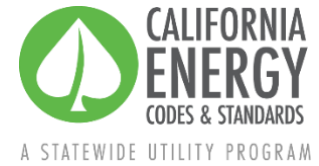


# Meeting Notes: April 21, 2026

Posted May 5, 2026



These notes summarize the content from the 2028 Title 24, Part 6 Code Cycle Utility-Sponsored Stakeholder Meeting on **HVAC**

If you are interested in providing input on any of the topics covered in this meeting, please email your comments to [info@title24stakeholders.com](mailto:info@title24stakeholders.com) by **May 19, 2026**. Comments received after then may not be incorporated into the final version of the CASE Report.

## Quick Links

- [Key Points from Meeting](#) – Read through highlights from each measure and review feedback requested from stakeholders.
- [In-Meeting Questions / Comments](#) – Navigate directly to questions asked during the meeting and responses from CASE Authors
- [Zoom Polls & Responses](#) – Review the Poll Questions asked during the meeting and see the responses from stakeholders.
- [Meeting Materials](#) (available on Title24Stakeholders.com) – Review slides, measure summaries, proposed code language and more on our website.

## Meeting Information

**Meeting Date:** 4/21/2026

**Meeting Time:** 2:00 – 4:30

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

## Meeting Agenda

Time	Topic	Presenter
2:00	Intro	Cosimina Panetti, Payam Bozorgchami/Kelly Cunningham
2:15	Modulating DOAS	Jeff Stein
3:00	Reducing Max Airflow During Deadband Operation for VAV	John Blade
3:45	HVAC FDD	Chris Battisti
4:30	Adjourn	

## Members of the CASE Team

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### 1.1.2 Statewide Utility Codes and Standards Team – Codes and Standards Enhancement (CASE) Team Members

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### California Energy Commission

#### Contact for 2028 Code Cycle:

Any questions for the CEC can be sent to: [EnergyCodeUpdateInquiries@energy.ca.gov](mailto:EnergyCodeUpdateInquiries@energy.ca.gov)

#### CEC Docket

Comments on the 2028 Energy Code update can be formally submitted to the docket: <https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=25-BSTD-03>

### Key Points from Meeting

The purpose and benefits of each measure presented at this meeting are noted below. Specific topics we are looking for feedback on are highlighted.

To provide input, email the CASE Authors noted above or send to [info@title24stakeholders.com](mailto:info@title24stakeholders.com).

## Topic 1 Modulating DOAS

- **Purpose:** This proposed measure seeks to establish mandatory and prescriptive requirements for modulating DOAS in non-residential new construction and additions and alterations, aligning with national best practices.
- **Benefits:** The proposed recommendations will reduce the fan energy at part load, improve indoor air quality, eliminate or reduce recooling energy of warm ventilation air when the majority of the zones call for cooling, and reduce ventilation system cooling and heating energy for all zones.
- **Feedback requested:**
  - Understand which space types are required (not simply allowed) to have ventilation occupied standby requirements.
  - Understand which space types are required (not simply allowed) to have ventilation occupied standby requirements.
  - Are any spaces allowed to have both demand-controlled ventilation and ventilation occupied standby requirements?

## Topic 2 Reducing Max Airflow During Deadband Operation for VAV

- **Purpose:** This proposed code change would modify prescriptive requirements for multi-zone variable air volume (VAV) HVAC systems in Section 140.4(c), such that the central air handler is required to be capable of turning down as much as the terminal units in individual zones during deadband and economizer operation to avoid wasting fan energy.
- **Benefits:** The proposal adopts ASHRAE 90.1-2022 Addendum u to ensure central air handlers can turn down airflow during deadband, matching existing zone-level turndown requirements. This closes a performance gap, reduces unnecessary fan energy use, and shows preliminary savings of about 0.08 kWh/ft<sup>2</sup> for key building types.
- **Feedback requested:**
  - After the meeting, the Statewide CASE Team is considering allowing a bypass duct to return excess air to the Packaged VAV unit without going to the zones as alternative method to comply. This would allow equipment that cannot turn down airflow enough to comply. We believe that this can be made to work in retrofits with a bypass through the curb. We would like to hear feedback from stakeholders on this idea.

- During the meeting, a stakeholder raised a concern that  $Q_{\min}$ , the lowest airflow a DX system using A2L refrigerants must flow, will be higher than the required airflows that we have proposed. We have since learned that only applies to equipment that does not have a refrigerant detection system (RDS). Equipment that does not have an RDS must maintain  $Q_{\min}$  24 hours a day, 365 days per year. Do stakeholders know of equipment that uses A2L refrigerants that do not have RDSs?
- Are stakeholders able to meet the multizone VAV requirements of Title 24 today? If so, how are they doing so with packaged VAV units?

### Topic 3 HVAC FDD

- **Purpose:** The proposed measure updates Section 120.2 by adding clear definitions for fault detection and diagnostics (FDD) and requiring FDD systems in new nonresidential buildings and large alterations over 100,000 ft<sup>2</sup> with heating or cooling capacities above 300,000 Btu/hr. It also establishes baseline requirements for FDD functionality, communication, and accessibility.
- **Benefits:** HVAC FDD provides operators with automated, continuous insight into system performance, helping identify inefficiencies and faults early. It sustains long-term HVAC efficiency by detecting issues caused by installation errors, equipment degradation, maintenance gaps, or control drift. By functioning as an automated form of commissioning, FDD supports timely repairs, maintains intended performance, and strengthens overall building energy resilience.
- **Feedback requested:**
  - Determine the current market penetration in California of HVAC FDD for existing buildings over 100,000 square feet.
  - Determine the current market penetration in California of HVAC FDD for new construction of buildings over 100,000 square feet.
  - To understand if buildings are not seeing energy savings or sustained energy efficiency from FDD, why?
  - What are the largest technical and market barriers?
  - Determine other market or technical barriers or solutions that should be considered for this proposal.
  - Are there other faults and FDD requirements for large buildings that should be considered for this proposal?

Opinions on the assumption that systems with FDD resolve faults on average 1 to 2 months sooner than systems without FDD.

## In-Meeting Questions / Comments

During the meeting, questions and comments were submitted in the Q&A pane in Zoom as well as asked aloud. Answers are provided below.

Attendees were also asked to respond to polls. Navigate directly to the **[Zoom Polls & Responses](#)** by clicking the link.

Due to time limitations, not all written questions and comments were discussed during the meeting, but all have responses available in these meeting notes.

### Questions regarding the Introduction Presentation material

**Question asked via Zoom question pane by Craig Williams:** There is obviously a motivation to address energy efficiency standards, and the CASE initiatives are self-evidently aimed at this specific purpose with assumed corollary alignment with initiatives towards addressing climate change. Please provide a brief statement that represent the CASE initiative generally and today's seminar specifically that is aimed at mitigating climate change and initiatives towards decarbonization through the ongoing development of the Energy Code. Thank you in advance for your reply. Craig Williams

**Answer. Kelly Cunningham:** Codes and Standards Enhancement (CASE) initiative presents recommendations to support the California Energy Commission (CEC)'s efforts to update the California Energy Code (Title 24, Part 6) to include new requirements or to upgrade existing requirements for various technologies. As directed by Section 25402.7 of the Warren-Alquist Act, the electric and gas utilities and their consultants that make up the Statewide CASE Team provide the CEC with support as they consider updates to Title 24, Part 6 and Part 11.

Additionally, 12. Pub. Res. Code Section 25402.7 requires electric and gas utilities to provide support for the CEC's building standards and other regulations. Because the CEC's building standards and other regulations address transportation electrification and building decarbonization, the IOUs' Codes and Standards programs and subprograms must support these broader clean energy goals. D.23-04-035:

<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M505/K808/505808197.PDF#page=36>

**Comment made via Zoom question pane by Robert Tomlinson:** Not sure how GHG goals are part of energy code original 1974 act.

**Response, Michael Shewmaker:** GHG goals were not included as part of the original 1974 act, rather it stems from newer legislation like Assembly Bill 32 (2006) and Senate Bill 32 (2016).

## **Modulating DOAS, Jeff Stein**

**Question asked via Zoom question pane by Elizabeth Becker.**

**Comment:** Worth pointing out that variable volume dampers also have to be manually balanced.

**Answer: Bryan Boyce:** Bryan Boyce: Response: Thank you for noting that.

**Comment. Elizabeth Becker:** Occupied standby requirements vary based on project type. There is a way to set the correct amount to zones w/ ASHRAE 62.1 using breathing zone factors, % of primary air, etc. I'd love a list of off-the-shelf DX, or even CHW AHUs, that meet the 15% turndown. 22% is about the lowest I've found. Higher OSA can also be reflective of MUA required for exhaust, pressurization, etc.

**Response. Bryan Boyce:** Thank you

**Robert Tomlinson Comment:** With DOAS VAV zone air valves, how is room air balance maintained room pressure control with exhaust, harder than the industry can absorb.

**Bryan Boyce. Answer:** Thank you for the feedback, we agree.

**Robert Tomlinson Comment:** COVID transfer between people: yes, is not impacted by typical modern HVAC systems, but try walking through Hearst Castle with 50 other [people] and only a floor fan blowing air around.

**Answer. Bryan Boyce:** acknowledged!

**Robert Tomlinson:** I agree with Elizabeth.

**Bryan Boyce:** Thanks.

**Question asked via Zoom question pane Zachary Jenkins:** ASHRAE's design guide for DOAS recommends setting the DOAS leaving air dew point (DP) to satisfy the internal latent load and ventilation latent loads. This is often a DP lower than 55F. How does the 4th proposal reconcile that ASHRAE recommendation? For min. ventilation air, how does this minimum align with ASHRAE 62.1 minimum ventilation rates?

**Answer: Bryan Boyce:** T24 ventilation rates are higher than 62.1 rates

**Question asked via Zoom question pane by Beth Braddy:** I may be missing it, but I didn't see this proposed language for 140.4(t) in the CASE report. Will these presentation slides also be posted to the Title 24 Stake holder site?

**Answer. Bryan Boyce:** You did not miss anything. This content was not in the Draft CASE Report, this has been developed since it was published. I also agree with Elizabeth. Adding an exemption to the ventilation rates if ASHRAE 62.1 is followed in [its] entirety seems like a doable addition. Thank you for the feedback, we will take this topic back to the team and determine if it is feasible for this cycle

**Question asked via Zoom question pane by Jireh Peng:** Since EnergyPlus does not support modeling modulating DOAS directly. Do you already have an idea (a workaround) for the compliance software to account for this saving?

**Answer. Bryan Boyce:** We used a spreadsheet analysis for the CASE report but understand that it may not be an acceptable workaround. We would like to collaborate with your team to understand what is possible.

**Question/comment asked Verbally by Zachary Jenkins:** Appreciate the details on this. My question is around the measure on additional reheat or, you know, running from 60 down to 55 on this. So, largely where I look at this is the reheat that you get out of a conventional DOAS unit is largely hot gas reheat that is collecting waste heat coming off of the DX compressor loop anyway. So, I guess my first question is: How are we saving energy if that reheat is coming from sources like hot gas reheat, when that energy is still going to be consumed to do the dehumidification and cooling work to bring that outside air down to 55, or whatever the target is. And then as a follow-up on that, ASHRAE's design guide for DOAS specifies or recommends that folks designed DOS around decoupled systems, where it is not a specified leaving air temperature, such as a 55 degree off coil, but instead, whatever leaving coil temperature satisfies both the ventilation and internal latent loads of the space, which can often be below 55, and would require the DOAS unit to cool past that point. So, how does this proposed measure reconcile with that recommendation from ASHRAE, which is laid out to be more energy efficient and cost-efficient, on overall units.

**Jeff Stein:** The compressor, you know, hot gas reheat question has to do with, like, if you're doing dehumidification and not needing to actually cool the space. California's different from a lot of the rest of the country, so I don't know where your experience might be, but we don't do dehumidification for the most part. It's not required by ASHRAE Standard 62.1, there aren't humid climates in California that require dehumidification, and so you wouldn't have that compressor energy to recover anyway, because you wouldn't necessarily be doing any dehumidification. I'd have to look at what particular ASHRAE requirements you're referring to, but again, this has basically been part of Title 24 already for at least one code cycle - once you've got zonal heating and cooling capacity, there's no reason to necessarily cool at the air handler level, you can do all of your cooling and dehumidification at the zone level, with your zonal cooling system. It also sounds like maybe we ought to have a follow up with you on the specifics of the ASHRAE requirement. The last thing I'll say is it's a prescriptive requirement, so if there is some particular case or reason why you would need to deviate from it, you have the option of using the performance path. It'll just be compared to a system that, that meets the prescriptive requirement.

**Bryan Boyce:** I like the idea of following up. Zachary, would that be of interest on your end?

**Zachary Jenkins:** That'd be great. Feel free, feel free to reach out. Love to have a conversation with the team on this.

**Bryan Boyce:** Thank you. Thank you so much for engaging.

**Question/comment asked Verbally by Elizabeth Becker:** Hi, I'm already collecting a bunch of notes so I can follow up separately, but I did want to raise a flag about the fact that we're saying that Title 24 ventilation requirements exceed ASHRAE 62.1, because there are, some caveats, and that's something that is very, very frustrating, actually, when working on, say LEED designs or whatever, [where] we're not allowed to take diversity at a system level, and we're forced into the Title 24 rates. Having to size a unit based on this maximum design, very high rate, that is now being capped at both high and low ends is very problematic. So, I know that it's not necessarily within your purview to inflict this code allowance, but I would strongly advocate that we should be able to use the 62.1 full standard as an alternative to the Title 24, which is a very flat, non-dynamic ventilation calculation system, and we already follow lots of other ASHRAE standards that are under continuous maintenance, so there's no really valuable argument, in my opinion, that says that we can't alternatively follow 62.1 to the letter instead of following the Title 24 blanket across the board.

**Jeff Stein Response:** Yeah, I hear what you're saying, and I actually kind of agree with you. Our office has tried for a long time to get California to simply adopt standard 62.1 and not have its own separate ventilation requirements, but that hasn't gone through, and I don't see that happening this code cycle at this point. So we are where we are, and that's basically where we've got the Title 24 rates. LEED is not a code requirement. I understand it makes it more complicated to do LEED compliance. If you're using Title 24, I can say that we've used Title 24 minimally compliant projects, that have met that LEED requirement but it may take a little bit more calculation exercising, but it can be done.

**Elizabeth Becker:** Yeah, it can, it's also made more complicated by that. Thanks.

**Question/comment asked Verbally by Jireh Peng:** Related to this new prescriptive requirement for designing about outdoor air, I know a lot of wasted energy is from this extra outdoor air. But I think, in practice, mostly the design to the next phone number, so usually not just the strictly square footage ties the CFM per square footage. So, I don't know how practical to enforce all the projects to strictly follow this minimum outdoor air rate.

**Jeff Stein:** I mean, enforcement is always a challenge with 2024, but I would argue that it's pretty straightforward. There are already forms that you need to fill out to document that you don't go below the minimum outside air rate, and so you've already calculated absolutely the minimum outside air rate for all your zones, and basically now we're saying, you can't go below it or above it for your

design minimum outside air. So I don't see it necessarily creating any kind of burden on a compliance or enforcement basis.

**Jireh Peng:** When you tune your systems, sometimes you won't be perfect to that number.

**Jeff Stein:** I'm not following. I mean, you've got the area. It's basically 0.15 CFM a square foot, or 15 CFM a person. So once you've done that calculation, that gives you the ventilation, and that's basically what we're saying you can't go above that as your minimum.

### **Reducing Maximum Airflow During Deadband Operation for Variable Air Volume HVAC Systems, John Blade**

**Question asked verbally Elizabeth Becker:** Hello! I have extreme issues with the fact that this is being proposed as the full measure for alterations. I don't think that enough attention is being paid to how difficult it already can be to size in place, especially DX units. There's a lot of factors, [such as] existing envelope may not be great, so it requires a higher unit capacity than one might have in a new building. [The] existing roof may not be able to bear increased weight, so if these new redesigned systems are significantly heavier because they have to have more coils, more compressors, condensers, [so it's a consideration]. All of the existing penetrations and the footprints are often also a prime limiting factor, so if anything about this is substantially different in these, it will have to be fundamentally redesigned units - it's just going to drive people to skip permits entirely. Like, I mean, it's already... you're right [] people falsify stuff all the time. I find it, I catch other people's work doing that all the time. But if we want people to adhere to the code we have to think about the people who are going: it's not the new buildings, it's not the large projects, it's the small things that [] can get away with not getting permitted. So, I would highly recommend that you reconsider, or at least loosen, the requirements for alterations specifically, given those constraints.

**John Blade Response:** [I don't think it's going to be an issue]. We're not changing full load efficiency, so we're not saying [that] you [must] have this higher performing unit at full load. So you don't need any more condenser coil, you don't need any more compressor, you don't need any more evaporator. This is taking the existing compressors and the existing evaporator that they have, and doing some redesign, but there should be no reason for the physical size of the box to change because of this requirement.

**Elizabeth Becker:** Okay, but if they're redesigning, then they are changing things inside. And one of the key drivers in the DX unit specifically, is that they have to maintain minimum velocities over those coils. And if we're proposing to

make this required across all DX units, then it's going to require physical redesign of the way the systems are made. I've been soliciting information and trying to get [others] get our manufacturers to attend this meeting and weigh in on this, and what I understand is [regarding] fan limitations, there's so many different factors in the fan limitations in all of this that it is possible to redesign these systems, it's going to take a long time, it's not going to go smoothly, and it's going to result in a fundamental change in the way systems are designed. So, if you want people to follow the code, especially in these smaller TIs, then I would just maybe try and think that through.

**John Bade:** I'd love to have some more discussion with you offline about this. I've talked to manufacturers, and there's nothing in this requirement for the low turndown that changes the size of your evaporator coil, changes the number of compressors you have on these systems, because these are typically multi-compressor systems anyway.

**Elizabeth Becker:** Yeah, but if you have to switch from [such as] a 2-fan to a 4 or 6 fan array, and then you have to have a VFD on every single one, and then you also have to integrate all of those controls. It's going to change the weight of your unit, it's going to change the upfront costs, it's going to change integration costs. There's a lot more to it than just slapping a new rooftop unit on there.

**Question asked verbally by Clint Reese:** So, I've got a concern with the 15% and A2L mitigation. You know, 15%, especially for a heat pump, have higher charge amounts. The 15%, in a lot of cases, is going to be below that QMIN value. And, you know, the current product standard does not require Detection while the fan is running. [] Most people are not turning down [] allowing the unit to operate below that QMIN, which, I've looked at it for pretty typical units in the single circuit size, smaller to medium tonnages, and you're oftentimes right at 25% to 30% requirement for QMIN. So that's a big concern I've got there.

**John Blade. Response:** That has been brought up to me by [ ] as a new concern [ ] the chair of 90.1, who proposed this in 90.1, and I had some emails back and forth with him, and I wasn't quite following what he was talking about. So, if we could arrange something offline that we could talk about, I get it. I'm on ASHRAE 15, so I know the requirements.

**Clint Reese:** The testing that's [] the way that the dash 2 dash 40 prescribes the testing, and [its] really the sensor technology that's available is what's going to be a limiting factor.

**John Bade:**, I'd like to talk to you sooner than later if we can figure out a way to do it this week.

**Clint Reese:** Okay.

## **HVAC FDD, Chris Battisti:**

### **Question asked verbally by Chris Reese:**

I had a couple of questions. In [the] diagram you showed, the FDD being done at potentially different levels, one of those being the supervisory controls or the onboard controls of the equipment. Yeah, a couple questions. One of them is that, that... The first one of the unit operating, outside of the, the program, or permitted user override. I'm just not really sure how that plays in with the onboard controls, where, you know, the programming is done there, the display of the mode, whether it's in a program mode, or if it's in the manual override is displayed right there at the controllers, would there be additional FDD required for that case?

**Chris Battisti response:** Not really, because you still, like you said, those modes are documented in the controller, right? That has to be configured from the configuration software, which is usually from, like, the BAS front end. And because that data has to travel up, you can use that control mode to say, hey, is there a fault or not? So that data still would be collected up, but I understand your point. The point is, how do you do it? What's the best way at the building [level]? And yes, that's certainly possible, but that's also where it can get kind of muddled [regarding] what's the best way to do it. So, I understand your point.

**Clint Reese:** [] The temperature sensors: how far does that extend? Like, an outside air sensor, a space sensor, or are we looking at unit sensors, [such as] the supply air temperature sensor, a coil temperature sensor?

**Chris Battisti:** Fantastic question. So, that's one thing that I, looking at the slides. I don't know if you've ever made slides before, but then you're going through it, finally in the presentation, you're like, ut-oh, I didn't change that part. [] Specifically, we're looking at zone temperature sensors, specifically, because that's a comment we had last time about we need to be more specific, because to your point, there's a lot of temperature sensors and systems, right? And if we just say, hey, faults on all of them, that's [a] pretty big ask, right? We're focusing on zone temperature sensors specifically based on that.

**Clint Reese:** Okay, excellent, thank you.

**Chris Battisti:** Of course.

**Question asked verbally by Elizabeth Becker:** Hi. I wanted to throw a suggestion out there regarding the functional testing. So, as it is right now, MEC13 is [] straddling built-up air handling units, as well as, chilled water, hot water, heating hot water distribution. But when you get down to a granular basis,

the Part 1 of MEC13 and the core of MEC12 are really not very different. Like, there's really only a few exceptions, and there's also a lot of crossover over in MEC12 with MEC5 for economizer testing, which also straddles a lot. So I wonder if you would consider [] restructuring it, or if you already have, so that [] MEC5 can be specific to ERVs and HRVs and whatnot, and then MEC12 can be specific for the full economizer functional test with FDD, and then MEC12, could be either the same, or maybe even sub-split like the lab controls form, where they, like, broke it up into different subsections, because there's a lot of occasions where MEC13 really doesn't apply for a whole system, it's really just - we're only installing or replacing the low side. Or we're only replacing this built-up unit, but then the distribution is staying the same.

**Chris Battisti Response:** That makes sense. So, general idea of your comment is: let's keep things together that need to be together, so if there's [] testing economizers, but economizer's FDD is a different measure - if you're testing economizers, include the FDD as part of that test, not as a separate thing, because you're there testing the economizer. Yes, you should just also test the faults while you're there.

**Elizabeth Becker:** Yeah, instead of splitting it up, because [of] the economizer test.

**Chris Battisti:** Yes.

**Elizabeth Becker:** It's like straddling so many things, it's really hard for - along with it, even if it was two parts, and it's like, okay, complete whatever part you have to [to] keep it together, they almost always go hand in hand together to make it as streamlined as possible.

**Chris Battisti:** Sounds like you've done testing, [so] you know [that] it's hard. And [attempting] to change things is difficult and making things more streamlined is super important to make sure this is effective. So we're trying to straddle a line of not making too many big changes to forms that already exist, but also being practical and wanting to make it better. So I completely agree on something we're looking at how to effectively do that. From a full controls perspective, that's a little out of scope, just because that's a pretty big thing to look at, but that's definitely something that should be looked at for how do we streamline this, and even if it's just one form, instead of three forms, way easier, because it's just one less thing you have to keep track of. So I'm completely in agreement with you, and we'll definitely do what we can with that.

**Elizabeth Becker:** Thanks!

## Wrap-Up

The meeting concluded with a call for participation throughout the code cycle and ways to participate and get in touch. Final CASE Reports will be posted May-June 2026 on [title24stakeholders.com](http://title24stakeholders.com).

Please reach out to the specific topic lead or [info@title24stakeholders.com](mailto:info@title24stakeholders.com) with input on the measures presented today.

The meeting adjourned at 4:30 PM PST.

## Zoom Polls & Responses

### Multiple Choice Questions

### Modulating DOAS

#### 1.1.2.1 DOAS – Space Types

**Poll**

**Pop Quiz! Q1. Which space types are required (not simply allowed) to have ventilation occupied standby requirements? (choose all that apply)**

**Correct Answers**

- Post-secondary classrooms
- Museums
- Conference rooms
- Disco/dance floors
- Office space
- Places of religious worship
- Multipurpose rooms < 1,000 square feet
- Libraries (reading rooms and stack areas)

### 1.1.2.2 DOAS – Demand Control and Occ Standby

Note that the question was verbally corrected from “allowed” to “required”, this was a typo on the slides.

#### Poll

**Pop Quiz! Q2. Are any spaces allowed to have both demand-controlled ventilation and ventilation occupied standby requirements?**

**Correct Answer**

- No
- Yes
- I am not sure

**Space Types with both:**

- Post-secondary classrooms
- Lecture halls
- Conference, meeting, or training rooms
- Multipurpose rooms < 1,000 ft<sup>2</sup>
- Breakrooms

## FDD

### 1.1.2.3 3. FDD – Role in Industry

#### Poll

**What is your role in the industry?** Pick the option that best describes your role.

- a. Building owner
- b. Building operator
- c. HVAC designer
- d. HVAC contractor
- e. Controls contractor
- f. FDD provider
- g. Commissioning agent
- h. HVAC or controls manufacturer
- i. Building official (plan checker, inspector, etc.)
- j. Other (type in Q&A)

### 1.1.2.4 4. FDD – Market Penetration of FDD

#### Poll

**What do you believe is the current market penetration in California of HVAC FDD for existing buildings over 100,000 square feet?** In your experience, select a percentage of large buildings in California that currently have HVAC FDD.

- a. 0%
- b. Up to 10%
- c. 11% - 50%
- d. Over 50%
- e. I don't know

### 1.1.2.5 5. FDD – Market Penetration of FDD New Construction

#### Poll

**What do you believe is the current market penetration in California of HVAC FDD for new construction of buildings over 100,000 square feet?** In your experience, select a percentage of new construction buildings in California that include HVAC FDD.

- a. 0%
- b. Up to 10%
- c. 11% - 50%
- d. Over 50%
- e. I don't know

### 1.1.2.6 6. FDD – Not Seeing Energy Savings

#### Poll

**If buildings are not seeing energy savings or sustained energy efficiency from FDD, why?** Select all that apply from the list below on the most common reasons buildings would not see energy efficiency benefits from FDD.

- a. Inaccessibility to fault information
- b. Lack of staffing
- c. Lack of staff training
- d. Lack of resources
- e. Improper implementation
- f. Other (FILL IN)
- g. I don't know

### 1.1.2.7 7. FDD – Technical and Market Barriers

#### Poll

**What are the largest technical and market barriers?** Select all that apply from the list below on identified barriers to the measure.

- a. FDD standardization
- b. Integration complexity with BAS
- c. IT/cybersecurity
- d. High upfront cost
- e. Unclear return-on-investment
- f. Lack of designer market knowledge of FDD benefits
- g. Lack of contractor market knowledge of FDD benefits
- h. Lack of operator market knowledge of FDD benefits
- i. Other (FILL IN)
- j. I don't know

### 1.1.2.8 FDD - Energy Savings Expected

#### Poll

**What is the range of HVAC energy savings that can be expected?** Based on HVAC FDD usage, select the range of total HVAC energy savings that can be expected.

- a. < 5%
- b. 6% – 20%
- c. > 20%
- d. I don't know

### 1.1.2.9 10. FDD Assumptions

## Poll

**Would you agree with the assumption that systems *with* FDD resolve faults on average 1 to 2 months sooner than systems *without* FDD?** The assumption was made to provide a conservative estimate on savings potential.

- a. Yes
- b. No\*

\*If no, please comment what assumption you would make or email [cbattisti@trccompanies.com](mailto:cbattisti@trccompanies.com).

## Long Answer Questions

N/A