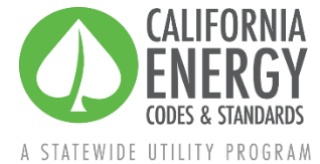


Meeting Notes

Posted 4/7/2023



Notes from 2025 Title 24, Part 6 Code Cycle Utility-Sponsored Stakeholder Meeting for:

Multifamily Domestic Hot Water

Meeting Information

Meeting Date: 2/17/2023

Meeting Time: 8:30 am – 3:15 pm

Meeting Host: California Statewide Utility Codes and Standards Team

Meeting Agenda

Time	Topic	Presenter
8:30 AM	Welcome and Meeting Directions	Cosimina Panetti Javier Perez Kelly Cunningham
8:50 AM	Central Heat Pump Water Heater (HPWH)	Jingjuan “Dove” Feng, TRC
9:35 AM	Individual HPWH Ventilation	James Haile, Frontier
10:25 AM	Discussion	
10:45 AM	Break	
10:55 AM	Individual HPWH Electric Ready	Jose Garcia, TRC
11:25 AM	Central HPWH Electric Ready	Jose Garcia, TRC
11:55 AM	CPC Appendix M Pipe Sizing	Amin Delagah, TRC
12:25 PM	Demand Control Clean-Up	Jose Garcia, TRC
12:35 PM	Lunch Break	
1:05 PM	Pipe Insulation Enhancement	Amin Delagah, TRC
1:35 PM	Automatic Balancing Valve	Jose Garcia, TRC
2:05 PM	Master Mixing Valve	Amin Delagah, TRC
2:55 PM	Discussion and Wrap-Up	
3:15 PM	Meeting Adjourned	

Members of the CASE Team

Statewide Utility Codes and Standards Team – Utility Staff

Name	Email Address	Affiliation
Kelly Cunningham	kelly.cunningham@pge.com	PG&E
Mark Alatorre	mark.alatorre@pge.com	PG&E
Thomas Mertens	thomas.mertens@pge.com	PG&E
Jeremy Reeve	JMReefe@sdge.com	SDG&E



Name	Email Address	Affiliation
Dom Michaud	dmichaud@sdge.com	SDG&E
Jay Madden	jay.madden@sce.com	SCE
Jim Kemper	james.kemper@ladwp.com	LADWP
Joshua Rasin	joshua.rasin@smud.org	SMUD

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

Name	Email Address	Affiliation
Maria Ellingson	mellingson@energy-solution.com	Energy Solutions
Cosimina Panetti	cpanetti@energy-solution.com	Energy Solutions
Heidi Werner	hwerner@energy-solution.com	Energy Solutions
Nikki Westfall	nwestfall@energy-solution.com	Energy Solutions
Jingjuan “Dove” Feng	jfeng@trccompanies.com	TRC
Amin Delagah	ADelagah@trccompanies.com	TRC
James Haile	jhaile@frontierenergy.com	Frontier Energy
Jose Garcia	jmgarcia@trccompanies.com	TRC
Elizabeth McCollum	emccollum@trcsolutions.com	TRC
David Douglass-Jaimes	DDouglass-Jaimes@trccompanies.com	TRC
Alea German	agerman@frontierenergy.com	Frontier Energy

California Energy Commission Staff Contacts for 2025 Code Cycle

Name	Email Address
Michael Shewmaker	michael.shewmaker@energy.ca.gov
Javier Perez	javier.perez@energy.ca.gov
Will Vicent	will.vicent@energy.ca.gov

Meeting Participants (available upon request by emailing info@title24stakeholders.com)

Action Items from Meeting

- The Statewide CASE TEAM followed up on all questions or comments that required a response and were not discussed during the meeting.

Key Points from Meeting

Heat pump water heaters (HPWH) are a key component of decarbonization, and the Central HPWH clean-up proposal would update the prescriptive requirements to allow more design options prescriptively, which is important as market adoption of central HPWH increases. All manufacturers of HPWHs require sufficient ventilation. The ventilation requirements for HPWH proposal for Multifamily Domestic Hot Water does not require that

HPWHs be installed, but rather requires ventilation for those that are installed. It does not involve commercial integrated HPWHs, split-system HPWHs. This proposal is important because:

- Electric ready requirements should align with standard practice and explicitly require electric readiness, throughout the building electrical system, upstream of the electric ready appliance.
- Individual HPWHs require more space and ventilation than gas water heaters, and the proposal for individual HPWH electric readiness would require planning for both.
- Retrofitting from central gas water heater to central HPWH can be technically challenging in existing buildings. The proposed central electric readiness requirements would require planning for the infrastructure that is most difficult to address at retrofit including physical space, air flow, condensate drainage, and electrical.
- The proposal to require pipe sizing per CPC Appendix M saves energy and reduces first costs, reduces health risks, improves water quality, and results in water and embedded energy savings.
- It proposes to remove the requirements for hot water demand control for recirculation systems serving multiple dwelling units (based on stakeholder feedback).
- The proposal for pipe insulation enhancement would improve the requirements for insulation of piping and appurtenances, and require 3rd party verification.
- The proposal for automatic balancing valves would save energy and reduce first costs in multifamily buildings that meet the criteria for the proposed compliance credit.
- The master mixing valve proposal would require the use of master mixing valves for central domestic hot water systems.

MEETING NOTES

During the meeting, questions and comments were submitted in three distinct formats which are provided in these meeting notes in these [hyperlinked for quick access] sections:

1. **In-Meeting Questions / Comments:** Questions and comments submitted verbally during the meeting via the 'raise hand' function in GoTo Webinar, where participants were unmuted to speak, or in some cases, comments submitted in writing were discussed verbally during the meeting (in which case the person that commented may not be identified in these notes).
2. **Questions / Comments Submitted Via GoTo Webinar:** See this section for questions and comments submitted in written format via the GoTo Webinar question pane.
3. **Public Input Submitted Via Mentimeter:** This section includes public comments and questions, including screen shots of the polls that were conducted during the meeting, and responses to those polls.

Not all written questions and comments were discussed during the meeting but all have responses available in these meeting notes.

In-Meeting Questions / Comments

Central Heat Pump Water Heaters, Dove Feng, TRC

1. Verbal question from Meg Walter on behalf of NRDC: Can you explain the Proposed Code Change table further?

System Configurations		Prescriptive Compliance Pathway		
		2022	2025	
			Primary path	Alternative path
Single-Pass Primary	with HW Circulation Returned to Primary Storage	No	No	NEEA AWHS Commercial HPWH Tier 3 or higher
	with Series Temperature Maintenance Tank System (Swing Tank)	Yes	Yes	
	with Parallel Temperature Maintenance Tank System with multi-pass HPWH	Yes	Yes	
Multi-Pass Primary	with HW Circulation Returned to Primary Storage	No	No	
	with Series or Parallel Temperature Maintenance Tank System (Swing Tank)	Yes	No	

All configurations can use the performance pathway

CASE Team response (Dove Feng): we’re proposing two prescriptive options (currently there’s just one prescriptive option in the 2022 code so we’re adding one more). It’s similar to the individual heat pump water heater code section. If the design or product meets advanced water heating specifications higher than Tier 3 rating, you can comply prescriptively, but in all configurations, you can use performance pathway.

1. Regarding refrigerants: why are you using R410 in analysis when it will not be allowed for use in CA in 2026?

a. CASE Team response (Dove Feng): Those are the current refrigerants used in majority of products offered on market currently. We know that those products are being phased out in favor of low-GWP products, so we wanted to compare the performance of all of these options. Also in 2022 ACM codes, the ACM assumption of the standard design uses R-134a as the standard requirement so we used this as our baseline for the 2025 code proposal analysis.

2. Question posed by moderator (from either GoTo Webinar or Mentimeter): Could you explain the rationale that the system with electric resistance for temperature maintenance has the most savings?

a. CASE Team response (Dove Feng): The energy savings shown can vary quite a bit. In that config the primary HPWH is providing the HW demand and TM system is only maintaining heat loss in recirculation loop, so if there is not a lot of energy loss in recirculation loop then the electric resistance use is small. Our model shows that configuration is very efficient. Lab testing data shows return to primary is also very efficient because you use the heat pump water heater to maintain both the primary and temperature maintenance load, but there are some products that do not support that configuration and there’s some concern that if the return water temperature is too warm the system may fail. There is data we’re looking into regarding this topic.

- 3. Question posed by moderator (from either GoTo Webinar or Mentimeter): Incremental first cost question – is the cost broken down further (for example cost of unit, controls piping)?**
- a. CASE Team response (Dove Feng): We have those data on costs; a lot of the cost (especially multi-pass equipment) is driven by the equipment cost. Some multi-pass equipment is more expensive than single-pass.
- 4. Question posed by moderator (from either GoTo Webinar or Mentimeter): Do all systems include a recirculation loop?**
- a. CASE Team response (Dove Feng): We do consider that there is a recirculation loop for central systems – that’s how we define ‘central system’. There are designers using one or multiple systems serving multiple dwelling units without a recirculation loop but we are not evaluating that for this code proposal.
- 5. Question posed by moderator (from either GoTo Webinar or Mentimeter): What standard lifetime are you using in the analysis for Central HPWHs?**
- a. CASE Team response (Dove Feng): We will be assuming 15 years for the equipment. There is a 30-year standard for the cost-effectiveness analysis but we assume the equipment has a 15-year lifetime. We haven’t done the cost-effectiveness analysis yet so we’re looking for more information – so please share if you have any you’re able to contribute.

Individual HPWH Ventilation, James Haile, Frontier Energy

- 6. Matt Motner: Regarding the projects you have reviewed- how representative are they and how many projects have you reviewed?**
- a. CASE Team response (James Haile): There were at least 12 multifamily projects we reviewed where we were able to tell from the designs how the ventilation was specified, but others just had a note from the contractor saying they ran out of money and couldn’t address ventilation. So they installed the heat pump water heater in closets with the same amount of ventilation as the previous gas water had.
- 7. Danny Kim: Was there any indoor air quality concern if only the inlet of the intake is ducted, and if so, was there consideration of requiring a morph rating filter and inlet?**
- a. CASE Team response (James Haile): We’ve not considered it for this measure, only been concerned with the performance of the heat pump water heater but that might be something to consider.

8. Clarifying question from moderator: Is ventilation required whether a heat pump water heater (HPWH) is installed or not? How do you size the ducting ventilation if the HPWH size is not defined?

- a. CASE Team response (James Haile): The ventilation requirements for a gas-fired water heater are much more stringent than a HPWH. Manufacturers have in their installation manuals and in contractor training - requirements for duct diameters and duct lengths and we're leaving that up to them as it can vary significantly from one HPWH to another and is related to the capability of the fan -so we're not specifying it in our proposal (but the larger the better; whatever gives the least resistance to air flow).

Individual HPWH Electric Ready, and Central Heat Pump Water Heater Electric Ready, Jose Garcia, TRC

9. Question from Mentimeter: A lot of central HPWHs combine the compressor and the tank – have you found any systems that separate the two out so they could have split systems that would not require ventilated indoor spaces?

- a. CASE Team response (Jose Garcia): Yes, that's common for central HPWH and in retrofit cases it's common for the the compressor to be outdoors and the tanks indoors so you don't have to modify the building for ventilation.

10. Comment via GoTo Webinar: the dimensional and air flow requirements are difficult to dictate with technology changing so quickly and there are over 100 new systems coming to the market this fall. How do we adapt to this new technology coming onto the market?

- a. CASE Team response (Jose Garcia): It is challenging to know what's coming in the future but by placing the heat pump outdoors they can reserve some space on the roof for a future heat pump and they won't have to worry about designing for future air flow as it would be vented outdoors. We also found in our analysis that the size of the existing mechanical room is often sufficient for the size of the future tanks so the size is already built into the building. Please reach out to me to share more.

CPC Appendix M Pipe Sizing, Amin Delagah, TRC

11. Comment via GoTo Webinar: I believe the water flow data you showed was only for HW peak flow. Do you have Cold water peak flow, or total MFam (at main) building flow data?

- a. CASE Team response (Amin Delagah): I believe the results we showed was for the total building starting at the meter, not just the hot water portion. Typically Appendix A or Appendix M is sized starting at the piping close to the water meter and starts with the cold piping first then the hot water piping is sized using that methodology.

Demand Control Cleanup, Jose Garcia, TRC

(No questions occurred during this portion of the presentation)

Pipe Insulation Enhancement, Amin Delagah, TRC

12. Question from Mentimeter: Code currently advises joints with dissimilar metals not using a dielectric fitting should remain exposed, how will the proposal address this?

- a. CASE Team response (Amin Delagah): I was not aware of this and I'd like to connect with you and consider if additional language is needed. We'd appreciate it if the commenter would reach out to us directly.

Automatic Balancing Valves, Jose Garcia, TRC

13. Question from Mentimeter: Reverse return piping is frequently used in hydronic systems to equalize flow, is this something that's being used in DHW systems?

- a. Our understanding of the market in California is that reverse return is not as common for domestic hot water systems as using balancing valves.

Master Mixing Valves, Amin Delagah, TRC

(No questions occurred during this portion of the presentation)

Wrap-Up

- All Draft CASE Reports will be posted March through June at title24stakeholders.com
- Round 2 meetings begin in April
- Meeting adjourned at 3:15 PM PST

Questions / Comments Submitted Via GoTo Webinar

The questions and comments below are provided verbatim (as-submitted) in the GoTo Webinar Question pane.

Name	Time Asked	Question / Comment	CASE Team Response
Rod Buchalter	09:07:54 AM PST	What about utilizing Drain / Waste water heat recovery to reduce storage size / protect against peak loads?	Yes, this is something to consider. We do need more lab and field testing with heat recovery to understand the impact on the heating plant efficiency and reliability. Single pass HP water heaters require supply water that is low in temperature and the location where the heat recovery system brings warm water back to the storage tank should not disrupt the water temperature stratification in the tank and cause a situation where the HP cannot operate with warm inlet water temperatures to the unit.
Chris Sweeny	02:07:11 PM PST	There is a lot of opportunity for CASE to develop structure around DHW balancing.	Thank you for this comment. Thank you Chris, it would be great to hear more from you. Please contact me if you see more opportunity than what we are currently proposing
Jon McHugh	09:14:30 AM PST	When are the various refrigerants being phased out especially R-410 and R-143?	We will review this as we finalize the proposal.
Robert Glass	09:20:40 AM PST	Why are you using R410 in analysis when it will not be allowed for use in CA in 2026?	CASE Team response (Dove Feng): Those are the current refrigerants used in majority of products offered on market currently. We know that those products are being phased out in favor of low-GWP products, so we wanted to compare the performance of all of these options. Also in 2022 ACM codes, the ACM assumption of the standard design uses R-34a as the standard requirement, so we used this as our baseline for the 2025 code proposal analysis.
Jon McHugh	09:22:46 AM PST	Could you explain the rationale that the system with electric resistance for temperature maintenance has the most savings?	CASE Team response (Dove Feng): The energy savings shown can vary quite a bit. In that config the primary HPWH is providing the HW demand and TM system is only maintaining heat loss in recirculation loop, so if there is not a lot of energy loss in recirculation loop then the electric resistance use is small. Our model shows that configuration is very efficient. Lab testing data shows return to primary is also very efficient because you use the heat pump water heater to maintain both the primary and temperature maintenance load, but there are some products that do not support that configuration and there's some concern that if the return water temperature is too warm the system may fail. There is data we're looking into regarding this topic.
Robert Glass	09:27:10 AM PST	Analysis should also show anticipated performance using new alternate Low GWP refrigerants - few are currently on NEEA list.	Yes, the lab testing supporting this measure is utilizing HPWH with low GWP such as CO2 744 and results will be shared in the draft report

Jon McHugh	09:27:31 AM PST	More clear question Proposed design 1 and proposed design 4 seem to have comparable performance but proposed 1 has electric resistance for temp maintenance and proposed 4 has a heat pump for temp maintenance what is the mechanism of similar performance?	We will review this as we finalize the proposal and provide an update here ASAP
Rod Buchalter	09:38:58 AM PST	Concerning heat recovery , Single pass systems would simply require cold water feed to the showers instead of feeding to the storage tank or water heater inlet .. we do this already with tankless gas water heaters that have inlet temperature limits. Recovery will also minimize the need for back up electric resistance elements which reduce the COP when utilized.	We will review this as we finalize the proposal and provide an update here ASAP
Meg Waltner	09:39:33 AM PST	Follow up question -- would a project without a recirculation loop not be eligible for prescriptive compliance? I'm not sure how common this is, but I have worked on an 8-unit renovation project (not in California) that was upgrading from an electric resistance central system to a central HPWH. It seems like having a prescriptive path for small multifamily with central systems is important.	We will review this as we finalize the proposal and provide an update here ASAP
Liam Buckley	10:10:16 AM PST	I would caution all against making any code recommendations that uses CBECC's central plant HPWH model, because that model cannot be validated against any other Title 24 Compliance Software. The reference performance data (COP, capacity at rated condition) is "confidential"; even in the Standard model and cannot be shared with the public, even though it resides in public-domain software.	We will review this as we finalize the proposal and provide an update here ASAP
Meg Waltner	10:14:04 AM PST	I'm curious how many projects the plan review you conducted represents?	Answered verbally. We reviewed about 12 multifamily projects. We also conducted interviews and believe the data is representative of current practice for HPWH ventilation.

Robert Glass	10:15:51 AM PST	Ventilation is required whether a HPWH is installed or not - correct? How are these sized if the HPWH sizing is not defined?	Specific to water heating, gas heaters require air for combustion. HPWHs require air for a thermal resource. The needs are different for the two with HPWHs generally requiring more ventilation. See handout SECTION 110.3 for proposed details on amounts of air.
Ted Tiffany	11:37:18 AM PST	Can't get on Menti but these dimensional and airflow requirements are tough to dictate with technology changing SO QUICKLY. There are 100+ new systems coming to market this fall.	Respond verbally: We acknowledge this as a challenge. I think that by looking at more of what's out there, it's difficult to predict future products, if the compressor is outdoors they don't have to worry about designing for future HP, we also found that most mechanical rooms housing existing gas system have adequate space already for the future tanks. Please reach out to us if you have any suggestion
David Reddy	12:11:24 PM PST	I believe the water flow data you showed was only for HW peak flow. Do you have Cold water peak flow, or total MFam (at main) building flow data?	CASE Team response (Amin Delagah): I believe the results we showed was for the total building starting at the meter, not just the hot water portion. Typically Appendix A or Appendix M is sized starting at the piping close to the water meter and starts with the cold piping first then the hot water piping is sized using that methodology.
David Reddy	12:15:19 PM PST	I recommend double-checking this. I'm familiar with the source of the graph shown, and if it is from the same source, it is only for HW.	Thank you David, we will record this feedback and verify if the water flow data is for HW Peak flows only, or if it applies to CW and total flows as well as we finalize the proposal
Jon McHugh	12:28:14 PM PST	Isn't appendix M a minimum pipe sizing? Does this require not exceeding some size?	Appendix M is an alternative pipe sizing procedure. The water demand calculator does all the work. It is not a minimum pipe sizing procedure and it does not require not exceeding some pipe size to my knowledge, it is still conservative but something that can be improved in the future and as water use trends continue to be reduced.

Public Input Submitted Via Mentimeter

Note: all questions and comments submitted via Mentimeter are anonymous. Those that were discussed during the meeting are incorporated into the ‘In-Meeting Questions / Comments’ section above; others are shown below.

Central Heat Pump Water Heater session comments

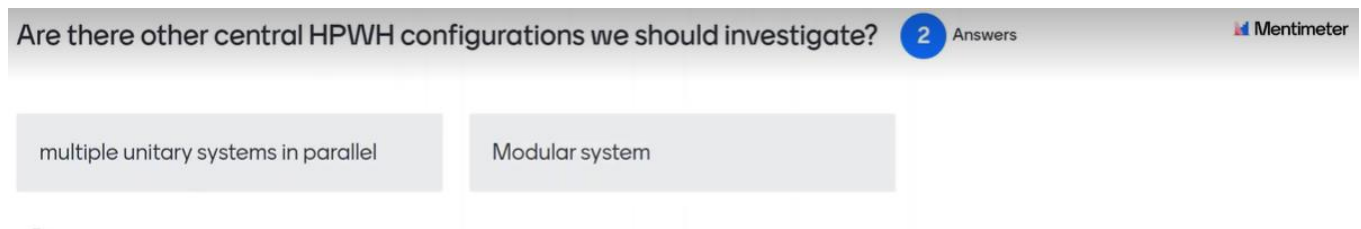
1. **Temperature maintenance system return to primary configurations was a concern we alerted the CASE team in the 2022 requirements, CASE choose not to address at that time. What changed CASE’s position?**
 - a. CASE Team Response: Not all HPWH equipment support temperature maintenance system returns to primary configuration. In 2022 requirements, the prescriptive requirements include decoupling the TM system from the primary HPWH system. For 2025 code development, we conducted interviews and collected product data and lab testing information to understand whether the industry practice and product features have evolved such that we should revise the requirements. The Statewide Team decided to keep the requirement that decoupling TM system from the primary HPWH system in the primary prescriptive requirement. However, if equipment manufacturers support direct return to primary configurations, they can submit their system designs to NEEA AWHs and designers then have the options to pick the design and comply prescriptively if the system design meet the alternative prescriptive requirement. Designers always have the options to comply using the performance approach which includes most common HPWH design configurations, including direct return to primary and decoupled TM system options.
2. **In the 2025 CASE proposal, it now has ‘No’ for prescriptive path listed in more configuration than ‘Yes’. and allows an alternative path for all. If that is the case, why have the prescriptive?**
 - a. CASE Team Response: The 2025 proposal added an alternative prescriptive pathway which allows greater design flexibility, ensure system efficiency and reliability using prescriptive pathway. Designers can comply with the code prescriptively using any system that meets the alternative requirements.
3. **Comment about first poll: That vote should be changed to 1%, not 100%, thank you. For percentage of HPWH.**
 - a. CASE Team Response: We will update the poll results
4. **For the system COP of the total HPWH system, will the modeling and data be publicly available?**
 - a. CASE Team Response: We will include system COP information in the final CASE report.

CPC Appendix M Pipe Sizing session comments

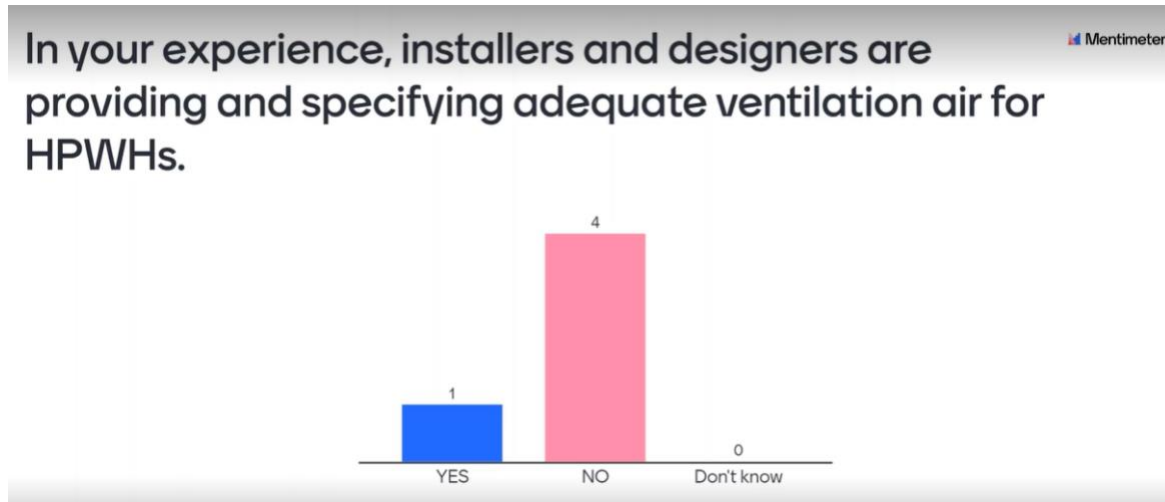
1. **When proposed code text says "verify" does that mean someone like a building official needs to confirm on a drawing and/or in the field? or is there a protocol for HERS verification intended?**
 - a. CASE Team Response: The draft code language could be reworded to remove the word "verify." To meet the prescriptive requirement, it should say "the water distribution design on the plumbing plans and associated sizing tables shall use Appendix M pipe sizing and explicitly indicate the methodology followed. HERS verification is not intended, plan reviewer reviews compliance docs and plans prior to the permitting process.
2. **I have seen mixing valves that were not getting enough HW flow to activate at all.**
 - a. CASE Team Response: Might not have been set up correctly, or might have become scaled

Mentimeter Polls & Responses

Central Heat Pump Water Heater Session, Dove Feng, TRC

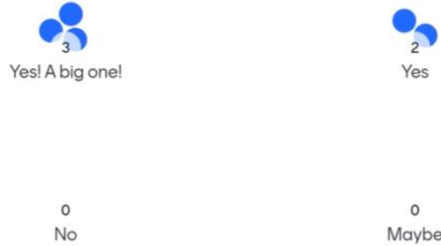


Individual HPWH Ventilation, James Haile, Frontier Energy



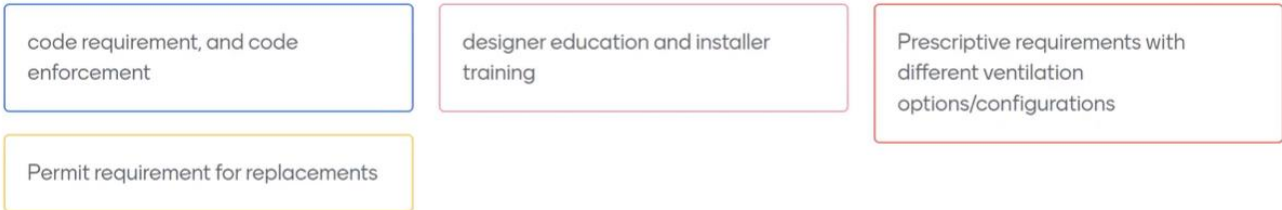
Is the apparent lack of attention to ventilation needs a problem?

Mentimeter



If the apparent lack of attention to ventilation needs is a problem, what are some solutions?

Mentimeter



What steps do you think should be included in the compliance and enforcement process for this measure? Select all that apply.

Mentimeter



Electric Ready Buildings Clean-up recommendations, Jose Garcia, TRC

Do you agree with our description? What else should we know? 

I can't speak to standard practice, but support expanding the electric ready requirements as you've proposed.

Electrical readiness for Electrical resistance heat tape for domestic hot water maintenance might be considered, especially with California submetering guidelines (CPC 601.2.2)

Individual HPWH Electric Ready Clean-up, Jose Garcia, TRC


Do you agree that the requirements should enable the future retrofit of 240 volt and 120 volt options? If not, what should we know? 

3 Answers

yes

Yes, agree.


If you require 240V with neutral then only one circuit needs to be run.

Do you agree with the technical justification and minimum requirements for space? If not, please explain and reach out to us with any data. 

1 Answer

set the readiness bar (voltage, amperage, NFA, closet volume) higher just in case the retrofit is subjected to inevitably revised code or ordinances.

Central Heat Pump Water Heater Electric Ready, Jose Garcia, TRC

Should the code require a route for future piping from the HP to the tanks be constructed or is this a detail that can be a retrofit? Why/why not? 

No, because typically the existing tanks would need to be replaced anyway

Would it be acceptable to have two sets of sizing factors, one for smaller gas systems and one for larger gas systems? Why or why not?

Mentimeter

(No responses provided by attendees)

Do you agree with these assumptions? If not, what would you improve?

(No responses provided by attendees)

CPC Appendix M Pipe Sizing, Amin Delagah, TRC

Current Market

- Based on review of 25 project drawings, none used CPC Appendix M for MF buildings
- Designers indicate that they have not used CPC Appendix M for California projects
- In California jurisdictions that allow CPC Appendix M, building inspectors responded that there is limited to no uptake in submitted building plans
 - Several designers interviewed were not aware of these California cities that allow CPC Appendix M
- Some designers that we have interviewed that work outside of California have started using Appendix M

Does this market overview align with your experience in California?

1 Answer

Yes, agreed.

Is Appendix M pipe sizing methodology known and understood by the design community?

Mentimeter

No, further education would be helpful

Awareness is increasing. I have recently seen presentations on Appendix M at conferences and education seminars (ASHRAE, AHR, Dry Climate Forum, etc.).

What has been your experience using the water demand calculator?

(No responses provided by attendees)

Are there any other technical considerations we should be aware of?

Fitting pressure loss charts are also horribly out of date and don't really work for modern fittings (push to connect, press fit, plastic fittings, etc.). Does Appendix M address this at all or is more work still needed on fittings?

We want to hear from you! Please provide any last comments or feedback...

(No responses provided by attendees)

Recirculation System Demand Control Cleanup, Jose Garcia, TRC

Please select any of the following that you agree are technical concerns:

Mentimeter



(1) Providing adequate hot water 24 hours/day



(2) Increased risk of legionella growth



(3) Demand control systems are often turned off

0

(4) None of the above

Do you have any other feedback for us? **2** Answers

Aqua stats are antiquated technology, most newer pumps (VFDs) include an n demand controls built in to the logic.

DHW controls, whether in the form of recirculation pump controls (demand or other method) or temperature modulation, should remain as a prescriptive requirement. Needs more definition to operation parameters that saves energy and preserves service



Pipe Insulation Enhancement, Amin Delagah, TRC

Does existing code related to pipe insulation extend to appurtenances and pipe supports in series with hot water piping?

even clamps should be insulated from pipe, but is this enforced when identified for compliance?

We want to hear from you! Please provide any last comments or feedback...

(No responses provided by attendees)

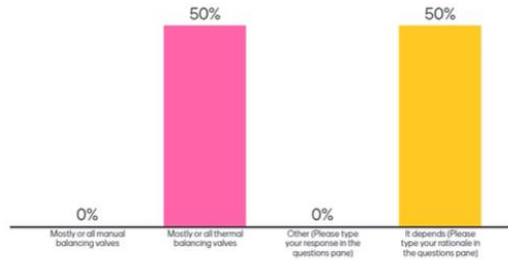
Automatic Balancing Valves, Jose Garcia, TRC

Are there other relevant code requirements, including for jurisdictions outside of California, that you are aware of?

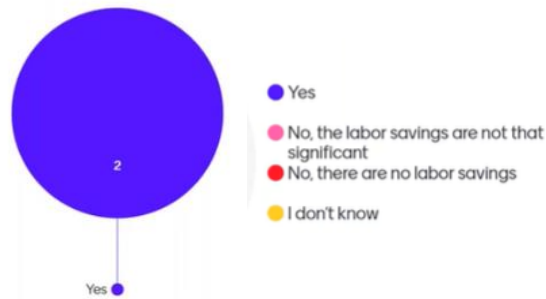
Mentimeter

There are no balancing standards anywhere. "Balancing valve" is not even defined

Designers, design consultants, and contractors: What balancing valve products are you specifying or installing in your multi-riser projects? Mentimeter



Designers, design consultants, and contractors: Do you agree that thermal balancing valves cost less up front due to reduced balancing costs? Mentimeter



We want to hear from you! Please provide any last comments or feedback...

2 Answers

There's a lot of opportunity for energy efficiency when it comes to hot water balancing.

PICV is a far better product compared to thermal balancing

Master Mixing Valves, Amin Delagah, TRC

Can you share your experience with mechanical or digital MMVs?

5 Answers

Mentimeter

digital seem to be VE'ed out but the owner

Maintenance is crucial, valve authority depends on it.

one configured, they work.

digital seems to be Value Engineered out by the owner

Like mechanical mixing valves, they are sensitive to low/no recirc flow.

What have you observed in the field with the commissioning or operation of mechanical or digital master mixing valves?

Mentimeter

(No responses provided by attendees)

Are there any other market observations or technology considerations with MMVs that we should be aware of?

(No responses provided by attendees)

We want to hear from you! Please provide any last comments or feedback...

(No responses provided by attendees)