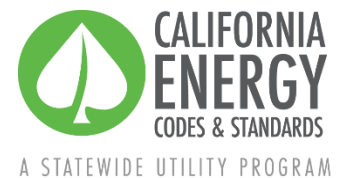


Meeting Notes



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

Posted December 4, 2019

Nonresidential HVAC Part 1: Data Centers, Boilers, Controls Utility-Sponsored Stakeholder Meeting

Meeting Information

Meeting Date: Tuesday, October 15, 2019

Meeting Time: 8:30am – 12:30pm PST

Meeting Host: California Statewide Utility Codes and Standards Team

Meeting Agenda

| Time | Topic | Presenter |
|--------------------------|--|--|
| 10 minutes prior to call | Live Attendee Poll | Marisa Lee (Energy Solutions) |
| 8:30-8:35 | Welcome and Meeting Ground Rules | Kelly Cunningham (PG&E) |
| 8:35-8:45 | California Energy Commission Introduction | Energy Commission Staff |
| 8:45-10:05 (1h, 20m) | CASE Presentation I: Data Center Efficiency | Hillary Weitze (Red Car Analytics) Jeff Stein (Taylor Engineering) |
| 10:05 – 10:15 | Break - 10 Minutes | |
| 10:15 – 11:00 (45 m) | CASE Presentation II: HVAC Controls (Part 1) <ul style="list-style-type: none">• Dedicated Outside Air Systems• VAV Minimum Controls | Neil Bulger (Red Car Analytics) Shaojie Wang, Tim Minezaki (Energy Solutions) |
| 11:00-12:00 (1hr) | CASE Presentation III: High-Capacity Boilers and Service Water Heating Systems | George Chapman (Energy Solutions) |
| 12:00-12:30 | Next Steps and Wrap Up | Marisa Lee (Energy Solutions) |

Meeting Attendees

| First Name | Last Name | Email | Affiliation |
|--|------------|--|---|
| Statewide Utility Codes and Standards Team | | | |
| <i>Utility Staff</i> | | | |
| Kelly | Cunningham | KACV@pge.com | Pacific Gas and Electric Company |
| Mark | Alatorre | Mark.alatorre@pge.com | Pacific Gas and Electric Company |
| Sean | Gouw | Sean.gouw@sce.com | Southern California Edison |
| John | Barbour | JBarbour@semprautilities.com | San Diego Gas and Electric |
| Jeremey | Reefe | Jmreefe@sdge.com | San Diego Gas and Electric |
| James | Kemper | James.Kemper@ladwp.com | Los Angeles Department of Water and Power |
| Luke | Sun | Luke.sun@ladwp.com | Los Angeles Department of Water and Power |
| <i>Codes and Standards Enhancement (CASE) Team Members</i> | | | |
| Alanna | Torres | atorres@energy-solution.com | Energy Solutions |
| Chris | Uraine | curaine@energy-solution.com | Energy Solutions |
| Heidi | Werner | hwerner@energy-solution.com | Energy Solutions |
| George | Chapman | Gchapman@energy-solution.com | Energy Solutions |
| Marisa | Lee | mlee@energy-solution.com | Energy Solutions |
| Simon | Silverberg | Ssilverberg@energy-solution.com | Energy Solutions |
| Sam | Chussid | Schussid@energy-solution.com | Energy Solutions |
| Tim | Minezaki | Tminezaki@energy-solution.com | Energy Solutions |
| Marissa | Lerner | Mlerner@energy-solution.com | Energy Solutions |
| Shaojie | Wang | Swang@energy-solution.com | Energy Solutions |

| | | | |
|---------|---------|--|--------------------|
| Jon | McHugh | jon@mchughenergy.com | McHugh Energy |
| Rahul | Athalye | Rathalye@noresco.com | NORESCO |
| John | Arent | Jarent@noresco.com | NORESCO |
| Sally | Blair | Sblair@noresco.com | NORESCO |
| Ben | Lalor | Blalor@noresco.com | NORESCO |
| Neil | Bulger | Neil@redcaranalytics.com | Red Car Analytics |
| Hillary | Weitze | Hillary@redcaranalytics.com | Red Car Analytics |
| Jeff | Stein | JStein@taylor-engineering.com | Taylor Engineering |
| Ben | Bannon | Ben.brannon@arup.com | ARUP |
| Andrei | Capraru | Andrei.capraru@arup.com | ARUP |

California Energy Commission

| | | | |
|---------|-------------|--|-------------------|
| Payam | Bozorgchami | Payam.Bozorgchami@energy.ca.gov | Energy Commission |
| Peter | Strait | Peter.Strait@energy.ca.gov | Energy Commission |
| Thao | Chau | Thao.Chau@energy.ca.gov | Energy Commission |
| Armando | Ramirez | Armando.ramirez@energy.ca.gov | Energy Commission |
| Cheng | Moua | Chen.moua@energy.ca.gov | Energy Commission |
| Danny | Tam | Danny.tam@energy.ca.gov | Energy Commission |
| Danuta | Drozdowicz | Danuta.drozdowicz@energy.ca.gov | Energy Commission |
| Kelly | Morairty | Kelly.moriarty@energy.ca.gov | Energy Commission |
| Matthew | Haro | Matthew.har@energy.ca.gov | Energy Commission |

Stakeholder Attendees

| | | | |
|----------|----------|--|--------------------|
| John | Bade | | 2050 partners |
| Aniruddh | Roy | | AHRI |
| Stefan | Gracik | | Alter Engineers |
| Aaron | Gunzer | | AMCA |
| Frank | Morrison | | Baltimore Air Coil |
| Dan | Johnson | | Beyond Efficiency |

| | | | |
|----------|------------|--|--|
| Chris | Light | | Celeritas Engineering |
| Jeanne | Fricot | | Center for Sustainable Energy |
| Tom | Paine | | Consol |
| Genesis | Tang | | CPUC |
| Hiroshi | Yoh | | Daikin |
| Darryl | DeAngelis | | Ebtron |
| Meg | Waltner | | Energy 350 |
| Ronald | Balneg | | Energy Commission |
| Mike | Wolf | | Greenheck |
| Tyler | Miner | | Henry Bush Plumbing, Heating and Air Conditioning |
| Jeff | Mang | | Hogan Lovells |
| Mike | Kanitz | | Honeywell |
| Mark | Lessans | | Ingersoll Rand |
| David | Guelfo | | JCI |
| Kevin | Muldoon | | KCC manufacturing |
| Bruce | Severance | | Mitsubishi |
| Louis | Starr | | NEEA |
| Chris | Ruch | | NEMI |
| Soph | Davenberry | | NEMIC |
| Les | Nelson | | Radiant Professionals Alliance |
| Vrushali | Mendon | | Resource Refocus |
| Sid | Abma | | Sidel Systems |
| Matt | Matheny | | Soler Palau |
| Beth | Braddy | | Trane |
| John | Busse | | US Boiler |

| | | | |
|---------|----------|--|-------------|
| Phillip | Stephens | | Weil Mclain |
|---------|----------|--|-------------|

Meeting Notes

1. Welcome and Meeting Ground Rules

- *Marisa Lee (Energy Solution) presented.*

2. 2022 Process Overview

- *Payam Bozorgchami (Energy Commission) presented.*
- *Kelly Cunningham (PG&E) presented.*

3. Meeting Materials

- Presentation available [here](#).
- Submeasure summaries available:
 - [Data Center Efficiency](#)
 - [HVAC Controls](#)
 - [High Efficiency Boilers and Service Water Heaters](#)

4. Data Center Efficiency

- *Hillary Weitze (Red Car Analytics, Statewide CASE Team) presented.*
- Meg Waltner (Energy 350): Could you talk a bit more about how you plan to determine the baseline efficiency level?
 - Hillary Weitze (Red Car Analytics): For proposed conditions, there will be energy star ratings. Baseline conditions will be from manufacturer data. We will be surveying the market to determine industry practices.
- Rahul Athalye (NORESO): Which building type or prototype will be used for this analysis?
 - Hillary Weitze (Red Car Analytics): We are trying to develop this a bit more. We are currently extrapolating this with IT load which does not line up obviously with specific building types. Current plan is to not tie to current commercial building types.
- Bruce Severance (Mitsubishi): There does not seem to be any discussion of Variable Refrigerant Flow (VRF) heat recovery when this is a well-developed, cost-effective and efficient technology. Why would you not include this in your cost-effectiveness analysis?
 - Hillary Weitze (Red Car Analytics): The intent of the proposal is to recover heat from data centers into other heating loads. I am not sure how you intend for VRF to be applied.
 - Bruce Severance (Mitsubishi): Air Source Heat Pumps (ASHP) are more cost effective depending on capacity.
 - Jeff Stein (Taylor Engineering): Bruce makes a good point. Some data centers use VRF. Proposal certainly does not preclude that. What is the best way to show cost effectiveness? It would be good to look at previous cost effectiveness analysis for things done like VRF.
 - Dan Johnson (Beyond Efficiency): VRF heat recovery is missing.

- Rahul Athalye (NORESO): Is the team pursuing a performance budget approach, i.e., Power usage effectiveness (PUE) budget?
 - Jeff Stein (Taylor Engineering): There is PUE compliance option in 90.1 but we are not proposing this for Title 24.

5. HVAC Controls Part 1

- *Neil Bulger (Red Car Analytics, Statewide CASE Team) presented.*
- Dan Johnson (Beyond Efficiency): We can already model DOAS with heat recovery and bypass in CBECC-COM¹ (though bypass is broken) and take credit for this. What is new about this? Is the existing simulation model inaccurate?
 - Neil Bulger (Red Car Analytics): There are two ways in EnergyPlus to configure bypass. Just the economizer lock -p is how it is currently configured, and we hope to expand that to include to a control bypass system.
 - Dan Johnson (Beyond Efficiency): So, it seems like this code change proposal is already available as a compliance option?
 - Neil Bulger (Red Car Analytics): It is currently available. About one-third of buildings surveyed had these control capabilities. Some technologies come with these controls as a default. We are trying to find out how much more that costs and establish best practices.

6. VAV Minimum Airflow rates

- *Tim Minezaki (Energy Solutions, Statewide CASE Team) presented*
- **Poll 1: Question on whether incremental costs should be \$0**

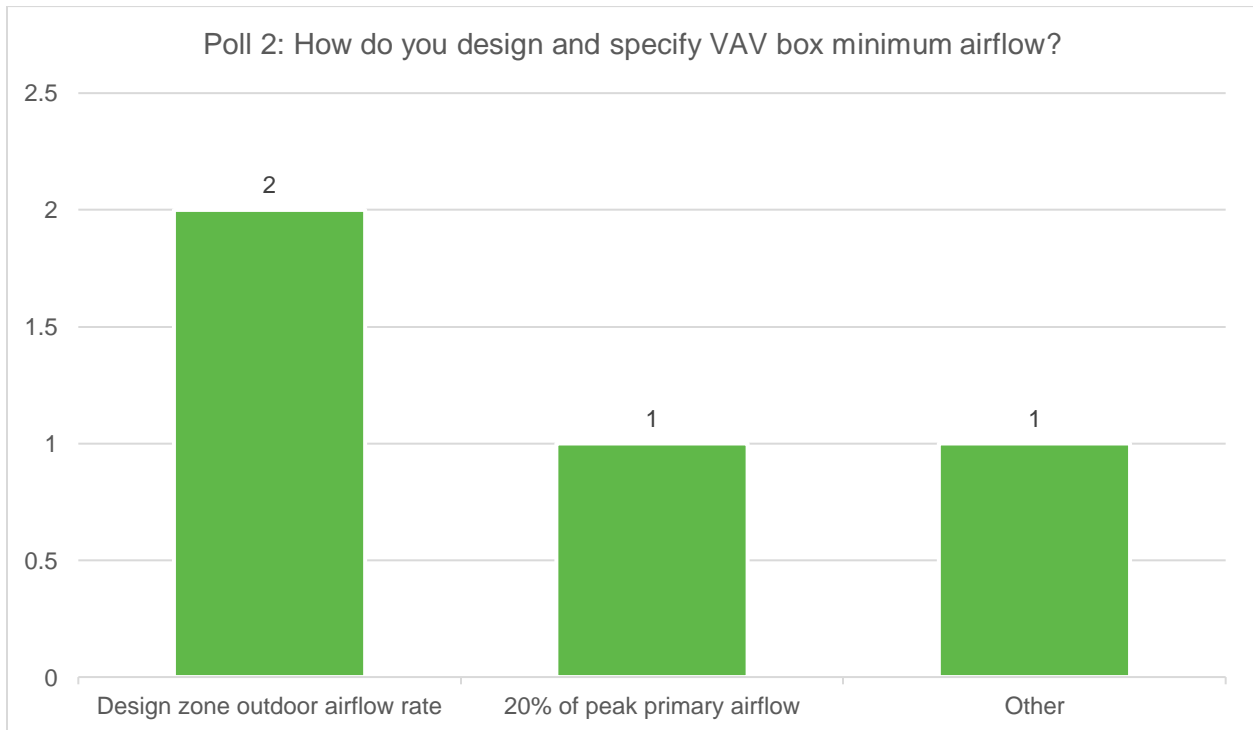
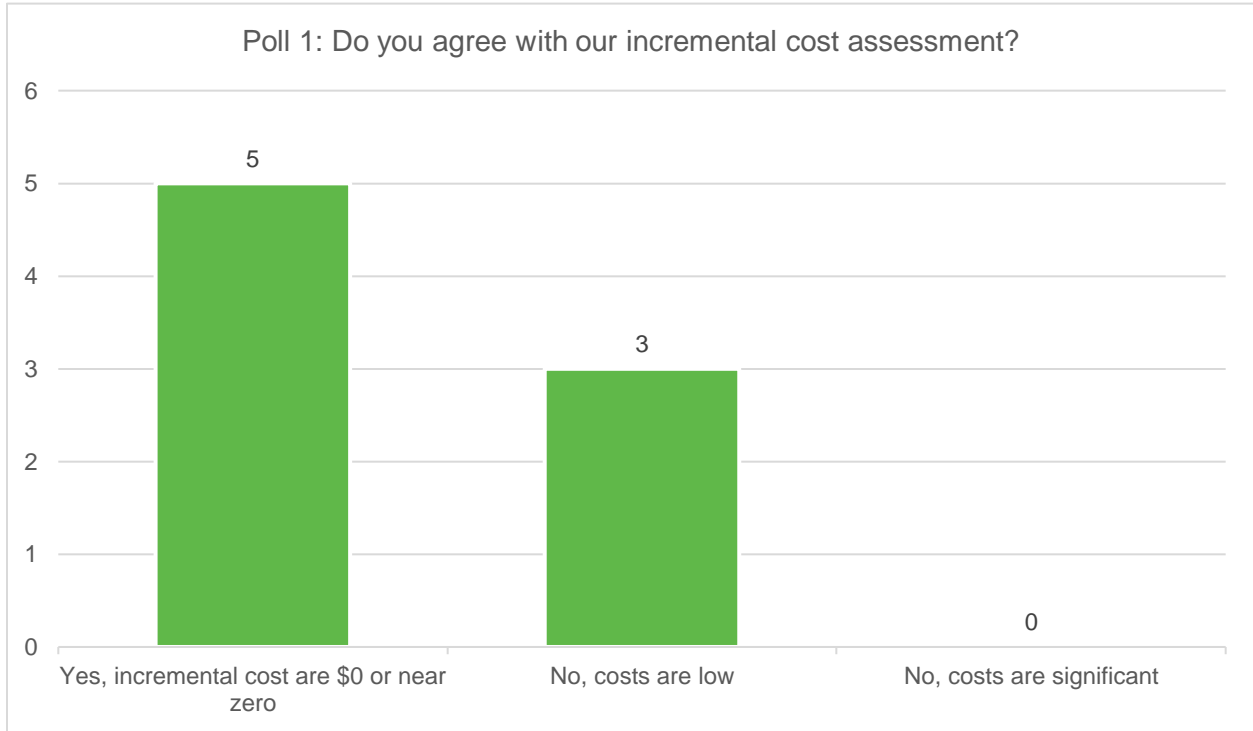
7. High efficiency Boilers and Service Water Heating Systems

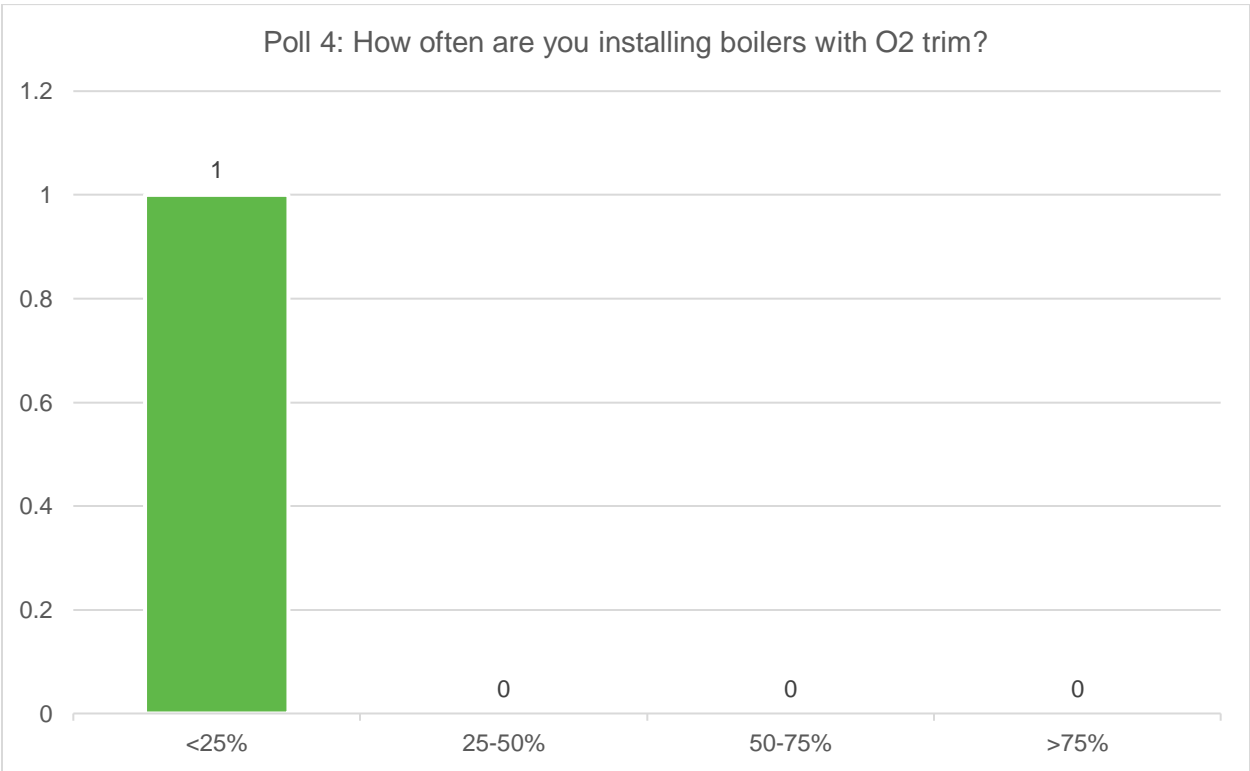
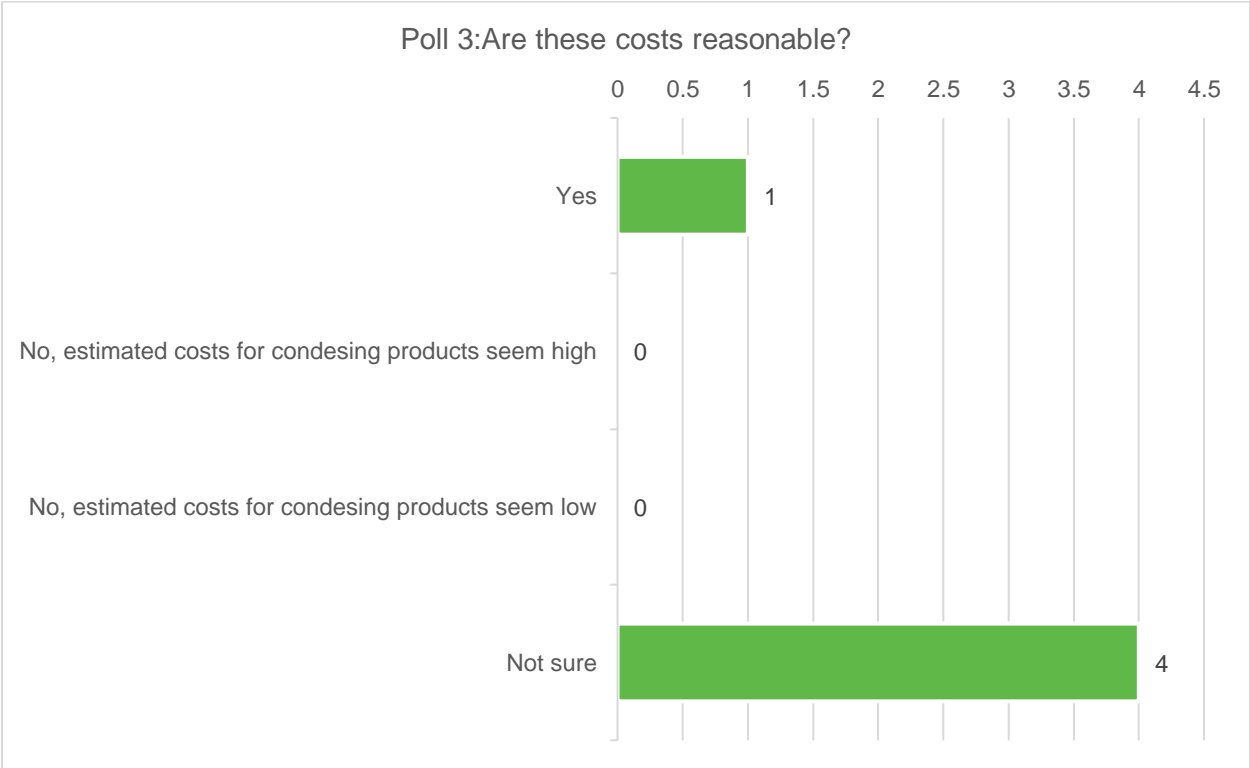
- *George Chapman (Energy Solutions, Statewide CASE Team) presented.*
- Sid Abma (Sidel Systems): What about the boilers over 10 million Btus and steam boilers used by industry?
 - George Chapman (Energy Solutions): Process boilers are already following regulations for O₂ trim controls. Boilers are currently federally regulated so they are pre-empted, unless they follow ASHRAE code. This is why the scope cut-off is at 10 MMBtu/hr.
- Sid Abma (Sidel Systems): All boilers can be high efficiency condensing. They may need to add a condensing economizer, and there has to be a place to utilize the recovered heat energy.
 - Shaojie Wang (Energy Solutions): O₂ concentration is 3% for the natural gas boilers with the capacity of 10 MMBtu/h or higher.
 - Sid Abma (Sidel Systems): Michigan Tech University is heating over 50,000 square feet with heat energy recovered from their 900 horsepower boilers exhaust.
 - Shaojie Wang (Energy Solutions): The measure is only for gas boilers.

¹ California Building Energy Code Compliance for Commercial/Nonresidential Buildings Software

- Sid Abma (Sidel Systems): The Sidel SRU Flue Gas Condenser is only designed for natural gas or LPG fired boilers. The lower the temperature the better. The greater the flow rate the better the performance.

Poll Results





Poll 5: What percent excess oxygen do you design to?

