accrue if the fan size is increased to compensate for the leakage. This seems unlikely.

### 1.3.3 Submeasure C: Kitchen Range Hood Capture Efficiency (RHCE)

1. Mike Moore (Newport Ventures): Moving forward with a RHCE requirement is a great idea but only after there is an industry certification rating program (CRP) in place. Without a CRP in place, there is not enough specificity in ASTM E3087 testing variables (e.g., hood height, static

pressure associated with flow – realistic or theoretical) to ensure repeatable and reliable results across manufacturers. Additional issues include additional costs associated with testing that will need to be repeated once an industry CRP is finalized (ultimately passed to consumers), inability to draw comparisons across manufacturer ratings, gaming producing inflated results, and confusion in the marketplace with respect to expected performance.

- a. Kelly Cunningham (PG&E, Statewide CASE Team): Thanks for your comment Mike and Roger, we will follow up with you after this meeting.
  - b. **Action Item: Statewide CASE Team (Marian Goebes) will follow up with Roger and Mike Moore regarding RHCE.**
2. Stephen Gatz (Whirlpool): The draft language states that Capture Efficiency would be required for products exempted from exhausting air. ASTM 3087 is only applicable to products that exhaust air.
    - a. Kelly Cunningham (PG&E, Statewide CASE Team): The Statewide CASE Team will look into this.
    - b. **Action Item: Statewide CASE Team (Marian Goebes) to follow up with Stephen Gatz about Capture Efficiency and ASTM 3087.**
  3. Stephen Gatz (Whirlpool): There is also work under ASHRAE 62.2 to define the conditions under which Capture Efficiency should be measured. The current Home Ventilation Institute (HVI) rating do not represent an installed condition and therefore are not relevant in the field.
    - a. Marian Goebes (TRC, Statewide CASE Team): The language is intended to have an exception for alterations, meaning existing units. There is some work happening for ASHRAE 62.2 to define conditions under which capture efficiency would be measured. There is some progress in ASHRAE 62.2 and HVI, and we are working with both organizations to collaborate and welcome manufacturer feedback.
  4. Joe McLain (General Electric): In the proposed exception language, unvented installs are addressed, but the ASTM method cannot be used on unvented hoods.
  5. Stephen Gatz (Whirlpool): The last language in the 150.0 G says where kitchen range hood has a Capture Efficiency in accordance with ASTM 3087 for recirculating types, but they are specifically excluded.
    - a. Marian Goebes (TRC, Statewide CASE Team): Thanks for calling this out. We will check ASTM standard for its coverage of recirculating hoods. We will revise requirements for alterations, because ASTM does not cover recirculating hoods
    - b. Stephen Gatz (Whirlpool): Correct.
  6. Brett Singer (Lawrence Berkeley National Lab): Could this apply to range hoods or over the range microwaves that also exhaust?
    - a. David Springer (Frontier Energy, Statewide CASE Team): Yes, it would apply to combination microwave-range hoods.
  7. Mike More (Newport Ventures): Is the idea that a lower and higher flow rate RHCE would be required, or either/or?
    - a. Elizabeth McCollum (TRC, Statewide CASE Team): Either a lower or a higher flow rate RHCE would be required.
  8. Chris Walker (CAL SMACNA): Has there been any evaluation of indoor air quality (IAQ) impacts from a lower capture efficiency rate?
    - a. David Springer (Frontier Energy, Statewide CASE Team): The current thinking is there would be a dual requirement, the existing ASHRAE 62.2 standard and an additional capture efficiency (CE ) standard that could be established using a higher CFM.
    - b. Marian Goebes (TRC, Statewide CASE Team): LBNL has researched PM2.5 and NO<sup>2</sup> concentrations under different capture efficiencies. We are reviewing those IAQ impacts as part of our investigations.

- c. John Rose (Home Ventilating Institute): A CE rating is more about comparing products. Ratings are based on testing in a lab environment with a tracer gas, so it does not directly correlate to exposure. That said, the IAQ impacts related to cooking pollutants are well documented.

## 2. CASE Presentation II: Multifamily High Performance Envelope

1. Bob Raymer (California Building Industry Association): Regarding Wall U-Factor, I would recommend that you contact the State Fire Marshall and the Building Standards Commission regarding early adoption of ICC's Tall Wood Building provisions which will most likely take effect on 7/1/21 at the earliest and 1/1/23 at the latest.
  - a. Matt Christie (TRC, Statewide CASE Team): Thank you for your input, we will connect with the State Fire Marshall and the Building Standards Commission.
2. Thomas Culp (Birch Point Consulting): I am concerned with the terms "factory assembled" versus "site assembled" fenestration. How do you count unitized curtain wall? What about a 10 feet tall factory assembled window versus a 3 feet tall site assembled window? This causes problems in the 2004 IECC supplement, and other codes. Please let me know if you would like to learn more about that history.
  - a. Nehemiah Stone (Stone Energy Associates): I recommend talking to Selkowitz regarding LBNL's and NRFC's research and analysis on this topic.
  - b. **Action Item: Matt Christie (TRC, Statewide CASE Team) to follow up with Thomas Culp about assembled wall and windows and Selkowitz on LBNL and NRFC's research.**
3. Nehemiah Stone (Stone Energy Associates): There is a thermal bridging metric in "common use" by Passive House software.
  - a. Lucas Morton (Pete Moffat Construction): Indeed Nehemiah. Passive House uses THERM, developed by LBNL.
  - b. Lucas Morton (Pete Moffat Construction): For passive house projects, I have also used numbers of 'typical' thermal bridging values from a resource.
  - c. Abhijeet Pande (TRC, Statewide CASE Team): - We are reviewing the Passive House requirements for thermal bridging. We have data from our New York projects where we are actively working with Passive House NY on high-rise multifamily, however we would appreciate if you can send any additional resources to our team
4. Rahul Athalye (NORESCO): Is this data on compliance with U-factors for low-rise only?
  - a. Matt Christie (TRC, Statewide CASE Team): Yes, it is.
5. Steve Dubin (Sika USA): Exterior walls do not need to be overly "thick" to achieve needed U-factors. Some continuous insulations (CI) are R-5 in under 1" thickness- and meet NFPA 285 requirements when used with another approved components.
  - a. Matt Christie (TRC, Statewide CASE Team): While there are some great opportunities with high R-value insulating materials, materials are very expensive or only a bit thicker to get down to CIs of the .051 , which causes heart burn and code compliance issues.
  - b. Steve Dubin (Sika USA): I disagree- but you can save time and money in these types of buildings by removing unnecessary components like exterior gypsum (and still meet NFPA).However, UL is a different story.
6. Nick Brown (Build Smart Group): Matt, I would like to set up some time to discuss NFPA-285; you are correct that this is a challenge for adding CI to high-rise multifamily buildings
7. Nehemiah Stone (Stone Energy Associates): Abhijeet, you should also reach out to Nick Bagatelos in Rancho Cordova for both window U-factors and wall U-factors. Joe **Lstiburek** (Building Scient Corporation) also has good information on thermal bridging in multifamily.

8. Bronwyn Barry (North American Passive House Network): We have worked on lots of high-rise multifamily projects in New York and Vancouver. I do not know specifically which wall insulation is used but it is a rigid exterior. I could get you information on how to deal with that. Regarding thermal bridging protocol, we have a standard for how to do that, but we have found that proper training is key. We are excited about accounting for thermal bridging but consultants need to get up to speed on how to calculate it, specifically how to get the outputs and where to put them in the energy code. Please let me know if you would like any support. THERM is a great tool.
9. Nick Montanarelli (Rmax): There are some inexpensive foams boards that will meet NFPA and CI requirements that are less than a dollar a square foot, less than an inch thick, and available from a number of manufacturers.
  - a. Matt Christie (TRC, Statewide CASE Team): As people are pointing out, there are lots of newer materials/quality materials within an inch, which professionals agree are viable for facades that can get R-5, R-6.
10. Tom Phillips (Healthy Buildings Research): Regarding thermal bridging, can you incentivize infrared scanning to spot major problems during & after construction? Sam Rashkin at Department of Energy may be doing this for low E single family.
  - a. Abhijeet Pande (TRC, Statewide CASE Team): For thermal bridging we will be leveraging discussions at ASHRAE as well as work that a separate nonresidential CASE topic is doing. Verification during and after construction will be reviewed.
11. Soph Davenberry (National Energy Management Institute Committee): There should be a consideration for continuous thermal, air, vapor barriers for the building enclosure as a whole, and attention to transitions across building structures and trade/crafts doing the installation.
  - a. Abhijeet Pande (TRC, Statewide CASE Team): All of those are factors are being considered when determining the requirements g for thermal bridging and quality insulation installation. There is a need to address coordination.
12. Tom Phillips (Healthy Buildings Research): Regarding assumptions, what climate change impacts on weather files (average and extreme) are being considered?
  - a. Payam Bozorgchami (California Energy Commission): We have an Energy Commission workshop on October 18 where we will be talking about weather files and climate zone weather information. Meeting notice will be out 10 days prior to the workshop itself. The workshop will be on the weather files and the TDV values for 2022 and new metrics for compliance with the PV and carbon requirements.
13. Bruce Severance (Mitsubishi): Bill MacClay's "The New Net Zero" has numerous section drawings on external CI for various building types which the team may want to reference.
14. Bruce Severance (Mitsubishi): Cost effectiveness of 1 inch thick CI is questionable compared to blown Optima, which gets an actual R-23 in a 5.5 inch cavity, combined with a thinner exterior foam rainscreen like DC14(3/8 inch thick). This strategy reduces flashing costs and failures around openings and allows vapor drive release. Also, foam strips on inside of studs to create thermal break between studs and interior drywall is far easier in high-rise scenarios.
  - a. Steve Dubin (Sika USA): Bruce, you mention that CI cost versus. the method you described is questionable in regard to cost-effectiveness. I would like to see the comparisons of material and labor between the two options, this sounds interesting (exterior insulation is very common in commercial- should translate easily to mid-rise).
  - b. Matt Christie (TRC, Statewide CASE Team): Thank you and we will be looking into these.
  - c. Nick Montanarelli (Rmax): Bruce are you talking about Blow-in Blankets (BIBs)? It does not address CI with an isolated stud effectively. Also, the nail pops would cause a ton of concerns.

- d. Bruce Severance (Mitsubishi): Yes, Optima is a BIBs system but there are no nail pops because it is sticky, and when it is squeegeed into the wall cavity using the hose, it holds its shape perfectly so there is no problem installing the drywall, which is why I have used it on projects (no complaints from drywall crew or nail pops). I am suggesting Optima in combination with DC14, a continuous exterior foam rainscreen that is only 3/8 inch thick, cuts with a knife and avoids the flashing costs and failures. One can also add interior foam strips on interior of stud to provide an additional thermal break.
  - e. Bruce Severance (Mitsubishi): I have a cost trade-off analysis on various wall assemblies, rated R-value and cost effectiveness. Please feel free to reach out to me at [bseverance@hvac.me.com](mailto:bseverance@hvac.me.com).
  - f. Nick Montanarelli (Rmax): Bruce, how are you addressing air sealing?
  - g. Nick Montanarelli (Rmax): Thanks Bruce, I would be very interested in seeing this. My experience is with fiberglass so I see value in BIBs but also in exterior CI.
  - h. Bruce Severance (Mitsubishi): I believe Passive Haus air sealing standards are excessive. 2 ACH50 is more than adequate in all but coldest climates. . Please reach out to me, I can send you my air-sealing QC checklist.
  - i. Bruce Severance (Mitsubishi): We should be discussing the huge advantage of Phase Change Materials (PCM) drywall to reduce loads in multifamily because it allows for the addition of insulated thermal mass equivalent to 4 inch concrete that automatically absorbs excess BTUs and releases them at 72 degree setpoint, providing a temperature stabilization effect that allows significant downsizing of heat pump capacities. This material is extremely cost effective in mass production. I have data, perhaps the only project that is monitored in North America
  - j. **Action Item: Matt Christie (TRC, Statewide CASE Team) to follow up with Bruce Severance about data on CI.**
15. Nehemiah Stone (Stone Energy Associates): Matt, will the Energy Commission be talking about how the potential change to metrics (i.e., giving more relevance to GHG emissions) could impact the analyses on any of these measures?
- a. Matt Christie (TRC, Statewide CASE Team): This will be discussed at the Energy Commission workshop that Payam mentioned above, on October 18.
16. Bob Raymer (California Building Industry Association): I realize we are very early in the process, but do you have any estimate when we will start seeing some draft cost estimates.
- a. Matt Christie (TRC, Statewide CASE Team): We understand that cost is the critical element for your support and thank you for acknowledging that it is early. We are starting with reclassification due diligence. We do not not have information yet on cost data methodology.
17. Rahul Athalye: Will you consider east-facing fenestration area? It is equally important at least as far as heat gain is concerned, perhaps less impactful in terms of TDV.
- a. Matt Christie (TRC, Statewide CASE Team): This is currently not on my radar, but you are correct that it is relevant, but morning TDV multipliers are not as problematic. We do not intend to research or implement east facing limitations/recommendations.
18. Tom Phillips (Healthy Buildings Research): How was external shading addressed? It will have big benefits regarding peak energy, resilience, and climate adaptation.
- a. Matt Christie (TRC, Statewide CASE Team): None of our measures address this, currently there is a performance credit for permanently affixed shading, and it will continue to exist.
  - b. Tom Phillips (Healthy Buildings Research): This is a low hanging fruit that we should incentivize. Build in the hardware to add shading, the models show we will need more



- and more shading for the rest of the century. Daniel Curl from U of T is addressing thermal bridging.
- c. Matt Christie (TRC, Statewide CASE Team): There is a fairly good incentive for shading, 99 percent of buildings go through the performance method and take advantage of this.
  - d. Tom Phillips (Healthy Buildings Research): I have noticed some external shading going on around Davis, but it seems very mixed, I am not sure why.
19. Bronwyn Barry (North American Passive House Network): Is there somewhere where the slide deck will be posted?
- a. Alanna Torres (Energy Solutions, Statewide CASE Team): It is posted on the [title24stakeholders.com](http://title24stakeholders.com) website under Public Meetings.
20. David W Ware (Knauf Insulation): I may have missed it, but it is not clear how you would deal with mixed use buildings.
- a. Matt Christie (TRC, Statewide CASE Team): First floor will frequently have commercial spaces with some internal loads governed by nonresidential code. It is more confusing for envelope measures. Do we do the whole building, or do we split between commercial and residential? Bifurcation seems to be the direction we are going but looking for feedback on making that determination.
21. Tom Phillips (Healthy Buildings Research): Will IAQ experts from the California Air Resource Board (CARB) and California Department of Health (CDPH) be involved?
- a. Chris Walker (CAL SMACNA): I agree with Tom Phillips in wanting IAQ experts to be included in these discussions. Also, there is a need for proper ventilation and CO<sup>2</sup> monitoring with DCV increases as building envelopes tighten.
  - b. Elizabeth McCollum (TRC, Statewide CASE Team): The CASE Team will engage CARB and CDPH.

## Poll Results

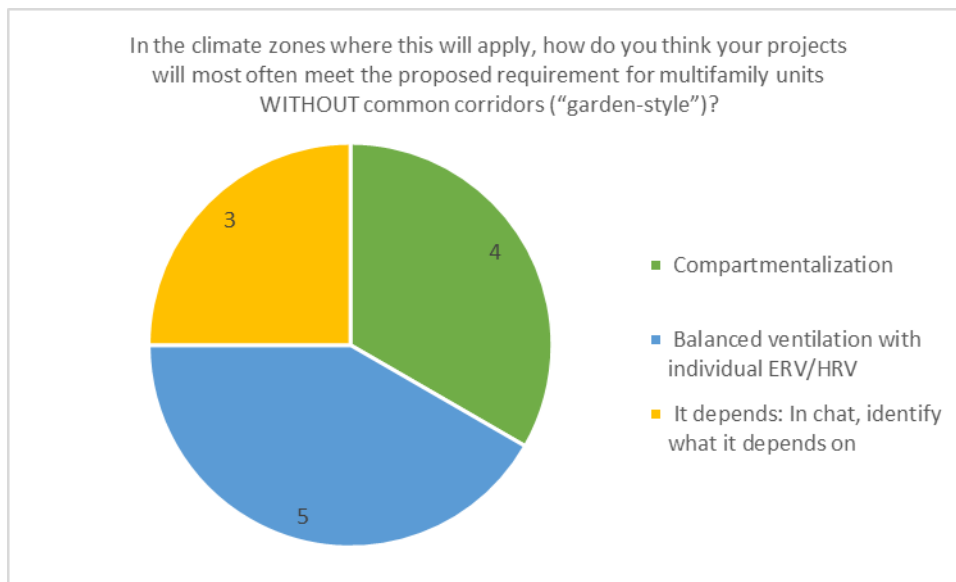


Figure 1: Results of Poll 1, Multiple Choice/Single Answer

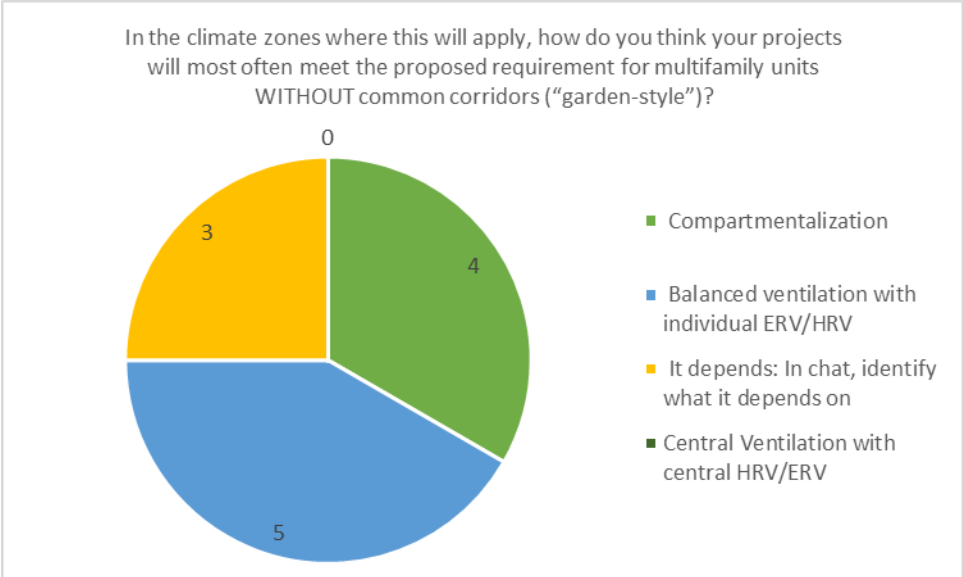


Figure 2: Results of Poll 2, Multiple Choices/Single Answer

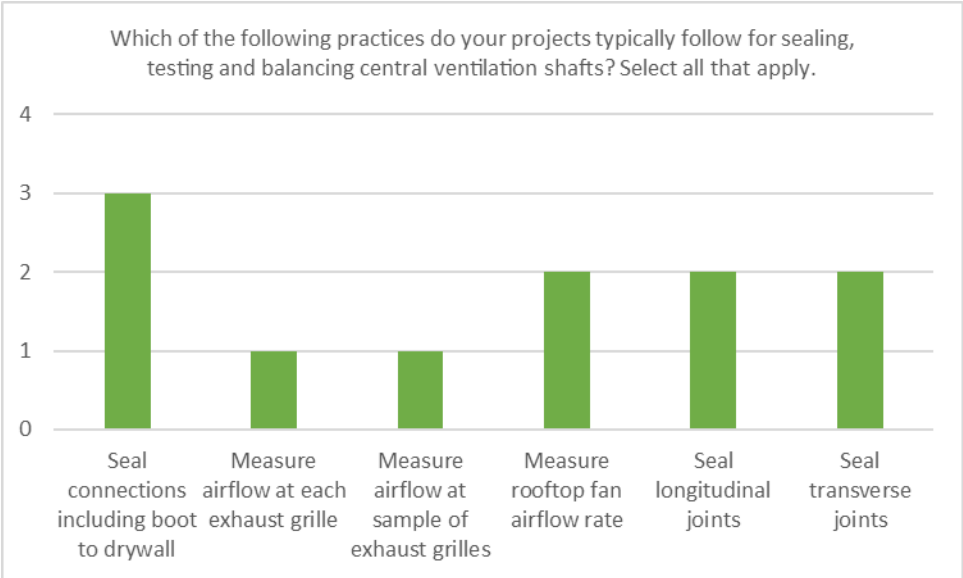


Figure 3: Results of Poll 3, Multiple Choice/All That Apply

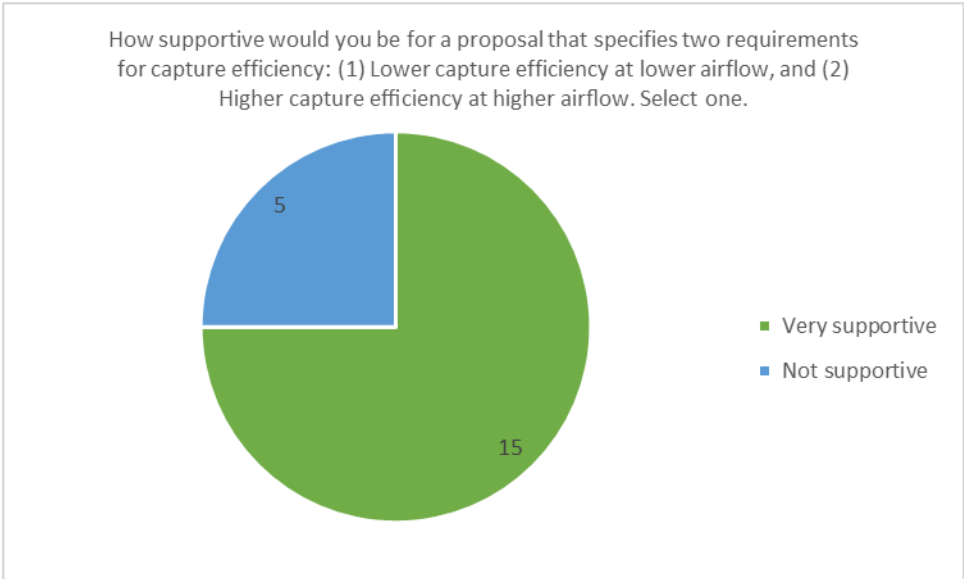


Figure 4: Results of Poll 4, Multiple Choice/Single Answer

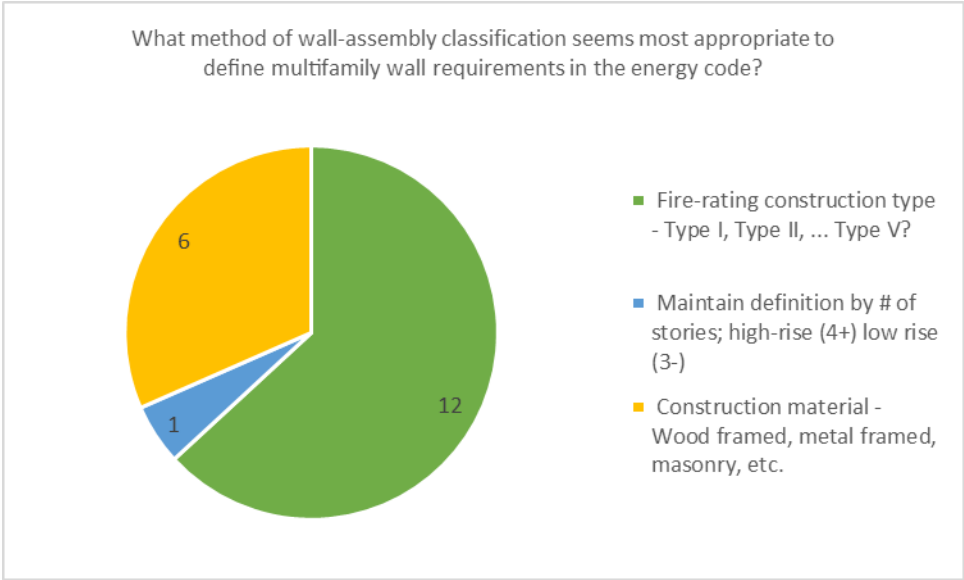


Figure 5: Results of Poll 5, Multiple Choice/Single Answer