Meeting Notes

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

Single Family Whole Building

Posted March 13, 2020

Meeting Information

Meeting Date: March 5, 2020

Meeting Time: 8:30am – 10:30am PST

Location: Adobe Connect webinar (sign-up at title24stakeholders.com/events)

Meeting Host: California Statewide Utility Codes and Standards Team

Meeting Agenda

Start Time	Topic	Presenter
10 minutes prior to call	*Live Attendee Poll*	
8:30 am	Meeting Guidelines	Statewide CASE Team
8:35 am	Opening Remarks from the California Energy Commission	Energy Commission
8:40 am	Overview and Welcome	Statewide Utility Codes and Standards Representative
8:45 am	CASE Presentation: Energy Savings and Process Improvements for Alterations and Additions	Alea German & Bill Dakin (Frontier Energy)
10:15 am	Wrap Up & Closing	Statewide CASE Team

Meeting Attendees

Statewide Utility Codes and Standards Team – Utility Staff:

First Name	Last Name	Email	Affiliation
Miguel	Malabanan	miguel.malabanan@ladwp.com	Los Angeles Department of Water and Power
Jeremiah	Valera	jeremiah.valera@ladwp.com	Los Angeles Department of Water and Power
Kelly	Cunningham	KACV@pge.com	Pacific Gas and Electric
Mark	Alatorre	M6AC@pge.com	Pacific Gas and Electric
John	Barbour	JBarbour@semprautilities.com	San Diego Gas and Electric

Codes and Standards Enhancement (CASE) Team Members:

First Name	Last Name	Email	Affiliation
Alanna	Torres	atorres@energy-solution.com	Energy Solutions
Marisa	Lee	mlee@energy-solution.com	Energy Solutions
Marissa	Lerner	mlerner@energy-solution.com	Energy Solutions
Benny	Zank	bzank@energy-solution.com	Energy Solutions
Heidi	Werner	hwerner@energy-solution.com	Energy Solutions
Alea	German	agerman@frontierenergy.com	Frontier Energy
Bill	Dakin	bdakin@frontierenergy.com	Frontier Energy
Ben	White	bwhite@frontierenergy.com	Frontier Energy
Elizabeth	McCollum	emccollum@trcsolutions.com	TRC
Jon	McHugh	jon@mchughenergy.com	McHugh Energy

California Energy Commission:

First Name	Last Name	Email
Andrew	Kosydar	akosydar@cbia.org
Ronald	Balneg	ronald.balneg@energy.ca.gov
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Michael	Shewmaker	michael.shewmaker@energy.ca.gov

Stakeholder Attendees:

First Name	Last Name	Affiliation
Rebecca	Everman	3M
Randall	Cooper	AHAM
Laura	Petrillo-Groh	AHRI
Shannon	Corcoran	Air-Conditioning, Heating and Refrigeration Institute (AHRI)
Chandra	Apperson	Apperson Energy
William	Callahan	Associated Roofing Contractors of the Bay Area Counties
Judy	Roberson	CA Energy Commission
Allen	Wong	CA Energy Commission
Jeremy	Wikstrom	CalCERTS
Jim	Hodgson	California Energy Registry
Luke	Nolan	Central Coating Company, Inc.
Roy	Eads	College of the Desert
Tom	Paine	ConSol

Sarah	Schneider	Cool Roof Rating Council
Farhang	Beik	DNV GL Energy Services USA, Inc.
Ken	Nittler	Enercomp, Inc.
Meg	Waltner	Energy 350
Haile	Bucaneg	Energy Commission
Tiffany	Mateo	Energy Commission
George	Nesbitt	Environmental Design/Build
Robert	Glass	Goodman Mfg Co,
William	Liu	IKO Industries Ltd
Chadwick	Collins	Kellen Company
Michael	Jouaneh	Lutron Electronics Co., Inc.
Jon	Mchugh	MEC
Bruce	Severance	Mitsubishi Electric
Rahul	Athalye	NORESCO
Erica	Dilello	Noresco
Sid	Dinwiddie	PABCO ROOFING PRODUCTS
Laurie	Jallo	PABCO ROOFING PRODUCTS
Anna	Larue	Resource Refocus LLC
Vrushali	Mendon	Resource Refocus LLC
Joe	Boros	Rheem Manufacturing Company
Chandra	Gollapudi	Samsung
Joseph	Briscar	SMXB
Tom	Martin	state of CA
Adam	Chrisman	SunEarth, Inc.
William	Leblanc	Systemair Inc.
Brendan	Mcgovern	Trane
Curt	Yaeger	Yaeger Services, Inc.

Meeting Resources

- Agenda
- Presentation
- Submeasure Summary - Single Family Additions and Alterations

Meeting Notes

1.1 CASE Presentation I: Energy Savings & Process Improvements for Alterations and Additions

1.1.1 Roof Replacements (Alea German, Statewide CASE Team)

1. William Callahan (ARCBAC): You might want to talk to Marcus Dodson at Western Roofing Magazine. They do an annual survey of roofing market conditions. They may

have some insight into residential roof replacement rates in California. His phone number is 775-333-1080.

2. Chadwick Collins (Kellen Company): I am curious what these savings for the roof replacement proposals are in terms of percent of annual usage.
    a. Bill Dakin (Statewide CASE Team): Chadwick, I do not have an answer right now, but we have this information. It differs depending on the climate zone.
3. Chadwick Collins (Kellen Company): The lifespan for built up roofing (BUR) at 15 years feels a bit low.
    a. Alea German (Statewide CASE Team): We found a very wide range in lifespan depending on the grade of the material and tried to capture and average
    b. Payam Bozorgchami (Energy Commission): Chadwick, what do you recommend for lifespan?
    c. Chadwick Collins (Kellen Company): Personally, I have been on some BUR's older than me (39). To your point, the installation really impacts the longevity of the system. I would think most would expect 20 or 25 years.
4. Chandra Apperson (Apperson Energy): Does that above roof deck insulation cost include cool roof costs or is that additional?
    a. Alea German (Statewide CASE Team): The low slope roof insulation costs does not include the cool roof costs. We are assuming that the insulation would not need to be replaced when the roof is replaced.
5. Chadwick Collins (Kellen Company): Many low slope roof materials are sourced from roofing supply companies, not big box stores, so I would be concerned with the costs for the low slope side.
    a. Alea German (Statewide CASE Team): Chadwick, are you referring to cool roof costs? Most of the big box store costs that we obtained are primarily for steep slope roofs. We have a number of data points and have one directly from a roofing contractor. Maybe we can talk offline about the lifespan of roofs.
6. Bruce Severance (Mitsubishi Electric): I have heard the cool roof costs are nearly the same as standard product and verified this with a local supplier for one product line recently.
    a. Bill Dakin (Statewide CASE Team): Bruce, that is truer for cool roof tile products. To be conservative, we looked at incremental costs for asphalt shingles with steep-slope roofs.
7. Tom Paine (ConSol): For those costs, what is the proportionate impact on the total cost of a roof replacement? Measures that have a significant impact on total cost will significantly deter roof replacements in total.
8. Meg Waltner (Energy 350): Did you evaluate the definition of low versus steep slope roofs when looking at above deck insulation or consider above deck insulation for roofs steeper than 2:12?
    a. Bill Dakin (Statewide CASE Team): Meg, we did evaluate above deck insulation with steep slope roofs and covered that in the first stakeholder meeting. There are a lot more complications so did not include as a requirement.

9. Bruce Severance (Mitsubishi Electric): The cost of roof insulation at $2/square foot +$1.30 labor seems accurate. On a 1665 square foot home the roof will be about 1850 square foot, so the additional cost to the consumer is $6,100 over just a roof replacement. However, this does not account for secondary roof decking and fascia modification if required, for example for remounting solar systems. These costs seem categorically higher than increasing attic insulation to R-60, which has an incremental cost of about $.50/square foot or $800 on a typical 1600 square foot home. Above roof deck insulation should only be required in high cooling load climates and only over vaulted ceilings and scissor trusses.
10. Chadwick Collins (Kellen Company): I know we are moving on, but did I hear correctly that the pricing for low slope came from one source – a contractor? One bad data point can skew results.
    a. Alea German (Statewide CASE Team): Our pricing came from more than one source, but we verified it with one contractor.
11. George Nesbitt (Environmental Design/Build): Only existing measures that reduce the attic temperature should be exempted, so remove R-38 attic insulation as an exception.
    a. Alea German (Statewide CASE Team): George, I understand you are saying that the cool roof is impacting the attic space and that zone. We see an equivalent energy savings with R-38 and so we are keeping it.
    b. Chadwick Collins (Kellen Company): George, but the energy cost is going to condition the space beneath the insulation.
    c. George Nesbitt (Environmental Design/Build): There are non-building reasons for cool roofing, i.e. heat island.
12. Luke Nolan (Central Coating Company, Inc.): These exceptions for insulation in roof replacements will exempt nearly all roof replacements from the insulation requirement.
    a. Alea German (Statewide CASE Team): Is your feedback that a lot of roofs would be able to claim these exceptions in one form or another?
    b. Luke Nolan (Central Coating Company, Inc.): That is correct, most my work has been on the nonresidential side, but it would apply on the residential side as well. Most projects can meet these exceptions in one way or another and would not need to add insulation.
    c. Alea German (Statewide CASE Team): We would like to maintain exceptions where conditions are cost prohibitive, but we would want to have it apply otherwise.
    d. Tom Paine (ConSol): I might want to see an exception based on total cost, if the measures double that of the replacement, or something along those lines.
    e. Alea German (Statewide CASE Team): Tom, that is an interesting idea.
    f. William Callahan (ARCBAC): I disagree with Mr. Nolan. The exceptions provide necessary flexibility because existing roofs are not blank slates.
    g. Luke Nolan (Central Coating Company, Inc.): I agree completely that roofs are not blank slates. However, it is usually possible to install some above insulation during a roof replacement. The broad exceptions provide a wide loophole.

h. George Nesbitt (Environmental Design/Build): Sometimes roof replacement is the best time for insulation.

13. William Callahan (ARCBAC): It would be nice to get building departments to perform inspections, but this is probably a pipe dream. In a conference call last week, Jon McHugh floated the idea of changing the California Building Code to require new curbs to be installed when HVAC units are changed out. Electrical permits are required and building departments do inspect these projects. Over a reasonable period of time, many more roofs would fall outside the exception and be "insulation ready".

1.1.2 Attic Insulation (Alea German, Statewide CASE Team)

14. Sid Dinwiddie (Pabco Roofing Products): Clarification – is this referring to air sealing for ducts or air sealing for attics?

    a. Alea German (Statewide CASE Team): This refers to air sealing of the attic space.

15. George Nesbitt (Environmental Design/Build): Large (walkable) attics are separate, but for some low slope attics, flat roofs, rafter roofs, roofing insulation is the best.

    a. Bill Dakin (Statewide CASE Team): George, we have roof insulation requirement for low-slope roofs. This only applies to steep-slope vented attics

    b. George Nesbitt (Environmental Design/Build): Some attics have no access.

16. Tom Paine (ConSol): For cost effectiveness, 1.1-1.2 is a low ratio and a 5-10-year simple payback is a long time.

17. George Nesbitt (Environmental Design/Build): Not all insulation needs to be removed to air seal an attic.

    a. Alea German (Statewide CASE Team): George, you are right that insulation could be moved around to perform the air sealing and not thrown away. To be conservative, we assumed it was thrown away.

    b. George Nesbitt (Environmental Design/Build): If it's blown in insulation you can move it and blow more over (or mix in with)

    c. Bill Dakin (Statewide CASE Team): George, to be conservative, we assumed labor to remove and reinstall insulation. Frequently, existing insulation is not in good condition

18. Bruce Severance (Mitsubishi Electric): There are always electrical repairs in attics. Every project has $200-$400 in electrical work.

    a. Alea German (Statewide CASE Team): Are you saying that this would be identified within the scope of work that would need to be addressed?

    b. Bruce Severance (Mitsubishi Electric): The California Building Code does not allow you to bury open electrical.

    c. Alea German (Statewide CASE Team): There are ancillary effects with the insulation replacement that will need to be considered.

    d. Bruce Severance (Mitsubishi Electric): Knob and tube wiring is also a barrier.

    e. Bill Dakin (Statewide CASE Team): Knob and tube and asbestos ducts are in the exemptions.

f. George Nesbitt (Environmental Design/Build): You can insulate over knob and tube; it just needs to be certified safe. You are not supposed to bury junction boxes.

19. Sid Dinwiddie (Pabco Roofing Products): One of the main challenges is verification.
20. Bruce Severance (Mitsubishi Electric): It is important to note that 2/3 of leakage in the attic occurs at the drywall to top plate joint. I tested this on a number of homes.
21. Chadwick Collins (Kellen Company): Are there any concerns about making sure any options pursed for air sealing does not negatively impact ventilation of the attic (intake at the eave, ventilation path under deck to exhaust) - just a concern of unintended consequences.
    a. Bill Dakin (Statewide CASE Team): Chadwick, good point. thanks for the input.
22. Tom Paine (ConSol): Air sealing is hard to value without blower door tests.
23. Tom Paine (ConSol): We need to find a way to incentivize these measures, without that I worry a lot about the impact to consumers and compliance.
24. Bruce Severance (Mitsubishi Electric): The work should be linked to HVAC replacement so the systems can be modeled and sized to meet the projected load after upgrades. Every home should have deeply buried ducts, which saves double the energy of high insulation alone.
    a. Bill Dakin (Statewide CASE Team): Bruce, the current proposal is tied to HVAC replacement.
25. Bruce Severance (Mitsubishi Electric): Attic ventilation needs to be an element to the whole house approach, but not with excessive depressurization of the attic.
26. George Nesbitt (Environmental Design/Build): Most of us would upgrade R-19 existing insulation.

1.1.3 Electric Equipment Replacement (Bill Dakin, Statewide CASE Team)

27. Adam Chrisman (SunEarth, Inc.): Can a resistance heater be used when combined with solar water heating systems?
    a. Alea German (Statewide CASE Team): Adam, yes it can. There is an exception for this.
28. George Nesbitt (Environmental Design/Build): I cannot imagine there are any electric resistance ducted heaters in CA.
    a. Alea German (Statewide CASE Team): George, there are not many, but there are some in older homes.
29. Meg Waltner (Energy 350): $920 incremental cost for Heat Pump Water Heater (HPWH) equipment seems a little high.
    a. Alea German (Statewide CASE Team): Meg, thanks. Let's talk more offline about this. If you have any resources, we would like to hear about it
    b. Tom Paine (ConSol): Meg, for resistance heaters to heat pump? If anything, I think that value might be low.

c. Alea German (Statewide CASE Team): Tom, is a total incremental cost of $2k for electric resistance storage to HPWH low do you think?

d. Tom Paine (ConSol): Probably, we mostly deal with new construction, so I'm not as clear on the labor component.

1.1.4 Duct Measures (Bill Dakin, Statewide CASE Team)

30. George Nesbitt (Environmental Design/Build): I can get most existing duct systems to below 6 percent (design). Most existing systems have less than 350cfm/ton, so it would be harder to hit a target.

    a. Bill Dakin (Statewide CASE Team): We did hear from a lot people where systems are now in terms of leakage. What we are seeing for cost effectiveness is the benefit to cost ratio is greater than six in 11 of the 16 climate zones. It would still be cost effective at $1000 for the incremental cost.

    b. Alea German (Statewide CASE Team): George, can you hit 6 percent in 2-story homes as well?

    c. George Nesbitt (Environmental Design/Build): It is around 4-6 hours to do a complete (6 percent) seal job.

    d. Alea German (Statewide CASE Team): George, we will follow up with you to get some further data on your experiences. Thank you.

    e. George Nesbitt (Environmental Design/Build): My hours are not for a change out, but fully existing system.

31. Chandra Apperson (Apperson Energy): I think $400-450 for duct sealing is more realistic.

    a. Alea German (Statewide CASE Team): Chandra, is that for the total project or additional labor to go from 15 percent to 10 percent?

    b. Chandra Apperson (Apperson Energy): Labor cost for sealing to 10 percent or less depending on the project.

    c. Alea German (Statewide CASE Team): Chandra, Thanks. One more follow-up: Is the $400-450 going from whatever the starting point is (>15 percent) to 10 percent?

    d. Chandra Apperson (Apperson Energy): Yes, whatever the starting point to 10 percent.

32. Bruce Severance (Mitsubishi Electric): 2 hours of labor seems low given the variability of conditions. The average duct leakage figure I have seen cited is 30 percent in California. The incremental cost of getting to 10 percent rather than15 percent is incrementally higher – last leaks are more difficult than the low-hanging fruit.

    a. Alea German (Statewide CASE Team): Bruce, good point about the last leaks and challenges.

33. George Nesbitt (Environmental Design/Build): A rare system that I could not get to 6 percent was 2-story with ducts in walls/floor and flex aluminum.

34. Bruce Severance (Mitsubishi Electric): Fixing duct leakage is perhaps the biggest return on investment of any upgrade measure. It makes sense to require <10 percent even if it takes 6-10 hours.

35. Bruce Severance (Mitsubishi Electric): Smoke testing can be challenging. Once the attic fills with smoke it is hard to see where the leaks are emanating from. It is best to fix all joints, especially replacing old, pre-UL181 tapes before conducting smoke test. Given the widespread failures of these tapes (see Anything but Duct Tape-Lawrence Berkeley National Lab) it makes sense to require pre-UL181 joints to be redone regardless.
    a. Alea German (Statewide CASE Team): Bruce, do you have any thoughts if there should be improvements to the code language on how and when smoke tests are performed?
    b. George Nesbitt (Environmental Design/Build): I agree smoke testing is hard, but if you can't see, then there is more sealing to be done

1.1.5 Compliance Options (Bill Dakin, Statewide CASE Team)

36. Bruce Severance (Mitsubishi Electric): It makes sense to use vintage tables for ACH. >10ACH50 is typical of raised foundations with diagonal subfloor (pre-1970) and this condition is distinct, and often hard to access.
37. Bruce Severance (Mitsubishi Electric): Alea and Bill, I will send some comments following the call.
38. Bruce Severance (Mitsubishi Electric): Fireplaces commonly leak 200-600cfm at 50pa. It is very cost effective to block them off, but standard sign posting “not to use fireplace” should be required.
    a. Alea German (Statewide CASE Team): Bruce, the credit would require that the fireplace be completely removed.
    b. Bill Dakin (Statewide CASE Team): Our proposal is that this be done when a fireplace is actually removed, so elimination of the chimney and any other leakage paths being sealed. But if you have test data (we have data from 11 test homes from the installation quality assessment) we could see how it aligns.
39. George Nesbitt (Environmental Design/Build): QII should have always applied to alterations (altered assembly only).
40. George Nesbitt (Environmental Design/Build): Floors and ceilings should perform as a new assembly.
    a. George Nesbitt (Environmental Design/Build): When you are in an existing home and you insulate a floor that has a crawl space, the general installation of that floor is comparable to a new home. It is true that the tub connections can be a problem but in terms of the ability to install the insulation in a quality manner is the same as new construction and same goes for an attic. You have the same framing, there is really no difference. For walls, the insulated header requirement is a new one, but other than that, if you have an open wall you can do a similar amount of air sealing.
    b. Bill Dakin (Statewide CASE Team): I agree with you. From a performance standpoint, if you are pulling insulation and performing air sealing you can get to most of those areas.
    c. George Nesbitt (Environmental Design/Build): When you have a low enough sloped roof it can be difficult to the top plate or the eaves. Maybe you cannot get 100 percent, but it is not clear that you are getting all the way with new

construction either. Perhaps there needs to be a way for the HERS Rater to determine if conditions are up to 100 percent or a derating is required.

d. Bill Dakin (Statewide CASE Team): We are proposing that most of these issues are addressed and derating is reduced to 80 percent.

1.1.6 Open Comment Period

41. Bruce Severance (Mitsubishi Electric): Cost effectiveness of blown R-60 even in milder climates should be evaluated. I have data on standard modeled CBECC models relative to cost which I will share.

42. Tom Paine (ConSol): Generally, I worry about any proposed measure with a cost benefit below 1.2, especially for measures in the thousands of dollars

43. Alea German (Statewide CASE Team): One thing that we have tried to do is balance the assumptions in our existing home case to balance where these requirements are applied and not apply where it is not cost effective. We have looked at situations for very inefficient homes where everything is very cost effective. It is hard to write requirements that account for all different situations, so we based our cost effectiveness on homes from the 1990s that are more efficient to strike a middle ground. If there is feedback on our assumptions, we would welcome that. The hope is that we have made enough conservative assumptions relative to the existing conditions that we can move forward.

44. Bruce Severance (Mitsubishi Electric): The primary loss through diagonal subfloor is air leakage. If the 3' clearance is there, urethane can be safely blown and 1/2" will air seal. It is better to stop the leaks low, and over insulate high in most climate zones and this is often overlooked. On energy upgrades, I am most concerned about actual energy savings and ROI for the client.

    a. Bruce Severance (Mitsubishi Electric): In my experience air sealing the attic is really beneficial, especially compared to spray foam. There are a lot of houses that only have a foot or less below the subfloor and there is not the necessary space to apply spray foam safely. There are also a lot of variable conditions in the attics that should be considered and discussed. Many of these can add costs to the job that were not originally considered. It is very challenging to have an exact figure. So many homes are under ventilated and adding a $200 solar attic fan tends to be a lot less expensive than soffit vents. It is really important to build in exceptions to make this cost effective given the conditions that can be encountered, and I know that is difficult. Do we have finance and incentive programs that can help consumers?

45. Bruce Severance (Mitsubishi Electric): In regard to above deck roof insulation, I have run numbers on that and really the only situation where I would impose that on the consumer is if you have vaulted ceilings where you cannot put insulation in the attic. It is 10 times more expensive to put insulation above the roof deck than blowing in R-60 insulation in the attic. It is only $0.50 more per square foot compared to R-38.

46. George Nesbitt (Environmental Design/Build): For alterations, HERS verified existing conditions should be a requirement, not just everything that is altered. You can go in and say where the area is not accessible and identify big things regarding accessibility. This is especially for QII. Attics are harder to air seal than crawl spaces. I have never bothered to air seal diagonal cross sheathing. Attics have a lot more penetrations from wiring and plumbing and dropped ceilings and chases.

Poll Results

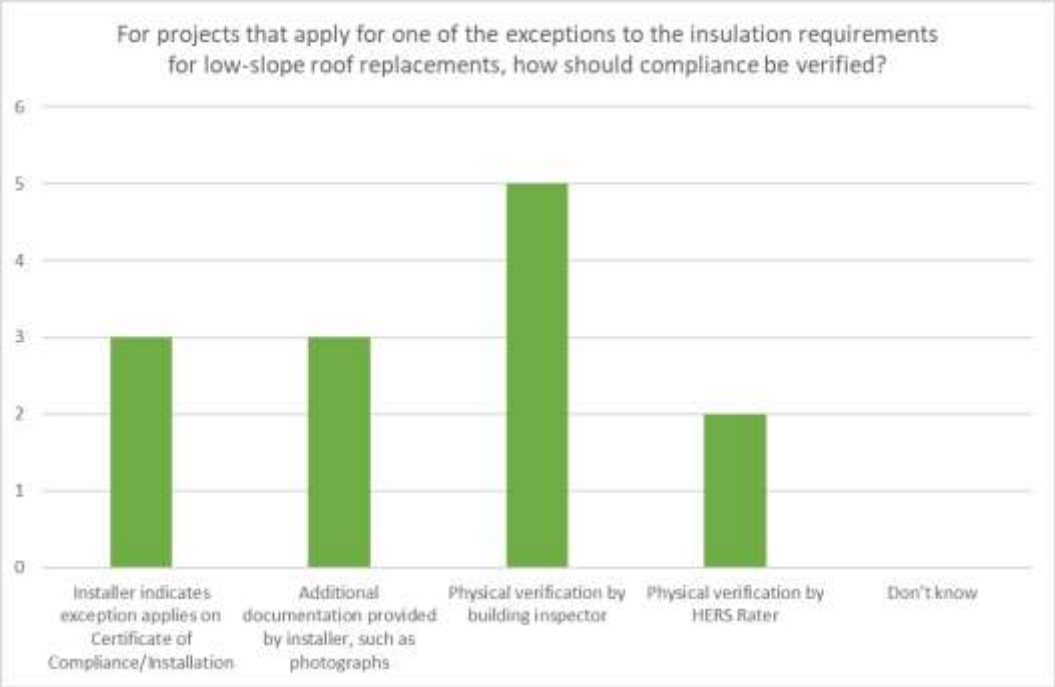

Figure 1: Results of Poll 1, Multiple Choice/Choose One.

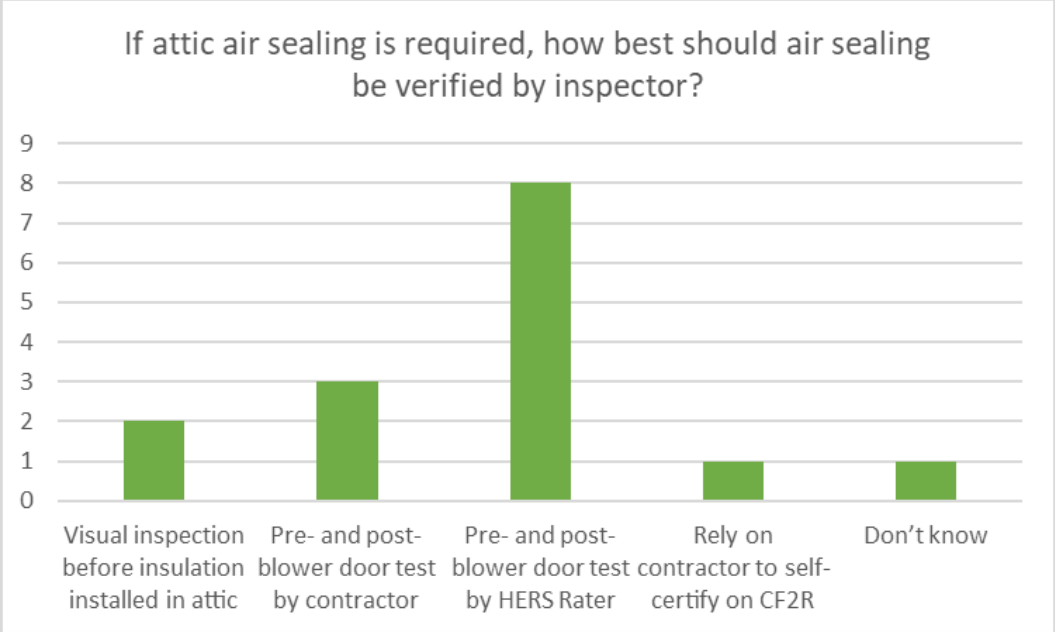

Figure 2: Results of Poll 2, Multiple Choice/Choose One.

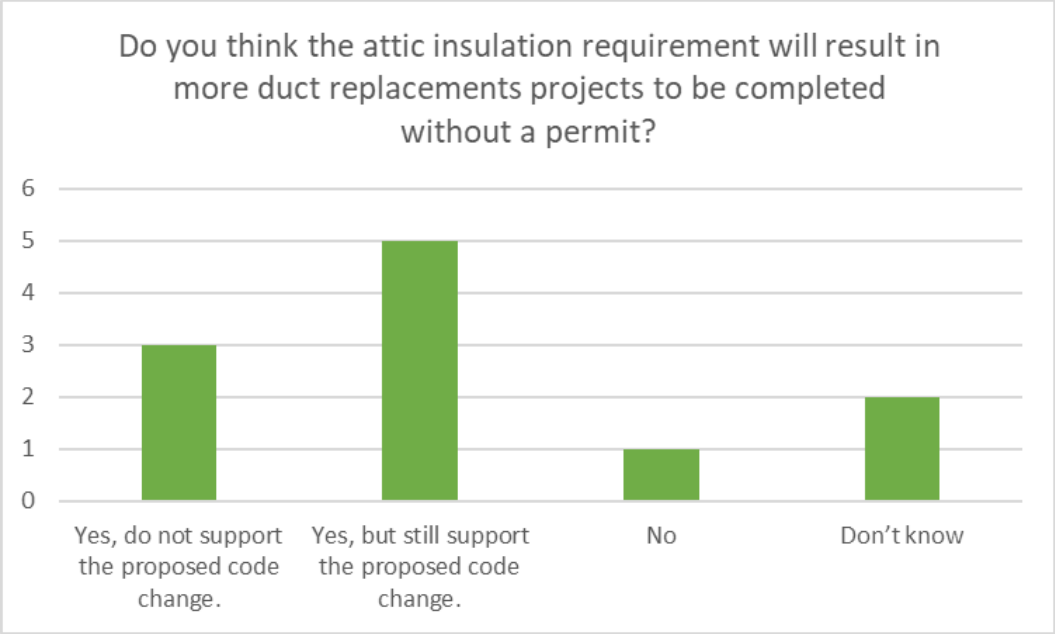

Figure 3: Results of Poll 3, Multiple Choice/Choose One.

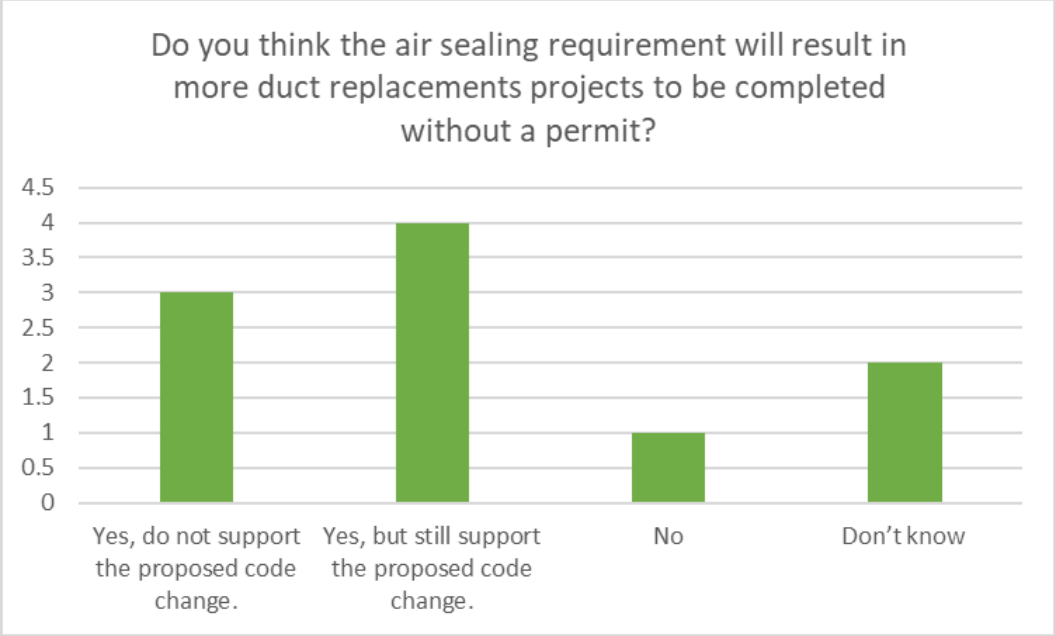

Figure 4: Results of Poll 4, Multiple Choice/Choose One.

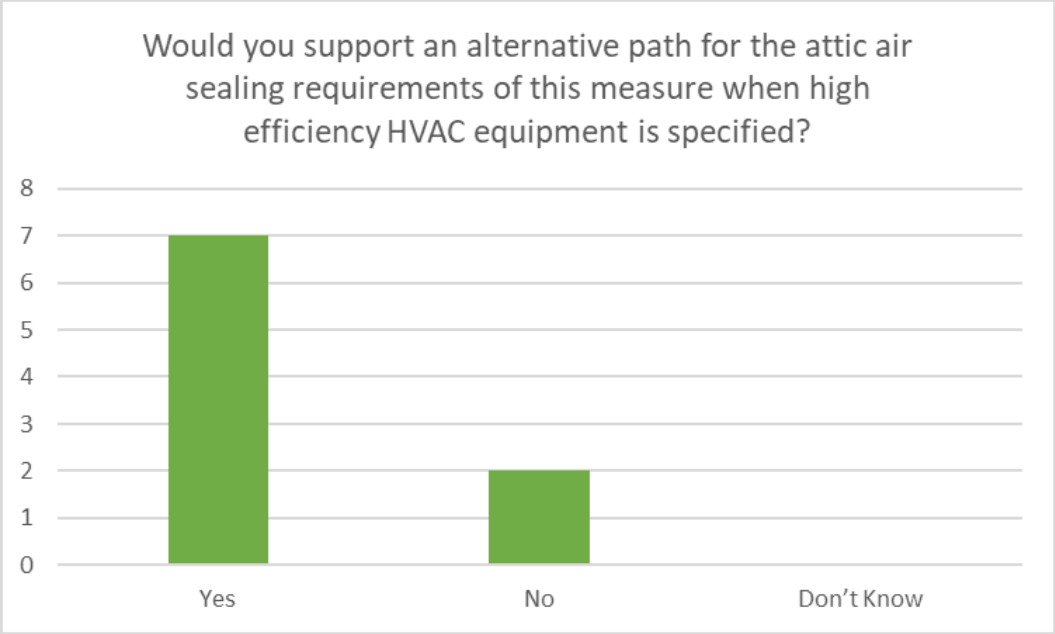

Figure 5: Results of Poll 5, Multiple Choice/Choose One.

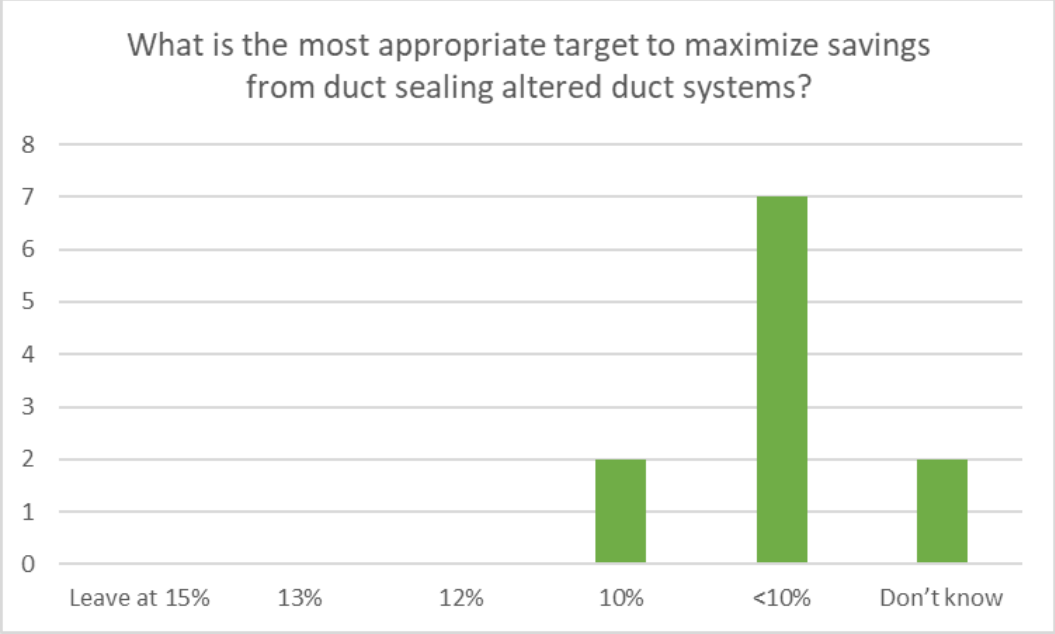

Figure 6: Results of Poll 6, Multiple Choice/Choose One.

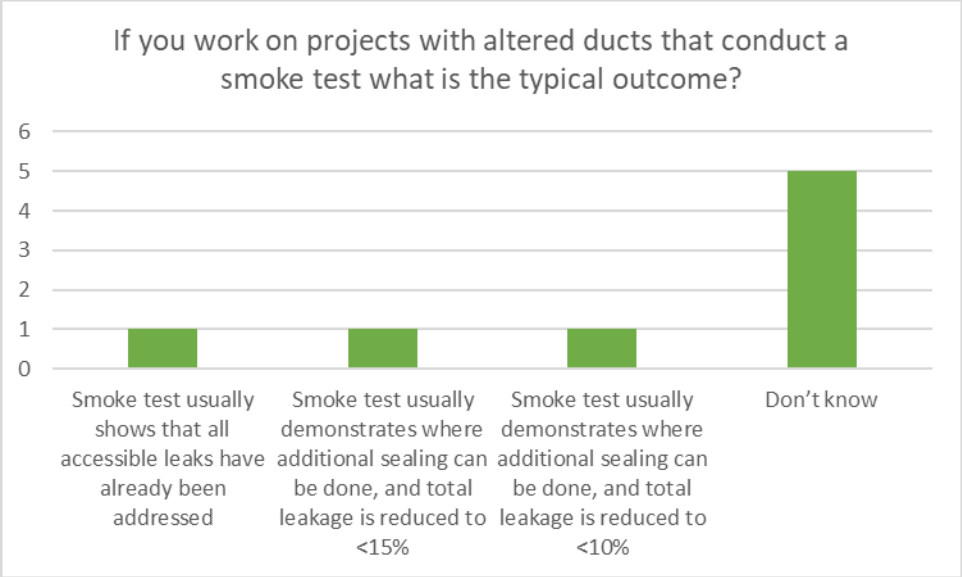

Figure 7: Results of Poll 7, Multiple Choice/Choose One.