CALIFORNIA MARKET TRANSFORMATION ADMINISTRATOR

ATTACHMENT 5

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MEETING NOTES FROM MTAB MEETINGS

1. October 13, 2023
2. November 30-December 1, 2023
3. January 25, 2024
4. April 25, 2024
5. June 14, 2024
6. July 12, 2024
7. August 26, 2024
8. September 19, 2024
9. September 23, 2024
10. October 25, 2024
11. November 20-21, 2024
12. February 19, 2025
13. April 22, 2025
14. June 27, 2025
15. August 20, 2025
16. September 29, 2025
17. November 12-13, 2025
18. January 29, 2026
19. March 5, 2026
20. March 25, 2026
21. May 6, 2026

Application 26-07-XXX

California Market Transformation Administrator

(CalMTA) July 6, 2026

MTAB Meeting Notes

October 13, 2023
In-Person Meeting

Introductions & Approval of the Previous Meeting Notes

Margie Gardner opened the meeting with introductions and a request for comments to the previous meeting (9/8) notes. There were no comments.

Disposition Report Outline Review

Margie reviewed the schedule for MTI Advancement Plan development and answered questions. Jennifer Barnes, 2050 Partners, reviewed the Disposition Report Outline.

There was discussion about the timing of deciding what would go into Batch 2 market transformation initiatives (MTIs) and how MTIs could meet desired portfolio characteristics such as equity, gas v. electric investment, length of time for initiative implementation, etc. It was explained that these topics would be covered in upcoming MTAB meetings.

Staff was encouraged to include context in the report about what impact and benefits the market transformation initiatives will bring to the state. MTAB members were encouraged to send feedback if they had further comments on the material.

Advancement Plan Template

Jeff Mitchell reviewed the Advancement Plan Template, which will be used for development of the full MTI plan. Jeff explained that there would be budget estimates and that the logic models in the Advancement Plans will include market progress indicators (MPIs).

There was further discussion about whether the development process would define a methodology to translate the market progress indicators (MPIs) for evaluation into savings. Karen Horkitz explained that the MPIs primarily will be tied to the theorized market changes and outcomes in the logic model and the MTI Plan will measure how we will get to those outcomes. Evaluation will consider savings in the market and whether the MTI caused them. The estimate of savings will come from comparing total market adoption against the baseline, so we will be measuring units in the marketplace. Other feedback on the Advancement Plan template included:

- The need for a research plan that shows what market research and other studies depend on other things—whether they are sequential, simultaneous, or contingent.

- That the market opportunity should describe why these actions are important at this time to create a transformed market with the following benefits.
- The need to identify and include in the plan market data sources that would be used to translate MT efforts into savings.
- Add challenges or hurdles in the foreseeable future that might prevent progress.

Overview of ideas moving to Batch 2

Jeff Mitchell presented information about the ideas that came in through the Request for Ideas, how they were grouped (as similar ideas), scored, and disposed. He then described ideas that are being scored in Stage 2. Specific questions and comments from MTAB members included:

- Whether there were equity aspects in the ideas related to heat pumps. It was explained that the portable heat pump idea in particular had a strong equity aspect.
- Efficient street lighting is mostly about controls and the MTI could couple efforts to further reduce wattage and upgrade controls.
- A question about how the induction cooktop MTI would play out with policies banning of gas for new construction. It was explained that these kinds of policies would be a good example of leverage that could drive market change or that we may opt to not pursue because the policy on its own would create the change we seek.
- Whether there were any ideas on transportation. Jeff said only an idea about bi-directional EV charging.
- If there were ideas related to controls. Jeff explained that there were a lot in HVAC and building controls, which were batched with the related technology.

Front Runner MTI Presentations

Portable/Window Heat Pumps

Jennifer Barnes presented the portable/window heat pumps concept. Jeff Harris of NEEA disclosed that they are working in this same area. MTAB member feedback included:

- A recent test showed that this technology works somewhat as intended and can be installed, but product efficacy should be reviewed. Excited that these are going to sell, but need to make sure the product is quality.
- This is a good opportunity to require low-GWP refrigerants because disposal is an issue.
- These products currently do not include efficiency ratings or identification as a heat pump. There would be a need to educate consumers on how to choose the right product and DYI installation.

- A question on whether this MTI would include packaged terminal heat pumps (Ephoca, for example) to help address air filtration. Jeff explained Ephoca would be a contractor/distribution channel.
- There was a group of low-income advocates that put forward a policy under landlord habitability that would have required landlords to provide air conditioning. While this isn't law, this technology provides a good option for that idea and, in the case where the household buys it, gets around the split incentive problem between tenants and landlords.
- With California's electric rates, it would be necessary to analyze whether this technology would help low-income households come out ahead on their utility bills. Jeff explained that assessing bill impacts would be part of the modeling plan.
- There is not a standard rating or consistency in the product currently.
- Should review how the product would interact with the ducted or ductless system in place to ensure they work together.
- Products need a test standard to be developed, which DOE has started, and PG&E is supporting.
- If this is a potential candidate for the ENERGY STAR Retail Products Portfolio (ESRPP), there are opportunities to partner with NEEA, existing efforts in California and NYSERDA in New York, which is an ESRPP sponsor.
- Excited that this product offers competition for ductless heat pumps, which have not come down in price. This would present an alternative room-level comfort option.
- Need to get the product registered with the California Energy Commission.
- A question about how this relates to emerging technology programs? It was explained that MTI development is coordinated with CalNEXT, so there is a good hand off and no overlap in efforts.
- Wondered if there was an aspect related to workforce education and training such as residential contractors being aware of the enhanced incentives and conversations with homeowners and tenants and expanding their work to include this as an option for customers. Jeff explained that he thought there could be, but generally this is a self-installed product.

Induction Cooking

Jeff Mitchell presented the induction cooktop concept. MTAB member feedback included:

- Asked whether this work could be leveraged with existing incentives. Jeff explained that there are incentives for appliances, but don't yet know the extent that they would cover induction stoves.
- Cultural barriers would apply to this technology since electric cooktops are seen by certain ethnicities as undesirable. There was discussion about finding ways to move past cultural barriers to the notion that these technologies are better and safer. We need to make induction cooking "insanely great."

- Certain markets are starting to move like in Portland. May need to focus on lagging marketings. Do we have data on current state of home stoves? It was shared that PG&E has data on current cooking end use loads.
- DOE has a ruling in process for gas and electric cooktops—advocates, utilities and manufacturers negotiated and submitted efficiency recommendations to DOE a couple of weeks ago.
- Suggested that the initiative look at cooking more broadly to include induction and higher-efficiency gas cooktops.
- Smaller 24-inch induction ranges are nearly impossible to find, which is an equity issue because small apartments need this size. There is also a 120V product with a battery that would help with demand flexibility.
- Another issue is the weight of the pans that are needed and that consumers must buy new cookware.
- Need to address panel upgrades in the MTI to make sure there's amperage necessary to run the stove.
- Discussion about the reported issue with pacemakers, but research is limited.
- The price barrier may be able to be addressed by removing some of the premium features of currently available products.

Efficient Rooftop Units (ERTUs)

Elaine Miller presented material on heat pumps to be used as efficient rooftop units for HVAC in commercial buildings. Jeff Harris disclosed that NEEA is working on a tiered efficiency specification so manufacturers could make products with better insulation and dampers and then move to Tier 2 or Tier 3 with additional measures. NEEA collaborated with the PG&E team and just finished negotiations for upcoming test procedures. MTAB member feedback included:

- There is a lot of stuff that can be done that's easy. We may be able to get the first 10% savings at the factory with a relatively low-hanging opportunity.
- One of the leverage points to go after is the mechanical engineers as a target audience, who service a lot of buildings, and could be educated on ERTUs.
- There is a need to address federal pre-emption.
- Concerns that economizers don't always work well and are required in California for any 3-ton units or greater. There is a new concept from ASHRAE that is total system performance ratio. Rather than looking at the RTU and economizer individually, the Total System Performance looks at the interactions between these two.
- This is a dual fuel opportunity. Whatever you do will likely save gas so this will allow a lot of different participation from different building types and supply. Manufacturers want to set up a dual fuel option and as things progress toward electrification, it's an opportunity to lower energy use and greenhouse gas (GHG) emissions.
- The equity aspect is that this initiative would target small to mid-sized commercial and provide products that are more affordable for small business/building owners and workforce development in low-income areas.

- A Building Performance Standard is coming to California and may be a leverage opportunity for this idea.

MTAB members discussed the need to review the top 20 in more depth and to be able to compare these three Batch 1 recommendations in relation to the others. It was clarified that Batch 1 ideas were chosen because they were high-scoring MTIs that were also the most ready for implementation and would allow CalMTA to meet the application deadline at the end of 2024. Still MTAB members felt they needed more information about the larger set of ideas to give advice or support to ensure success. Staff agreed to bring the other highest-ranking ideas to the next MTAB meeting for further discussion including the Disposition Report, which will have some information to show how the 117 ideas were disposed.

Individual MTAB members expressed questions about whether induction cooktops could be a quick mover. Another had similar comments about ERTUs stating that the fuel substitution test for rooftop units when you have electric or gas and replace with heat pump can have a negative TSB and challenges because of refrigerants.

Evaluation Framework

Karen Horkitz presented on the Evaluation Framework. MTAB comments and feedback included:

- The need to ensure that evaluations document markets where CalMTA was engaged and had impacts. There is a need to determine collective impacts brought to market transformation and other programs due to CalMTA's work and collaboration. Karen explained that one of the MPIs will always be market adoption and from that we will have a methodology to access data to measure the savings impacts.
- There was discussion about how to ensure that data is available from the start and to have contracts for implementation that state what data is needed and how to get it.
- Concern was raised that the approach is biased against market transformation. In this proposal, the resource acquisition (RA) program savings are primary even though we are clearly intending to design the MT program to make the RA program possible or more successful. To give all the units with incentives to RA and take only what's left seems too limiting.
- MTAB members further discussed how baselines for saving estimates are set differently for RA and market transformation and concerns about how that would affect market transformation credit for savings. They reviewed the role of free ridership and differing timelines for RA versus market transformation and how the MTI would receive the savings from long-term market effects.
- There were questions about the non-energy benefits of MTIs. Karen explained that these would be included in evaluations.
- The need to have evaluations of CalMTA programs coordinated with other program evaluations was discussed. "You have two different programs that you are trying to get the sum total of savings for, but because they're not aligned at the baseline you end up leaving energy savings on the table or worse double counting." It was generally agreed that coordination would be very important, and some coordination practices are needed and that the MPIs could help facilitate the evaluation process.

- The use of the 3X rule and concerns that the Framework ignores the 3X proposal were raised. Karen explained that while the Evaluation Framework does not ignore the idea, it recommends another path. It was confirmed that even though the 3X rule is not in currently recommended, it could be included as an option in the Application.
- The need for transparency for evaluations was stated including that evaluators have the final say in the outcomes, all evaluations are published, and the evaluation team does not work for the initiative development team.

Public Comment

Richard Fennelly: "If your proposal doesn't overlap or compete with existing initiatives, do you get extra credit for that?" Jeff Mitchell responded that the team worked through the criteria but didn't give extra credit.

Carol Yin: "I suggest not taking the 3X option off the table. The 3X option would incentivize the CalMTA to really break down market barriers. We were talking about the equity needs . . . there are a lot of market-barrier-based needs that may not tied in neatly with a particular code or standard. We want to make sure that CalMTA has a way to be recognized for doing the hard groundwork of breaking down market barriers. Rather than doing something that C&S calls technology transformation that is clean and tidy. The other reason is that it is by far simpler than anything we are talking about right now. So, if we're really working toward success without getting tied down into details, let's keep that option on the table."

Richard Fennelly (public comment via online form post meeting): "It might be a good idea for topics being held for future consideration to reach back to them and identify areas where their proposal might seem weak so that they have the opportunity to supply further information to hopefully cure such a deficiency."

Other public comment can be submitted via this form: https://calmta.org/mtab-comments/

Next Meeting & Next Steps

Stacey Hobart explained that the next meetings would be held in Southern California at the end of November and subsequently in a location to be determined on Jan. 25, 2024.

The meeting adjourned.

Attendees

MTAB Members

Haley Goodson, TURN
Fred Gordon, Energy Trust of Oregon
Jeff Harris, Northwest Energy Efficiency Alliance
Randall Higa, Southern California Edison
Lujuana Medina, County of Los Angeles County Environmental Division Manager
Peter Miller, Natural Resources Defense Council (virtual)
Steven Miller, SEI and proxy for Cyane Dandridge (virtual)

Christie Torok, California Public Utilities Commission
Ky-An Tran, California Public Advocates

Staff and Consultants

Taqua Ammar, CalMTA (administered by Resource Innovations)
Jennifer Barnes, 2050 Partners on the CalMTA team
Lynette Curthoys, CalMTA (administered by Resource Innovations)
Jim Giordano, CalMTA (administered by Resource Innovations)
Stacey Hobart, CalMTA (administered by Resource Innovations)
Karen Horkitz, Consultant to CADMUS on the CalMTA team
Elaine Miller, CalMTA (administered by Resource Innovations)
Jeff Mitchell, CalMTA (administered by Resource Innovations)
Nils Strindberg, CalMTA (administered by Resource Innovations)

In-Person Guests

Carol Yin, ETCC
Ann, Enervee
Mary Anderson, PG&E
Anad Jen

Virtual Guests

Richard Fennelly, CoilPod LLC
Jay Luboff, Jay Luboff Consulting LLC
Marc Costa, The Energy Coalition
Mark Isaacs, GS Research LLC
Saro Hoffman-Dachelet, Center for Energy and Environment
Pat Eilert, PG&E
Don Arambula, DAC
Joseph Gallegos, www.UmidaAG.com
John King, Energy Solutions
Irina Krishpinovich, Ortiz Group
Nick Brod, DNV
Savannah McLaughlin, CPUC
Emily Pelstring, CPUC
Melinda Lopez, The Ortiz Group
hob Issa Lincus, Inc.
Jessica Granderson, Lawrence Berkeley National Laboratory
Denis Livchak, Synergy Energy
Steven Long, ICF
Nick Leritz, NEEA
Edward Merkel, Innovative Facilities Solutions
Samantha Putlak, Energy Solutions
Spencer Lipp
Ben Bunker, Pearl Certification
Lisa Ash, Brio
Allegra Steenson, PNNL
Rafael Friedmann
Kim Page, Recurve
Maddie Hansen-Connell, MN Center for Energy and Environment
Marisa Lee, Energy Solutions
Carlo Gavina, SoCal Gas
Kevin Berry
Stephanie Gutierrez, San Diego Gas & Electric
Alton Kwok, San Diego Gas & Electric
Dan Suyeyasu, CodeCycle.org
Amy Barr
Christopher Malotte, SCE
Christian, Valoria

Jesse Emge, Evergreen Economics

Charles Kim, SCE

MTAB Meeting Notes

November 30-December 1, 2023
In-Person Meeting

Day 1: Nov. 30, 2023

Introductions & Approval of the Previous Meeting Notes

Stacey Hobart opened the meeting with introductions and a request for comments to the previous meeting (10/13) notes. There were no comments.

Declaration of COI

Stacey Hobart reiterated the conflict of interest (COI) policy for MTAB members and CalMTA and asked members to declare any potential COI.

- Jeff Harris disclosed that NEEA has active MTIs across a four-state area working in the same market categories targeted by CalMTA, although these are all in the Pacific Northwest.
- Fred Gordon is on the NEEA advisory board but does not anticipate this directly overlaps with work in California. He will be retiring from the NEEA board in spring 2024.

Stacey described COI policies and firewall between Resource Innovations employees who work in a decision-making capacity for CalMTA and Resources Innovations employees who work on projects for "covered entities," such as implementing energy efficiency programs for California investor-owned utilities. Approval by the CPUC Contract Manager is required to consult with subject matter experts from Resource Innovations who also work on projects for covered entities.

Draft Stage 1 Disposition Report

Jennifer Barnes presented the revised Disposition Report scope, with two separate reports and schedule for development. Specific questions and comments from MTAB members included:

- How is CalMTA coordinating with groups like CalNEXT for ideas that were archived because they were too early in the technology lifecycle?
    - Jeff Mitchell confirmed that CalMTA is working closely with CalNEXT to determine how best to coordinate and support development of those ideas.
- How would CalMTA approach the research needs flagged in the report related to what municipalities and other public agencies were doing re: induction cooktops/ranges?

    - Jeff M. noted that this is part of our external program review process and that we are still clarifying opportunities vs. overlap.
- How is CalMTA facilitating coordination that might help incorporate archived tactics, not technologies, to other programs?
    - Jennifer noted that this has surfaced internally and externally and that CalMTA is considering what that mechanism might look like.
- How is CalMTA consistently exploring equity opportunities in the MTI scoring process?
    - Jennifer responded that the scoring team considered equity even if the idea submission didn't identify any aspects, and tried to be realistic about true equity impacts within the market transformation framework for that idea.
- How is CalMTA defining equity?
    - Karen Horkitz described CalMTA's equity workgroup and adopted equity lens, as defined on our website, but noted we are still determining how we will measure our equity impact.

Discuss & Prioritize Batch 2 MTI Ideas

Jeff Mitchell introduced a discussion of high-scoring MTI ideas still under consideration for development into Batch 2, including the process used to calculate Total System Benefit (TSB) for each MTI. MTAB member questions and feedback included:

- Why the LLLC + HVAC idea scored so low, given CEC interest in integration of systems and the fact that this will become increasingly important statewide over the next 10 years?
    - Jeff Mitchell clarified that the low score indicates a limited role for CalMTA since Title 24 captures so much of these savings already.
- Whether CalMTA's evaluation process takes into account how MTIs might impact savings in other programs or sectors to result in greater TSB overall.
    - Jeff Mitchell confirmed that CalMTA does consider this.
- Why certain MTIs were selected as Batch 1 when some potential Batch 2 ideas appear to be higher scoring?
    - Jeff Mitchell and Margie Gardner described the frontrunner selection criteria and need to have at least one MTI Plan ready to submit next year, so Batch 1 reflects ideas that could be developed quickly.
- Why did some MTIs focused on premium products receive a high equity score?
    - Jeff Mitchell noted that these MTIs create a great opportunity for CalMTA to intervene in the market, drive the product cost down, and make it more accessible to equity communities.

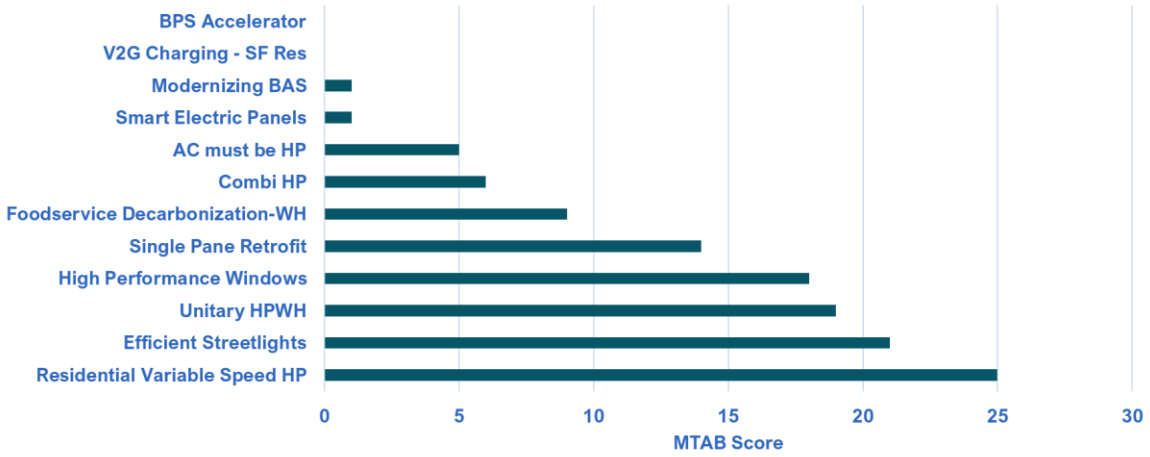
Jeff Mitchell then introduced an interactive activity in which MTAB members could ask questions about each potential Batch 2 MTI and hold up a sign reflecting their level of interest: green (excited), yellow (neutral or unsure), or red (no way). The table below summarizes MTAB response and important comments and questions related to each idea.

Idea Name	MTAB Response	MTAB Comments/Questions
Residential Variable Speed Heat Pump	Primarily excited	• How California's 2030 heat pump goals factor into adoption/impact assessment • Need for detailed WE&T plan since HVAC requires substantial workforce development
Combination Heat Pump	Mixed positive response (primarily green/yellow)	• Concerns about 10-year ramp-up and low equity score • Baseline competition makes this challenging – it's a complicated way to solve the problem, even if the solution is superior • Combining HVAC + WH in one system reduces panel impact and creates the opportunity for grid recovery • CEC Equitable Building Decarb program will focus on LMI homes so this could create more efficiencies and reduce cost barriers • This would likely start as a new construction offering vs. asking households to make two upgrades simultaneously • WE&T will be needed: installers aren't used to hydronic heating and coordinating with a plumber and HVAC installer together can be challenging
Vehicle-to-Grid Charging - Residential	Mixed negative response (primarily yellow/red)	• Failure of SB 233 sets this back but might be revisited, as it has a substantial grid benefit • Many manufacturers are still shipping grid-ready cars • CalMTA forecast factors in assumptions about remote work and commuting • Market assessment indicates that there's no significant gap for CalMTA to fill
Food Service Decarbonization	Primarily negative for appliance electrification; primarily excited for water heating	• Splitting up initiative would allow CalMTA to focus on the more straightforward water heating component vs. very challenging electrification of equipment • The combined initiative would be extremely challenging: very difficult market to penetrate, lots of resale equipment in use, chains/franchises are the only real point of leverage • Concerns about very costly panel upgrades and bill impacts if targeting full electrification

Idea Name	MTAB Response	MTAB Comments/Questions
Heat Pump Water Heater – Single-Family	Primarily excited	• Concerns about crowded marketplace/many existing programs, although CalMTA could play a statewide coordination role • Need to clarify CalMTA's role in general: wouldn't achieve new savings but could accelerate adoption • Significant workforce development needed as well a shifting the market from replace-on-burnout trend
Building Performance Standards Acceleration	Primarily neutral	• BPS can be helpful in shepherding customers into existing programs but not a strong MT play • Lifecycle building costs indicate an integrated approach would be most cost-effective • BPS can enable communication of the longer-term benefits of investment and increase the building's value as an asset
High Performance Windows	Primarily excited (one negative response)	• CalMTA would likely work upstream and build tools to increase demand • Concerns about low TRC • Conservative budget due to significant market leverage: national collaborative, manufacturers' interest in differentiating themselves, large production builders, affordable housing programs, etc. • Most people replace windows one at a time: a unit-based approach makes investment more accessible but other aspects of the MTI more complicated
AC must be Heat Pump Policy	Very mixed response between excited and neutral with two negative responses	• AC industry is already in flux over new refrigerant codes; another rule may not be palatable • Concerns about limited equity impact and high TRC • Might need to be done at the federal level and not state due to pre-emption issues • Similar policy under consideration through Title 24; if this passes it will have a significant impact on LMI households • Questions about the baseline for grid benefits if a heat pump can have AC cycling • Modeling assumes gas backup would be left in place but does not consider controls • Existing legislative work could be leveraged; helps CalMTA achieve codes & standards goals
Single Pane Retrofit - Commercial	Mixed positive response (primarily green)	• MTI includes the curtain wall and glass, but not frame • Cost-effectiveness forecast does not factor in impact of solar heat gain control, which will reduce future costs • This is a long-term play: only a few manufacturers in the market, so we are early in the diffusion of innovation curve

Idea Name	MTAB Response	MTAB Comments/Questions
Highly Efficient Streetlights	Primarily excited	• Municipalization could be a tactic to target this market • County of LA found that 60% of energy costs came from streetlights; local governments are interested in buying streetlights back from utilities • Strong equity impact due to cost-savings and safety • A good early and highly visible opportunity
Smart Electric Panels	Primarily neutral	• Model focuses on grid benefits above energy savings since it's an enabling technology • Hard to achieve but represents a major barrier for multiple MTIs • Equity impact is low because the panels are expensive, and the MTI would target homes with an interest in pursuing expensive electrification upgrades • Cost estimates include just the panel, not cost of labor • MTI could be more all-encompassing to just focus on managing additional loads or load flexibility • Upgrading utility service is very expensive, so the impact of just the panel upgrade could be overstated; CalMTA did explore potential cost-savings and benefits for the utility
Building Automation System	Primarily neutral (one negative response)	• Unclear role for CalMTA to play given decades of efforts trying to advance this technology • Concerns about low TRC, no equity angle, and split incentive issues • Market is ripe for disruption: commercial real estate market could profit off this • Impenetrable market barriers given that action should have been taken decades ago • Title 24 guideline may address this

This was followed by a second interactive activity in which each MTAB member received five Post-it notes numbered 1-5, which they were asked to place on one of the 12 ideas posted around the room. During the exercise, 1 represented an MTAB member's highest priority MTI and 5 represented an MTAB member's lowest priority. In analyzing the exercise responses were then converted to scores that flipped the scale (i.e., Post-it notes with number 1 received 5 points, 2 received 4 points, and so on). The figure below summarizes the score for each MTI based on this exercise.



Lynette Curthoys clarified that the exercise should not be considered a vote or formal decision on which Batch 2 MTIs to develop further, but rather a priority-ranking exercise based on the information presented and MTAB member feedback in the meeting. Lynette also shared that day 2 of the MTAB meeting would include a discussion about how priority MTIs identified through this process would impact the overall balance and desired characteristics of the CalMTA portfolio.

Public Comment

- Richard Fennelly: RFI submission aligns well with Building Performance Standards Acceleration and Food Service Decarbonization MTIs and offers substantial emissions reduction potential.

Day 2: Dec. 1, 2023

Discuss Overall Portfolio Characteristics

Jeff Mitchell presented CalMTA's key questions in developing an MTI portfolio followed by a summary of the current Batch 1 and 2 balance in terms of market sector, technology focus, required investment, ramp-up timeline, WE&T needs, and equity impacts. MTAB member questions and feedback included:

- Whether the portfolio is too heavily focused on the residential sector, given the desire for a balanced portfolio and all ratepayer classes to feel invested.
- This balance also reflects the shorter ramp, near-term opportunity, and historic success of MTIs in the residential market. Being well-positioned for success and offering the greatest value to the state are top priorities at this stage; RFI submissions also skewed heavily residential.
- Future RFI cycles and MTI batches can target sectors not captured in Batch 1 or 2, particularly industrial and agricultural, and CalMTA can take the time to find the right MTIs for these segments with MTAB input.
- Two MTIs (windows and eRTUs) are both fuel neutral.

- Could two HPWH measures be combined/addressed in tandem, or are they really separate initiatives?
- Consider other state goals and their timeframes when looking at MTIs. For example, California has a goal of installing six million heat pumps by 2030 and will need a shorter-term MTI to meet that timeframe.
- Saving carbon sooner is better, as MTIs with shorter horizon are preferrable.
- Additional evaluation of ESJ angle for each MTI may be warranted; however, splitting out WE&T and equity means that some MTIs would have a positive impact on ESJ communities through workforce development that isn't captured in these tables.
- What is CalMTA's target level of ongoing funding, given that the potential budget totals $369M but implementation budget is $250M for five years?
    - Jeff Mitchell said CalMTA will need to follow up on this.

Lynette Curthoys clarified that MTAB prioritization of and feedback on potential MTIs will factor into CalMTA's further research, analysis, modeling, and TSB estimates. This work will also be informed by desired portfolio balance/characteristics, Phase III funding allocation, and milestone timeline. A summary memo shared in advance of the Jan. 25 MTAB meeting will provide Batch 2 MTI recommendations along with additional information about each initiative.

ESJ Listening Sessions Report Out

Rachel Good presented an overview and key findings from the five listening sessions conducted with ESJ community representatives in early November. Discussion between MTAB members and the CalMTA team centered on the following topics:

- Did pay equity/pay scale (a $25/hr. wage) or connections to pre-apprenticeships or union jobs come up?
    - Rachel explained that conversation focused on on-ramp to clean energy work and hands-on learning opportunities/apprenticeships as well as the contracting process, but no deep dive into this issue.
- Initial briefing and in-session facilitation ensured that participants understood that MTIs typically work upstream and not directly with end-use customers. Coordination with existing programs focused on ESJ communities also surfaced as a topic.
- Regarding technology adoption, were there concerns about targeting ESJ communities with new technologies that may face failure/problems that these audiences may not be able to tolerate.
    - Rachel stated that while participants were interested in health and safety benefits, there were concerns about bill/grid impacts and a desire not to be stuck with something that doesn't work.

Update on Draft MTI Evaluation Framework

Karen Horkitz presented the public comments received on CalMTA's draft Evaluation Framework and proposed response, as well as an updated timeline for finalizing the framework. Discussion between MTAB members and the CalMTA team centered on the following topics:

- Whether the utility-claimed savings subtracted to determine which portion is attributed to CalMTA would be net savings?
    - Staff clarified that this would be the case and that we would subtract the savings reported by utilities. CalMTA noted that market changes resulting from policy, national programs, and other extrinsic factors would be included in the baseline market adoption and thus *not* be attributed to CalMTA.
- Whether under the recommended approach, savings attributed to CalMTA would include savings that utilities considered to be free ridership or double-counted savings.
    - Karen explained that the proposed approach is designed to include free ridership in the market baseline, which is subtracted from total market adoption, and therefore would not be attributed to an MTI.
- CalMTA's recommended removal of language regarding "no overlap" between MTIs and the statewide codes and standards makes sense because it will not affect the approach to savings attribution and could encourage useful co-creation.
- While the CPUC separates out program administration and EM&V funding for EE portfolio programs, the Decision that led to CalMTA includes an evaluation budget under the CalMTA umbrella. Some MTAB members questioned whether having CalMTA contract with the evaluator was consistent with California policy or the best long-term solution (vs. having the independent evaluator report directly to the CPUC Energy Division, as with resource acquisition programs). Others thought we should honor the language in the decision, which could be changed. The issue may be raised during the application filed at the end of 2024.
    - Process evaluations (how market activity aligns with program logic and interventions) for MT programs were discussed as fundamentally different than resource acquisition programs. MT requires adaptive evaluation that provides feedback to the program so strategies can be adjusted in real time. Impact evaluations (what savings are attributable to observed changes in market adoption) could be separated out. In the Northwest, third-party evaluators are accepted by regulators as long as they operate under independence rules like those proposed by CalMTA.
    - CalMTA noted that most evaluations included in the Decision pertain to the real-time evaluation function envisioned by the adopted MT Framework and that the proposed solution of including the designated ED representative on the selection committee and all communication related to implementation of

the evaluation work might better serve the intent of the adopted market transformation framework.
    - Clarification that two organizational evaluations do not fall under the CPUC's MT Framework: an evaluation of systems and operational practices after Year 3, as well as the Year 5 evaluation, which relates the performance of CalMTA and the future transition to a nonprofit. The CPUC Energy Division may contract for these evaluations directly.

MTAB members requested additional time to review the Decision before providing input on the proposed approach to ensure independence of third-party evaluation activities. CalMTA will schedule a meeting for further discussion on this topic prior to the Jan. 25 MTAB meeting.

Public Comment:

- Carol Yin: The C&S program has fairly granular evaluation requirements and a separate set of rules, but MTIs can't easily be divorced from current evaluation practices in California – for instance, C&S and CalMTA can't have two separate Delphi panels with separate groups of experts for the same technology.

Advancement Plan: Portable Heat Pump

Elaine Miller presented a summary of the draft Advancement Plan for portable/window heat pumps. MTAB feedback included:

- Being more specific with the target market (i.e., existing multifamily properties that don't have a central heating system) might make this MTI more effective; income-qualified and public housing also often has window units.
- While there is a federal standard for portable AC units, only the cooling side is regulated. This has ramifications for ENERGY STAR differentiation of products as well.
- There's a real opportunity for MT to make this a fairly low-cost heat pump product for a specific audience--this product is so much less expensive than a ductless heat pump that even if its performance isn't as impressive, it's still a good solution. Multiple leverage points exist to bring this to scale and rapidly drive down product cost.
- ENERGY STAR Retail Product Platform (ESRPP) may be a good intervention. CalMTA proposes testing the use of the platform to target ESJ communities; needs to talk to implementers to better understand what products they currently stock.
- Product differentiation is a barrier when shopping: it's very hard to tell which products are heat pumps vs. resistance, most manufacturers and brands are unfamiliar, and product research is hard to do. Stocking practices also need to be addressed.
- The product still needs a lot of improvement, particularly in terms of aesthetics and viability in different types of rooms. The unit mounts via a thin strip with no insulation, which is not secure.

- Ducting is impossible unless the building has double-hung windows. Double ducting is more efficient and should be highlighted in the differentiation but that also means increased complexity of installation.
- Energy Trust of Oregon did field testing and this is highly recommended. It's important to have people try to install them in various home times and see what happens; need to determine when the product is stabilized enough to be mass-marketed.
- What is CalMTA's overall philosophy of intervention and how we structure MTIs: addressing all pieces of the puzzle (proper product design, installation, and workforce development, etc.) or focusing on one specific "golden carrot" end goal?
    - Elaine replied that CalMTA seeks to take all these pieces on but not at the same time--sequenced thoughtfully to achieve true MT.
- Many code and policy standpoints still need to be worked through on the refrigeration front. This product could represent an early entry point in the U.S. for this type of refrigerant.

Advancement Plan: Induction Cooktops

Elaine Miller presented a summary of the draft Advancement Plan for induction cooktops. MTAB feedback included:

- The cost of cookware should be factored into overall product cost since some customers will need to replace existing pots and pans.
- Interventions could mirror those deployed successfully for ductless heat pumps in the Northwest. Success came from focusing on increased home comfort and energy savings in specific areas of the house. Could this MTI focus on plug-in induction cooktops as an introduction to efficient electric cooking?
- Potential target audiences with an equity impact could include the unhoused population (e.g., including induction cooktops in small housing pilots conducted by LA County and SoCalREN) and senior living facilities.
- Good availability of 24" cooktops, but ranges are still uncommon premium products.
- Winning hearts and minds will be key--leveraging aspirational home improvement spaces (e.g., designer magazines, TV cooking shows). If we spark interest and the technology is economically viable/beneficial, market growth will happen naturally.
- Cooking is an unregulated load in Title 24 currently; the possibility of making it regulated exists but not sure what that would look like.

Advancement Plan: Efficient Rooftop HVAC Units

Alexis Allan presented a summary of the draft Advancement Plan for efficient rooftop HVAC units (ERTUs). MTAB feedback included:

- What is the intervention point, given that most properties have RTUs already?

    - Alexis stated that the MTI would seek to encourage higher efficiency tiers and push manufacturers to develop more efficient products.
- Would the higher cost of ERTUs create a split incentive issue?
    - Market characterization will provide more insight into this question and CalMTA can tailor interventions accordingly.
- The value proposition behind this product remains challenging: customers are reluctant to budge above the minimum efficiency standard and expect a two- to three-year payback period; this is especially challenging given the split incentive.
- This is a commodity product that nobody thinks about unless it's failing. Big box retailers have RTUs and efficient versions could help them meet GHG reduction goals and ESG criteria. In order to solidify the value proposition, we need a test procedure.
- Manufacturers already face regulatory requirements and product changes that are placing a high demand on equipment testing and certification facilities, so they are likely to resist any new requirements that require testing.
- NEEA's Chris Dymond has been facilitating discussions around the country to prioritize improvements to HVAC systems. These conversations indicate that if a significant embedded cost is involved, market traction will be very low. Multiple opportunities for improvements that are not inherently costly to the manufacturer, although they could still have a high markup.
- CalMTA wants to understand the best product for California to provide a clear ask to manufacturers, and also build demand as we explore the product category. Manufacturers hate regional differentiation of products, so it's better to find a common set of ideal features than optimize specifically for California.
- There may be an opportunity to share budget with CalNEXT on this work, although most of the work CalNEXT is doing focuses on economizers and WE&T.

After the last Advancement Plan was presented, Stacey Hobart shared a feedback form with MTAB members to gather comments on the Disposition Report and Advancement Plans.

Public Comment

- Richard Fennelly: Condenser coils had good potential to be part of the ERTU initiative.
- Anne Arquit of Enervee: While Advancement Plan logic models call out the higher cost of some products and need to work with manufacturers to drive down prices, it's also important to look at financing like the eco-financing integrated into Enervee's marketplace.

Future MTAB Meetings & Topics

Lynette Curthoys presented CalMTA's proposed cadence of MTAB meetings and topics for the first part of 2024 and asked members whether the preferred to have the Jan. 25 meeting in person or virtual. Lujuana Medina advocated for January's meeting to be held in person, which was echoed by Jeff Harris.

MTAB Recruitment Schedule

Stacey Hobart shared a timeline and process for recruiting MTAB members whose term will be up next year.

The meeting was adjourned.

Attendees

MTAB Members

Haley Goodson, TURN
Fred Gordon, Energy Trust of Oregon (virtual)
Jeff Harris, Northwest Energy Efficiency Alliance
Randall Higa, Southern California Edison
Lujuana Medina, County of Los Angeles County Environmental Division Manager
Peter Miller, Natural Resources Defense Council
Cyane Dandridge, SEI
Christie Torok, California Public Utilities Commission (virtual)
Ky-An Tran, California Public Advocates

Staff and Consultants

Taqua Ammar, CalMTA (administered by Resource Innovations)
Jennifer Barnes, 2050 Partners on the CalMTA team
Lynette Curthoys, CalMTA (administered by Resource Innovations)
Rachel Good, CalMTA (administered by Resource Innovations)
Stacey Hobart, CalMTA (administered by Resource Innovations)
Karen Horkitz, Consultant to the Cadmus Group on the CalMTA team
Elaine Miller, CalMTA (administered by Resource Innovations)
Jeff Mitchell, CalMTA (administered by Resource Innovations)
Nils Strindberg, CalMTA (administered by Resource Innovations))

In-Person Guests

Brian Gaze, Evari GIS
Christopher Malotte, SCE
Gustavo Sevilla, SoCalGas
Gregory Tropsa, Blue Frontier
Carol Yin, ETCC

Virtual Guests

Mary Anderson, PG&E
Don Arambula, DAC
Bahareh van Boekhold, ILLUME Advising
Eliot Crowe, Lawrence Berkeley National Laboratory
Kelly Cunningham, PG&E

Richard Fennelly, CoilPod LLC
Nick Fiore
Hale Forster, CEE
Carlo Gavina, SoCalGas
Ted Giraldin, Lawrence Berkeley National Laboratory
Peter Grant, Lawrence Berkeley National Laboratory
Selena Heise, Brio
Ari Isaak, Evari GIS
Spencer Lipp, Timber Cove Energy Solutions
Christopher Malotte, SCE
Darlene Mar, ABA of SV / Caaba of CA
Alan Meier, Energy and Efficiency Institute, UC Davis
Nicholas Mesler, Evari GIS
Luke Natzke, The Cadmus Group
Anne Arquit Niederberger, Enervee
Kate Olinger, Uponor
Emily Pelstring, CPUC
Neil Pickard, The Cadmus Group
Ralph Prahl, Prahl & Associates
Sarah Price, Lawrence Berkeley National Laboratory
Rebecca Rothman, VEIC
Priya Sathe, The Cadmus Group
Gustavo Sevilla, SoCalGas
Purabi Thakre, Lawrence Berkeley National Laboratory
Charlie Toledo, Suscol Intertribal Council

MTAB Meeting Notes

January 25, 2024
In-Person Meeting

Welcome & Disclosure

Stacey Hobart opened the meeting by welcoming attendees and reiterating the conflict of interest (COI) policy for MTAB members and CalMTA and asked members to declare any potential COI.

Jeff Harris disclosed that NEEA has active market transformation initiatives (MTIs) across a four-state area working in the same market categories targeted by CalMTA, although these are all in the Northwest.

Review 11/30-12/1 MTAB Meeting Notes

Stacey Hobart invited any comments regarding the previous meeting (11/30-12/1) notes. There were none.

Stage 1 Disposition Report Comment Review

Jennifer Barnes provided an update on CalMTA's Stage 1 Disposition Report and approach to addressing public comments received on the draft report via the Public Document Area (PDA) website. It was clarified that while there were no direct requests for confidentiality, CalMTA would want to notify submitters in advance if the information was going to be made public and that the team feels that sharing the idea scoring breakdown with MTAB would sufficiently address this comment. CalMTA agreed to provide a comparison of the final draft and final version of the Stage 1 Disposition Report and Advancement Plans to MTAB.

Final MTI Evaluation Framework

Karen Horkitz provided a status update on CalMTA's Evaluation Framework, including the need to resolve questions about the proposed third-party evaluation oversight and management approach. In response to this feedback, CalMTA refined its approach in alignment with policy objectives laid out in the CPUC Decision. A January 8 webinar allowed CalMTA to present and achieve consensus on this approach. The Evaluation Framework is on track to be finalized by April 2024.

Recommendation for Batch 2 MT Ideas

Members of the MTI development team presented the top-ranked ideas recommended for inclusion as a Batch 2 MTI including: (1) efficient streetlighting, (2) residential heat pump water heating, (3) single-pane replacement windows for commercial buildings, and (4) food service water heating.

Jeff Mitchell noted that while the residential variable speed heat pump and high-performance window ideas scored well, CalMTA recommends holding off on further development at this stage due to active code work that may impact the former and the low TRC of the latter. MTAB questions and discussion around each of the four potential Batch 2 ideas, which followed CalMTA's presentation of the preliminary product definition and market transformation (MT) theory for each, is documented below.

Residential Heat Pump Water Heaters (HPWH)

- Should CalMTA's MTI focus more on technology transformation to try to eliminate the back-up heat mode, which would help reduce the need for panel upgrades as well as the significant electrical grid capacity needs associated with back-up heat?
    - Jeff Mitchell agreed that there is an opportunity to improve these products over time and that CalMTA should look specifically at this issue.
- The potential for overlap with TECH Clean California and, to a lesser degree, the Building Initiative for Low-Emissions Development (BUILD) Program, which both identify as California's HPWH market transformation programs.
    - Jeff Mitchell clarified that CalMTA will want to examine the market closely and better understand where we can add value to make sure there's an additive role before advancing further.
- Whether demand flexibility presented a potential opportunity.
    - Jeff Mitchell explained that while most large HPWHs have connectivity enablement, this functions differently when operating in heat-pump-only mode and CalMTA doesn't want to oversell the benefits of a demand-flexible product that will still add electrical load to the grid.
- New Buildings Institute and NEEA have worked in this space for years, contributing to Title 24 and specifications that enable credit claims for dropping watts through demand flexibility. Additional load may be shed, and work is underway with other groups on controls and HPWH enhancements. Substantial work is being done on demand response (DR) since the U.S. Department of Energy does not regulate DR.
- Would CalMTA's MTI be a pure electrification play since HPWHs are subject to federal standards with proposed rulemaking in process?
    - Jeff Mitchell clarified that the opportunity here is coordination and policy alignment that would help ensure customers adopt the most efficient HPWH option as California moves towards electrification.
- Has CalMTA talked to solar providers in California, since water-heating storage capacity could be addressed with solar panels, thus eliminating additional load?
    - Jeff Mitchell replied that CalMTA's outreach will begin primarily in the next stage and that solar providers have been identified as a potential coordination point.
- Given the multiple active HPWH programs, how would CalMTA evaluate its impact on this market?
    - Karen Horkitz explained that CalMTA would first inventory existing programs, analyze data, talk to program staff, and seek to address why California is not on its desired adoption trajectory. In evaluation, CalMTA would dive into strategies

to impact market lift and track market activity after intervention. The third-party evaluation process would include interviews and research to gather market feedback regarding factors that influenced purchase decisions.

- California building code treats water heaters with a solar thermal system (considered energy efficiency) differently than water heaters connected to a solar panel (not EE).
- Because of the significant work focused on HPWHs in California, some strategies proposed by CalMTA may already be addressed or will be through the CEC Equitable Building Decarbonization Program. As a result, CalMTA should make sure the MTI is very focused and niche and should be careful about EE encompassing distributed energy resources (DER) deployment.
- Acknowledgement of the massive funding allocated to getting HPWHs installed. While MT can increase the speed of adoption, and a higher level of coordination could result in better quality and efficiency, it is also higher risk because of the current baseline.

<u>Food Service Water-Heating</u>

- CalMTA's presentation captured the typical barriers for this technology, but what are the opportunities that will drive purchases?
    - Jeff Mitchell replied that the cool air production that can be undesirable with residential HPWHs can be a benefit in commercial kitchens.
- By getting this technology to scale through commercial food service (a large sales opportunity), CalMTA can make it more accessible and affordable for multifamily properties.
- The idea of getting a large franchise to change standard specs for equipment was raised as a massively influential opportunity with potential for leveraging innovations like 120-gallon water heaters specifically for quick-serve restaurants. CalMTA should look at existing specifications, especially for franchises that are already all-electric due to their condensed footprint.
- How are cooling benefits being captured?
    - Jeff Mitchell said this could be captured by looking at make-up air requirements for restaurants, which involves a lot of air-conditioning. An air-conditioning heat pump, which is already running, could also heat water.
- The need to research restaurant load and recovery requirements.
    - Jeff Mitchell replied that California's health code requirement for restaurants considers second-hour ratings, creating a potential opportunity to update the code to be more realistic for heat pumps by looking at recovery vs. volume.
- The need to segment the market since quick serve restaurants have different needs than other dining establishments. Additionally, many new water heating models will easily meet the heath code and new refrigerant requirements.
- The idea of potentially expanding the market to schools was raised, which could increase equity benefits.

<u>Efficient Streetlighting</u>

- Since joint power authorities often manage streetlighting, not just individual cities, this could represent a potential marketing avenue.

- Southern California Edison (SCE) has done significant work in partnership with CalTrans and technology centers related to higher-efficiency controllable streetlights. SCE will share the information which identified several barriers to this work.
- Municipalization might not be the best approach to addressing this market.
- Beneficial impacts on pollinators could also be an opportunity, since adjusting lighting frequency can improve the environmental profile. UC Davis's work is an example.
- It was recommended that CalMTA review the regulatory framework related to LED lighting profits. Concerns were raised that this technology has not stabilized enough and that benefits were not clear enough to many end-users.
- Similar work in Oregon had faced some political resistance due to the substantial profit utilities make from streetlights.
- The substantial benefits to be had from this technology (grid flexibility, dimming and controls, ability to control operations during peak load times, GHG/carbon issues) were noted, as well as the fact that tariffs allow for conversion to LEDs.
- The new generation of controlled technology is far more reliable than it was in the past and that many additional improvements are feasible, such as the ability for utilities to ramp up illumination through controls at peak grid times.
- Utilities will not make more money from more consumption – decoupling has already happened.
- Many local governments in Southern California have already bought back streetlights from SCE. Opportunities exist to engage public agencies in disadvantaged communities (DACs) as well as the safety benefits for ESJ communities in addition to reducing energy usage.
- Regarding the potential safety benefits, more illumination could be very important and that less overall illumination could make things less safe. CalMTA could develop a more nuanced pitch that addresses different safety concerns in different communities, since different communities will value different benefits/attributes. Next generation lighting controls should be connected to local planning efforts.

<u>Single-Pane Replacement Windows (Commercial Buildings)</u>

- Has CalMTA considered the opportunities and barriers around attachment products?
    - Rick Dunn explained that CalMTA has looked into the work done by multiple organizations to investigate attachment products, including NEEA and the DOE. He noted that opportunities for CSW (as compared to VIG) relate to the ability for CSW to reduce energy loss through the window frame; many buildings still have highly inefficient aluminum frames. Modular CSW systems will allow building owners to select the most appropriate product for their particular type of window.
- CalMTA might want to clarify the MTI's target since double-pane windows, which are already addressed in Title 24, may be prevalent. When cooling is a concern, getting the right visual transmittance (VT) is important and benefits on the heating side might not be as significant. Low-E glass windows are the standard for new construction, but how do we achieve something similar in existing buildings.

- Clarification was requested regarding how secondary windows work with buildings that have historic preservation requirements.
    - Rick Dunn stated that these products are a good solution for historic windows since you can attach on the interior and can also improve the frame and not just the pane. Margie Gardner added that there are far less historic preservation buildings in the commercial space, which is the MTI's target market.
- Whether there was an operable window solution to preserve the air flow feature.
    - Rick Dunn said CalMTA will need to investigate this area moving forward but that it is very interesting. NEEA's work found that utilities are concerned about operability in terms of locking in savings (e.g., how would you know how this energy-saving technology is being operated?), but in California where open windows may cool down the home, this could be a beneficial feature.
- Concerns were raised about significant flux in the commercial real estate sector due to a shift to remote work.
    - Rick Dunn acknowledged this but noted that even without line-of-sight occupants, owners still need to comply with building performance standards before selling. If owners convert buildings into housing, there may be a compelling opportunity to replace windows, since VIG is expensive but performs very well and might make sense for large-scale projects. Elaine Miller added that the municipal and state governments, universities, schools, and hospitals (MUSH) market might also be a good target.
- Regarding office space occupancy and the dynamic nature of the commercial real estate market, owners are not likely to be interested in capital improvements. While this MTI is exciting and CalMTA should pursue it, it's important to be careful about occupancy assumptions until the market stabilizes.
- It was suggested that CalMTA also look at resiliency and the importance of a high-performing envelope during power outages, and should explore how to quantify or monetize this. Since windows are often the weakest link in the building envelope, during extreme heat or cold high-performance windows can be life-saving.
- It was also suggested that CalMTA explore the impact on employee/tenant retention. Installing high-efficiency windows could allow owners to extend the area deemed to be safe and legally able to be occupied (an economic development opportunity).
- SCE is currently working on studies related to resilience and building performance standards, and is therefore very supportive of this initiative – it checks all the boxes. The recent ASHRAE conference identified a need for tools that could quickly perform analysis to optimize window design, which could enhance the MTI value proposition.
    - Rick Dunn said that one of the benefits of the Partnership for Advanced Window Solutions (PAWS) collaborative is having access to tools that support this – even more simplistic versions can provide reasonably accurate findings that convince owners to invest and complete M&V.
- The Lawrence Berkeley National Laboratory's FLEXLAB® allows users to test out windows and get quantitative measurements.

- Heating equipment on the gas side is typically much too large for what California climate requires. With heat pumps, it can be prohibitively expensive to oversize it – if you replace gas capacity with equivalent electric capacity, you run the risk of higher operating costs.
    - Rick Dunn confirmed that this was a concern in NYSERDA's work: after already switching buildings to a more expensive fuel source, when the technology has to use more fuel, bills go up.
- Clarification was requested about the equity components of this MTI.
    - Rick Dunn said that building envelopes in ESJ communities are typically less efficient and include original windows/frames. Additionally, multifamily properties and public schools may potentially be included in the target market and would be identified through the next stage.

Overall Portfolio Balance

Jeff Mitchell shared a breakdown of Batch 1 and Batch 2 MTIS by geographic sector, technology type, market sector, ramp-up rate/timing, and potential ESJ and workforce education and training benefits and invited MTAB feedback.

There was discussion about whether ESJ benefits should be ranked higher on ERTUs since many commercial buildings in low-income areas have RTUs and not central systems which would offer greater proportionate impact. The issue of fuel-balance was also raised noting that windows are fuel-neutral, and ERTUs could be gas fueled.

MTAB Feedback on Batch 2 Ideas

MTAB members were invited to share their opinions on the Batch 2 ideas including if they disagreed or supported any of the specific technologies. It was clarified that this step would allow staff to move forward with the Advancement Plans to determine if the idea was viable for development into a full MTI. The Advancement Plans would be shared for public comment.

- Peter Miller said that he was largely on board with the proposed Batch 2, given the need to winnow down ideas to a manageable number. The ideas are a nice diverse group representing different sectors with different ramp-up speeds. While it feels like there are still a lot of questions at this early stage, he feels comfortable with the plan and has no real concerns.
- Ky-An Tran said that of the four Batch 2 ideas, he considered efficient streetlighting and food service water heating to be the best and liked Jeff Harris' suggestion about leveraging the food service initiative to address multifamily water heating. Ky-An shared concerns about single-pane replacement windows due to the wildly fluctuating commercial building market.
- Jeff Harris said that at this stage it's hard to know which MTIs will ultimately be "winners," so he supports advancing quite a few knowing some will fall off and thinks this group has good diversity. He noted that while people may want to have questions answered before investing, some investment is required to answer those questions and the process will allow CalMTA to refine the portfolio to focus on the most promising ideas. Potential MT interventions are also likely to be diverse – for HPWHs,

CalMTA's primary role may be coordination – and that some MTIs could move forward very quickly.

- Lujuana Medina said she had no initial comments beyond what she had provided previously, but that the process feels rushed and she was unsure what the motivation for that rapid pace is – assumes this is due to CPUC requirements. Lujuana also said she has some uncertainty related to Commissioner Shiroma retiring, since she has been a major proponent of MT, energy efficiency, and equity.
- Fred Gordon conceded that while he had doubts about several ideas, he shared Jeff Harris's sentiment that you have to get to the next phase to really understand the prospects. He suggested some critical questions to get there and actually be able to make a decision. There are evaluation concerns with residential HPWHs due to the many concurrent activities making it hard to find out CalMTA's actual impact – there's so much noise in the market. CalMTA could potentially focus on bringing together the many channels pushing a higher coefficient of performance and come up with critical factors showing how CalMTA made a difference, with the goal of improving HPWH efficiency. HPWHs are such a high priority that if CalMTA accomplished this, the MTI would be more significant than anything else on the list.
- Cyane Dandridge expressed agreement with MTAB feedback so far and shared that her greatest concern was about the residential HPWH idea. She suggested that CalMTA might want to explore how that MTI would be evaluated before determining whether to move forward. She also added that she liked the non-energy benefits of windows and streetlighting, which are great marketing opportunities that impact multiple stakeholders (such as demonstrating tenant retention to building owners).
- Randall Higa stated his hope that CalMTA will provide sufficient time to submit helpful written comments. In general, he expressed some concern that municipalization was not necessarily the right focus for the streetlighting MTI but that this market includes significant opportunity for technology improvements. He praised the significant building performance standard opportunities and ESJ community benefits of the commercial windows MTI. Food service water heating presents and opportunity, as with ERTUs and window glazing, to influence chain accounts' standard specifications. He highlighted the potential to combine MTIs into a standard package that would be very compelling for these businesses, and that packaged MTIs would yield tremendous grid benefits. He also shared a desire to coordinate with CalMTA and provide SCE's expertise and information to move some MTIs forward more quickly.
- Christie Torok stated that she has concerns about multiple Batch 2 MTIs and wished there was a chance to see more built-out plans. She described the HPWH market as incredibly cluttered and said she wanted to better understand the market and business opportunity for streetlighting. The unknowns of the commercial real estate market make the single-pane replacement MTI risky, and its potential benefits and opportunities do not feel fully fleshed out. The food service water heating MTI feels very focused but targets a market that can be tough to reach and is resource constrained.
- Hayley Goodson responded by explaining that the question is whether it's worth investing in answering these questions and that she believes the answer is yes. MTI

goals will evolve through research and some MTIs might drop off, but none of this will happen unless we answer these questions now. In the case of residential HPWHs, she was initially skeptical but now sees an opportunity to address the substantial market barrier created by a very cluttered and siloed market. Coordinating across efforts will be required to meet statewide adoption goals. For food service water heating, she identified the need to model bill impacts due to the industry's low margins. She shared an interest in better understanding delivery channels and the business case for streetlighting and, while similarly concerned about the commercial building stock transition, is hopeful that empty buildings will be repurposed and the MTI can address built infrastructure more than simply commercial real estate.

Stacey Hobart explained that CalMTA will take this feedback and regroup with Christie to determine whether to move forward with all four. MTAB feedback and questions will inform Batch 2 Advancement Plans. CalMTA will also provide an update and report on Batch 1 progress in the spring.

There was discussion about the process should any MTI not move forward. It was clarified that only ideas deemed as viable initiatives would advance and that if at any point a barrier is identified that cannot be overcome, we would not continue. It was recommended that CalMTA look at the most difficult factors first and determine whether they can be feasibly addressed before investing further.

Public Comment

- Kelly Cunningham of PG&E shared Randall's concern about municipalization being the right strategy for efficient streetlighting. She said that the market has reached a point where it might be time to revisit this but doesn't see municipalization as an MT strategy. CalMTA may instead want to focus on the many excellent control options that have not reached full penetration due to acceptance barriers. Kelly expressed a desire to see measures combined, since windows and envelope upgrades for restaurants would help with HPWH and induction performance.
- Carol Yin said that the factors listed in the portfolio view slide are important but that not all scoring criteria (like grid benefits) was included, and that she would like to see table with all factors.

Update Review of Advancement Plan Comments

Jeff Mitchell presented a summary of the Advancement Plan comments received including comment of engagement and partnership, research, pilots, and TSB/cost-effectiveness assumptions. He also shared the changes that were made to the Advancement Plan based on comments requesting more clarity about CalMTA's role in the California energy efficiency landscape, more detail regarding research activities and objectives, and clarifying language about the conceptual logic model and identified barriers or potential interventions. He also shared the timeline for final Advancement Plan updates and CPUC approval. MTAB comments related to the Advancement Plans included:

- Significant technological opportunity for ERTUs exists, making this work a good direction for CalMTA.
- NEEA is working on ERTUs, looking at fuel-neutral components, and that they are beginning to get traction with manufacturers. The environment in which products are sold and performance standards are set is complex. Work related to this technology is also being conducted by Minnesota CEE, codes and standards entities, and the Consortium for Energy Efficiency. Given this significant activity, California's participation could help drive a consistent national standard that offers significant leverage – a time-sensitive opportunity for national collaboration.
- Clarification between the RTU regulated by federal appliance standards and this MTI and the activities in scope for federal appliance standards vs. building standards was requested. ASHRAE 205 has been actively working in this space for 15 years and there are documented challenges in getting part load information from manufacturer. If that data is obtained, CalMTA could significantly move the needle forward.

Presentation of Batch 1 MTIs: Strategy Pilots

Jeff Mitchell and Elaine Miller reviewed the development process for Strategy Pilots and specific pilot scopes. In response to a question about ERTU pilot timing, Elaine said that more research was needed before forming a pilot. MTAB comments and questions included the following:

<u>Geographic Targeting Using ESRPP for Portable/Window Heat Pump and Induction Cooking</u>

- Would the pilot focus on portable induction cooktops that would be available at a lower cost?
    - Elaine Miller explained that CalMTA will request that data from participating retailers and see if we are able to influence this.
- Whether CalMTA was concerned about portable heat pump installation and safety for pilot participants
    - Elaine Miller agreed with this overarching concern, but clarified that this was outside of scope for the ESRPP pilot and would instead be addressed through the Portable/Window Heat Pump Self-Installation Practices pilot.
    - Jeff Mitchell followed up to clarify the scope and purpose of this specific pilot. ESRPP is a proven approach to engage the plug load and appliance market, but this pilot seeks to test whether participating retailers would be willing to put certain products in certain store locations and share related sales data, an unproven approach.
- Whether the pilot was purely research or if it included incentives
    - Elaine replied there would be incentives
- The potential risk if customers have a negative experience with portable heat pumps
    - Elaine clarified that the overall MTI research plan captures insight into customer experience even though it is not the focus of this pilot

- What level of insight into ESJ communities could be feasibly attained through this pilot, since ESRPP does not capture much end-user information or experience
    - Elaine reiterated that the pilot is focused on learning whether retailers are willing to participate in this approach and does not seek to gather insight into specific ESJ communities.
- Two key questions relevant to this pilot were identified: (1) whether or not ESRPP can be used to target specific audiences and (2) under what condition ESJ customers will purchase these products. Regardless, validating the ability to target is enough to support MT and is a worthy goal.
    - Elaine confirmed that this and the ability to acquire data are the two primary reasons CalMTA is interested in the pilot.
- How do ESRPP retailers fit into the overall customer journey?
    - Elaine replied that the pilot is not looking at the whole customer journey, just one specific part, but that it will still analyze the customer journey within that specific subset – for instance, how much support retailers provide in addition to stocking the equipment. If this product is in stores but staff are not guiding customers to it or educating them about it, this is a lost opportunity.
    - Jeff Mitchell shared that ESRPP retailers account for 60-80% of product sales nationally. While AC units are a lower portion of overall sales, induction ranges are on the higher end.
    - Personal experience demonstrates the challenge of identifying which portable AC units use heat pump technology.
    - In the past, ESRPP retailers were required to offer specific staff education and training and may still be.
- A slight modification to the second research question was suggested to highlight its focus on <u>currently</u> available products.
- If, since CalMTA is conducting the pilot this year, it might be better to focus on induction technology now and add portables later, since there is more product diversity and availability for induction products in the retail channel
    - Jeff Mitchell responded that testing the willingness of retailers to participate in this targeted approach would still apply regardless of the technology focus.
- The need to study the pilot approach itself and not just the participants, and to have a strategy for any negative response from consumers
    - Jeff Mitchell noted that CalMTA will rely on retailers, who are heavily invested in the customer experience, to identify products they are willing to stock and sell. The ability to track returns through this data is also interesting and revealing.
- Whether SCE's loaner induction program could somehow be tied into the retailer journey. For instance, if somebody goes into a store and asks about induction products, they could be referred to a loaner program first.

<u>Portable/Window Heat Pump Self-Installation Practices</u>

- Jeff Mitchell communicated that CalMTA had already updated this plan to include window units based on submitted public comments.
- Greater detail was requested about how the customer journey factors into this pilot plan, and the level of information CalMTA will collect to understand specific support needs for specific building types.
- Potential barriers to adoption arise when buying energy efficiency technologies in retail locations, as qualifying product lists can require extensive review and daunting in-store research.
- What baseline system (e.g., mini-split or gas wall heater) did CalMTA assume?
    - Jeff Mitchell replied that the Advancement Plan looked at a mix of conditions (small AC benefit, wall furnaces, etc.) and that CalMTA will re-evaluate baseline calculations in Phase 2.
    - Karen added that the Advancement Plan was developed before Phase 2 research, which will result in actual models, and includes short-cut assumptions documented in the plan.
    - The San Joaquin pilot used non-natural-gas systems (propane, wood pellets) as the baseline.
- The CPUC has made a change to the avoided cost calculation for refrigerants. Previously, calculations assumed that replacing a furnace with a heat pump meant all the cooling load was added but some customers are looking for a technology that would meet heating and cooling needs and cooling saturation has increased over time. The current baseline is a hybrid.

Look Ahead: CalMTA in 2024

Lynette Curthoys presented a summary of CalMTA's planned 2024 activities and noted the challenge of balancing speed and commitment to process to effectively bring MTIs to market, with the pace informed by CPUC requirements. Given that CalMTA has many good ideas in the pipeline and a very full agenda for the year, one MTAB member recommended pushing out the next RFI to the second half of 2024.

Stacey Hobart reviewed the proposed agenda, dates, and locations for 2024 MTAB meetings.

Public Comment

- Kelly Cunningham of PG&E asked whether the ESJ communities targeted through CalMTA's strategy pilots included both renters and homeowners. Kelly praised the continued centering of equity in CalMTA's work but felt there had not been sufficient attention paid to the renter retail supply chain, citing a recent study that showed the massive portion of rented homes owned by investment companies. She also called out large corporate landlords operating in ESJ communities. Kelly commented that neither renters nor landlords were mentioned much in the draft strategy pilot plans and flagged the increased pressure for landlords to offer cooling as a potential opportunity. She added that the ESJ designation does not always signify low-income and reiterated that CalMTA needs to have a strategy for renters.

- Kevin Hamilton of Central California, a member of the CARB environmental justice community, echoed Kelly's comment. He added that in watching how the state is addressing ESJ communities, the rented home market will be critical. Low-to-moderate income households already face significant challenges and there is increasing pressure on building owners to upgrade. Kevin added that the 3,000 households in the San Joaquin Valley he works with include many homeowners.
- Carol Yin asked if there was any reason why, if the pilot indicates that ESRPP is not successful at or feasible for reaching ESJ communities, CalMTA wouldn't use it to target other markets. Jeff Mitchell replied that the standard ESRPP approach is well-proven and well-documented, so ESRPP will likely be a final MTI, but current efforts are working to determine ESRPPs effectiveness in targeting ESJ communities.
- Kevin Hamilton responded that unless ESJ community members are savvy and have access to the internet, they will have a hard time participating in the pilot.

The meeting was adjourned.

Attendees

MTAB Members

Haley Goodson, TURN
Fred Gordon, Energy Trust of Oregon (virtual)
Jeff Harris, Northwest Energy Efficiency Alliance
Randall Higa, Southern California Edison
Lujuana Medina, County of Los Angeles County Environmental Division Manager (virtual)
Peter Miller, Natural Resources Defense Council
Cyane Dandridge, SEI
Christie Torok, California Public Utilities Commission
Ky-An Tran, California Public Advocates

Staff and Consultants

David Alberts, CalMTA (administered by Resource Innovations) (virtual)
Taqua Ammar, CalMTA (administered by Resource Innovations)
Jennifer Barnes, 2050 Partners on the CalMTA team
Lydia Boeteng, CalMTA (administered by Resource Innovations) (virtual)
Lynette Curthoys, CalMTA (administered by Resource Innovations)
Nick Fiore, CalMTA (administered by Resource Innovations) (virtual)
Rachel Good, CalMTA (administered by Resource Innovations)
Stacey Hobart, CalMTA (administered by Resource Innovations)
Karen Horkitz, Consultant to the Cadmus Group on the CalMTA team
Melinda Lopez, The Ortiz Group (virtual)
Alyssa May, CalMTA (administered by Resource Innovations) (virtual)
Elaine Miller, CalMTA (administered by Resource Innovations)
Jeff Mitchell, CalMTA (administered by Resource Innovations)
Sepideh Rezania, Unrooz Solutions (virtual)

Nils Strindberg, CalMTA (administered by Resource Innovations)
Katie Teshima, CalMTA (administered by Resource Innovations)

In-Person Guests
Carol Yin, ETCC

Virtual Guests
Mary Anderson, PG&E
Tiffany Botello, SCE
John Clint, AESC
Katherine Court, Pacific Northwest National Laboratory
Kelly Cunningham, PG&E
Anders Danryd, SoCalGas
Chidinma Emenike, MN CEE
Richard Fennelly, CoilPod LLC
Peter Franzese, CPUC
Carlo Gavina, SoCalGas
Brian Gaze
Ted Giraldin, Lawrence Berkeley National Laboratory
Kevin Hamilton, Central California Asthma Collaborative
David Jagger, Energy Solutions
Hilary James, Tanko Lighting
Christopher Malotte, SCE
Savannah McLaughlin, CPUC
Dominique Michaud, SDG&E
Tamara Mullins, Resource Innovations
Phanindra Pagadala, PG&E
Emily Pelstring, CPUC
Sarah Price, Lawrence Berkeley National Laboratory
Merry Sweeney, SDG&E
Kate Zeng, SDG&E

MTAB Meeting Notes

April 25, 2024
Virtual Meeting

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She then had the MTAB members introduce themselves, including a new member, Karina Camacho from the Western Riverside Council of Governments/I-REN.

Stacey invited any comments regarding the previous meeting (1/25) notes. There were none.

Annual MTAB COI Requirements Refresher

Lynette Curthoys reviewed the MTAB charter, including roles and responsibilities, member expectations, and process for meeting notices, public comment, and meeting notes. She then presented the conflict of interest (COI) policy for MTAB members and CalMTA as well as the plan to electronically send the annual MTAB Public Disclosure form for members to sign.

Draft MTI Plan Template

Jeff Mitchell described required elements of the Market Transformation Initiative (MTI) Plans developed through Phase II of CalMTA's process and the current layout of CalMTA's proposed plan template, for which MTAB feedback will be solicited using a form distributed via email.

It was asked whether feedback on the draft MTI Plan template should be shared in discussion at the meeting or submitted through the form. Stacey noted that all comments received through the form will be appended to the meeting notes (see Attachment 1 at the end of this document), but if discussion is desired, specific feedback could be shared with other MTAB members as a follow-up email.

Jeff then introduced several discussion topics including offramps (when action is required based on an MTI's performance with regards to critical market outcomes/impacts), the template's description of stakeholder engagement (coordination with external programs and activities) and market engagement (coordination with market actors like manufacturers and retailers), the inclusion of appendices to provide more detailed information for key sections, and next steps in finalizing the plan template. These topics elicited the following comments and questions from MTAB members:

- Is the offramp process meant to address lack of success or "failure of hope?" Using heat pump water heaters (HPWHs) as an example, MT work has been happening in this market according to a 30-year timeline rather than immediate success. CalMTA

should guide offramp conversations to examine whether there's still a compelling business case for the MTI at key points.
    - Jeff Mitchell acknowledged the importance of having offramp conversations transparently with the MTAB to determine why an MTI is worth continuing or not. Some cases may require adjusting the strategy to achieve desired outcomes, while in other cases the MT theory may not play out as anticipated or the market may not be ready, and CalMTA should leave the market.
- Who is the target audience for the MTI Plans and what level of familiarity with the material should be assumed by CalMTA? Even educated energy efficiency stakeholders might not understand MT and not be able to follow the plan.
    - Jeff clarified that the primary audience is the CPUC, MTAB members, and stakeholders with the goal of facilitating a conversation about the MT theory and what is known about the market today. The plans are not intended to provide the level of detail or background information a stakeholder who hasn't already been engaged in CalMTA's work would need. Multiple other mechanisms, such as web content and webinars, will bring this information to a broader audience in a more digestible way.
- Are outlines for the appendices available for review?
    - Jeff responded that while those templates were still in development, they could be shared with MTAB at a later date.

Progress Report: MT Ideas in Phase II

Elaine Miller provided updates on the Induction Cooktops & Ranges and Portable/Window Heat Pumps MTIs, including results of the technology assessment, key takeaways from market characterization study, updates on active and in-development pilots, and next steps. MTAB members provided the following questions and feedback:

<u>Induction Cooktops & Ranges</u>

- It was recommended that the MTI differentiate between cooktops and ranges, as 240V cooktops and 240V wall ovens will essentially double amperage requirements due to electric code and panel capacity considerations.
    - Elaine said that the MTI product team will take this into consideration.
- What were the data sources and sample size for the panel capacity research findings shared in this presentation?
    - Elaine clarified that no primary research was conducted by CalMTA and that this report compiles findings from 37 existing research efforts. She acknowledged that the lack of a comprehensive data set on multifamily panel size remains a significant gap.
- While CalMTA's investment in this MTA is still very early, this research will be valuable to California as the state works towards electrification.

- Jeff cautioned that this information is very preliminary, and it is still to be determined how these data points will impact the MTI. As CalMTA gains a greater understanding of these market considerations, it will be important to share them more widely.

Portable/Window Heat Pumps

- Is there a potential niche for (1) preventing higher-capacity central cooling, and (2) providing supplemental heating, to reduce capacity requirements in both seasons? It may not be necessary for this technology to meet the full heating load at low temperatures.
- Does the additional volume of portable heat pumps requested for the Strategy Pilot impact the overall sampling of manufacturers and installers, or will it bias CalMTA more towards a specific manufacturer or installation practices?
    - Rick Dunn noted that it helps make form factor distribution in the pilot more even. The requested units are the most expensive but have the most potential to stay permanently installed. A limited number of these models were initially included due to cost, but the manufacturer came back to CalMTA with a price reduction that made doubling the number of units included possible.
    - Regarding self-selection of products by pilot partners, Rick added that all products are designed to be self-installed, but participants will likely require some support from partner organizations. Limiting the number of included product types simplifies the support these partners will need to provide. Building/window design will determine available options and some tenant selection between limited options may follow.
- A recent *New York Times* article that discussed installation challenges for inexpensive U-bent products was mentioned. (https://www.nytimes.com/2024/04/14/nyregion/heat-pumps-climate-change.html)
- Is the assumption that portable heaters are much more common than portable air conditioners accurate?
    - Hope Lobkowicz shared data compiled by CalMTA showing that 18% of households own a portable heater, 13% own a portable AC, and 8% own both.
- It was noted that market characterization feedback indicates that this technology is viewed as something used sporadically with a very low purchase price, which doesn't align with the MTI's vision of measure that is used for a sustained period to reduce energy consumption.
- The three communities targeted by the self-installation strategy pilot are all coastal areas with stable climates. Is the pilot looking only at installation practices or also how the heat pump functions post-installation?
    - Elaine confirmed that the pilot was focused on validating the self-installation potential of these products and not product performance.

Efficient Rooftop Units

Alexis Allan presented on progress for ERTUs, including refining product definition to focus on the right technology package for California, market research and timeline, stakeholder interviews. MTAB members provided the following questions and feedback:

- Whether CalMTA had reviewed relevant reports on the Energy Transition Coordinating Council (ETCC) website or checked in with the ASHRAE 205 committee on how an ERTU can be modeled? Because the Department of Energy is not focused on incorporating product components in a regulated RTU, modeling can help understand how features like economizers impact RTU efficiency.
    - Alexis clarified that the list of organizations cited in the presentation was not inclusive of all the entities that CalMTA will coordinate with, and that the team will be sure to engage with the ETCC. Regarding ASHRAE, an MTI team member is directly involved with this work and there are active conversations about the MTI modeling approach.

Stacey asked if the level of detail and information provided was sufficient for the MTAB to understand progress towards completing Advancement Plan activities. MTAB members confirmed that it was the right level.

MTI Portfolio Characteristics

Lynette and Rick introduced an exercise to help define CalMTA's portfolio composition and areas to prioritize including impact estimates for current ideas under development and CalNEXT's priorities and alignment with those ideas. Jeff shared an overview of MTI ramp rate and cumulative total system benefits (TSB) over time, noting the relatively long timeline for this work. Initial questions received from MTAB members included:

- Does the ramp rate forecast look only at quantifiable MTI results/impacts, or does it factor in CalMTA's investment over time and the period of getting an MTI off the ground?
    - Jeff replied that when you drill down on the data, it shows the MTIs getting off the ground at different speeds, but the desire is to identify the right mix of MTIs for the funding period. It's important to consider how quickly the portfolio can accrue positive benefits, but there is also a need to convey that the greatest benefits will be accrued over time.
- How are equity impacts centered in the discussion of portfolio balance?
    - Lynette noted that because initial analysis indicated a good balance of equity and workforce development considerations in the MTIs, these factors were not included in the poll, but that CalMTA could factor equity impacts into the discussion.

- How is risk being captured in this exercise? While CalMTA wants to strive for mostly lower risk MTIs, it could be acceptable for several MTIs to be high-risk if the portfolio still gets to the best-case scenario overall.
    - Jeff acknowledged the need to establish overall risk tolerance with the CPUC and the MTAB, as risk can be defined in different ways (cost-effectiveness, ability to move the needle, accurately forecast and evaluate, etc.). Risk tolerance will be especially important when new MTIs enter the portfolio.
- How important is it for CalMTA to target all market segments because ratepayers in all segments are funding the program? Is sector diversity already addressed at the utility level, so that CalMTA can focus on efforts that represent the best fit for MT?
    - Christie Torok confirmed that CalMTA should focus on gaps in the market that aren't already addressed by the IOU resource acquisition/energy efficiency portfolios.
- What timeline is expected for MTIs that will be cost-effective sooner, and which MTIs are anticipated to be cost-effective more quickly?
    - Jeff replied that this varies widely and the timeline could range from Day 1 to Year 5 and could be 10 years and beyond. Some MTIs might be incredibly valuable but not fully cost-effective until after CalMTA leaves the market.

Breakout sessions were then facilitated virtually, with MTAB members asked to rank portfolio factors from most to least important, with 1 as the most important and 5 as the least important. Results from this exercise are summarized in the table below (low scores are highest priority).

Missing market segments (e.g., agriculture, industrial)	Ideas incubated by CalNEXT that are suitable for MT	Quick ramp rate to demonstrate early wins and proof of concept	Highest lifecycle TSB to have the greatest impact	Ideas that will be cost effective sooner
41	33	22	14	25

Additional feedback from MTAB members after the breakout sessions included:

- Ideas incubated by CalNEXT would be more mature and have less risk with a shorter timeline for achieving success. A maturity matrix could be helpful for new ideas, looking at factors like technology-, market-, and MT-program readiness.
- CalNEXT coordination should be a priority, but this isn't necessarily reflected in the score, as that alignment is assumed to be required.
- There may be value in looking at other market transformation organizations' work to develop a reasonable understanding of when MTIs can be cost-effective.

CalMTA Program-level KPIs

Karen Horkitz provided an overview on proposed program-level key progress indicators (KPIs) that would be used as a component of evaluating overall CalMTA performance, with

illustrative values. She noted that individual MTI Plans will have MTI-level scorecards included. Comments and questions from MTAB members included:

- The drill-down menu is nice but is it only appropriate for one particular metric (Incremental Savings and Benefits toward CA Goals)?
    - Karen noted that prior feedback indicated there were too many metrics, so the drill-down approach seeks to balance simplicity with the need to show which factors impacted the overall number.
- When market progress indicator targets are set for each MTI, CalMTA should be careful about assigning 100% achievement as a reasonable target, since not all are likely to be satisfied at a particular time.
- It's difficult to look at co-created TSB without wanting to know how much energy was saved. Is the benefit-cost ratio intended to be cumulative?
    - Karen replied that by default, benefit-cost ratios represent lifetime values. MTIs are long-term investments, so calculating this ratio in the short-term will look unnecessarily negative.
- The description of co-created TSB refers specifically to utility programs, but could it also include other efforts and a broader definition of co-creation?
    - Karen confirmed that a highly specific definition will need to be developed for each MTI in the evaluation plan and that it is highly dependent on what external efforts are included in the baseline. For instance, if the impact of Inflation Reduction Act tax credits is reflected in the baseline, we wouldn't consider this co-creation. If external programs or activities wouldn't happen without CalMTA collaboration, this would be deemed co-creation.
- Suggestion that CalMTA develop KPIs related to high-level principles in D.19-12-021
- Should there be a KPI for portfolio balance that takes into account how Phase II "MTI Development" ideas distributed with regards to end uses (e.g. not limited to technologies), fuels, customer segments, market potential, etc.?

Stacey noted that this was an introductory conversation and there would be the opportunity for further discussion at the next MTAB meeting.

Public Comment

- Carol Yin: Can CalMTA speak more about the relationship between the KPIs and the MTI requirements in the Decision and the upcoming five-year evaluation? Any needs that could be anticipated now should be, since CalMTA will likely be evaluated on the requirements in the Decision.
    - Karen clarified that these KPIs were not specified in the Decision but the five areas introduced are all areas that are discussed in the Decision. MTAB is charged with reviewing CalMTA's performance, and the assumption is that MTI scorecards, combined with individual MTI performance, would be considered in the 5th year review.

- Carol Yin: In anticipation of the five-year review it might be worth creating metrics to track CalMTA's compliance with Decision requirements, especially those related to what the MTIs are supposed to accomplish or include (e.g., provisions for a well-trained workforce).

Stacey invited any final comments from MTAB and reviewed the timeline for presenting Phase I materials at upcoming meetings. The meeting was adjourned.

Attendees (all virtual)

MTAB Members
Karina Camacho, Western Riverside Council of Governments
Cyane Dandridge, Strategic Energy Initiatives
Hayley Goodson, The Utility Reform Network
Fred Gordon, Energy Trust of Oregon
Jeff Harris, Northwest Energy Efficiency Alliance
Randall Higa, Southern California Edison
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission
Ky-An Tran, California Public Advocates

Participating Staff & Consultants
Alexis Allan, Brio, (on the CalMTA team)
Lynette Curthoys, CalMTA/Resource Innovations
Rick Dunn, CalMTA/Resource Innovations
Margie Gardner, CalMTA/Resource Innovations
Rachel Good, CalMTA/Resource Innovations
Stacey Hobart, CalMTA/Resource Innovations
Karen Horkitz, consultant to the Cadmus Group on the CalMTA team
Elaine Miller, CalMTA/Resource Innovations
Jeff Mitchell, CalMTA/Resource Innovations
Hope Lobkowicz, The Cadmus Group (on the CalMTA team)

Guests
Mary Anderson, PG&E
Don Arambula
Nancy Barba, Frontier Energy
Athena Besa, SDG&E
Kyle Booth, Energy Solutions
Martha Camacho-Rodriguez, Central Basin
Paul Campbell, ICF
Sebastien Csapo, PG&E

Vida Daneshmand, LADWP
James Dodenhoff, Silent Running LLC
Chidinma Emenike, CEE
Richard Fennelly, CoilPod LLC
Carlo Gavina, SoCalGas
Brian Gaze, Evari GIS Consulting
Rocco Guaragno, Resource Innovations
Hilary James, Tanko Lighting
Nicholas Janusch, CEC
Marisa Lee, Energy Solutions
Margaret Marchant, Frontier Energy
Chris Malotte, SCE
Savannah McLaughlin, CPUC
Elizabeth Medrano, SoCalGas
Howard Merson, Energy Solutions
Nick Michel, Northwest Energy Efficiency Alliance
Jose Orozco Pelico, Los Angeles Cleantech Incubator
Phanindra Pagadala, PG&E
Emily Pelstring, CPUC
Jose Pineda, LADWP
Sarah Price, LBNL
Stacie Risley, SDG&E
Rebecca Rothman, VEIC
Armen Saiyan, LADWP
Luis Sanchez, Community Resource Project
Luke Sun, LADWP
Charlie Toledo, Suscol Intertribal Council
Jacquelyne Vera, Acterra
Jay Wilson
Babak Yazdanpanah, LADWP
Carol Yin, Yinsight, Inc.

Attachment 1

MTAB member feedback on the MTI Plan Template

To view the document, visit: https://calmta.org/wp-content/uploads/sites/263/MTI-Plan-Template-Draft.pdf

Section	MTAB Comment	CalMTA Response
2	It is useful to have a spot where you ask: "explain how the case for market transformation is compelling." The difference between a promising and less promising market transformation opportunity is often some feature of the product that lines up with a deep unmet consumer need, or an ability to piggyback on some action that is certain to go forward, commitment by manufacturers for their own reasons, etc. It's often difficult to pull this compelling reason out of the outline or know if one exists.	Added text in executive summary for writers to explain why this MTI opportunity is compelling.
2	Is there a list of ESJ priorities? Or what do we expect applicants to be referring to when it comes to ESJ priorities? I like the 3 outcomes, short, medium and long. I like the addition of other non-energy benefits.	Our intention is to weave ESJ priorities and strategies throughout the MTI Plan, to ensure it is incorporated throughout our strategy and logic model as opposed to a single location. Additionally, we have included a high-level ESJ summary in Section 2.1 table.
2	p. 4: Section 2.1 – Theory of Market Transformation Market End State (What is the desired end goal if the MTI is successful?) • Is this a place to acknowledge potentially complementary EE programs like C&S? Without an acknowledgement, this information might create "turf" concerns. • While complementary efforts are also addressed in Section 5.1 Stakeholder Engagement Strategy, it could be good to also flag at a high level in Section 2.1.	Added a row in the 2.1 table: "Key Leverage Points (Complementary efforts and EE programs leveraged by this MTI)."
2	pp. 5-6: Section 2.3 -- Initiative Budget & Outcomes • It looks like the Phase III – Market Development Budget does not break budget down by time period. Is that correct? • I see more budget information in Section 9 – Budget, but not broken out by "critical activity" as in Section 2.3. Will a budget breakdown by time period be provided elsewhere – e.g., Appendix I?	Yes, it is correct that the Market Development budget is not broken down by time period and is intended to give the reader a snapshot of estimated cost across the lifecycle of the initiative. The more detailed budget will be included in the budget appendix.

Section	MTAB Comment	CalMTA Response
2	p. 6: Section 2.5 – ESJ Community Benefit and Section 2.6 – Workforce Development • Will these sections include a breakdown of benefits by similar time periods as in Section 2.3?	This would appear in the final logic model, where ESJ outcomes are included with associated time periods to ensure these targets are incorporated into the overarching initiative strategy.
3	3.2 I've seen this sort of exposition and it's often puzzled me. It can be about the baseline situation or about an alternative technology or initiative. At NEEA, program proposers sometimes throw in whatever they have. This often means that the writing is about the baseline condition when there is an alternative change that manufacturers or others are considering which is more laborious to study but in the end more important. If you try to stuff both in this one format, it tends to be confusing as it's too succinct. I suggest: (1) limit the competitors to one or two. (2) have a place to say, "the primary potential competition is from "_____" as promoted by "_____" and here's why we are focusing on that. If it's just the baseline because there are no other market dynamics that may lead to major change, say that. Then there's some context for the stuff in the chart.	Reduced competitors in table to two and added sentence in subsection description to have writers summarize the primary competing product/practice and why.
3	For 3.3 it would be great if this is "total market potential, considering what is known about limitations on product applications due to technical, supply chain, or preference patterns". This would at least create pressure to think through the market. I suggest this based on my experience with such estimates in that they tend to shrink at each initiative stage. If it is infeasible to do this sort of reduction at the stage that the template is used, at least there should be an asterisked statement noting that contents may settle due to shipping.	The Decision describes 'market potential' similarly to 'program potential,' as "technical, economic, and market potential." Therefore, the estimates of potential benefits will be inclusive of market forces. We do understand the potential to overestimate at early stages of market deployment and will review estimates prior to finalizing.
3	p. 7: Section 3.2 -- Competitive Analysis • What are "internal" versus "external" strengths and weaknesses?	Strengths and weaknesses refer to internal factors of the product/company (i.e. brand or technology), while opportunities and threats are external factors that we can't control (i.e. market trends).
4	Where is the description of how the product or service must change to reach the stated needs of a broader market? Is that under barriers and strategies in #2, or is it here?	Key Product changes will be summarized in Section 3.5. with a more detailed analysis in the Product Assessment appendix.
	Is 4.5 to describe baseline assumptions not just about	4.5 is now 4.4 due to consolidating the

Section	MTAB Comment	CalMTA Response
	current market conditions but how the market will evolve without the initiative? Should the author assume that other initiatives in this market that would occur independently of CalMTA are part of the baseline conditions, and consider them in creating efficiency or sales trend forecasts? If so, maybe there should be a statement to that effect.	template. The baseline market characterization report will provide more detailed context around the assumptions made and we will update the text here to reflect that.
4	Do we want to provide more details on what type of response we're looking for target market overview? Or would that be too leading and we want to keep it open-ended and see their responses?	The questions in the table should provide enough guidance for the writers. We also added a row to restate the target market for clarity on what market we're targeting.
4	p. 9: Section 4.4 – Market Baseline & Assumptions and Section 4.5 – Key Baseline Assumptions • What's the difference?	Consolidated these two sub-sections into one.
5	pp. 9-10: Section 5 – Stakeholder & Market Engagement • The italics refer to "supply chain players" while Section 5.2 -- Stakeholder Engagement Strategy refers to "Market Actor". Using different terminology might introduce confusion.	Updated term to "market actor."
6	This section has the first mention of success metrics but focuses only on progress indicators. Should there be mention of later results-based success indicators somewhere?	We will have more detail of metrics and indicators in the logic model packet and have included critical outcomes in Section 2.3. We updated the description text to capture "success indicators" as we see those as the same as critical outcomes.
6	p. 10: Section 6.2 – Market Progress Indicators • "Responsible" – referring to entity responsible for collecting the data? Or responsible for the Data Source? Change to make clearer.	Updated text to "Responsible Entity/Team."
7	It would be good to have a bullet summary of the most important evaluation goals before listing activities.	Added a sentence for writers to call out the key evaluation goals.
7	I like how we keep "insert year" to see what they propose for an evaluation cadence. What does savings forecast mean?	The savings forecast is how the evaluation team will project the estimated benefits of the MTI over time.
7	p. 11: Section 7.1 – Evaluation & Research Approach Summary • Italics refer to "evaluation, measurement, and evaluation" – should one of those be verification?	We updated this to simply "evaluation."

Section	MTAB Comment	CalMTA Response
8	This comment is based on reviewing risk discussions in several NEEA proposals. This format walks us through risks, their severity, likelihood, and mitigation approaches. Such a format often left me wondering or guessing the degree to which mitigation is likely to succeed. Should there be a column for "likelihood that mitigation could succeed"? There could be a three-point scale, something like: 1. Desperate and uncertain. 2. Who knows? 3. Good chance to succeed. My choice of words is slightly snarky, but in the interest of clarity. The idea is to challenge designers to own up if they are just papering over a problem. If there are nicer words that do that, I'm all for them.	Added "likelihood that mitigation will succeed" column in the full Risk Management Plan – the table in the MTI Plan is intended to be a high-level summary and due to formatting restrictions, we do not want to overcrowd.
8	Good questions for risk mitigation and the HML scale.	
8	p. 11: Section 8 – Risks & Mitigation • Typo in italics under Section 8 heading (cut "of")	Typo – updated text.
9	I'm not clear what "end of contract means." Resource Innovations? MTAB? Maybe specify the end year instead. Is there a place, and value, for a first-year estimate? From a benefit/cost perspective it's not the most important thing, but from a fiscal management point of view it might be.	End of contract refers to the current CalMTA funding period. Updated text in section description to clarify.
9	Do we want to add a miscellaneous category or ask about incidentals and inflation; anything they could expect would change their budget?	These categories may be included in the full budget appendix. The budget here is intended to be high-level.
10	Seems like a lot of material but probably necessary.	
10	The components look right to me, but I can't comment on the presentation of information since sample appendices have not been provided.	
General	It looks pretty good to me. I think my comments are about making it clearer and more useful. Areas where I'm less clear are where what you write depends on the maturity of the initiative when this is written, which likely varies.	
	Looks great. Awesome work	

MTAB Meeting Notes

June 14, 2024
In-Person Meeting, David Brower Center, Berkeley, CA

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She reiterated CalMTA's conflict of interest policies and asked MTAB members to disclose any conflicts. There were none.

Stacey invited any comments regarding the previous meeting (4/25) notes. There were none.

Review of Residential Heat Pump Water Heating Advancement Plan

Stacey reviewed CalMTA's multi-stage market transformation initiative (MTI) development process and the ideas currently in Phase I and II of development, as well as the timeline for advancing these ideas.

Alexis Allan presented the draft Advancement Plan for Residential Heat Pump Water Heating with a focus on the current market challenge, desired future end-state, and preliminary logic model. MTAB member comments included:

- Creating an inventory of the many entities currently promoting HPWHs and what gaps make sense for CalMTA to fill will help clarify the focus of the MTI.
- The strategic plan proposed as a near-term outcome of this MTI in Phase II would have value for the state, even if the MTI does not ultimately result in a full MTI Plan.
- One potential area of focus might be strategies to reduce use of electric resistance back-up heat in the common hybrid 240V HPWH models. With the right controls, this back-up heating functionality is unnecessary. Workforce education and training could help support this goal.
- As the market for existing electric water heaters is significantly different than the market for existing gas water heaters, CalMTA should be careful about how we bifurcate those segments.
- Does CalMTA envision a shared goal for all participating stakeholders convened through this MTI, such as percentage of market penetration or number of heat pumps adopted?
    - Alexis noted that while there is currently a very broad target – that by 2035, the majority of residential water heaters sold in California are grid-enabled HPWHs – this will be refined through Phase II research and activities and substantiated by specific milestones as outcomes.
- Because there are many different tiers of efficiency for residential heat pump water heaters (HPWHs), differentiating which tier(s) this MTI will focus on (to the extent

possible) will be important. There may also be the need for specification alignment between existing programs.

- Understanding demand control potential and where in the market demand control is best addressed (utilities, manufacturers, etc.) will also be important. It's a good goal to make HPWHs demand-control-ready but CalMTA should also assess whether standardization of demand control should be a goal or whether it poses a risk to manufacturer engagement.
- The current product definition is currently broad enough to include the small commercial market. Is CalMTA considering this?
    - Alexis responded that this is not currently under consideration but could be.
- Should HPWHs for multifamily buildings be included in the draft Advancement Plan? If so, they didn't seem to be. Additionally, does the product definition include both unitary and split systems?
    - Alexis confirmed that the multifamily market segment is included, and that the definition is intentionally broad to encompass both system types.
- Load-shift capability is included in the product definition, but does the scope end there or would CalMTA explore actually implementing load-shifting?
    - Alexis acknowledged that this has not yet been explored but that CalMTA welcomes MTAB feedback about including implementation in the MTI.
- Through efforts in the Northwest, where market share for residential HPWHs has grown to double digits, manufacturers know what success looks like and the potential impact of a statewide market transformation program.
- In addition to coordinating with the California Air Resources Board (CARB), CalMTA should also explore work being done by the air quality management districts (AQMDs). In some cases, regional work may be more advanced than statewide policy, and aligning all the AQMDs with CARB could be valuable. Some AQMDs have also historically had significant influence on the industry.
- Did CalMTA's initial market scan found active programs doing work beyond offering rebates and incentives?
    - Alexis replied that in addition to multiple incentive programs, some existing programs focused on trade ally training and awareness-building/education, as well as quite a few related research projects. CalMTA's more robust scan in Phase II will ensure we are not duplicating efforts and are instead filling gaps and adding value.
- Product development is included in the initial MT theory, but is further development truly needed or is the product already there and not being adopted? It seems like sizing could be a potential area of focus, encouraging manufacturers to make differently sized or shaped products that better fit into closets or other common installation areas.
    - Alexis explained that CalMTA seeks to better understand what the California market wants in terms of product enhancements and how similar this is to what other markets nationwide.

- It was suggested that the market needs a non-proprietary demand control system.
    - Jeff Mitchell responded that we want to minimize requests made to manufacturers at this stage since they are being engaged at multiple levels currently, yet uptake remains low. If we decide to go to them requesting an additional feature, we need to demonstrate this will move the market.
- Collaboration is needed to help inform development of products that meet challenging installation needs (e.g., multifamily properties or small spaces). Working at the statewide level and collaborating nationally will be important to getting installers on board and transforming them into HPWH advocates.
- CalMTA should also explore strategies to deal with grid capacity issues, including home panel capacity and smart panels.
- It would be valuable to identify all available funding for this market and technology and the timeline for allocating/dispersing this funding to determine whether it is sufficient to support statewide adoption goals.
- As part of overseeing statewide strategy, would CalMTA monitor external program performance?
    - Alexis replied that monitoring the statewide market and ensuring required tactics are in place would be a focus of the MTI, but not at the individual program level.
- Understanding where the best cases for residential electrification exist would be helpful to determine where HPWH adoption/installation will be easiest and where will barriers arise.
- Potential topics to explore or re-explore: the percentage of water heaters purchased at a big box retailer vs. directly from contractors, reasons why a water heater is replaced (emergency vs. pre-emptive), any correlation between house vintage/location and size of closet or likely water heater installation site, and panel capacity by house type.
- In reviewing past research reports, CalMTA should analyze the underlying data as well as key findings or conclusions.
- Understanding the varied risk factors related to electrification at the household and community level would allow the MTI to identify and target the communities that are best primed for electrification.
- How does the budget reflect collaborative activities or outreach/education vs. staff time?
    - Alexis noted that the budget includes potential innovation sessions, stakeholder summit, and outreach on the market research side. Stakeholder engagement and support is built into staff time.
- Is the preliminary MTI budget included in the 2025 ABAL?
    - Jeff confirmed that the activities planned for 2025 are included in the ABAL but the budget includes some Phase I activities and work that will begin in Q3 2024.

- Regarding equity considerations, reaching ESJ communities will likely require engagement of stakeholders who are not active partners and may not be familiar with the technology. Planning around these stakeholders' strategic goals rather than only asking them to adopt CalMTA's goals might have greater impact.
- It was requested that CalMTA provide a detailed breakdown of the technology assessment portion of the MTI budget in the draft Advancement Plan, mirroring the table for the market research budget.

Stacey discussed the upcoming public comment period that will allow CalMTA to capture additional feedback before finalizing the draft Advancement Plans.

Review of Commercial Replacement & Attachment Window Solutions Advancement Plan

Rick Dunn presented the draft Advancement Plan for Commercial Replacement & Attachment Window Solutions (CRAWS) with a focus on the current market challenge, desired future end-state, and preliminary logic model. MTAB member comments in response to the MTI overview included:

- This technology seems to offer significant secondary benefits, including less disruption related to upgrades and increasing the amount of usable space inside the building.
- In developing initial market assumptions, was the prevalence and impact of curtain walls assessed?
    - Rick clarified that the MTI target market was focused on older buildings, where curtain walls are much less prevalent.
- What assumptions were made about operable vs. inoperable window situations in existing building stock before identifying recommended solutions?
    - Rick noted that there was a lack of good building stock data for California, so wanted to better understand this question through Phase II market research – recognizing that there are viable solutions for both.
- In considering the role that ESCOs could play in this MTI, it should be recognized that this tends to be a conservative market driver and bundling financing components can prove challenging.
    - Rick agreed that the potential leverage provided by ESCOs needs to be validated and that other financing options may prove to be a better fit.
- While early BPS efforts in the Northwest indicate that BPS is a great driver as a policy tool, the number of participating buildings remains relatively low due to compliance challenges and relatively low fines for non-compliance.
    - Rick agreed and added that the activities described in the plan seek to understand both where BPS has been successful (e.g., New York) and what factors have contributed to that success. Lack of harmonization between standards with a state or region can make compliance more challenging (ex: Washington State policies differ from those adopted by the city of Seattle).

- Two potential obstacles were identified including that the HVAC industry is not interested in selling smaller systems or coordinating with window installers. It may be more effective to engage window installers before HVAC installers with a focus on medium-to-small private sector buildings. Secondly, installers may see a risk in downsizing HVAC equipment. CalMTA should examine how HVAC specifications change across different building types and sizes to present strong evidence that no risk exists.
    - Jeff clarified that in a future state where buildings move towards electrification, downsizing means not upsizing electrical systems when switching from gas. Rick added that a prior study found thermal comfort was the most influential factor for upgrading windows so addressing HVAC first is a lost opportunity. CalMTA will need to work with design teams to raise visibility of pathways to improved envelope performance; and leverage ASHRAE findings that identified the positive results of improving envelope before HVAC upgrades.
- While electrification will often result in increased overall energy costs, many incentive programs require that building upgrades result in lower energy bills – creating a situation where advanced measures like solar PV system installation must be included. Building envelope upgrades present an easier and less expensive approach to reducing energy bills cost-effectively.
- The industry has been trying to accurately quantify non-energy benefits for decades, but how is this information being used? People will value these benefits not because they are quantified but because we help them understand what they mean and how they can be factored into the decision-making process.
- Given the importance of indoor air quality in schools, what filtration benefits can be delivered by window upgrades? Old windows are leaky and can let in unhealthy air (e.g., smoke during fire season). Factoring in non-energy benefits could be particularly helpful in ESJ communities when traditional cost-effectiveness metrics wouldn't allow a project to move forward. Data sets from projects approved through the CEC's CalSHAPE program may be useful references.
- CRAWS could contribute to permanent load-shifting.
    - Rick agreed that this had potential and was backed by interesting studies demonstrating how CRAWS can enable building pre-heating or pre-cooling to manage peak load.
- CalMTA should optimize sizing practices for HVAC systems or develop a baseline to determine whether over-sizing was a real challenge.
    - Rick noted that because air leakage often gets underestimated when sizing systems, it's assumed that envelope air leakage is the same as when it was first built and may not reflect current conditions.
- Will the baseline assessment also gather info on HVAC systems in these buildings since that seems important to the MTI?
    - Rick replied that the general building stock assessment could include this. However, publicly available information in many states exists that is easy to

assess and indicates the value of a combined approach to building improvements. CalMTA needs to better understand the level of detail in in California's existing benchmarking data. Jeff added that the market research currently being conducted for the Efficient Rooftop Unit (ERTU) MTI will also capture some of this data.

- Reservations were expressed about the true size of the market that could be reached by BPS as a leverage point, as many buildings have very different decision-making processes. CalMTA should either limit its focus to a market segment with an integrated design element (vs. small buildings that are unlikely to ever adopt BPS) and MUSH buildings or identify a different avenue to reach the market.
- Since this MTI was originally focused only on vacuum-insulated glass and commercial replacement was not included in the TSB estimate included in the Advancement Plan, when will an updated estimate be shared?
    - Karen said that this work was planned for Phase II and would likely be completed by mid-2025.
- What assumptions, if any, about statewide adoption of BPS are included in the Advancement Plan estimates?
    - Karen confirmed that no assumptions on this were factored into the TSB estimate in the Advancement Plan.
- CEC CalSHAPE program has given out $421M in grant money to 640+ local educational institutions for projects that are just starting the demonstration phase. CalMTA should look at opportunities to leverage these projects and understand how/if this program is contributing to lost opportunities related to windows.
    - Rick agreed and added that CalMTA could also use CalSHAPE data to find the right schools for potential windows. We didn't include proposed pilot strategies in the plan, but this could be a potential opportunity.
- CalMTA should look at opportunities to ensure that statewide efforts to adopt BPS address the need to pursue envelope measures and recognize windows as a potential lower-cost option for envelope improvements.
    - Rick agreed and noted that CalMTA is submitting comments to the CEC's Request for Information about BPS to inform this.

Public Comment

- Alice LaPierre of the City of Berkeley shared two public comments:
    - Regarding the Residential Heat Pump Water Heating plan and a desire to increase adoption in ESJ communities, steel pipes in older homes will pose significant challenges due to corrosion, clogging, and insufficient flow. The state needs to have a strategy in place to address this – not just the supply line but in service delivery.
    - Regarding CRAWS, strong support for building envelopes being prioritized. However, low occupancy rates post-COVID mean that envelope upgrades can be a hard sell for building owners. Special leasing mechanisms in which

tenants agree to be responsible for utilities and property taxes can motivate building upgrades since the lower utility bills will be an incentive for tenants to lease that building. Thermal imaging is also a great selling tool for windows.

CalMTA Program-Level KPIs

Karen Horkitz recapped the April 25 MTAB discussion about proposed program-level KPIs and invited additional feedback from MTAB. MTAB comments included:

- The word "lifecycle" or "lifetime" should be inserted between "forecasted" and "B-C ratio" since this is not a short-term play.
- While not including numbers in the dropdown menu seems appropriate, it may be valuable to include a snapshot of the market adoption curve in the dashboard to show the relationship between money being spent and impacts. An MTI-level metric showing where the MTI is at a given place in time with regards to investment and impact would be helpful.
- It is historically challenging to predict the timing of market transformation and when seismic market shifts will occur. Because the bulk of MTI budgets are often spent before significant savings are accrued, this can make it difficult to show the correlation between investment and impact in a positive way. Leaning heavily into market progress indicators to tell this story is recommended.
    - Karen confirmed that CalMTA will try not to make predictions at the yearly level but will rather estimate a time range for when market shifts are expected.
- Regarding current-year budget expenditures, it's hard to know if coming in under- or over-budget is considered preferable but this metric can still provide context for other KPIs (e.g., if an MTI is under budget but under-performing on other targets vs. over budget but exceeding goals).
- Why are third-party expenditures tracked cumulatively but not other (e.g., admin.) costs? Cumulative seems like a useful way to track expenses since MTIs are long-term plays but perhaps annual is more critical.
    - Lynette confirmed these fields came directly from CalMTA's contract but will be reviewed to ensure the most interesting and meaningful aspects are captured.
- While TSB is important, many stakeholders will want to see energy savings as a top-line item vs. one of the drill-down menu options.
- Further context for KPI #13 (third-party budget as % of total program expenditures) should be provided so that there is guidance to know whether that value is positive or negative. While the CPUC intends for this metric to position CalMTA as an administrator and outsource MTI implementation, there is no specific target at this point and CalMTA is not expected to follow the IOU requirement for outsourcing 60% or more of an energy efficiency portfolio. It might be useful to include a footnote or reference that emphasizes the CPUC's interest and desire to monitor CalMTA utilization of third parties, even without a set target.
- It would be helpful to add a metric that tracks how accurate CalMTA forecasts are or the rate at which things change in relation to CalMTA's planning.

Karen noted that CalMTA will share a populated KPI scorecard at the first 2025 meeting.

Draft 2025 Annual Budget Advice Letter (ABAL)

Lynette Curthoys presented a summary of past CalMTA budget activity and the details of 2025 budget cost categories and activities. MTAB member feedback included:

- Is baseline development included in the evaluation budget?
    - Lynette clarified that the evaluation cost category is reserved for actual evaluation services. Karen added that the field work conducted to establish each market baseline is included in the strategy development and testing component of Phase II budgets.
- Does CalMTA intend to integrate the data needed to track market progress into CalMTA's system or would subcontractors manage and track this?
    - Margie Gardner replied that data would ultimately be stored in one central location overseen by Resource Innovations.
- How does CalMTA's budget account for MTIs that ultimately do not move forward to Phase II?
    - Jeff noted that the ABAL assumes fewer MTIs move forward than are currently in the pipeline. Lynette added that the CPUC can shift budget between cost categories, providing additional flexibility. The Decision indicates that start-up funding will be in place until an MTI is formally approved.
- Budget lines could be rounded up to improve readability and avoid false precision.
- Several areas were flagged for more detailed analysis and follow-up from CalMTA, including differences in the allocation of administrative support and Advancement Plan development between the 2024 ABAL (revised after the initial filing due to limited visibility into 2024 activities when that ABAL was developed) and the 2025 ABAL, as well as a request for more itemization to match the granularity of preliminary budgets in the Advancement Plans.
- The addition of an unspecified or uncommitted category could reduce fluctuation over the year, since fund-shifting can get confusing, and it might be beneficial to have some funds available quickly without the re-allocation process. However, if the funding in this category is too substantial, it could make it difficult to decide what categories to shift it to. Assuming that money in the uncommitted category could be used without going through the regulatory approval process, what impact would this have on perception given the potential symbolism of reserving money vs. committing it upfront to specific enterprises?

Lynette explained that this feedback would be considered as well as written feedback received by MTAB members via an online form that would be sent after the meeting.

MTI Plan Template Feedback

Jeff shared the key pieces of feedback provided by MTAB on the MTI Plan Template and CalMTA's response to that feedback, including:

- Because the MTI lifecycle extends well beyond the timeline of the preliminary budget, is that budget intended to reflect just the contract period or the total cost of the MTI?
    - Jeff clarified that while CalMTA does not plan to provide a year-by-year forecast in the MTI Plan, the plan will include both the actual budget for the contract period and the estimated total lifecycle cost with some parameters in place (e.g., the MTI is estimated to be in the market for a minimum of 15 years).
- MTI Plans should credibly identify the key market barriers that can be mitigated by CalMTA before allowing the MTI to exit the market.
    - Jeff agreed that a critical path is important to each MTI and could be included in the logic model discussion. Stacey added that the Evaluation Advisory Group will also be reviewing and vetting these materials to confirm the metrics that will indicate a market is transformed.
- Assuming that an "elevator pitch" for each MTI will be part of the MTI Plan introduction or executive summary, MTAB would like to review these in advance. The chances of successfully transforming a market are significantly better with exciting leverage points.
- Regular "where we're at" status updates for each MTI could help keep focus vs. relying too much on market research.

Phase I Disposition Report Comment Summary

Jennifer Barnes presented themes of public comments submitted in response to the Phase I Disposition Report as well as CalMTA's response. MTAB questions included:

- Costs categorized as "other" for each MTI's preliminary cost estimate varied widely from miniscule to very large. In the latter cases, understanding what factors contributed to that cost would be helpful.
    - Jeff agreed that for the several cases where the "other" category was high, contributing factors could be broken out and included as a footnote.

Strategy Pilot: Chefluencer for Induction Cooking

Jeff presented an overview of the "Chefluencer" Strategy Pilot for the Induction Cooktops & Ranges MTI, including research objectives, the interventions it will test, implementation strategy and timeline, and public comments received. MTAB feedback and questions included:

- What is the scale of the Strategy Pilot (e.g., target number of events or participating stores)?
    - Jeff described the plan to implement this Strategy Pilot with more than one retailer in more than one location for a few hours over a few days. If one retailer agrees to participate, events would occur in more individual store locations. Multiple retailers would result in events in fewer store locations per retailer.

- Making the discount coupon contingent on completing the survey creates a biased sample of people who are already motivated to purchase an induction product, but this is also the correct target market for this MTI.
- Is it correct that CalMTA does not expect the Strategy Pilot alone to influence retailer stocking practices, but is instead looking at long-term change?
    - Jeff confirmed this is accurate.
- Will CalMTA target locations based on any specific market characteristics?
    - Jeff confirmed a desire to host events in different regions of the state, although CalMTA is still working with retailers to determine locations. Stacey added that CalMTA is also exploring synergies with utility induction cooktop loaner programs to try to convert people who have already had some hands-on experience with the technology.
- Has CalMTA referenced any past campaigns that have utilized this kind of approach to determine its likelihood of success?
    - Jeff replied that there was little existing data regarding how effective demonstrations in retail locations are.
- A recent ACEEE report about consumer attitudes toward electrification highlighted that the ease of cleaning was a major motivator for customers to choose induction – might be worth leveraging.

Public Comment

No public comment was provided during this opportunity during the meeting.

Next Meeting & Next Steps

Stacey presented the MTAB review timeline for key deliverables (e.g., MTI Template, Phase I Disposition Report, APs & Strategy Pilots, and the 2025 ABAL) as well as the timeline for formation of CalMTA's Evaluation Advisory Group. MTAB comments and questions included:

- Given the tight review timeline, should MTAB members focus their review on specific areas of each deliverable to ensure that CalMTA gets the input it needs?
    - Stacey replied that CalMTA seeks to have MTAB members read all documents before the public comment period closes so they can submit their comments through that channel if desired. Jeff added that MTAB members should priorities the areas of each deliverable that are most interesting to them or where they can provide the most valuable input.
- Will there be separate Evaluation Plans for each MTI?
    - Karen confirmed that there will be specific evaluation plans developed for each full MTI Plan, with details in the appendices. One evaluation advisory group will review and inform these plans across the portfolio rather than specific advisory groups for each MTI.

Attendees

MTAB Members

Hayley Goodson, The Utility Reform Network
Fred Gordon, Energy Trust of Oregon
Randall Higa, Southern California Edison
Nick Luritz, Northwest Energy Efficiency Alliance (proxy for Jeff Harris)
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission
Ky-An Tran, California Public Advocates

Participating Staff & Consultants

Alexis Allan, Brio (on the CalMTA team)
Lynette Curthoys, CalMTA/Resource Innovations
Rick Dunn, CalMTA/Resource Innovations
Margie Gardner, CalMTA/Resource Innovations
Rachel Good, CalMTA/Resource Innovations
Stacey Hobart, CalMTA/Resource Innovations
Karen Horkitz, consultant to the Cadmus Group (on the CalMTA team)
Jeff Mitchell, CalMTA/Resource Innovations

Guests

Mary Anderson, PG&E
Don Arambula, Don Arambula Consulting
Chris Badger, VEIC
Code Bruder, The Energy Coalition
Julie Cantor, Franklin Energy
Fernanda Craig, SoCalREN/Los Angeles County
Sebastien Csapo, PG&E
Richard Fennelly, CoilPod LLC
Carlo Gavina, SoCalGas
Brian Gaze, Evari GIS Consulting
Alfredo Gutierrez, ICF
Matthew Horwitz, SCE
Mina Jimenez, Proteus
Alice LaPierre, City of Berkeley
Spencer Lipp, Timber Cove Energy Solutions
Elise Logan, The Cadmus Group
Cinthia Magana, The Ortiz Group
Christopher Malotte, SCE
Savannah McLaughlin, CPUC
Phanindra Pagadala, PG&E
Emily Pelstring, CPUC
Grace Pratt, Caliber Strategies
Cassie Rauss, SCE
Rebecca Rothman, VEIC
Andre Saldivar, SCE
Lyn Stoler, Impulse Labs
Carol Yin, Yinsight, Inc.
Kate Zeng, SDG&E

MTAB Meeting Notes

July 12, 2024
In-Person Meeting, David Brower Center, Berkeley, CA

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She reiterated CalMTA's conflict of interest policies and asked the Market Transformation Advisory Board (MTAB) members to disclose any conflicts. There were none.

Stacey invited any comments regarding the previous meeting (6/14) notes. There were none.

RFI Initial Report & Advancement Plans Status

Jeff Mitchell presented an overview of all ideas in development as well as a summary of the recently closed Request for Ideas (RFI) results. He then shared an update on the Efficient Streetlighting idea in Phase I of development, communicating the rationale behind CalMTA's decision to conduct additional research and revisit it together with the third batch of market transformation (MT) ideas before moving forward. One MTAB member expressed appreciation that CalMTA is taking a reflective approach to MTI development.

Draft Advancement Plan: Foodservice Water Heating Systems

Sepideh Rezania presented the draft Advancement Plan for Foodservice Water Heating Systems with a focus on the current market challenge, desired future end-state, and preliminary logic model. MTAB member comments included:

- Challenges associated with the tenant-owner relationship, such as split incentives, should be addressed since many restaurants operate in leased buildings. Is there any data indicating what percentage of the foodservice market leases their space or how that decision-making structure factors into the proposed interventions and MT theory?
    - Sepideh responded the preliminary research indicates that most independent restaurants lease their space, so upgrade decisions are made by building owners. There may be opportunities to shift this model or explore opportunities to address the leasing structure, but the MTI will need to consider the split incentive issue upfront.
- Whether CalMTA is aware of any pending litigation around the Bay Area Air Quality Management District (BAAQMD) zero-emission appliance standards referenced in the Advancement Plan, or any similar developments that could impact the timing of these standards.
    - Sepideh would seek better understanding of the landscape around these standards and potential BAAQMD support as a priority activity in Phase II.

    - It was noted that BAAQMD is in the process of developing a comprehensive climate action plan that includes community engagement, so from a strategy perspective it would be beneficial to engage them soon.
- If efficient dishwashers are included in the MTI, are there any health and safety standards for restaurants that would need to be addressed?
    - Sepideh noted that low-temperature dishwashers are currently in use at restaurants so presumably they meet health standards. There hasn't been significant uptake of ventless machines, but research indicates that they also meet required standards.
- The SCE Energy Education Center recently installed a dishwasher with a built-in booster electric resistance heater that is capable of utilizing low-temperature hot water. Dishwasher booster heaters are also available that can be connected directly to city water. These types of dishwashers enable food service facilities to eliminate the need for gas or electric booster heaters and therefore only rely on heat pump water heaters, which are limited to 140 degrees without the use of sanitizing chemicals.
    - Sepideh noted that electric resistance back-up supports heat recovery, an important element of this technology.
- The health code used to allow lower-temperature water to be used in restaurants when accompanied by sanitizing chemicals, which would be heat-pump-friendly, but this may have changed. Equipment is changing rapidly and efficient models are both available on the market and code-compliant, but local jurisdictions setting health guidelines may not be familiar with this technology.
- Affordability and upfront cost seem like a very significant and challenging barrier
    - Sepideh agreed and added that the large percentage of low-temperature dishwashers that are leased could inform an interesting approach. Also, since dishwashing chemical providers are the entities leasing this equipment, perhaps they would be willing to lease ventless machines.
- Because so many foodservice establishments operate in leased buildings, the split incentive issue could actually be an opportunity instead of a barrier: if building owners purchase the equipment, it could be a selling point for future tenants if/when a restaurant turns over.
- The MTI product definition touches on multiple different devices spanning water supply, distribution, and usage, which would historically be addressed separately with a unique logic model for each. How would an MTI that addresses all these technologies be implemented?
    - Sepideh acknowledged this is something that requires critical thought in Phase II. It would be interesting to learn more about how larger restaurant chains address this as many have their own labs to test systems.
- Also regarding product definition, CalMTA needs to narrow down the MTI's focus. Restaurants have widely varied decision-making processes and ownership structures and these products span different markets -- how do we get past the initial beachhead market? Small independent restaurants might not be a good target market due to

resource constraints and potential cost issues. Large-load chain restaurants are likely a better market and there's still potential to identify equity angles by engaging diverse business owners within that. Pulling all the components together seems challenging if we target the segment of small restaurants that lease equipment. Moving away from promoting retrofits and focusing on influencing chains' specifications would be an easier path.
    - Sepideh replied that while smaller cafes use less water than large full-service restaurants, the former segment could have fewer barriers. Phase II activities will allow CalMTA to better understand market entry-points and refine focus areas and strategy. Our initial theory that cafes and restaurant chains could be the easiest entry-point but that may not prove to be accurate.
- It is important to identify the decisionmakers at each level of the market. Building owners might be the primary decision-maker for water heaters, but restaurant owners may decide which dishwasher is purchased. The split-incentive issue applies in all cases but different decision-making points could require different interventions.
    - Sepideh shared that CalMTA's preliminary research found that in some cases, even when building owners own the equipment, cost of failures get passed on to the restaurant tenant. Initial conversations with market actors also indicate that equipment availability has significant impact on emergency replacement scenarios, and that ensuring the right equipment is in stock will be important.
    - Jeff Mitchell noted that Phase II activities will help identify a systems-approach to MT without having to cobble together three different MT strategies.
- While acknowledging the significance of Title 24 as a leverage point, ENERGY STAR should also be captured as leverage. There are ENERGY STAR standards for some foodservice equipment and may be one for relevant water-heating systems.
- In considering workforce development, inclusion of electric water heaters in new construction will not just create new jobs but *different* jobs – this may be a leverage point.
- The logic model combines reducing financial barriers together with other activities, but this is an important and distinct issue that should be in its own separate box.
- Participation in demand management is the primary way to achieve cost parity for electrification in this market. Most restaurants are challenged to participate in demand management due to the need for staff to be available at all critical times to run the thermostat and other DR-enabled equipment, as well as understanding how this equipment works.
- Regardless of whether the MTI includes end-use equipment like dishwashers, it should capture the need for water-heating equipment to adapt to changes in dishwashing technology.
- In addition to the BAAQMD standard, South Coast AQM may have stricter and more imminent policies in place with implementation dates as soon as 2026.
- Given the different decision-makers and points of influence, can CalMTA reach the dishwasher market through the logic model developed for HPWHs?

    - Sepideh clarified that the MTI will focus on HPWHs and if we decide to try to influence the efficient dishwasher market, it would be in support of water heaters.
- CalMTA should clarify what specific market the MTI is specifically trying to address vs. a broad overall strategy that includes end-use devices, distribution, and supply.
- HPWH cost parity is a desired outcome but one of the challenges is rate structure, which is not captured in the Advancement Plan interventions but is needed for the MTI to be successful. It's possible the primary way to address this is through time-of-use rates or curtailment of negative pricing.
- The market characterization study should capture how different segments of the market behave since a one-size-fits-all approach will be hard. It will be challenging to approach a highly fractured market with widely varied energy savings potential, so CalMTA should understand those nuances before moving forward.
- The MTI should include a progress indicator tracking contractors that have proven profitable success with a business model for installing restaurant HPWHs, not simply the overall share of contractors doing this work, which would provide the impetus for others to be trained.

Equity Update

Rachel Good presented an update on CalMTA's equity workstream, including key objectives and recent activity as well as important findings from a series of ESJ community listening sessions conducted in June. MTAB comments included:

- More details about CalMTA's planned equity sounding board were requested.
    - Rachel and Stacey shared that a 6-8 member group who would meet three times annually with additional ad hoc engagement as needed. All members' organizations will be compensated for their participation.
- It was suggested that CalMTA should avoid use of the word "stakeholder" due to its colonialist background, particularly in interactions with ESJ communities.
- What is the intersection between ESJ community engagement and workforce development? What portion of listening sessions focused on workforce development and what other outreach is occurring to get input?
    - Rachel replied that June's listening sessions were focused on specific MTIs with workforce development as an integrated component. In addition, CalMTA is planning a dedicated series of briefings with WE&T organizations this fall to better understand market needs and coordination opportunities.
- The term "equity lens" often refers to a series of questions used to support implementation plan development vs. the series of strategies presented by CalMTA. Addressing equity requires awkward questions that must be struggled through.
- Regarding the equity sounding board, CalMTA should focus on quality relationships and not quantity when recruiting members. Any advisory relationship must come with

compensation. Members must also understand the broader context of MT and how CalMTA work integrates into the overall market.

- Did listening session attendees ask about maintenance issues related to HPWHs in either the residential or foodservice market? There may be challenges finding contractors to do maintenance and repairs.
    - Rachel confirmed that this did not come up in the listening sessions.
- How will CalMTA communicate with participants regarding the impact of their participation, an important way to show the tangible impact they had on the process?
    - All listening session findings have been shared with and actively discussed with the MTI teams and revisions to draft Advancement Plans based on this feedback will be communicated with attendees.
- Many of the comments and feedback received in the listening sessions are not exclusive to ESJ communities and would have impacts across the entire market.

Public Comment

No public comments were received at this time.

2nd Quarterly Progress Report

Stacey presented second quarter milestones achieved by CalMTA as well as the ongoing cadence of future updates. Elaine Miller and Jeff Mitchell shared updates on the Phase II ideas under development, including refinements, timeline for key milestones, technology assessment and market characterization findings, and external coordination. They also presented updates on the ongoing strategy pilots for the Portable/Window Heat Pump MTI. MTAB comments included the following.

<u>Induction Cooktops & Ranges</u>

- Is the battery backup described in the product definition just a daily peak-load offset or would it provide reliable backup power during outages? How does this impact the price of the technology?
    - Elaine replied that the product could do both, but also ultimately allowed for a 120V product to perform at a higher level with all burners on. The battery does add to the price but not massively so, and the price is going down currently.
- Is the MTI also looking at plug-in appliance versions of 120V products, which are lower-cost and therefore important from an equity standpoint?
    - Elaine noted that while CalMTA would focus on the entire market, there are some concerns about how plug-in versions perform.

<u>Portable/Window Heat Pumps</u>

- CalMTA has documented a long list of future product enhancements. Is there a prioritization or ranking to help direct resources?
    - Elaine said CalMTA is working on this. Air filtration is a priority from a end-user perspective, but manufacturer feedback indicates it will be difficult to achieve.

    - Jennifer Barnes added that form factors for different window configurations (e.g., horizontal sliding windows) and temperature performance (e.g., cold climate capabilities) were the highest priorities, followed by air filtration.
- CalMTA needs to address the issue of misinformation and lack of clear labeling when trying to buy a heat pump air conditioner.
- This technology faces the same challenge as ductless heat pumps/mini-splits did: backup systems will kick in that are less efficient than standard products, resulting in higher energy consumption. Areas with cold-climate capacity needs will also need strip resistance.
- The home heating/cooling scenarios presented should reflect that gas is not used only for central HVAC systems; many homes have gas wall heaters and baseboard heat.
    - Jennifer confirmed that this scenario was included in CalMTA's research.
- It would be helpful to know the distribution of all these scenarios across the target market, which may be captured in future work.
- CalMTA should clarify and separate out findings related to the cost of running this equipment vs. fuel-switching.
- This will be a hard market to penetrate and CalMTA should manage expectations about how long MT will take.

<u>Efficient Rooftop Units (ERTUs)</u>

- Do the values presented represent avoided cost or total system benefits (TSB)?
    - Jeff clarified that they were avoided cost.
- Heat recovery ventilation as a fuel-neutral improvement is part of the work being done in this market in the Northwest, as is better economizer operation.
- Understanding what percentage of the market would currently opt for a premium RTU vs. minimum efficiency unit might help target the MTI better – are we looking at trying to improve the commodity product or come up with a new premium product? If it's the latter, we will need to develop a strong value proposition since there's not much wiggle room in the RTU market. CalMTA should pick a niche where the MTI can have the most impact.
    - Jeff replied that we are not seeking to promote a premium product but rather to provide building owners/operators with options to achieve higher efficiency.
- The U.S. Department of Energy engages industry stakeholders in updating the efficiency regulations for RTUs without consideration of other components that can be added on such as economizers, heat recovery, etc.
- MTI success will depend on reaching a market state where premium products have enough of a competitive advantage to create cost pressure.
- Is there a split incentive issue here? Is the target market primarily owner-occupied or leased buildings?
    - Jeff noted that CalMTA was collecting this data now but assumes the majority of the market is leased buildings.

- Market characterization work should segment the market based on decision-makers and building types. Big-box retailers are already resistant but finding the right segment to market this to would build momentum.

2025 Annual Budget Advice Letter (ABAL)

Lynette Curthoys presented a summary of feedback received from MTAB members on the first draft of the 2025 ABAL. She shared slides summarizing key comments and CalMTA's responses to them, walked MTAB members through notable changes in the redline, and talked in detail about the new Appendix A that was developed in response to MTAB feedback. MTAB members were provided with a redlined copy of the draft ABAL and the new Appendix A. MTAB members asked the following clarifying questions and made some suggestions for improvement.

- Why did CalMTA revise the forecast for 2024 in ABAL Table 2 to increase the Administration cost category back up to the full 2024 ABAL amount and what resulting tasks were cut from other areas?
    - Lynette clarified that no activities were cut and that no changes are currently forecasted at the cost-category level for 2024. Rather, the forecast was updated because it is too early in the year to forecast shifting Administration costs to other cost categories as was done in 2023. She indicated that CalMTA could show the anticipated breakdown between routine and non-routine administrative costs in the final ABAL.
- It is important to note that the overall budget estimate did not increase from 2024 to 2025, and that administration remains below 10%.
- In response to an MTAB member question, Lynette confirmed that changes in level of effort anticipated for major activities from 2024 to 2025 can be seen in the increase or decrease in the full-time equivalent (FTE) numbers that were added to the table.
- Adding more line items to the budget, particularly for Phase II research and strategy pilot activities, would be beneficial.
- NEEA provides a single budget estimate for their equivalent of Phase II activities, followed by quarterly reporting on how and why the estimates change throughout the year.
- MTAB members were supportive of CalMTA's plans to include budget updates in future MTAB meetings and quarterly reports and mentioned the importance of including a brief narrative describing the driver of any changes and the implications. This is in line with expectations for utilities to report on deviations from budgets in all areas, even beyond energy efficiency.
- Why do the first three Advancement Plans include pilot costs that do not seem to be reflected in the 2025 ABAL?
    - Jeff clarified future MTIs may or may not require strategy pilots, and if they do, the funds would be allocated from the MTI's Phase II cost estimate. While strategy pilot funds are not earmarked in a separate gated funding pool,

CalMTA proposes to use the same strategy pilot approval process that was described in the 2024 ABAL.

- The draft ABAL had a typo on p. 13 regarding the number of MTIs that would transition to Phase II in 2025. The correct number is two, as shown on p. 12 in the list of key deliverables from Phase I.

Several members expressed that they were prepared to recommend the redlined ABAL as presented. One member indicated a desire to further discuss his comments with CalMTA before moving forward with the recommendation process. Lynette offered 1-on-1 discussions for any MTAB member that has additional questions. It was agreed that any additional redlines to the ABAL would be annotated in a different color and MTAB members would receive both the clean and redline version, as well as a response to comments memo, when asked to recommend the final ABAL.

MTI Evaluation in Practice

Karen presented evaluation activities by MTI stage, evaluation components of MTI Plans, and an overview of the process for evaluating CalMTA. MTAB comments and questions included:

- Will the metric tracking increase in market share look at this in terms of the baseline forecast?
    - Karen confirmed this metric captures incremental market growth.
- An early progress indicator related to implementation of key activities (e.g., distribution of communications in the market) would be viewed favorable.
- Distinguishing between leading and lagging indicators can be challenging in MT. Market share can be a lagging indicator because an organization must first work on awareness-building, stocking practices, etc. before impacting that metric. How do these dependencies figure in to CalMTA's approach?
    - Karen noted that final logic models will capture more cause-and-effect sequencing and will be part of the causality assessment used by the third-party evaluator to determine the impact of MTI activities. The evaluation plan will also include details about the type of planned data collection activities and the targeted outputs from each activity. Additionally, an evaluation advisory group will be formed in time to review draft MTI Plans before they are shared.
- Regarding timing of progress indicators, what is the assumed start date (e.g., when the selected implementer has a notice to proceed)? A clear start date and end date will allow the milestones make sense (e.g., "by the end of 2028"). This would also help us understand how market progress relates to product cycles or regulatory changes that would require compliance.
- More leading indicators would also be helpful because metrics that aren't measurable for five years won't allow CalMTA to course-correct if needed. Activity completion in pursuit of market change could be useful to track and document.

    - Karen replied that many logic models include not just interventions and outcomes but also outputs. Many activities conducted in support of MTIs will be a focus of the process evaluation (did we do the things we said we would and what's the proof) vs. looking at market change. CalMTA could include some of those metrics to indicate influence on the market even if they are not traditional market outcomes.
- Where does the evaluation advisory committee fit into the timeline for review and refinement of the evaluation plan?
    - Karen said that CalMTA intends to seat the committee in September and prepare them for a short turnaround review of the plan in October. In addition to reviewing all draft deliverables, this group will be instrumental once CalMTA starts soliciting third-party evaluators.
- Recognizing that this is a dynamic process of continuous improvement, is it customary to build in flexibility on progress indicators in contracts with third-party implementers?
    - Karen confirmed that this was typical and routine. Ongoing learning and adaptive management require a mode of continuous learning and improvement, although parameters would be set for when and why the plan would be updated.
- The audience for MT evaluation needs to prepare for a different mode of inference and precision than traditional energy efficiency programs as even when you can show significant savings, precision can be challenging.

Public Comment

Alice LaPierre of the City of Berkeley asked about the source of assumptions regarding window configurations for the Portable/Window Heat Pump MTI, as the Bay Area has many older buildings with double-hung windows.

Carol Yin requested that CalMTA clearly define the difference between metric, milestone, and threshold, and use these terms consistently. She also noted that any recommendation made by the third-party evaluator regarding CalMTA must be evaluated by a different evaluator, which CalMTA should consider in its planning.

Next Meeting & Next Steps

Lynette closed by presenting the MTAB review timeline for upcoming deliverables. She also reviewed the timeline for finalizing the 2025 ABAL, the MTI application, and providing quarterly updates.

The meeting was adjourned.

Attendees

MTAB Members

Cyane Dandridge, Strategic Energy Initiatives
Benjamin Druyon, Inland Regional Energy Network (virtual-proxy for Karina Camacho)
Hayley Goodson, The Utility Reform Network
Fred Gordon, Energy Trust of Oregon
Jeff Harris, Northwest Energy Efficiency Alliance
Randall Higa, Southern California Edison
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission
Ky-An Tran, California Public Advocates

Participating Staff & Consultants

Taqua Ammar, CalMTA/Resource Innovations
Jennifer Barnes, 2050 Partners (on the CalMTA team)
Lynette Curthoys, CalMTA/Resource Innovations
Rachel Good, CalMTA/Resource Innovations
Stacey Hobart, CalMTA/Resource Innovations
Karen Horkitz, consultant to the Cadmus Group (on the CalMTA team)
Elaine Miller, CalMTA/Resource Innovations
Jeff Mitchell, CalMTA/Resource Innovations
Sepideh Rezania, Unrooz Solutions (on the CalMTA team)
Nils Strindberg, CalMTA/Resource Innovations

Guests

Katie Abrams, Birch Road Consulting (virtual attendee)
Mary Anderson, PG&E
Sharyn Barata, Opinion Dynamics (virtual attendee)
Rob Bohn, PG&E
Kelly Cunningham, PG&E (virtual attendee)
Debbie Ebel, Okapi Architecture (virtual attendee)
William Graswich, CPUC (virtual attendee)
Alice LaPierre, City of Berkeley (virtual attendee)
Spencer Lipp, Timber Cove Energy Solutions (virtual attendee)
Jeff Luoma, NEEP (virtual attendee)
Cinthia Magana (virtual attendee)
Brian Maloney, SFPUC (virtual attendee)
Christopher Malotte, SCE (virtual attendee)
Tara McElhinney, NEEP (virtual attendee)
Kaitlin McGee, Clean Energy Alliance (virtual attendee)
Savannah McLaughlin, CPUC (virtual attendee)
Elizabeth Medrano, SoCal Gas (virtual attendee)
Emily Pelstring, CPUC (virtual attendee)

Alice Sung, Greenbank Associates (virtual attendee)
Peter Tanios, SoCal Gas (virtual attendee)
Ying Wang, Okapi Architecture (virtual attendee)
Carol Yin, Yinsight
Kate Zeng, SDG&E (virtual attendee)

MTAB Meeting Notes

August 26, 2024
Virtual Meeting

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She reiterated CalMTA's conflict of interest policies and asked the Market Transformation Advisory Board (MTAB) members to disclose any conflicts. Jeff Harris noted that he works for a market transformation organization in the Northwest that focuses on similar areas to CalMTA although not in California.

Stacey invited any comments regarding the previous meeting (7/12) notes. Randall Higa identified two items of feedback in need of clarification and CalMTA committed to updating those sections of the draft notes.

Comment Summary on Draft Advancement Plans

Jeff Mitchell presented an overview of comments received on the draft Advancement Plans for the market transformation ideas, Commercial Replacement & Attachment Window Solutions (CRAWS) and Residential Heat Pump Water Heating, during the June 10 to July 11 public comment period as well as CalMTA's response to address these comments.

Commercial Replacement & Attachment Window Solutions

There was no additional MTAB feedback.

Residential Heat Pump Water Heating

MTAB feedback included:

- The draft Advancement Plan identifies multiple incipient regulations related to this market. It would be useful to acknowledge having a regulation in place does not mean it will be implemented successfully and call out the ways in which working collaboratively with market actors now will help ensure the regulations take force and are accepted by the market.

Strategy Pilot Updates

Jeff then shared recent progress and modifications to two planned Strategy Pilots: (1) Induction Cooking Chefluencer Event Testing, and (2) Geographic Targeting Using ESRPP for Portable/Window Heat Pump and Induction Cooking. Regarding the scope change for the Chefluencer Strategy Pilot, which is documented in a memo on CalMTA's website, MTAB members provided the following comments and questions:

- How does the revised scope impact the scale of the Strategy Pilot (i.e., any change to the number of consumers reached)?

    - Jeff replied that CalMTA's research team estimated that the pilot needed to reach approximately 150 consumers for its findings to be actionable and that we are confident that we can achieve this target through either channel. The modified scope focuses on 10-15 Chefluencer events at farmer's markets, community centers, and community learning events throughout California, an increase from the estimated 10 events scoped for retail settings.
- How were the specific community events and locations selected? Given the desire to use insight from consumers at these events to inform future MTI messaging, how will CalMTA ensure that diverse or marginalized voices are captured through the process?
    - Elaine Miller noted that this Strategy Pilot leverages events previously scheduled by the Building Decarbonization Coalition (BDC), CalMTA's partner on this work, which are already targeting diverse communities. The scope of work specifies CalMTA's desire for broad geographic coverage and multilingual events.
- How is CalMTA using social media to promote these events?
    - Jeff shared that a videographer and photographer have been hired to cover the events to gather assets that can be used on social media and in a more robust future campaign.
    - Stacey added that the participating chefs are social media influencers who are promoting the event through their channels. The pilot also leverages The Switch Is On, the statewide electrification education and awareness-building campaign implemented by BDC, which has a significant social media following.
- How equitable is the geographic distribution of these events?
    - Stacey reiterated CalMTA's desire for equitable geographic distribution. She referred MTAB to the current schedule of events, which includes sites in East LA County, Bakersfield, and San Diego, and mentioned that other events were still being added.
- What is the length of Chefluencer events and how are they standardized?
    - Jeff clarified that all events follow a similar approach with consistent talking points, but that the specific event can vary based on factors such as the audience, size, and type of food prepared.
    - Elaine added that the Chefluencer is supported at each event by BDC staff who represent the technology in an expert, standardized manner.

No additional MTAB feedback was received regarding the ESRPP strategy pilot.

2nd Quarter Financial Review

Jim Giordano presented an overview of CalMTA expenditures, an update on a funding shift, and status of the 2025 ABAL. Information about actuals-to-date will also be shared in the Q2 report, which will be finalized soon and shared publicly. MTAB feedback included:

- Given that some cost categories are approaching initial allocations, will surpluses in other areas be used to support those activities or have most of the activities planned for those categories been completed?
    - Jim replied that CalMTA is examining areas to shift funds from areas within the same cost category where less time and effort is needed than anticipated. For example, because fewer RFI submissions were received in 2024 than 2023, less funding is needed for RFI scoring and can be allocated to Advancement Plan development activities.
    - Lynette Curthoys added that funding will not shift between cost categories but some Phase I funding may be carried into Phase II.

Introduction to Idea to Initiative Campaign

Stacey Hobart presented CalMTA's plan for an educational campaign that will help socialize the first two MTI Plans to the market prior to the CPUC application process. MTAB questions and comments included:

- Previous market transformation organizations have developed an MTI's market progress indicators (MPIs) and logic models in parallel at approximately the same time in order to understand how to measure the success of intervention strategies in that logic model. Should CalMTA consider moving the MPI portion of the evaluation section of the campaign (Part 3) up closer to the logic model section (Part 1)?
    - Karen Horkitz expressed her familiarity with this approach and described the reasons that CalMTA has taken a slightly different schedule:
        - Most of the time allocated for the Sept. 19 MTAB will include a thoughtful discussion of the logic model and how key findings from the product assessment and market characterization research informed the logic model.
        - Meanwhile, CalMTA is actively developing a preliminary evaluability map that will relate to the Sept. 19 material but will need the additional time to work through all the details of the evaluation plan, such as firm milestones, that are likely to be scrutinized and discussed later.

  Concrete milestones will be associated with each MPI, but from a timing perspective, it seems more useful to wait until after the logic model presentation to share these details. In the future, we may opt for a different approach.
    - Stacey added that CalMTA is in the process of forming an Evaluation Advisory Group following MTAB feedback about potential mechanisms that would enable more objective review of evaluation plans. This group will review and provide feedback on the evaluation plans before they are presented to MTAB.

Public Comment

- Carol Yin (via Zoom chat): The MTI Plan Template did not provide more than a one sentence description about the contents of each Appendix. Would it be a good idea to share a template of each Appendix's contents soon in order get MTAB input on

whether the information in each Appendix can be expected to have enough info to support an MTAB member's evaluation of the MTI Plan?

- Carol Yin (via Zoom chat): Here is a document that essentially presents a reporting template for ETP product assessments. This may help in developing your own templates, and also give you an idea of the level of detail that ETP reports contain: https://www.calmac.org/publications/ETP_Best_Practices_Guidelines_Published.pdf (Although the CPUC calls it "Best Practices," it's really just a reporting template.).

Next Meeting & Next Steps

Stacey reviewed the schedule of upcoming MTAB meetings and planned agenda items. MTAB questions included:

- Regarding the application process, has the question of whether CalMTA will be financially able to operate after the application is filed been resolved? Is there a rolling ABAL, for instance?
    - Lynette replied that the Decision wording limits start-up funding to 36 months. CalMTA assumes that period will end Nov. 23, 2025, and we will need to have the application approved by then or may reach a funding cliff. The application will include a proposed schedule based on this assumption and CalMTA hopes to get feedback early on regarding this schedule's feasibility. The Decision also estimates a 6-9 month period for processing the application, which would provide enough time to resolve this before the end of the start-up period. CalMTA is doing contingency planning to explore potential scenarios if it seems like the application will not be approved before the end of Nov. 2025 but currently feels confident that this timeline is feasible.
- The comment period after the November 2024 MTAB meeting will therefore need to be completed quickly.
    - Lynette confirmed this is correct. CalMTA's current schedule requires the application to be filed by Dec. 20, 2024, and PG&E will need to review in advance of this date since they will be filing it on our behalf, per the Decision.

The meeting was adjourned.

Attendees

MTAB Members

1. Karina Camacho, Inland Regional Energy Network
2. Hayley Goodson, The Utility Reform Network
3. Fred Gordon, Energy Trust of Oregon
4. Jeff Harris, Northwest Energy Efficiency Alliance
5. Randall Higa, Southern California Edison
6. Peter Miller, Natural Resources Defense Council
7. Stephen Miller, SEI (proxy for Cyane Dandridge)

8. Christie Torok, California Public Utilities Commission
9. Ky-An Tran, California Public Advocates

Participating Staff & Consultants

1. Taqua Ammar, CalMTA/Resource Innovations
2. Lynette Curthoys, CalMTA/Resource Innovations
3. Jim Giordano, CalMTA/Resource Innovations
4. Rachel Good, CalMTA/Resource Innovations
5. Stacey Hobart, CalMTA/Resource Innovations
6. Karen Horkitz, consultant to the Cadmus Group and evaluation lead
7. Elaine Miller, CalMTA/Resource Innovations
8. Jeff Mitchell, CalMTA/Resource Innovations
9. Nils Strindberg, CalMTA/Resource Innovations

Guests

1. Don Arambula, independent consultant
2. Nick Bagatelos, Net Zero Envelope, Inc.
3. Sam Bauer, Ad Hoc Group
4. Alicia Bohigian, Self-Help Enterprises
5. Kyle Booth, Energy Solutions
6. Jon Clark, NEEA
7. Sebastian Csapo, PG&E
8. Michael Daukoru, CalTF
9. Natalie Flores-Rios, SCE
10. Jose Gonzalez, Self-Help Enterprises
11. Tom Herron, National Fenestration Rating Council
12. Rachel Holley, Cascade Energy
13. Nathaniel Jutras, the U.S. Environmental Protection Agency
14. Alice La Pierre, City of Berkeley
15. Yang Li, Energy Solutions
16. Debra Little, AjO
17. Christopher Malotte, SCE
18. Maass, ILLUME Advising
19. Xico Manarolla, Clean Power Alliance
20. Savannah McLaughlin, CPUC
21. Lola Mull, ICF
22. Ritesh Nayyar, TRC
23. Lynda Powers, Resource Innovations
24. Samantha Putlak, Energy Solutions
25. Rebecca Rothman, VEIC
26. Vanessa Sanchez, Okapi Architecture, Inc.
27. Saurabh Shekhadar, ICF
28. Andrew Steinberg, SoCalGas
29. Simpson Tanner, Energy Solutions
30. Patricia Terry, Redwood Coast Energy Authority
31. Rusty Tharp, Aozora Consulting
32. Rick Tonielli, ComEd
33. Carol Yin, Yinsight
34. Kate Zeng, SDG&E

MTAB Meeting Notes

September 19, 2024
Virtual Meeting

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She reiterated CalMTA's conflict of interest policies and asked the Market Transformation Advisory Board (MTAB) members to disclose any conflicts. Jeff Harris noted that he works for a market transformation organization in the Northwest but that no conflict of interest exists.

Stacey invited any comments regarding the previous meeting (8/26) notes. There were none.

Induction Cooking: Market Transformation Theory & Logic Model

Tom Bougher of 2050 Partners presented the results of CalMTA's product assessment for the Induction Cooking Market Transformation Initiative (MTI) including product definition details, energy consumption, bill impacts, avoided cost, and health and safety benefits. Hope Lobkowicz of the Cadmus Group presented key findings and conclusions from CalMTA's market characterization study for this MTI, which included primary and secondary research, stakeholder interviews, and focus groups. Elaine Miller then shared the updated MT theory and logic model.

MTAB comments and questions related to the material presented included:

- Plug-in/portable induction cooktops are currently excluded from CalMTA's product definition but can still be a valuable technology, particularly as a transitional step for consumers who are not fully ready replace gas cooking. Participating ESRPP retailers all sell these products and include them in sales data, so adoption could be easily tracked. The inclusion of portable cooktops would also enable induction adoption among renters without requiring the building owner to agree to a full stove replacement.
- CalMTA should assess the energy implications of battery charging/discharge in storage-enabled induction products. ENERGY STAR looks at a product's total energy consumption, which would capture some energy increase from charging and could result in the exclusion of induction products with batteries.
- More field data is needed to be confident in assumptions about how often consumers use their oven as well as to understand the current level of induction awareness in the general California population.

    - Tom agreed that this will be a priority in Phase III. Current assumptions are based on an EPRI field study, but CalMTA wants to capture more California-specific field data.
- In CalMTA's assessment of consumer interest regarding induction cooktop loaner programs, did the survey describe the look and size of the loaner product?
    - Hope confirmed that the survey included a detailed description of the loaner product, including number of burners and approximate size.
- Recent U.S. Department of Energy materials emphasize the health impacts of switching from gas to electric cooking. Safety surfaces as a consideration for consumers in CalMTA's market characterization work, but does health also factor in?
    - Hope replied that health concerns did not come through as a significant concern in surveys or focus groups. Some respondents expressed skepticism about whether gas cooking truly has negative health impacts.
- Health factors seem like a strong selling point for induction, even for landlords. Did CalMTA track before-and-after responses related to presenting information about health impacts?
    - Hope noted that the study asked participants for their initial response, then presented information and asked if that changed their position. We saw only a minor change related to indoor air quality and other health-related factors.
- While the identified barriers are real, it's important to remember that there's a significant market for this technology already because of the millions of homes, specifically single-family residences, that are currently wired to accept induction products.
- The health benefits of switching from gas cooking may be challenging to communicate, given the individualized and varied nature of kitchen airflow and ventilation usage. Health impacts are most serious in smaller, more enclosed, and less ventilated kitchens or in cases where consumers do not use ventilation consistently (e.g., ventilating while using the range but not the oven). Many consumers may not view this as an issue for their household.
- The bill impact analysis looks at ranges, cooktops, and ovens. What is the impact of a consumer using an induction cooktop without the impact of the range? Would adopting an induction cooktop without replacing the oven reduce bill impacts as an interim step?
- Some activity should focus on the oven aspect of the range. Most wall ovens are electric and many consumers prefer electric ovens. Can this preference be leveraged in outreach and messaging to promote electric ranges and explain how an induction range provides a better and preferred built-in oven, particularly with consumers who like to bake? In a base case with a separate cooktop and oven, given that the oven is often electric, the energy bills for the oven only may be higher but the consumer preference and improved performance should also be taken into consideration.
- CalMTA should consider guiding ENERGY STAR toward a separate specification for battery-enabled induction products, given the different round-trip efficiency potential

as an Emerging Tech category for ENERGY STAR promotion. These products may be less efficient from an ENERGY STAR perspective, but from a carbon-reduction standpoint and off-peak charging perspective, they are hugely beneficial to total system benefits.

- To address the cost barrier for induction products, an intervention could try to determine potential economies-of-scale and the opportunity to reduce manufacturing costs, particularly with battery products, A tear-down analysis could help determine ways for these products to be cost-competitive with radiant electric products.
- The logic model seems to be trying to address two separate markets simultaneously: higher-income, single-family homes with plenty of ventilation, which could create an opportunity to accelerate the market with products that are widely available now, while simultaneously trying to push 120V battery products that are on a different timeline and have a different set of actions associated with market transformation.
- The new construction market seems easier to address, with more immediate short-term results. Many barriers identified in the logic model, such as panel upgrades, are not an issue in new construction. For the lower-income and multifamily markets, portable cooktops seem like the easiest way to influence induction adoption, backed with educational messaging that addresses the behavioral component and environmental benefits of shifting as much cooking as possible to electric.

Room Heat Pumps: Product Assessment, Market Characterization Summary & Logic Model

Tom, Hope, and Elaine followed the same sequence for sharing the results of CalMTA's product assessment, market characterization study, and updated MT theory and logic model for the Room Heat Pump MTI.

MTAB comments and questions included:

- Has CalMTA explored potential load-shifting opportunities given TOU rates?
    - Tom noted that CalMTA plans to explore this in the future and hopes to emphasize products with demand response capabilities.
- Does CalMTA's analysis assume a similar cooling efficiency for the base case and room heat pumps? It seems like new room heat pumps would have a higher cooling efficiency than the existing cooling unit.
    - Tom clarified that CalMTA assumed a comparable efficiency between the room heat pump and window AC units, with all savings coming on the heating side. The CEER of saddlebag units is around 16, which is also the federal minimum for window ACs in 2026, when this MTI would be active in the market.
- When looking at the baseline, most analyses indicate that any new unit, even those that are not a heat pump, will be more efficient than the product it's replacing due to updated efficiency standards.

    - Tom agreed with this statement and noted that the baseline is based on the way CalMTA is tracking savings. For a normal replacement we consider what the consumer would buy instead of a heat pump. The room heat pump is therefore compared to a new AC unit or electrical resistance gas furnace, rather than the old product that is being replaced.
- Does the product definition update, which now includes through-the-wall options, indicate the inclusion of PTACs? Many low-efficiency PTACs are in existence, creating a significant opportunity to replace them with higher-efficiency units.
    - Jeff Mitchell responded that CalMTA explored this but is working with a definition that aligns with that used by the DOE/EPA. Information gained through this target market could potentially influence a future MTI or MTI offshoot focused on PTACs in the hospitality sector.
- It seems worth analyzing the cost of using the defrost functionality, which can be significant event in California climate zones that occasionally dip below 35 degrees.
    - Tom noted that CalMTA conducted this analysis and that it informed the decision to exclude Type 1 products. Consumers can still get most of the heat pump benefits without defrost in most climates, and the cost is much more competitive with standard window AC.
- Is price parity looking only at space heating or both heating/cooling?
    - Hope confirmed that while one survey question looked only at the former, other questions look at both. Consumer motivation related to improving comfort often links to the immediate functionality they need versus a holistic approach.
- It would be interesting to see how learning about benefits outside of cost parity impact the likelihood of adoption.
- Did CalMTA look at the segment of consumers who do not currently have air conditioning but are considering adding home cooling due to rising temperatures, and how might this impact the baseline?
    - Hope replied that while the study did not specifically incorporate bill impacts related to this, respondents were asked about plans to add air conditioning and their likelihood of choosing a room heat pump if they did.
- CalMTA should consider that savings projections for room heat pumps are often lower than expected due to challenging integration with resistance back-up heat, as demonstrated in Energy Trust of Oregon and NEEA programs. Savings will be very dependent on resident behavior and how they utilize one system versus the other.
    - Tom expressed familiarity with those studies and acknowledged the challenge, particularly in displacement cases where HVAC systems are operating in tandem.
- Messaging should reflect that consumers are more influenced by the promise of cooling capabilities with the bonus of supplemental heating and are very motivated to acquire cooling during extreme temperatures.

- California could play a significant role in shifting the national market to adopt natural refrigerants, particularly for hermetically sealed products. Could the State set its own standards for accepting natural refrigerants in products outside of federal regulations?
- Is the goal a product that will work all the time in moderate climate zones so that backup can be disconnected or eliminated? In absence of that, figuring out controls integration will be necessary.
- In multifamily properties and ESJ communities, a cold-climate HP is going to be more expensive. It's worth investigating behavioral changes and using end-user education to shift households away from using the backup system unless absolutely necessary. Buying the more robust unit that displaces all backup systems might not be needed.
- Passing curtailed solar to new electrical loads could be extremely advantageous, giving that these heating systems would likely consume energy during peak times.

Comment Summary on Draft Advancement Plan: Foodservice Water Heating

Jeff Mitchell presented an overview of comments received on the draft Advancement Plan for the Foodservice Water Heating Systems during the July 8 to July 31 public comment period, as well as CalMTA's responses to these comments.

Public Comment

- Andre Saldivar: The SCE Foodservice Technology Center is interested in testing how 120V induction products with battery backup perform from a volume and production capacity, particularly when the oven is in use. Can these products feed a large family? Does it give end-users a negative experience? Have boil times and times to cook been tested? Lending programs provide caveats for 120V burners when they're loaned out since they don't perform as well.
- Alice La Pierre: As CalMTA reconsiders the paused Efficient Streetlighting MT idea, the California Street Lighting Association could be a good point of contact.

ABAL Update & Upcoming Meetings

Lynette Curthoys provided an update on the 2025 ABAL and plans to have it approved by the end of 2024. Stacey shared times/dates and agenda items for the remaining 2024 MTAB meetings.

The meeting was adjourned.

Attendees

MTAB Members

1. Cyane Dandridge, SEI
2. Hayley Goodson, The Utility Reform Network
3. Fred Gordon, Energy Trust of Oregon

4. Jeff Harris, Northwest Energy Efficiency Alliance
5. Randall Higa, Southern California Edison
6. Peter Miller, Natural Resources Defense Council
7. Christie Torok, California Public Utilities Commission
8. Ky-An Tran, California Public Advocates

Participating Staff & Consultants

1. Taqua Ammar, CalMTA/Resource Innovations
2. Tom Bougher, 2050 Partners
3. Lynette Curthoys, CalMTA/Resource Innovations
4. Rachel Good, CalMTA/Resource Innovations
5. Stacey Hobart, CalMTA/Resource Innovations
6. Karen Horkitz, consultant to the Cadmus Group and evaluation lead
7. Hope Lobkowicz, the Cadmus Group
8. Elaine Miller, CalMTA/Resource Innovations
9. Jeff Mitchell, CalMTA/Resource Innovations
10. Nils Strindberg, CalMTA/Resource Innovations

Guests

1. Hellen Chen, ACEEE
2. Richard Fennelly, CoilPod LLC
3. Natalie Flores-Rios, SCE
4. Carlo Gavina, SoCalGas
5. Rocco Guaragno, Resource Innovations
6. Ted Howard, Small Business Utility Advocates
7. Mina Jimenez, Proteus
8. Weldon Kennedy, Copper
9. Alice La Pierre, City of Berkeley
10. Jim Lutz, HWR
11. Christopher Malotte, SCE
12. Emily Pelstring, CPUC
13. Mary-Ann Rau, Velma
14. Andre Saldivar, SCE
15. Steve Schiller, Schiller Consulting
16. Jason Wexler, Gradient
17. Carol Yin, Yinsight
18. Richard Young, Frontier Energy

MTAB Meeting Notes

September 23, 2024
Virtual Meeting

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She also provided a brief notice regarding CalMTA's recruitment of members for a future Equity Sounding Board.

Stacey then shared CalMTA's conflict of interest policies and asked the Market Transformation Advisory Board (MTAB) members to disclose any conflicts. Jeff Harris noted that he works for an organization implementing energy efficiency market transformation programs in the Northwest but that no conflict of interest exists.

2024 RFI Submissions: Stage 1 Scoring & Prioritization

Jennifer Barnes reviewed CalMTA's scoring process for potential market transformation ideas, including the disposition of ideas received through the summer 2024 RFI, as well as ideas submitted in the first RFI in 2023 that were subsequently rescored. MTAB comments and questions about the scoring process included:

- How does CalMTA capture market readiness and anticipated ramp rate for potential MT ideas?
    - Rick noted that this would be assessed in Stage 2 scoring. Stage 1 primarily focuses on estimated total system benefit (TSB), although both commercial readiness and MT alignment are included in the RFI scoring criteria.
- What key factors make something a point of leverage and how does that pertain to the scoring process?
    - Rick clarified that Stage 1 scoring seeks to measure whether leverage points were identified as well as how many and whether they've been proven successful in the given market. Policy, codes, and other factors are included as sustained benefits rather than points of leverage.
- In general, it would be beneficial to know what other California programs/projects relate to these potential ideas – either where CalMTA doesn't need to work on it because it's already being addressed or where substantial leverage exists.

Rick Dunn then presented the 20 highest-scoring ideas (weighted by total system benefits) for MTAB discussion and prioritization. These ideas had indicators showing whether the CalMTA team was recommending the idea as one of the top five to consider for advancement. Clarifying MTAB questions and feedback follow.

Combination Heat Pumps

- CalNEXT is also looking at this technology, which could be an opportunity for leverage or coordination.
- Does the focus technology need to include all three end-uses or could it include harvest thermal?
- Does it necessarily have to be a monobloc system (one in which the entire refrigeration circuit is in one box outdoors that would allow for lower-GWP/natural refrigerants that may be flammable or toxic)?
- Could these be central or are they specifically only for individual systems (one per dwelling unit)?
- If the baseline system could be all hydronic, there are a fair amount of combination gas systems installed so this MTI could involve a retrofit of those systems or be compared to them for a baseline.

Sustainable Outdoor Lighting

- When wouldn't these products use the battery? It seems like that would be the default in most cases.
    - Jennifer replied that market insight indicates that the battery is not sufficient to last through the night in winter months when it's darker for longer.
- The return-on-investment is hard to calculate for this technology. Are there ancillary benefits that accompany the substantial cost associated with it? If not, it seems like a hard sell.
    - Rick acknowledged this challenge and said that the scoring team is exploring that. There are different packages and form factors, so all-in-one solutions that are relatively heavy and may not be compatible with existing poles could be cost-prohibitive due to infrastructure upgrade needs.

Thermal Energy Storage as a Distributed Energy Resource

- Some load-shifting is available today, but it does consume some additional energy. Total system benefits are accrued from shifting to lower greenhouse gas (GHG) emission periods, but there's a high risk to the refrigerated distribution warehouse owner related to product viability, as there is any time you take the risk of changing the temperature regime.
- Is this better positioned as an emerging technology project that CalNEXT would work on rather than an MT program?
- SDG&E recently completed a project on this technology through the Energy Transition Coordinating Council and the report is publicly available.

Reflective Insulation for Windows

- Would the reflective insulation be subject to AERC ratings?
    - Rick replied that he would expect so, for both this and attachment windows.

Variable Frequency Drives (VFDs) on all Pumps and Fans >10 HP

- VFDs are not a new technology and are in relatively wide use. However, the Pump Energy Index (PEI) creates an opportunity for small VFDs to be used without significant engineering and makes them easier to apply. This MTI would help increase the prevalence of VFDs in products with a lower horsepower range.

Agricultural Irrigation as a Flexible Demand Load

- NEEA conducted a similar project and ran into some unusual barriers, including issues with rodents that led to project discontinuation. The market varies widely based on highly specific factors like geography, crops, and pest systems, which CalMTA should keep in mind.

Building Performance Standards (BPS) Accelerator

- BPS can include residential buildings in many cases, hopefully with associated grid benefits that could be captured in the scoring.
- This MTI should include a significant workforce development component, since people will be needed to conduct assessments and trainings if standards are to be adopted. Significant job creation could be a benefit of this MTI.
- What is the actual baseline if a jurisdiction decides to implement BPS? What happens after the BPS is passed – are people actually implementing to meet the standards? Energy savings are probably somewhere between a zero-BPS baseline and 100% compliance, with a range of potential baselines based on penalties and state attitude.

Smart Electric Panels

- CalMTA may want to consider combining this with the Smart Homes idea also under consideration.
- NEEA has looked at this technology but primarily for resiliency. With a secondary input like a distributed energy resource on-site (e.g., solar panels or generators), smart panels allow you to reassign/reallocate circuits based on what your available power is.
- Outside of resiliency, the challenge is that all smart panels assume that products/systems are being turned on or off. CalMTA needs to consider how to determine the best point of influence on the decision to change the energy profile of the end-use device, If this happens at the panel level, there are severe limitations since the panel doesn't "know" what's actually happening with a device. However, smart devices can make decisions about loading/offloading or shifting. Given California's

dynamic pricing, devices are being technologically modified to read dynamic pricing signals and adjust its behavior to minimize costs to the end-use customer. Addressing smart panels isn't incompatible with this, but there's a philosophical question about allocating resources to smart panels instead of the devices.

Smart Homes

- The potential for smart buildings is very significant in terms of load shifting/peak load management, and some energy savings potential exists, but the platform will need to connect with California's dynamic pricing structure. Doing so will require coordination with the CEC/CPUC as well as home device manufacturers.
- Although energy savings may be debatable, grid benefits should definitely be included in CalMTA's calculations.

High Performance Windows

- Reducing peak demand has grid impacts, especially since peak hours coincide with sunny, hot parts of the day in summer and cold parts of the day in winter.

There were no substantive comments related to Very High Efficiency Dedicated Outdoor Air System (DOAS) or Residential Smart-Splitting.

Stacey then invite MTAB discussion on idea prioritization and level of excitement or concern/reservation about the top-five highest ranked ideas including: Combination Heat Pumps, Thermal Energy Storage as a Distributed Energy Resource, Variable Frequency Drives (VFDs) on all Pumps and Fans > 10 HP, Building Performance Standards (BPS) Accelerator, and Smart Electric Panels. Individual MTAB feedback follows.

Which ideas excited you? How do you feel about the top five?

- Excitement was expressed for the BPS accelerator and VFD ideas from a workforce development perspective, including potential synergies with SEI programs in higher education and the fact that these ideas will link to job creation.
- Combination heat pumps offer huge potential but the industry has been unsuccessfully trying to drive adoption for a long time. The MTI is also capital-intensive. However, the right products already exist in in Europe and Asia and it may be the right time for MT. It would be exciting for California to lead the charge in making this happen.
- Overall, the list represents a nice diverse set. While there's some uncertainty about whether the BPS accelerator will be successful, there was support for a non-technology/adoption-related MTI that will help advance the other ideas in CalMTA's portfolio.
- Was the High-Performance Windows idea not recommended to move forward because it's included in the CRAWS MTI currently in Phase II of development?

    - Rick clarified that it was a separate technology but that it would be a second window-based initiative with some similar challenges and barriers and similar benefits and risks, and CalTMA is targeting more diversity in its portfolio.
- It's disappointing that the cost of sustainable outdoor lighting is so high, because this idea has significant benefits. California needs more batteries on the grid and it would be exciting to have solar lighting with load-shifting potential. If it's determined to not be right for CalMTA, there are hopes that another entity will pilot this and try to push it along to move the market in other ways.
- Support was expressed for combination heat pumps, thermal energy storage, and VFDs, as well as for the potential off-peak impact of reflexive window insulation. There was disappointment shared that reflexive window insulation and agricultural irrigation aren't ranked higher.
- Another member expressed strong support for combination heat pumps. VFDs have been around for decades and are addressed quite a bit in Title 24, so clarifying the focus of this idea will be important.
- Re: smart panels, while the concerns expressed by some MTAB members are valid, the problems that this technology is trying to solve are important. It may benefit from being combined with home energy management systems or other tools that bring together end-uses. For customers, the value proposition is convenient, but for utilities it's about enabling and optimizing grid flexibility.

<u>Do you have any concerns, reservations, or questions?</u>

- While the idea is promising and interesting, some skepticism about thermal storage was shared: what is the customer base for these technologies and is it scalable? Calculating the actual TSB potential of this idea may be difficult given the multiple possible load-shifting scenarios.
- For smart panels, there are concerns about lack of savings outside of a resiliency scenario. While the technology may yield some useful information, it seems better to focus on smart devices since decisions are made there and not at the panel-level.
- Given current challenges in the commercial real estate market, it may not be a sensitive time to drive BPS compliance unless the MTI has a very long ramp rate.
- Re: BPS, CalMTA needs to ensure there's a gap that needs to be filled. There is a lot of activity at the state and federal level but it may still be too early for MT intervention.
- One member stated that they were not excited about the BPS acceleration and smart panel/smart home ideas.
- The submitted idea Television Energy Efficiency Driven by Retailer Incentive Program scored low and was not in the top 20 presented to MTAB, but it is a potentially fast ramp program targeting a technology most people have and links to Title 20. NEEA supports this in its ESRPP sponsorship and has quite a bit of market data available.

- Industrial heat pumps are not on the list but should be considered. The industrial sector offers significant opportunity with many high-lift industrial heat pumps are entering the market but seem to be virtually unknown.

Public Comment

- Jim Lutz: Has CalMTA considered the availability of test procedures for rating products? In the case of combination heat pumps, DOE does not seem to have a test procedure and ASHRAE's test procedure is very old and hasn't kept up with changes in the technology.
    - Rick confirmed that this was a consideration but that the lack of a test procedure represents a potential intervention rather than a dealbreaker. For example, there is no test procedure in place for the Commercial Replacement and Attachment Window Solutions idea currently in Phase II of CalMTA's process, so one of the proposed interventions is developing one.

Stacey reviewed the time, date, location and agenda items for the next MTAB meeting in October and in-person meetings in November.

The meeting was adjourned.

Attendees

MTAB Members

1. Karina Camacho, Inland Regional Energy Network
2. Steve Miller, SEI (proxy for Cyane Dandridge)
3. Hayley Goodson, The Utility Reform Network
4. Fred Gordon, Energy Trust of Oregon
5. Jeff Harris, Northwest Energy Efficiency Alliance
6. Randall Higa, Southern California Edison
7. Peter Miller, Natural Resources Defense Council
8. Christie Torok, California Public Utilities Commission
9. Ky-An Tran, California Public Advocates

Participating Staff & Consultants

1. Taqua Ammar, CalMTA/Resource Innovations
2. Jennifer Barnes, 2050 Partners
3. Lynette Curthoys, CalMTA/Resource Innovations
4. Rick Dunn, CalMTA/Resource Innovations
5. Margie Gardner, CalMTA/Resource Innovations
6. Rachel Good, CalMTA/Resource Innovations
7. Stacey Hobart, CalMTA/Resource Innovations
8. Elaine Miller, CalMTA/Resource Innovations

9. Jeff Mitchell, CalMTA/Resource Innovations
10. Nils Strindberg, CalMTA/Resource Innovations

Guests

1. Rob Bohn, PG&E
2. Hellen Chen, ACEEE
3. Kelly Cunningham, PG&E
4. Michael Daukoru, CalTF
5. Natalie Flores-Rios, SCE
6. Carlo Gavina, SoCalGas
7. Rocco Guaragno, Resource Innovations
8. Ted Howard, Small Business Utility Advocates
9. Mina Jimenez, Proteus
10. Nathaniel Jutras, the U.S. Environmental Protection Agency
11. Debra Little, AjO
12. Jim Lutz, HWR
13. Christopher Malotte, SCE
14. Xico Manarolla, Clean Power Alliance
15. Mary-Ann Rau, Velma
16. Vanessa Sanchez, Okapi Architecture, Inc.
17. Pavitra Srinivasan, ACEEE
18. Rusty Tharp, Aozora Consulting
19. Carol Yin, Yinsight
20. Kate Zeng, SDG&E

Draft MTAB Meeting Notes

October 25, 2024
Virtual Meeting

Welcome & Introductions

Stacey Hobart opened the meeting by welcoming attendees and reviewing the meeting agenda. She invited comments regarding the previous meeting (Sept. 19 and 23) notes. There were none.

Stacey shared CalMTA's conflict of interest policies and asked the Market Transformation Advisory Board (MTAB) members to disclose any conflicts. Jeff Harris noted that he works for a market transformation organization with programs that target some of the same technologies as CalMTA, but that this does not present a conflict.

Market Progress Indicators and Milestones

Karen Horkitz presented the metrics and milestones proposed to evaluate the progress of the markets targeted by the Room Heat Pumps and Induction Cooking Market Transformation Initiatives (MTIs), including key terminology used and a review of the logic mode outcomes for each MTI.

General MTAB questions and comments included the following:

- Are all metrics linked to activities for which CalMTA has primary or secondary influence, or do they encompass MTI activities completed by collaborators?
    - Karen clarified that the key distinction is in which metrics should be used to assess MTI success versus market activities that should still be tracked.
- Can the members of CalMTA's Evaluation Advisory Group be shared publicly?
    - Karen replied that independent consultant Fred Gordon (formerly Energy Trust of Oregon; MTAB member), Rafael Friedmann of Friedmann Clean Energy Consulting, and Alexandra Dunn of ILLUME Advising were selected as members.

Room Heat Pumps

MTAB questions and feedback related to proposed metrics and milestones for the Room Heat Pump MTI included:

- Regarding tracking improved labeling in retail locations, labeling should include whether the heating technology is a heat pump or electric resistance heating. Today, product labeling rarely states this.

- It would be worth including a distinct ENERGY STAR designation as an output in the logic model, as one of the main areas of confusion in the market is determining between efficient heating and cooling products and efficient heat pump products.
- Confirming that the "limited market awareness" baseline condition applies to all products in the category, including products that look the same but are less efficient or don't perform well.
- For the MTI to be successful, a federal standard that includes the heating component of these products should be in place, which would require a new test procedure.
- How will CalMTA share/present how established milestones evolve or change over time during implementation, as they are bound to do?
    - Karen shared that the current plan is to capture this in CalMTA's annual operations plans, as NEEA does, and to reflect these changes in the MTI scorecards.
- For milestones with the start date of "contract execution," what contract does this refer to?
    - Karen noted that this would be the date a contract is executed with a third-party implementer for the MTI following CalMTA's RFP process. CalMTA anticipates some time will be needed between CPUC approval of the application and the subsequent solicitation for implementation.
- How does CalMTA plan to update milestones and metrics as the market evolves?
    - Karen acknowledged that while CalMTA needs to assess whether the MTI is making adequate progress, not all proposed metrics may be equally important or capable of being accurately predicted. Throughout Phase III: Market Deployment, any learnings with significant impact on the final plan will be shared with MTAB.
- It's possible that several years into the MTI, the technology will have evolved so much that it no longer reflects the initial product description. Should this occur, will CalMTA have to start from scratch?
    - Karen replied that CalMTA will track, evaluate, and course-correct in a very transparent manner, reporting on variances and new learnings with the hope that product evolution won't require an end to the MTI. She added that the third-party evaluator selected for the MTI may recommend a change in approach through their process.
- Even though we don't know everything about the future market, market transformation isn't possible unless we get something in place now. Having a good, plausible framework in place to assess our effort, even if the outcomes are well beyond what we anticipated, still validates the work.
- Adding an outcome that captures actual market activity (e.g., products actually being shipped and stocked) beyond just the contract in place could be beneficial.
- Interdependencies between MPIs or clarification that no interdependencies exist, would be useful to note, even if in a footnote.

- Are there multiple units now that don't meet the MTI criteria but have an ENERGY STAR label?
    - Elaine replied that there are not, although there are AC-only units with an ENERGY STAR label. An ENERGY STAR rating that captures both heating and cooling doesn't exist but is coming soon.
- It may be important to explore how important the engagement of established major manufacturers is in this market. For major HVAC systems there are roles for smaller manufacturers who tend to innovate first but whose products may not perform as predictably and who may not ever achieve significant market share. The engagement of the dominant manufacturers is a second, equally critical step toward market transformation. There is the need to better understand if there are dominant manufacturers in the nascent room heat pump market and where brand familiarity matters.
- CalMTA has established that there is a shortage of products suitable for slider or casement windows, which are most of the windows in California. Is it even possible to have a product that works in casement windows?
    - Elaine agreed that casement windows are challenging, but that some solutions exist in other markets. More residential buildings in California have slider windows than casement, and these are much easier to deal with so solutions are already being discussed with manufacturers.

Induction Cooking

MTAB questions and feedback related to proposed metrics and milestones for the Induction Cooking MTI included:

- To assess market saturation, will CalMTA look at induction specifically, induction with radiant, only 120V battery-equipped products, etc.?
    - Karen clarified that the MTI would track efficient electric products overall but segment all product types. Elaine added that some interventions are focused on the 120V battery-equipped product, but others look at the whole market.
- Market saturation is an end-metric and should focus on all induction products. 120V battery-enabled products are a means to that end.
    - Karen noted that CalMTA will include all relevant products in the evaluated impacts, including radiant.
- When calculating the market share by percentage of full category sales, does this include both electric and gas cooking products?
    - Karen said that it does.
- 120V battery models are trying to overcome the barrier of bill impacts related to switching to induction, but less specificity in this metric may be beneficial. If a manufacturer could make a 120V model without a battery, wouldn't CalMTA want to include those? Some consumers may want a low-cost option that doesn't require service upgrades.

- Less specificity could also negatively impact some MPIs, as CalMTA must be specific enough to figure out what the MTI is actually accomplishing in the market. For instance, in trying to track the incremental cost of battery-equipped 120V induction compared to 240V induction products, the specification of models that include batteries is important because of the additional benefits associated with storage.
- Inclusion of a battery enables a lower cost of installation and potentially lower operating costs, but doesn't it also have load-shifting potential?
    - Karen confirmed that it does and noted that this is captured in another MPI and built into CalMTA's cost-effectiveness forecasting.
- To compare the cost of 240V induction products and battery-equipped 120V models, does this include the total cost of service and potential panel upgrades? Tracking the average price of the standalone product is easy, but it may be challenging to track all the components of installation and wiring, so CalMTA should consider using a proxy that includes panel upgrades.
- CalMTA should track cooktops separately from ranges. Also, to address a large portion of the low-income market, there should be tracking of 24" wide cooktops and ranges.
- What is the current incremental cost of battery-equipped 120V versus 240V induction?
    - Jeff Mitchell said that the battery-equipped 120V models are currently 2.5-2.7x the cost of the 240V product.
- Market share metrics at any given point in time are not all that helpful, except directionally. Given that induction currently has a very low market share across all cooking devices, it seems reasonable to have a marker that shows MT moving market adoption from the innovators to early adopters at 10% market share, and then reaching a 20% market share puts the market in the early majority phase, using the diffusion of innovation theory.
- Recognizing that CalMTA won't be responsible for all activities in the market, it's important to capture where CalMTA has only a secondary influence but where the MPI itself is critical to MTI success.
- What is the logic behind the MPI tracking availability of data on bill impacts for low-income consumers?
    - Elaine replied that one of the barriers to including induction technology in income-qualified programs is the lack of data providing evidence that battery-equipped 120V products reduce bill impacts for low-income customers. If programs reference data gathered/shared by CalMTA as they get approval for including the products, we could track that.
- One significant concern: induction adds peak load more than other fuel substitution measures, so while it is a linchpin for full electrification, the grid may not ultimately be able to handle widespread adoption.
- It's also concerning that CalMTA does not anticipate that a 120V product with battery will really be affordable for many customers within a reasonable timeframe. If the focus is simply incremental cost and trying to get these products into the homes of low- and moderate-income customers, where is the positive outlook? Batteries provide benefits

to consumers and the grid that other products don't, but isn't part of the value proposition also ensuring comparable performance to 240V and gas ranges?
    - Jeff described CalMTA's work to examine the feasibility of a standard 120V product on a 15-amp circuit and ultimate consensus that the user experience was very poor, which was substantiated by NYSERDA/NYCHA work. Regarding price, battery-equipped 120V products are still in a very early stage of the product development lifecycle and it's a very dynamic market. Innovation in batteries will help drive the cost down.
- CalMTA should carefully look at the many different market segments included in the overall target market and determine which are best positioned for early adoption.
- One member shared that their overall reaction was that CalMTA was doing the right thing in the right direction, and that they were fully supportive of what's been put together so far, with some tweaks around the edges. In the future, the market barrier is more important than the baseline condition, since that directly links to logic model outcomes.

Karen noted that the full plan will be shared with MTAB members for review on Nov. 14, but that CalMTA welcomes feedback on what has been shared so far. Feedback should be provided by Oct. 30. CalMTA will provide a Word document where comments can be shared.

Public Comment

The following comments were received from public MTAB attendees:

- Anonymous attendee: These metrics are mostly upstream or midstream metrics. To address concern about overspecification of measures early on, perhaps it would be useful to include market metrics on a) end-use customers' needs for heating and cooling, b) customer energy burden for heating and cooling, etc.
- Alice La Pierre: I would love to see at least one other style of induction range with battery. Currently the "Charlie" is a drop-in stove, and not all apartments can accommodate this style. A model with the controls at the back would help sell these.
    - Jeff Mitchell noted that the logic model does include interventions to fill the technology gap and target the multifamily market.
- Anonymous attendee: How will you determine the percentage of market share that constitutes the "tipping point"?
    - Jeff Mitchell replied that CalMTA is developing adoption curves now, which will visualize how we see the market adopting these products over time. In addition, MTI plans include an exit strategy that will illustrate what we expect to see in the market and when we would propose to begin exiting market development activities.
- Anonymous attendee: What kinds of CalMTA data sources could low-income programs reference?

- Rick Dunn shared one example for room heat pumps: using data to demonstrate the need for models that work in horizontal slider or casement windows, which are more prevalent in affordable housing. CalMTA is engaged with manufacturers to explore the possibility of bringing solutions for casement windows, which are currently only available in Europe, to the U.S. market.

Next Meeting & Next Steps

Stacey shared the plan for the next MTAB meeting in Irwindale, CA on Nov. 20-21. The meeting will feature discussions of the full MTI Plans for Room Heat Pumps and Induction Cooking, which will be sent out to MTAB members for review before the meeting.

The meeting was adjourned.

Attendees

MTAB Members

1. Karina Camacho, Inland Regional Energy Network
2. Cyane Dandridge, SEI
3. Hayley Goodson, The Utility Reform Network
4. Fred Gordon, Context Consulting
5. Jeff Harris, Northwest Energy Efficiency Alliance
6. Randall Higa, Southern California Edison
7. Peter Miller, for Natural Resources Defense Council
8. Christie Torok, California Public Utilities Commission
9. Ky-An Tran, California Public Advocates

Participating Staff & Consultants

1. Taqua Ammar, CalMTA/Resource Innovations
2. Tom Bougher, 2050 Partners
3. Lynette Curthoys, CalMTA/Resource Innovations
4. Rachel Good, CalMTA/Resource Innovations
5. Stacey Hobart, CalMTA/Resource Innovations
6. Karen Horkitz, consultant to the Cadmus Group and evaluation lead
7. Elaine Miller, CalMTA/Resource Innovations
8. Jeff Mitchell, CalMTA/Resource Innovations
9. Priya Sathe, the Cadmus Group
10. Nils Strindberg, CalMTA/Resource Innovations

Guests

Rob Bohn, PG&E
Kelly Cunningham, PG&E
Blake Dressel, CEC

Rocco Guaragno, Resource Innovations
Jennifer Holden, Community Resource Project, Inc. (CRP)
Mina Jimenez, Proteus, Inc.
Weldon Kennedy, Copper
Samantha Lamos, Gradient
Alice LaPierre, City of Berkeley
Jim Lutz, HWR
Christopher Malotte, SCE
Robert Marcial, PG&E
Kevin McFadden, 2050 Partners
Savannah McLaughlin, CPUC
Steve Nadel, ACEEE
Emily Pelstring, CPUC
Ralph Prahl, Prahl & Associates
Steve Schiller, Schiller Consulting
Rusty Tharp, Aozora Consulting LLC
Eduardo Uranga, The Negawatt Home Corporation
Carol Yin, Yinsight, Inc.
Richard Young, Frontier Energy Food Service Technology Center
Kate Zeng, SDG&E

Draft MTAB Meeting Notes

November 20-21, 2024
Virtual Meeting

Day 1: Nov. 20

Welcome & Introductions

Stacey Hobart opened the meeting by inviting the Market Transformation Advisory Board (MTAB) and CalMTA team members to introduce themselves, followed by a review of the day's meeting agenda.

Stacey reviewed CalMTA's conflict of interest policies and asked MTAB members to disclose any conflicts. There were no disclosures. She then asked for any comments or feedback regarding Oct. 25 MTAB draft meeting notes. There were none.

An MT Portfolio for California

Lynette Curthoys shared appreciation for the MTAB members whose guidance resulted in the development of CalMTA's first two draft Market Transformation Initiative (MTI) Plans. She then described several notable aspects of these MTIs, including support for statewide decarbonization goals, potential benefits for environmental and social justice (ESJ) communities, and substantial health and safety benefits.

She presented the high-level total system benefits (TSB) and cost-effectiveness metrics for the two MTIs and shared the market deployment timeline with key milestones for filing of an application to the California Public Utilities Commission (CPUC) and future third-party requests for proposals (RFPs). Lynette reviewed the next steps for MTAB members to comment on the MTI Plans. She noted that previous comments received from MTAB, including Advancement Plan comments and prior meeting notes will be included in the Application supporting materials. Comments received in today's meeting and via MTAB member written comments, will be included in a separate appendix (Appendix I) of the final MTI Plans.

Summary of Room Heat Pump MTI

Elaine Miller provided an overview of the Room Heat Pump MTI. MTAB comments included the following:

- Barriers related to the technology itself (e.g., any currently available products that do not perform at the optimal level or have all desired features) seem to be addressed through activities like the tech challenge, but CalMTA should also call out any activities related to installation barriers if the time and effort required to install room heat pumps proves significant.

- The need for rate structures that enable or encourage electrification seems applicable to multiple MTIs and is an issue with many drivers or requirements. Is this an MTI-specific intervention or a standalone MTI, and what role would CalMTA play in supporting rate design and optimization?
    - Elaine clarified that this intervention will be a component of multiple MTIs and is included in the Induction Cooking MTI Plan. CalMTA is still determining the support we could provide for this work and will clarify an appropriate role to play for this MTI – for instance, potentially collecting/sharing data and supporting product development with a focus on the multifamily sector.
- The MTI Plan rightly highlights bill impacts as a significant barrier, so capturing the need for improved electrification-friendly rate structures in the plan makes sense. The most natural role for CalMTA is providing data, information, and input on what forward-looking rate design could look like (e.g, what a customer needs to do to qualify for special electrification rates, whether enrollment in demand response programs is required, etc.) as well as helping advocates and policymakers think about this issue in terms of real-life technology and use-cases.
- Most IOUs have electrification rates of some sort, although the requirements may be easier for end-uses like EV charging but not others such as cooking or space cooling, although pre-cooling can help with this. However, it's also important to increase the efficiency of products to reduce electrical bills beyond any special rates, and CalMTA could support the advancement or sales of more efficient products.
    - Elaine noted that the Room Heat Pump MTI Plan talks about pushing for a more rigorous ENERGY STAR specification that should drive increased efficiency.
- CalMTA has identified a barrier around operating costs in an electrification scenario and needs to include something in the logic model that addresses that, so this intervention should remain regardless of CalMTA's role in driving new rate structures. In the Northwest, NEEA doesn't lobby for special rates but provides supportive data and real-world examples of policy impacts, a role CalMTA could play in California.
- Recognizing that rate structure is likely not the only intervention that will cross multiple MTIs, CalMTA should look at its organizational structure to determine how best to address these cross-cutting activities.
    - Jeff Mitchell replied that CalMTA has decided to represent cross-cutting interventions in each MTI Plan they apply to, but that CalMTA's influence in these areas will grow as the organization grows.
- Regarding cost parity between room heat pumps and less efficient products, as well as the higher operating cost associated with fuel switching, it's worth noting that the success of ductless heat pump initiative in the Northwest demonstrates that many customers will adopt a more expensive technology in exchange for better performance and valued benefits like increased comfort.

Room Heat Pumps: Total System Benefits & Cost-Effectiveness

Karen Horkitz introduced a discussion on the market forecasts and cost-effectiveness for the Room Heat Pump MTI. MTAB questions and feedback included:

- Are IOU-verified savings still subtracted when running the societal cost test (SCT)?
    - Karen confirmed that CalMTA did this consistently.
- A footnote in Appendix B of the MTI Plan indicated that impacts will be measured only once implemented but costs are measured earlier. Is that accurate?
    - Karen noted that this was correct and that it was important to capture the cost of the MTI spent leading up to its full market deployment.

Gouri Mishra of Cadmus presented estimated adoption (both baseline/naturally occurring adoption, or BMA, and adoption in the presence of the MTI, or TMA) in terms of number of households and number of units, as well as the inputs, assumptions, and methodology used to develop them. Questions and comments included:

- Looking at market assumptions about household heating and cooling types, how did CalMTA define rural vs. urban given that much of California is suburban?
    - Gouri noted that the definition taken directly from U.S. Census as used in the U.S. Energy Information Administration Residential Energy Consumption Survey (EIA-RECS). Suburban households are included in the urban segment.
- Why aren't climate zones a factor for market assumptions, since hotter climate zones may be more likely to adopt a room heat pump for its cooling capabilities?
    - Gouri clarified that climate zones were one of the variables initially considered for inclusion, but that it was ultimately discovered to have a relatively minor impact on likelihood of adoption. The final four variables were derived from 80 potential factors following analysis of how significant preferences were in those segments.
- Even if climate zones had a minimal impact on adoption, wouldn't they have significant impact on benefits?
    - Matt Wisnefske replied that this was included in the unit energy savings (UES) calculations.

Matt Wisnefske of Cadmus then introduced a presentation of cost-effectiveness and results for the Room Heat Pump MTI, including TSB and various cost-effectiveness tests. He presented technology definition inputs and program regulatory inputs. Questions and comments included:

- How did CalMTA deal with the baseline assuming that two pieces of equipment are retired at the same time, which people rarely do?
    - Matt acknowledged that by necessity, CalMTA made generic assumptions about how people behave, and this was one of them.
- Are discount rates real or nominal, as they seem high in real terms?
    - Matt confirmed that they are real.

- Is it assumed that at the end of the estimated useful life (EUL) that equipment is replaced at cost?
    - Matt explained that in cases where a particular piece of equipment works for nine years, the market adoption forecast assumes that the replacement unit would remain at the improved level of efficiency moving forward rather than returning to the more inefficient level of the previous unit. A second cost is not assigned in this scenario. If the unit is considered an MTI-moved unit then it is included in the calculation; if it is not considered an MTI-moved unit, it isn't represented. So, as the baseline and adoption curves move, the difference in the cost is included over time.
- The MTI is not responsible for units in the baseline adoption curve, but by reducing the cost of the technology through market transformation, everyone on the baseline would pay less so there are additional savings.
    - Matt agreed that while these are not included, it is an example of the entire state benefiting from the MTI indirectly.
- The ramp-up of TRC and parallel ramp-down of cost is typical and indicative of why California is pursuing MT: it is a long-term investment with the potential to deliver significant savings.
- From a cost-effectiveness standpoint, if you put a room heat pump in a home that previously only had heating, energy use will go up. How is that taken into account?
    - Matt replied that CalMTA modeled multiple scenarios, including this one in which there is a net-negative over time. It is included in the analysis but represents a fairly small percentage of California homes.
- When looking at cooling load, did CalMTA consider climate change and the likely increase in the number of cooling days over time?
    - Rick Dunn noted that CalMTA used rear-looking data to determine the number of heating and cooling degree days and due to climate change, the cooling degree days calculated were likely an underestimate.
- CalMTA was established to take a different approach than conventional utility resource acquisition programs, which are service-territory specific. Showing all statewide impacts outside the funding IOU territories helps demonstrate that MTIs will benefit the entire statewide market.
- The CPUC discussed the unique value a statewide independent administrator could bring vs. having an IOU administrator and the Decision says that CalMTA would be able to conduct "truly statewide activities…outside of IOUs." It is important to present the net incremental impacts statewide.
- A "robustness" or resilience investment test could be valuable, as certain variables driving the market are outside of CalMTA control or are uncertain – for instance, if manufacturers are unable to develop a form factor for horizontal slider or casement windows or if these products are unable to be integrated with central systems. CalMTA should model these and perform a sensitivity test to know how significant they are, clarifying which of the identified risks are identified are outside of CalMTA's control.

MTI Evaluation Plan

Karen presented highlights from the Evaluation Plan (Appendix F) for this MTI, including an overview of the evaluation approach and objectives for third-party evaluation. There was no MTAB feedback.

Room Heat Pumps: Budget, Risks & Discussion

Jeff Mitchell provided a summary of the MTI Phase III budget across a 20-year period, broken down by activity (program implementation, market research, mid/upstream and downstream incentives, and program evaluation). MTAB feedback included the following:

- Looking at what NEEA would typically spend on an initiative of this scale and factoring in the relative size of the California market compared to the Northwest, the budget seems very appropriate and potentially on the low side.

Elaine Miller shared the risks and management/mitigation strategies identified in Appendix G of the MTI Plan. She asked MTAB members to discuss the MTI Plan with a focus on bright spots and possible challenges, questions of clarity for CalMTA, questions for other MTAB members, and other feedback. MTAB comments and questions included:

- While California likely has mitigation strategies in place, CalMTA should describe these in addressing the potential risk of ENERGY STAR or Inflation Reduction Act (IRA) funding being eliminated by the next presidential administration.
- As a bright spot, there are many national actors, including in the Northwest, that are very engaged with manufacturers, share the need for a milder-climate product, and are interested in partnering. This satisfies language in the Decision that refers to market activation outside of California. The more other regions are involved, the greater leverage CalMTA will have with manufacturers.
- The MTI represents "the right amount of audaciousness" by taking enough risk but with a strong rationale and a high likelihood of success.
- The MTI makes sense and has the right level of ambition. It will be exciting to have more detail on activities during the first five years after the plan is approved.
- It's important for CalMTA to differentiate an MT approach from that used in resource acquisition programs, and this plan does that. It includes multiple interventions that would not otherwise happen, and they come together with significant cost-effectiveness potential. Additionally, room heat pumps are a product that people understand and as California gets hotter, more people will want an efficient cooling option.
- Of all the ideas, this MTI fits expectations the most. It is encouraging to see manufacturer response and activities in other areas of the country. There are also strong equity benefits.
- Is the MTI dependent on federal funding?
    - Elaine noted that it was nice to leverage but not essential, and the MTI could work without it. Karen added that the ENERGY STAR labeling intervention relates to product differentiation and labeling, and there are many other

pathways to get there and achieve those strategic aims. Jeff Mitchell also pointed out that the MTI doesn't expect or depend on the U.S. Department of Energy to lock in a behavior.

- The process of developing the MTI with the advisory board has met expectations, and there is recognition of the significant work that CalMTA has put into this.
- While there remain some concerns about high electrical rates and other factors that are outside of CalMTA's control but important, this MTI has a lot of clear value.
- Margie Gardner shared appreciation for MTAB's level of involvement in developing the first MTI Plans and hope that the MTI will move forward in the proceeding/application.
- The collaborative relationships, processes, and systems built so far with manufacturers, community-based organizations (CBOs), and other interested parties seem to be productive and will benefit future initiatives.
    - Rachel Good noted that while Appendix E wasn't presented to MTAB, this MTI has significant alignment between residential electrification efforts with an equity focus, which represent a large part of the IOUs' residential electrification programs.
- In addition to generally liking the MTI, it's possible that some customers may prefer this to a central heat pump system due to high electrical rates.
- It's exciting to see the MTI come to fruition. CalMTA needs to look at the ductless heat pump/mini-split market vs. the room heat pump market to see where the individual drivers exist from a market push-pull perspective and where room heat pumps may be a better fit.

Stage 2 Scoring & Prioritization of RFI Submissions

Rick Dunn introduced ideas under consideration for future development as "Batch 3," including an overview of the scoring process and RFI scoring criteria. Jennifer Barnes of 2050 Partners and Rick then presented a summary description, potential benefits, potential challenges and MT strategies, and preliminary TSB estimates for the four top-ranked ideas: Multifunction Heat Pumps, BPS Acceleration, VFD on all pumps & fans >10 HP, and Efficient Streetlighting (previously in Phase II development but paused by CalMTA).

Rick and Jennifer then introduced an interactive activity in which MTAB members could ask questions about each potential idea in this new batch and hold up a sign reflecting their level of interest: green (excited), yellow (neutral or unsure), or red (no way). The MTAB response and important comments and questions related to each idea are shared below.

Idea Name: Multifunction HP
MTAB Sentiment: Mostly neutral or unsure
Comments/Feedback:

- ETCC developed a hot and cold storage tank for a multifunction heat pump that enabled load-shifting in both directions – is that included?

    - Jennifer replied that there are many different configurations that could be included and CalMTA has not determined what to focus on or include.
- Early versions of this technology were not particularly efficient when shifting between functions, and CalMTA should confirm this has been solved or can be.
- Strong positive support: it's worth keeping an open mind about the many different configurations. Air-to-water configurations offer the substantial benefit of using hot water as defrost or supplemental heat, therefore, from a grid perspective, consolidating to a single load and reducing use of strip heat.
- For some customers this might involve electrifying multiple parts of their homes, so CalMTA will need to explore how incentives would work or be applied.
- CalMTA should require these products to be connected so that end-users can shift loads around to the best rate period, especially if they are on an electrification rate schedule.
- If this product is deemed superior to high-efficiency heat pumps and heat pump water heaters, it may compete with these technologies and be more difficult to implement.
- There are multifunction gas heat pumps with a cooling side that are 50% more efficient than the gas water heater they replace. Would these be included?
    - Staff responded that CalMTA will work with the CPUC to assess inclusion of efficient gas technologies, looking at statewide policy.

Idea Name: BPS Acceleration
MTAB Sentiment: Mixed between excited and neutral or unsure, although slightly more neutral or unsure
Comments/Feedback:

- Another challenge that CalMTA will need to address is that no workforce is in place to support strategic energy plan development and subsequent implementation.
    - Rick agreed and laid out alternative solutions that have reduced capital investment over time.
- Most BPS will promote electrification so how can this be done in a way that minimizes the impact on the grid?
- For this to be successful, the MTI will need to reinvent how people operate buildings and position operations as a building profit center in the long-term play.
    - Rick acknowledged that the current standard is the consequence for noncompliance, but that better strategies to drive compliance are needed.

Idea Name: Efficient Streetlighting
MTAB Sentiment: Mostly "no way" with one neutral or unsure and one excited
Comments/Feedback:

- CalMTA should consider that while the technology is stable, previous work in this market has faced an unstable supply chain with significant wait time.
- Market barriers are entrenched with the jurisdictions that have to make these decisions and it's a hard market to penetrate. In an example from 10+ years ago, the LED market hadn't taken off, so savings were more substantial, and the value proposition was clearer.

Now that LEDs are the norm, savings are just claimed from the portion associated with controls.
    - Jennifer noted that older LEDs can be updated to more efficient LEDs and not all streetlights have been converted, resulting in more significant savings.
- Also from this past example, experts looked at safety standards for roadway lighting. Illumination wasn't the appropriate metric for safety, and it was more about contrast and other factors, which proved challenging from the perspective of the municipalities' investment.
- How much would a city save by switching? What's the value proposition for cities to upgrade beyond efficient LEDs?
    - Jennifer replied that this depends on multiple factors, especially their existing technology. Jeff Mitchell added that it is also dependent on whether cities own their lights, as both energy and maintenance savings are much more significant in those cases.
- SCE owns more streetlights than anyone else in the state. There's uncertainty about how much more CalMTA can add from an energy efficiency perspective in this technology area.
- It seems like this is an exciting new area with opportunities for technology improvements at the control level, and the MTI could potentially make a big impact for a relatively low investment.
- CalMTA should explore city sports lighting, as cities seem motivated on that.

Idea Name: VFD on all pumps & fans >10 HP
MTAB Sentiment: Mostly excited, two neutral or unsure
Comments/Feedback:

- Are the people who sell motors the same people who sell VFDs?
    - Rick replied that it's a little of both, and that currently it may be that the people selling the motors are seeing the opportunity and bundling it, but that this is likely one of the challenges to address early on.
- NEEA is implementing programs in this relative area, looking at VFDs with very low HP. The market is complex and active. There are different kinds of manufacturers (e.g., motor manufacturers, drive manufacturers) all approaching different components. CalMTA should also look at a federal standard for pumps that recognizes a wide range of efficiency considerations, with fans on the way to a similar standard. All these activities could be applied to commercial buildings, industrial applications, possibly even irrigation-pumping systems – so refining the focus of the MTI will be helpful.
- How does Title 24 address this? How much of this is building-related under Title 24, even for replacements, because that seems like where the opportunity really is.
    - Jeff Harris clarified that Title 24 has standards that require VFDs in a certain size pump, not this smaller size, and this is also primarily in the retrofit market. NEEA's smart pumps program goes all the way down to 1 HP, which aren't covered by replacement requirements in building codes, although thousands of them are sold every year.

CalMTA should think about expanding this MTI to capture a broader range of horsepower.

Rick then introduced a breakout group activity for MTAB members to discuss factors that make a good MTI, followed by group discussions and presentations. MTAB feedback included:

Multifunction HPs

- The technology seems not ready for widespread adoption, particularly since they are less efficient than single-function heat pump systems or heat pump water heaters.
- Unlike separate space/water heating heat pump technologies, this could reduce the need for some of the grid buildout associated with electrification and could eliminate panel upgrade needs.
- The MTI could be very complex from a contractor standpoint, especially in water heater emergency replacement situations. Many different product configurations also create complicated retrofit technologies.
- From a statewide perspective, there could be issues competing with investments in promoting heat pump water heaters and heat pump HVAC systems that are already a priority.

BPS Acceleration

- The MT play is more about addressing barriers than technology. Trying to drive uptake of BPS has been happening for a while and seems challenging to address.
- The opportunity lies in creating a business case for building decision-makers to comply or go beyond compliance to pursue upgrades that are in their best interest, with BPS as a leverage point.
- 100% compliance should not be considered a realistic baseline assumption.

Streetlights

- This is a lower-cost MTI (positive) that creates opportunities to engage local governments.
- It may be hard to convince laggards who haven't already upgraded to LEDs and there might be additional issues with the utility-city ownership model.
- The MTI is complicated and difficult.

VFDs

- In general, the MTI seems focused on overcoming barriers rather than the technology, which already exists and seems accessible. It could be a short-term play.
- Adding an MTI focused on a commercial and industrial technology is viewed positively.
- The technology is ubiquitous, has impact, and fills CalMTA portfolio gaps by serving the C&I (and maybe agricultural) segments.

Public Comment

- Richard Fennelly: The cooling sector sells defective equipment that requires condenser coil cleaning, which almost never happens. Utilities need to incentivize preventative action.

The meeting was adjourned for the day.

Day 2: Nov. 21

Welcome & Introductions

Following an induction cooking demonstration at the Food Technology Center featuring a battery-enabled 120V range, Stacey Hobart opened the meeting by welcoming attendees and reviewing the Day 2 meeting agenda. She shared updates to the MTAB conflict of interest (COI) rules. She also reviewed several updates to the MTAB charter.

Summary of Induction Cooking MTI

Elaine Miller provided an overview of the Induction Cooking MTI. MTAB comments included the following:

- One outcome of advocating for an ENERGY STAR 2.0 specification for electric cooking could also be mitigating bill impacts through increased efficiency – potentially addressing bill impacts through a different path than rate design.
- ENERGY STAR efficient radiant products are included in the MTI but not addressed in most of the interventions. How does CalMTA envision radiant products fitting into the MTI activities and does its inclusion impact market acceptance if induction cooking is assumed to provide a superior end-user experience?
    - Elaine clarified that while the product definition includes ENERGY STAR-certified radiant products, almost all MTI interventions are focused exclusively on induction. No budget is allocated specifically to radiant products, but some interventions may increase adoption of efficient radiant products along with induction models.
    - Jeff Mitchell added that the MTI seeks to raise the efficiency of the product category, starting at the top (induction) but also wanting to raise the floor (efficient radiant). ENERGY STAR-certified radiant products are included in the product definition because some existing products are as efficient or more efficient than some induction products, but if the MTI achieves its desired market impact, radiant products will likely fall off.
- Radiant cooktops are about half the cost of comparable induction products and the radiant cooking experience has gotten better, so they could play a role in moving the market to efficient all-electric cooking, especially for consumers concerned about

affordability. This could also motivate induction manufacturers to lower the cost of their products to be competitive.

- As a counterpoint, switching from gas cooking to electric is already a jump for some consumers and past negative experiences may make consumers opposed to adopting electric radiant or deter them from adopting electric cooking products at all.
    - Looking toward ENERGY STAR 2.0, SCE helped develop the ENERGY STAR specification for commercial electric cooking products and learned there two ways to elevate induction in the specification: (1) raising overall efficiency standards and (2) including an idle rate, which effectively eliminates all other electric cooking options.

Induction Cooking: Total System Benefits & Cost-Effectiveness

Note: Throughout the discussion below, MTAB members raised questions that prompted the CalMTA team to revisit their models and analysis. The update to the material shared at this MTAB meeting is described in a supplemental memo added to the packet for this meeting located at: https://calmta.org/market-transformation-advisory-board-mtab-meeting-11-20-21-24/. In addition, sensitivity analysis was conducted to determine how key assumptions would affect the modeling for the Induction Cooking MTI and can be found in the Appendix B of this plan linked at: https://calmta.org/resources-and-reports/induction-cooking-mti-plan/.

Karen Horkitz shared an overview of the TSB and cost-effectiveness numbers for the Induction Cooking MTI. Gouri Mishra then presented estimated adoption (both baseline/naturally occurring adoption, or BMA, and adoption in the presence of the MTI, or TMA), including separate models for existing households and newly built housing units, as well as the inputs, assumptions, and methodology used to develop them. MTAB feedback included:

- It seems like the forecast shows radiant has a larger cumulative market share even in the presence of the MTI. Is that accurate and what is the reasoning?
    - Gouri explained that accelerated retirement of gas cooking products drives up an increased cumulative market share for all electric cooking products. Radiant will increase from a low percentage of the market share today to a very high one before induction starts to dominate the market. Looking at how many people purchase induction or radiant in a given year (vs. total market share), radiant is a much smaller percentage.
- In looking at the cumulative adoption forecast, CalMTA should also consider the diffusion of innovation curve: the "early majority" may be adopting induction, but "laggards" may be price-driven and opt for efficient radiant products first.
- As increased adoption of efficient electric cooking drives positive GHG impacts but negative grid impacts, it may be worth conducting a sensitivity analysis to model the TSB for scenarios with different ratios of radiant vs. induction products.
- How current is the data used to estimate the electrical loads for cooking products? It's likely that consumer cooking behavior has changed since the increase in home

cooking during the height of the COVID pandemic and cooking behavior is likely to vary widely, so the operating cost for consumers who cook a lot will look very different than for those who cook very little.
    - Jeff Mitchell noted that CalMTA used EPRI load shapes for this, which were published in 2019. Gouri added that EIA RECS is trying to ascertain changes in cooking behavior after the pandemic which will be reflected in the next iteration, scheduled for completion in the next year or two.
- The Northwest has a home energy use measurement data set that is actual load shapes and includes some cooking load shapes. This data is public at the hourly level.

Matt Wisnefske then introduced a presentation of cost-effectiveness and results for the Induction Cooking MTI, including TSB and various cost-effectiveness tests. He presented technology definition inputs and program regulatory. MTAB comments and questions included:

- In the scenario in which a gas burner range (counterfactual equipment) is replaced with an efficient induction or ENERGY STAR radiant range, does the first-year incremental measure cost include electric panel upgrades for service?
    - Matt replied that non-product assumptions were not modeled because the wide variance made this difficult to do accurately.
- Feedback emphasized the importance of modeling this, since electrical upgrade charges should be factored into incremental cost. This should also differentiate between a simple panel upgrade and upgrading to 240V.
- In California, electrification measures include estimates of infrastructure upgrades, although in some cases those costs are separated out.
    - Andre Salvidar of SCE (subject matter expert) shared that the 2019 version of the CPUC's fuel substitution technical guide says that the measured technology cost may exclude any additional upgrades required to increase the building's total electric or natural gas load. If those additional upgrades are included for the purpose of calculating the incremental measure cost, work papers should explain why. However, the necessity of such upgrades is specific to individual buildings and the cumulative load of installed technologies in the building and therefore in most cases should not be attributed entirely to a single measure.
- Do calculations assume the same cost for an induction and an ENERGY STAR radiant range? Will the inclusion of ENERGY STAR radiant products in the calculations skew some of the numbers if interventions are focused on induction products?
    - Matt clarified that there was a significant delta between products and CalMTA developed a reasonable median product price estimate after looking at a wide range of products sold by California retailers.
- There was discussion about whether the initiative is focused on induction cooking or efficient electric cooking including induction and ENERGY STAR radiant.

- How is CalMTA weighting replacement by induction vs. ENERGY STAR radiant products over time and do these scenarios use the same adoption curves Gouri presented? The same weightings that change over time would also affect the calculation of costs and benefits over time because there's a different incremental cost and different benefits calculation between the two technologies.
    - Matt replied that as with other MTIs, CalMTA assumed reductions in the relative incremental measure cost year-over-year using a learning-curve-based analysis. As induction products, especially those with a battery, become more common, economies of scale and additional market pressure will reduce the relative cost compared to the baseline. The numbers in the replacement scenario table are the first-year incremental measure costs, which are the highest they will be during the lifecycle of the MTI.
- Even though the MTI is focused on increasing induction adoption, it is developed as an initiative targeting increased adoption of efficient electric cooking, with induction as one primary way to reach high levels of efficient electric adoption because of its superior cooking experience. Induction is a pathway to getting more people to switch from gas cooking to electric, but the ultimate endpoint is efficient electric cooking.
- Given the substantial interest in building new accessary dwelling units (ADUs) in California, it may be easier to promote induction for these units as they would not face the challenge of infrastructure upgrades. Has CalMTA factored this in?
    - Matt noted that CalMTA has not isolated this segment specifically but that it could factor into adoption of smaller 24-inch models. Karen added that CalMTA will use data collection to true-up the forecast every year, so if we see that ADUs are a niche, specific strategies could be deployed to address that in the model. These units will also be captured in our market share calculations from an evaluation perspective.
- Would products with less than four hobs be included? The statewide fuel substitution workpaper currently requires four or five hobs.
    - Jeff Mitchell said that CalMTA is using the U.S. DOE definition right now but will look at the statewide workpaper to ensure alignment.
- CalMTA forecasted incremental price reductions over time, but for the battery-equipped models there's a very high cost associated with the battery itself. Has CalMTA used other forecasts for decrease in lithium-ion battery costs? If product cost is driven by batteries, the price of those is likely to go down quickly as EV adoption goes up.
    - Gouri stated that CalMTA did not look at the battery itself but referenced EV price trends, taking the revolutionary learning rate from the DOE study and applying it to the 120V model. Karen noted that CalMTA will look at this in finalizing the cost-effectiveness estimates.
- The MTI seems more frontloaded in cost than the Room Heat Pump MTI is, so showing the lower discount rate with the societal cost test would be helpful.

- Regarding discount rates, the number that is now in the Avoided Cost Calculator was adopted in 2024. The weighted average cost of capital for 2025 will be a bit lower, but not dramatically.
- With the assumption that induction cooking offers a superior cooking process, CalMTA should ensure that forecasts capture the consumers who may prefer it over gas, regardless of price parity.
    - Karen confirmed that those questions were included in CalMTA's baseline market characterization surveys and as a potential market progress indicator, and that the MTI will continue capturing preferences as part of market monitoring.
- How will CalMTA measure the MTI's ability to win hearts and minds and when it happens?
    - Karen replied that CalMTA can reference responses from the market characterization work about general perception, favorability, likelihood of purchase, etc. and compare with future stages. The third-party evaluator will also have good ideas for how to clearly identify this.
- Did CalMTA use the same baseline market characterization survey for the Room Heat Pumps and Induction Cooking MTIs?
    - Karen said that CalMTA used one survey to cover both products, with the same sample. Sampling needs to reflect the market, so for these two products it made sense to use the same one but for future MTIs it may be different.
- How is CalMTA tracking equity for this beyond inclusion in other California programs, specifically capturing hearts and minds in ESJ communities?
    - Karen replied that this information is in Appendix F of the MTI Plan and varies by metric. For instance, the consumer survey was broken out by low-income and non-low-income respondents and anything tracked by survey will follow this approach. For metrics related to inclusion of the measure in programs, CalMTA will track this at the statewide level so that will include equity programs. The metric tracking the share of products stocked in stores will specifically include those in identified ESJ communities and will include analysis of product price points.
- If CalMTA is really looking at all efficient electric cooking products, the MTI should include strategies to reduce gas replacement costs to get to parity.
- Consumers would have two choices: (1) between gas and induction and (2) between 120V and 240V models.
    - Jeff Mitchell noted the significant grid benefit of the 120V model, so CalMTA may shift strategy more toward that product if the price goes down quickly.

Public Comment

- Carol Yin: CalMTA uses the term "limited and low income" interchangeably in MTI Plans and it would be good to define these in terms of what programs they will be impacting and how savings will be claimed/attributed.
- Weldon Kennedy: Regarding the need for an analysis of the total cost of adopting induction products that includes panel and wiring upgrades, it would be good if CalMTA could publish this to show what parity really looks like as well as the cost per household or building.

Induction Cooking: Budget, Risks & Discussion

Jeff Mitchell provided a summary of the MTI Phase III budget across a 20-year period, broken down by activity (program implementation, market research, mid/upstream and downstream incentives, and program evaluation). MTAB questions included:

- Since no downstream incentives are included in this budget, how does CalMTA plan to engage or support programs serving ESJ community members?
    - Jeff Mitchell noted that the MTI strategy can shift over time, so there may be future downstream incentives offered if they are needed to reach these customers. Incentives paid to property owners/managers or builders may technically be downstream incentives but are categorized in the midstream budget. Elaine added that the tech challenge will help CalMTA understand manufacturers' willingness to drive down prices to increase affordability to all customers.

Elaine shared the risks and management/mitigation strategies identified in Appendix G of the MTI Plan. MTAB feedback included:

- How significant is consumer understanding of the health impacts of gas cooking when looking at risks?
    - Elaine confirmed this is a significant risk but there is still much to learn about that specific barrier. Consumer surveys completed at Chefluencer events indicate that health impacts are one of the greatest motivations to switch.
- The health impacts may be more persuasive for residents in smaller multifamily buildings and ESJ community members.
- For high-pollution communities where poor air quality is driven by many external factors, it can be easy to deprioritize switching cooking methods. CalMTA should be sure to address this in the messaging or it will come off as tone deaf.
    - Elaine explained that having a local champion who can communicate in the regional language is important. CalMTA will also need to address consumer resistance regarding the focus on gas stoves in proportion to other issues in ESJ communities, potentially by bundling any promotion of induction cooking with information about weatherization or positioning basic energy efficiency as a first step. She confirmed that before deploying any MTI marketing, CalMTA

will research and test messaging to make sure it is culturally sensitive and responds to community priorities.

- Messaging needs to be tailored to specific segments and audience priorities if the MTI is to be successful in changing hearts and minds.
- The Green & Healthy Homes Initiative partnered with local hospitals to access data on community factors like the rate of childhood asthma. Are there indicators CalMTA could look at to monitor health impacts?
    - Elaine replied that these indicators are not fully identified yet but are part of the MTI's planned trajectory.
- Regarding the need for rate optimization: Special rates already exist for income-qualified customers, but many are unaware of them and others may not be on the correct rate. The major IOUs have electrification-rate schedules that vary in structure and have very different requirements, but getting efficient electric cooking alone would not qualify a customer for any of the available options. No time-of-use (TOU) periods are convenient for cooking, and some have a higher fixed charge, so consumer uptake varies. It may not be financially advantageous for smaller users to be on these rates. At the end of the day California IOU electrical rates are very high and rate design alone will not solve this.
    - Jeff Mitchell clarified that the MTI Plans use "electrification rates" as a catch-all term designed to capture issues related to the high cost of electricity and bill impacts. CalMTA's ability to share real-world use cases and insight could be beneficial to better rate design. Sometimes policymakers who want to see electrification are disconnected from the people who face operating costs.
- While bill impacts are significant for electrification overall, they are less significant for cooking. The operating cost difference between a gas range and an electric range is nominal on a monthly basis and many consumers would be willing to look beyond that if they love their electric stove. The bill impact of switching to electrical cooking products is not necessarily the major challenge in this market.
- Before finalizing estimates of potential bill impacts and operating costs, it would be good to have greater insight into true usage patterns related to cooking, ensuring any estimates of cooking behavior used in CalMTA's modeling are accurate and current.

Stacey asked MTAB members to discuss the Induction Cooking MTI Plan with a focus on bright spots and possible challenges, questions of clarity for CalMTA, questions for other MTAB members, and other feedback. MTAB comments and questions included:

- CalMTA should be clearer about the goal for this MTI. Is it targeting (1) efficient electrification of cooking or (2) widespread adoption of induction as part of the overall market, with induction as a tool with which to electrify? The presentation sounds like the latter, but the documents are a little ambiguous and read more like the former. Appendix B is not ambiguous and seems very much focused on the former, which is the electrification of cooking.

- California transitioned to TSB in order to make fuel-switching work more feasible and palatable – it makes sense as a public benefit. The question is how much of the MTI goals are achieved through adoption of efficient radiant products. Modeling multiple scenarios and doing some sensitivity analysis may be beneficial.
- If the MTI pushes electric radiant products at all, is there the risk of backlash due to the inferior performance and low consumer satisfaction that could set electrification of cooking back overall?
- The Bay Area Air Quality Management District already requires electric replacement after furnace burnout, and similar requirements for cooking won't be far behind. If CalMTA is advocating for recommending or forcing an electric replacement in these scenarios, induction should be the only option.
- The 120V model with a battery is exciting, as the ability to cook with power out is huge. The 240V products are less exciting due to concerns about panel upgrades, expensive installation, and bill impacts.
- In touting the ability to cook during power outages, CalMTA should be careful about clarifying the negative health impacts of cooking without an exhaust fan or range hood, even with electric cooking products.
- The focus on 120V battery-equipped products seems like a good way to promote induction and an induction-only initiative seems like a good fit for MT. Is an MTI more broadly focused on efficient electric cooking better suited for the energy efficiency portfolio?

Stacey asked the MTAB members how much the lack of cost-effectiveness for the Induction Cooking MTI was an issue for them. The responses included:

- Regarding the preliminary total resource cost (TRC) of the MTI, the 0.9 TRC is a little bit disappointing, and the Decision should be reviewed to ensure a TRC of <1.0 is acceptable. Initially, really liked the addition of the battery-enabled products, but now looks more like pushing electrification. If it was focused fully on induction, there's an opportunity for market transformation. I need to read more but am more hesitant about this MTI at this time.
- The societal cost test (SCT) value is cost-effective, and the MTI addresses many societal costs and benefits beyond energy savings. While a TRC of 1.0 would be preferable, this kind of situation is why California has adopted other tests. Looking more closely at incremental measure costs or economies of scale associated with decrease in battery prices may result in a higher TRC. I just wish it was better.
- Guidance appears to be that all MTIs should strive to be cost-effective, but the only requirement is at the portfolio level. However, the Decision emphasizes the importance of individual cost-effectiveness for first MTIs and the CPUC is very interested in TRC vs. other cost-effectiveness tests.
- The Oregon Public Utilities Commission considers benefits you can't measure are just as important as the ones you can. CalMTA should apply its best judgement for benefits that could add value if the quantifiable metrics aren't quite sufficient and

make an argument for the significant, but difficult to quantify, health and safety benefits not captured in TRC.
    - Karen confirmed that the modeling team would refine the TRC estimate for the Induction Cooking MTI based on factors that include: (1) the addition of equipment installation/infrastructure costs; (2) factoring in the probable decline in the cost of batteries and assumption that the current 120V battery-equipped product may not be the best basis for cost modeling, as it may remain a niche custom-build product and not one that would be adopted at scale; and (3) factoring in data about statewide benefits outside of IOU service territories.
- The CPUC was very clear on not establishing a cost-effectiveness threshold for each MTI but rather wanting the portfolio to be managed with an eye toward cost-effectiveness. The CPUC uses SCT only as information and not as a basis for approving programs (which is TRC and PAC only). With the Room Heat Pump MTI's TRC factored in, CalMTA is in a good place at the portfolio level but should be thoughtful about how to present a MTI <1.0 – acknowledging it's not optimal and being clear on the many factors going into that. This is particularly important since California is used to resource acquisition programs where benefits are accrued fairly quickly, versus MT programs which yield significant benefits but not immediately.
- While there was previously a requirement that each IOU's energy efficiency portfolio be cost-effective, when this was segmented in 2021 to include market support and equity programs, only resource acquisition programs at the portfolio level were expected to be cost-effective and not all reach a TRC of 1.0.
- Induction cooking represents an on-peak-load measure that doesn't immediately pay the customer back but also yields significant other benefits, so the MTI needs a story with these various scenarios built out to show the foreseeable negative effects if the state doesn't try to address induction cooking right now. For limited-income customers, benefits messaging needs to overpower concerns about building an expensive stove that will drive usage up during peak times.
- If modeling assumptions are based on the premium model cost, CalMTA may not be capturing the real market and may want to make sure prevalence of mass market products, such as smaller models with smaller batteries, are factored in.

Application Overview

Lynette described the process for and contents of the CPUC application Pacific Gas & Electric will be filing on behalf of CalMTA, which will include the Room Heat Pump and Induction Cooking MTI Plans as well as an estimated five-year implementation budget and request for a process for future approval of new MTI Plans. MTAB feedback included:

- From the perspective of ensuring that program costs are being spent efficiently, TRC is a significant issue, but hearing about the MTI development process and all benefits of the technologies is also important. CalMTA should tell the story of how this work

benefits California. Statewide numbers are relevant in contextualizing, but CalMTA should keep in mind that IOU ratepayer dollars and benefits are always top of mind.

- Some reviewers value the opportunity to access and review Excel work papers, so CalMTA should have those ready with live cells supporting cost-effectiveness calculations.
- CalMTA may face expectations that these are the two MTIs that are the "best" of all possible ideas, so clarifying the frontrunner criteria and speaking to long-term portfolio plans will provide context and build confidence.
- CalMTA should clarify that these MTIs do not overlap with or duplicate existing program efforts but rather add value to the external program landscape.
- It is important to clearly state in the application why MT is different and provides added value, and that its activities cannot simply be rolled into other efforts.
- The narrative should tell the story that MT needs to extend itself more than resource acquisition programs and that these examples prove that principle. If all outcomes are accomplished after five years, not enough of a risk has been taken.
- Public comments on the application can be submitted directly to the docket and are included for consideration. Formal motions are submitted as evidentiary material and are weighted more heavily.

Public Comment (from the online public comment form)

Jayson Martin: "Regarding the MTAB meeting, I am pleased to report that the recent session was quite productive, fostering insightful discussions and collaborative efforts among participants. The exchange of ideas was particularly enriching, and I believe it will significantly contribute to our ongoing electrification initiatives."

Wrap-Up & 2025 Meeting Plans

Stacey shared a few closing items, including formation of the eight-member Equity Sounding Board and process for MTAB members to submit comments about the two MTI Plans prior to their finalization. She asked MTAB members to share their relative feelings about the deadline for comment form submittals and ask any questions about the process for resolution.

Stacey presented the initial plan for 2025 MTAB meeting dates and alignment with quarterly activity report updates.

The meeting was adjourned.

Attendees

MTAB Members

1. Karina Camacho, Inland Regional Energy Network
2. Cyane Dandridge, SEI
3. Hayley Goodson, The Utility Reform Network
4. Fred Gordon, Energy Trust of Oregon

5. Jeff Harris, Northwest Energy Efficiency Alliance
6. Randall Higa, Southern California Edison
7. Peter Miller, Natural Resources Defense Council
8. Christie Torok, California Public Utilities Commission (virtual)
9. Ky-An Tran, California Public Advocates

Participating Staff & Consultants

1. Taqua Ammar, CalMTA/Resource Innovations
2. Jennifer Barnes, 2050 Partners
3. Lynette Curthoys, CalMTA/Resource Innovations
4. Rick Dunn, CalMTA/Resource Innovations
5. Margie Gardiner, CalMTA/Resource Innovations (virtual)
6. Rachel Good, CalMTA/Resource Innovations
7. Karen Horkitz, consultant to CalMTA
8. Stacey Hobart, CalMTA/Resource Innovations
9. Elaine Miller, CalMTA/Resource Innovations
10. Gouri Mishra, Cadmus (virtual)
11. Jeff Mitchell, CalMTA/Resource Innovations
12. Nils Strindberg, CalMTA/Resource Innovations
13. Matt Wisnefske, Cadmus

Guests

1. Pradeep Bansal, Energy Solutions
2. Rob Bohn, PG&E
3. Courtney Dilly, SMUD
4. Richard Fennelly, CoilPod LLC
5. Natalie Flores-Rios, SCE
6. Mina Jimenez, Proteus, Inc.
7. Debra Little, AjO
8. Jayson Martin, R&B Wholesale Distributors
9. Savannah McLaughlin, CPUC
10. Emily Pelstring, CPUC
11. Andre Saldivar, SCE (subject matter expert on induction)
12. Steve Schiller, Schiller Consulting
13. Eduardo Uranga
14. Yanda Zhang, ZYD Energy

MTAB Meeting Notes

February 19, 2025
Virtual Meeting

Welcome, Agenda, & Conflict of Interest Disclosure

Stacey Hobart opened the meeting by welcoming attendees, facilitating introductions, and sharing the meeting agenda. She reviewed CalMTA's conflict of interest policies and asked the Market Transformation Advisory Board (MTAB) members to disclose any conflicts. There were none.

Stacey asked MTAB members for any comments regarding draft notes from the previous meeting (11/20-21). There were none.

2024 Request for Ideas: Phase I Update

Jeff Mitchell presented CalMTA's multi-stage idea scoring process and Market Transformation Initiative (MTI) development process with specific information related to the request for ideas (RFI) issued in the summer of 2024. Rick Dunn then reviewed the ideas that were advanced to Stage 2 following that RFI accompanied by a discussion of CalMTA's Batch 3 priorities and considerations and a discussion of the ideas that CalMTA does not recommend advancing. MTAB comments and questions about these ideas included:

- While it is not the idea recommended to move forward, CalMTA should keep the "variable frequency drives (VFDs) on all pumps and fans >10 HP" idea under consideration for future development, as it has large and significant potential despite the complex, fragmented nature of the market. The barriers are challenging but seem well-suited to a market transformation approach.
- Northwest Energy Efficiency Alliance (NEEA) has worked in this market for a while (particularly with products <10 HP) and would welcome the influence on national market actors that California's involvement could provide.
- How did the Efficient Streetlighting idea, which was previously advanced to Phase II but paused, score in this round compared to future iterations?
    - Rick clarified that no new information was identified that would enable CalMTA to re-score the idea, so the score did not change and was not prioritized in comparison to the other ideas under consideration.
- The Multifunction Heat Pump idea seems very well-positioned for an MT approach based on the identified reasons for not advancing, barriers, and opportunities.
- What is CalMTA's process or threshold for reviewing archived submissions?

    - Rick replied that there is no set threshold for reconsideration. CalMTA considers which ideas make the most sense at a given time based on market conditions, potential savings opportunities, and MTI portfolio needs.

Rick then shared CalMTA's recommendation to advance the Building Performance Standards (BPS) Accelerator idea into Phase II for strategy development and testing. MTAB feedback included:

- One of the barriers related to BPS policy implementation in the Northwest is the lack of simple pathways to collect data that demonstrates compliance (e.g., utility meter data for the whole building). In California, collecting data in investor-owned utility (IOU) territories may be straightforward, but 15% of the state is served by publicly owned utilities, where obtaining that data may be more difficult.
- In addition to data collection challenges, it is also challenging to ensure that entities upload this data to a system identified by the state. Looking at consistency and how other states have pursued BPS implementation will be important.
- Rent impacts and split incentives will be challenging to navigate for both multifamily properties and commercial real estate.
- While this is a nascent market, it's also very crowded with many active entities. Policy has been somewhat developed, implementation is in the early stages since no compliance dates have happened yet, and evaluation of savings is also going to be very challenging due to overlapping with MTIs and the numerous other market activities.
- CalMTA may want to focus specifically on market-related barriers, compliance, and education. Entities actively addressing BPS include:
    - IOU local reach codes and ongoing codes and standards engagement with the California Energy Commission (CEC) to provide support for SB48
    - IOU Explorer "Building Estimates" tool through the Local Energy Codes program to assist jurisdictions in understanding what existing building stock looks like to help shape policies
    - National BPS Coalition through the U.S. Department of Energy (DOE) and BPS Technical Assistance network through the U.S. DOE/Environmental Protection Agency (EPA)
    - CalBPS working group led by the U.S. Green Building Council California (USGBC California) and Noresco
    - USGBC California also has a robust BPS Hub providing resources to jurisdictions and stakeholders
    - American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) has a BPS guide and code-enforceable standard for BPS ("ANSI/ ASHRAE/IES Standard 100, Energy and Emissions Building Performance Standard for Existing Buildings")

    - Pacific Northwest National Laboratory (PNNL), Lawrence Berkeley National Laboratory (LBNL), and the National Renewable Energy Laboratory (NREL) are all working on various aspects of BPS, including support of the BPS Technical Assistance Network
- Having a workforce in place to support this will be critical and challenging, as for most building owners, future regulations are hypothetical and not a reality. What will motivate people to staff up to deal with this beyond the few innovators that already have adequate staffing? Strategic Energy Management (SEM) is the closest corollary with a successful value proposition, although it is based less on a hypothetical future standard than energy savings that can be accrued. Structuring this around a profit center may help motivate people, who don't really believe in the standard yet or think they can just pay the fine.
    - Rick agreed and stated that the need to develop a value proposition will be a focus of early research, as will an exploration of what aggregation looks like in the market.
- Work in the Northwest has taken almost the inverse approach to BPS than what CalMTA is considering: looking at BPS as leverage to advance deep energy retrofits. BPS will require all buildings in California to address their energy index and take action, even if that action is a decision not to comply. BPS can spark conversations about SEM, deep energy commissioning, or other advanced energy projects and ultimately encourage building owners to invest in significant upgrades beyond what BPS would require them to do. CalMTA should think of BPS as a leverage point to address barriers like lack of capital investment or split incentives.
- Much of the BPS-focused work in Washington State centers on workforce development. CalMTA should not underestimate workforce challenges from the perspective of the building owners but should also see this as an opportunity for MT – and the potential to increase the number of environmental and social justice (ESJ) community members moving into this high road career path.
- Issues vary widely between buildings that just meet the 50,000-square-foot threshold and very large buildings, as well as across different geographies/regions. Trying to educate a building owner whose portfolio spans different building sizes and locations will be challenging. BPS work in Washington, D.C., which is very advanced, might be helpful.
- With seven MTIs in various stages of development, are CalMTA resources best allocated to introducing a new MTI or to fully developing all existing ideas?
    - Jeff Mitchell explained that CalMTA balances all in-development MTIs from a labor and budget perspective. Not all ideas currently in Phase II of development will move into Phase III and CalMTA needs to consider the size of each MTI and how significant of a role in the market CalMTA will need to play.
- The BPS Accelerator idea illustrates the importance of dynamic management across an MT portfolio. BPS will have synergistic benefits for other MTIs and could introduce

concepts with the potential to become future MTIs, so moving this idea forward could be a pivotal move that positions CalMTA's portfolio as more than the sum of its parts.

Key Performance Indicators (KPI) Scorecard Review

Karen Horkitz shared CalMTA's identified program-level key performance indicators, and the metrics used to assess progress in those areas. MTAB feedback included:

- The dashboard is useful and aligns with what NEEA uses. Experience in the Northwest has found that some audiences want to drill down into specific elements, such as Total System Benefit (TSB), at a deeper level. It may be valuable for CalMTA to develop a view that provides that level of detail for key stakeholders.
    - Karen noted that there have been internal conversations about this and that CalMTA is exploring options to make it more dynamic and update some areas, like financials, quarterly. Others would follow the evaluation schedule.

Application Update

Lynette Curthoys provided an update on the current status of the application filed with the CPUC on CalMTA's behalf, which included a request for approval of the Room Heat Pumps and Induction Cooking MTI Plans. She also described the process proposed in the application for approval of future MTIs and the request to replace the filing of ABALs with a Trigger-Based Budget Advice Letter. MTAB members raised the following points:

- The IOUs' energy efficiency application follows a four-year cycle but with a true-up every two years. Experience with this process indicates that budget allocations do shift based on portfolio progress toward meeting targets set in the Potential and Goals Study.
- The 6-9 month application schedule included in the Decision was initially approved in 2019 and more time may be required than was initially estimated.

2025 Operations Plan Overview

Lynette then shared an overview of CalMTA's 2025 Operations Plan, including key priorities and milestones for MTI development, stakeholder engagement and communications, and administration and operations including financial reporting. MTAB questions and comments included:

- Will the draft Commercial Rooftop Unit (RTU) MTI Plan be released prior to the opening of the public comment?
    - Lynette replied that the public comment period will coincide with MTAB review of the MTI Plans. CalMTA will use the Idea to Initiative campaign and Phase II research findings to tee up key components of the plan in advance.
    - Jeff Mitchell added that the logic model, MT theory, and other components would be presented to MTAB via public meetings before the full plan is released.

- The review process would be easier if key documents were shared several days before CalMTA presents them.
    - Lynette noted this is our intent and said that MTAB meetings are scheduled to allow for a period to review and ensure alignment with target completion dates.

Stacey then described CalMTA's plan to use quarterly update webinars to share activities completed in the previous quarter in lieu of a written report and separate from MTAB meetings.

2024 Financial Update

Jim Giordano summarized 2024 budgets by cost category and final expenditures. MTAB feedback included:

- It's common for MT implementation budgets to be underspent because markets don't always move at the projected rate. Experience in the Northwest indicates that the total amount of money available matters less than the number of staff in place to help move the market.

MTAB Recruitment Plan & Timeline

Stacey reviewed the open MTAB seats and process/schedule for recruitment.

Public Comment

The following public comment was received from Dennis Roberts:

- To be truly market transformational, building standards should be linked to a comprehensive zero-emissions plan, recognizing the underperformance of these plans globally and in California. More attention needs to be paid to demand reduction. A program model exists that takes energy savings and allows people to recoup their investment based on those savings as a first step in zero-emission funding.

Next Meeting & Next Steps

Stacey presented CalMTA's plan for MTAB meetings in 2025, which will occur both virtually and in person.

The meeting was adjourned.

Attendees

MTAB Members

1. Cyane Dandridge, SEI
2. Hayley Goodson, The Utility Reform Network
3. Fred Gordon, Energy Trust of Oregon

4. Jeff Harris, Northwest Energy Efficiency Alliance
5. Chris Malotte, Southern California Edison (proxy for Randall Higa)
6. Peter Miller, Natural Resources Defense Council
7. Christie Torok, California Public Utilities Commission
8. Ky-An Tran, California Public Advocates

Participating Staff & Consultants

1. Taqua Ammar, CalMTA/Resource Innovations
2. Jennifer Barnes, 2050 Partners (on the CalMTA team)
3. Lynette Curthoys, CalMTA/Resource Innovations
4. Rick Dunn, CalMTA/Resource Innovations
5. Rachel Good, CalMTA/Resource Innovations
6. Stacey Hobart, CalMTA/Resource Innovations
7. Jeff Mitchell, CalMTA/Resource Innovations

Guests

1. Grant Alpert, 2050 Partners
2. Don Arambula, Don Arambula Consulting
3. Lauren Bates, Opinion Dynamics
4. Mogens Birkelund, S.C. Nordic A/S
5. Rob Bohn, PG&E
6. Alamelu Brooks, Energy Solutions
7. Richard Chien, Bay Area Air Quality Management District
8. Kelly Cunningham, PG&E
9. Jillian Du, BayREN/ABAG
10. Natalie Flores-Rios, SCE
11. Sue Hanson, EMC Insights
12. Anh Lay, ACCES
13. Cristina Marquez, IBEW 569
14. Savannah McLaughlin, CPUC
15. Emily Pelstring, CPUC
16. Dennis Roberts, Energy Efficiency Done Right
17. Frank Sandtner, Nationwide Marketing Group
18. Carol Yin, Yinsight, Inc.

MTAB Meeting Notes

April 22, 2025
Virtual Meeting

Welcome, Agenda, & Introductions

Stacey Hobart opened the meeting by welcoming attendees, facilitating introductions, and sharing the meeting agenda.

CalMTA First Quarter Activity Report

The first half of this Market Transformation Advisory Board (MTAB) meeting was allocated to a special presentation of CalMTA's Q1 2025 Activity Report, which provided updates on operational and Market Transformation Initiative (MTI) development milestones, including financial updates. Substantive MTAB comments and questions included the following.

- Regarding Phase II activities for the Room Heat Pump MTI:
    - What assumptions were made for simulated outdoor air in the room heat pump lab testing?
        - Elaine Miller confirmed that the lab test is load-based and tests units across a range of simulated outdoor air temperatures.
    - While it's important to look at the longer-term bill impacts of a technology, it is also valuable to report on early impressions of bill impacts and then dispel them as data becomes available moving forward, as CalMTA is doing.
    - CalMTA has identified incorporation of this measure into existing income-qualified programs as an intervention/point of leverage. Has there been any qualitative feedback from partners about this?
        - Elaine replied that overall existing programs are excited about the potential of this measure although most have not incented or installed room heat pumps at this time. CalMTA is actively supporting development of a measure package to include room heat pumps in the IOUs' ESA program in partnership with PG&E and Gradient.
    - The Self-Installation Practices Strategy Pilot identified that most participants needed help with room heat pump installation. What would have happened re: installation if they were not supported by the strategy pilot?
        - Elaine noted that this could vary widely and that building staff or retail stores' "white glove service" were two potential options.
    - Upfront cost is an identified barrier for product adoption at this time. It would be helpful to understand how low the cost would have to be for consumers to consistently choose this over a portable AC unit?

        - Elaine agreed that this would be a key aspect of the market to understand, although the cost barrier mainly applies to saddlebag versions of the product. Other types have a much lower purchase price.
    - Regarding product cost and installation difficulty, at some point the room heat pump market may intersect with the DIY ductless heat pump market, as the 115-120V systems are just over $1,000 now and have fairly low installation requirements, although drilling a hole in the wall is not insignificant.
- Regarding the Induction Cooking Chefluencer Strategy Pilot, these events seem to be capable of shifting the opinions of consumers who attend them. Does CalMTA have a plan to expand the influence of the Chefluencers beyond event attendees?
    - Jeff Mitchell explained that CalMTA has explored testing Chefluencer events in retail locations to influence retail staff to become induction influencers themselves. CalMTA will also be participating in a buyer's event with a large retailer in May 2025 and will coordinate a similar event there.
- Regarding Phase II activities for the CRTU MT Idea:
    - Why does the CRTU product definition not include heat recovery and energy recovery (ERVs)?
        - Nick Fiore replied that CalMTA has conducted significant research into ERVs and found a very substantial cost adder (nearly double the cost of an RTU without an ERV); the preponderance of mild climate areas whereas ERVs are most cost-effectiveness in cold to very cold climates; and long payback period.
        - In follow-up communication via email, Nick reiterated that ERVs are not currently a target of this idea because they are less effective in California's milder climate zones and have a high cost of equipment/lack of cost-effectiveness. The below chart illustrates ERV energy savings compared with other RTU features in CalMTA's most recent energy modeling.
    - There's interest in better understanding the impact of ERVs on peak load management, which may be more significant than the value of the ERV during average operating conditions.
        - Nick confirmed that this was part of CalMTA's modeling that will be followed up on when data is available.
    - Fault Detection and Diagnostics (FDD) has been around for a long time but not yielded significant benefits. Does any new data show benefits beyond notifying operators when a system component breaks?
        - Nick replied that as units become more complex with variable speeds, having these sensors will be important to home in on the exact issue when a unit isn't performing properly.
        - In a follow-up communication, Nick shared resources that informed CalMTA's decision to target Automated Fault Detection and Diagnostics (AFDD) through the CRTU MT idea. Regarding energy savings, the

Western Cooling Efficiency Center found that if all new RTUs in California had AFDD, annual energy use would be reduced by 12% (30,000 MWh savings over 15 years); a study from LBNL found that savings from proper commissioning range from 5-16% depending on type of program and building type; and another study from Berkeley Lab found a median savings of 9% whole building energy savings. Regarding prevalence of faults, a Berkeley Lab study found 21 faults that occurred in 20% of the AHUs in their dataset of 60,000 units. On any given day, 40% of AHUs and 30% of air terminal units reported a fault of some kind.

    - CRTUs are a highly optimized commodity product with costs negotiated down to the penny. CalMTA should look ahead 10 years and envision the new standard to which manufacturers could cost-optimize.
    - If the primary energy savings benefit from CRTUs is on the cooling side, why isn't CalMTA considering rooftop unitis with gas heating sections in cooling-dominated climates?
        - Nick explained that CalMTA's product definition is currently fuel agnostic and does not exclude dual fuel systems.
- Regarding federal policy impacts for the Residential Heat Pump Water Heating MT idea, the instantaneous water heater standard is the only federal residential water heater standard that can legally be pulled back. A lack of enforcement for these other standards could impact compliance but won't likely impact the upcoming standards outside of instantaneous water heaters.
- Regarding the Foodservice Water Heating MTI, cost to the end-use customer will vary widely given rate differentials. Without a new rate structure, end-use customers could pay more to run a heat pump water heater. Special rates could recognize time of charging or leverage solar energy.

Review of Draft Meeting Notes and Annual MTAB COI Training

The agenda transitioned to MTAB business. Stacey asked MTAB members for any comments regarding draft notes from the previous meeting (2/19/25). There were none.

She shared the MTAB recruitment and application process and welcomed Mary Anderson of Pacific Gas and Electric (PG&E), the newly seated investor-owned utility (IOU) representative on the MTAB, followed by a review of the MTAB charter and conflict of interest policies. This represented the annual COI training required for MTAB members. Stacey asked the members to disclose any conflicts. There were none.

CalMTA Application Update

Lynette Curthoys presented a summary of recent activity related to CalMTA's application to the CPUC, which would authorize funding for implementation of the Room Heat Pumps and Induction Cooking MTIs. Items discussed included the March 17 Pre-Hearing Conference, list

of parties to the proceeding, the final scope of the proceeding, and the application proceeding schedule. MTAB questions included:

- What are the expectations for MTAB members regarding response to questions in the scoping memo for this proceeding?
    - Lynette confirmed that most MTAB members' organizations are participating as parties in the proceeding so all input should be given with the formal CPUC process.
- Why did the CPUC sunset the ABAL process for Program Administrators since the decision that resulted in CalMTA's creation?
    - Lynette directed interested parties to D.21-05-031, the decision that eliminated ABALs.
    - Christie Torok of the CPUC explained the process as an eight-year application with four-year funding allocation and forecast, with a mid-cycle filing and true-up advice letter after two years.

Review of Disposition Report for 2024 Request for Ideas

Jennifer Barnes shared a recap of MTAB comments received on the draft Disposition Report for the 2024 Request for Ideas, including changes made to the report in response to those comments and planned next steps. There was no further feedback from MTAB members.

Public Comment

There were no public comments made during the comment period.

Next Meeting & Next Steps

Stacey presented CalMTA's plan for MTAB meetings in 2025, including dates and locations (virtual and in-person).

The meeting was adjourned.

Attendees

MTAB Members

1. Mary Anderson, Pacific Gas & Electric
2. Cyane Dandridge, SEI
3. Hayley Goodson, The Utility Reform Network
4. Fred Gordon, Energy Trust of Oregon
5. Jeff Harris, Northwest Energy Efficiency Alliance
6. Peter Miller, Natural Resources Defense Council
7. Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

1. Jennifer Barnes, 2050 Partners (on the CalMTA team)

2. Lynette Curthoys, CalMTA/RI
3. Marcus Dimeo, CalMTA/RI
4. Rick Dunn, CalMTA/RI
5. Nick Fiore, CalMTA/RI
6. Jim Giordano, CalMTA/RI
7. Rachel Good, CalMTA/RI
8. Stacey Hobart, CalMTA/RI
9. Karen Horkitz, KSH Advising (on the CalMTA team)
10. Marlee Konikoff, CalMTA/RI
11. Elaine Miller, CalMTA/RI
12. Jeff Mitchell, CalMTA/RI
13. Alex Opipari, CalMTA/RI
14. Katie Teshima, CalMTA/RI
15. Alex Wurzel, CalMTA/RI

Guests

1. Katie Abrams, Birch Road Consulting
2. Rebecca Barker, Earthjustice
3. Kjellen Belcher, Earthjustice
4. Jenny Berg, self
5. Rob Bohn, PG&E
6. Alamelu Brooks, Energy Solutions
7. Jonathan Budner, Franklin Energy
8. Paul Campbell, ICF
9. Sarah Chinberg, Midea
10. Roy Christian, SoCalGas
11. Maria Dahlin, N'de Apache Tribe
12. Anders Danryd, SoCalGas
13. Michael Daukoru, CalTF
14. Mori Farid, SoCalGas
15. Richard Fennelly, CoilPod LLC
16. Natalie Flores-Rios, SCE
17. Carlo Gavina, SoCalGas
18. Sandra Gonzalez, SoCalGas
19. Jennifer Green, MCE
20. Andrew Guerra, Ecology Action
21. Sue Hanson, EMC Insights
22. Randall Higa, SCE
23. Brynn Holbrook, ICF
24. Jennifer Holmes, Michaels Energy
25. Lore James, Ecology Action
26. Matthew Joyce, Tierra Resource Consultants

27. Floyd Keneipp, Tierra Resource Consultants
28. Justin Kjeldsen, Franklin Energy
29. Jay Luboff, Jay Luboff Consulting LLC
30. Christopher Malotte, SCE
31. Normand Marchand Jr, ClearWall Corporation
32. Savanna McLaughlin, CPUC
33. Mark Ouellette, ICF
34. Emily Pelstring, CPUC
35. Ralph Prahl, Prahl & Associates
36. Michelle Ralston, Common Spark Consulting
37. Dennis Roberts, Energy Efficiency Done Right
38. Rebecca Rothman, VEIC
39. Steve Schiller, Steven Schiller Consulting
40. Rohini Srivastava, ACEEE
41. Brian Stevens, CPUC
42. Jeorge Tagnipes, CPUC
43. Lindsey Tillisch, PG&E
44. Charlie Toledo, Suscol Intertribal Council
45. David Vehslage, Whirlpool
46. Carol Yin, Yinsight

MTAB Meeting Notes

June 27, 2025
Virtual Meeting

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting by welcoming attendees, facilitating introductions, and sharing the meeting agenda. She reviewed the conflict-of-interest policies established for both MTAB members and CalMTA staff and asked attendees to disclose any conflicts. While no conflicts of interest as established in the MTAB charter[1] were disclosed at that time, Stephen Miller, a proxy for Cyane Dandridge, noted later that SEI has an existing workforce development program that includes support of Building Performance Standards (BPS). Jeff Harris also mentioned later that the Northwest Energy Efficiency Alliance (NEEA)'s market transformation work in the Northwest includes programs that focus on some of the same markets as CalMTA's market transformation initiatives.

Stacey then welcomed Jennifer Green of MCE as a new MTAB member.

She asked MTAB members for any comments regarding draft notes from the previous meeting (4/22). There were none and the notes were made final.

Review Draft Advancement Plan: Commercial Building Efficiency Accelerator (CBEA)

Jeff Mitchell shared the purpose and structure of CalMTA's Advancement Plans, which describe the research and analysis needed to complete a full Market Transformation Initiative (MTI) Plan.

Rick Olson-Huddle presented an overview of the Commercial Building Efficiency Accelerator (CBEA) Advancement Plan, including preliminary MT opportunity, leverage points, conceptual logic model components, diffusion/lastingness mechanisms, research objectives, and budget.

MTAB questions and comments included:

- Questions about multiple topics that will be identified or clarified through Phase II research, such as:
    - The size of the market and specific market segments CBEA will focus on
    - The impact of high vacancy rates in commercial offices post-COVID

[1] https://calmta.org/wp-content/uploads/2025/04/Full-Charter-for-CalMTA-MTAB-1-7.pdf

    - The role of multifamily housing, which will likely require a unique playbook
    - Investigation of the work ESCOs are doing in California, which may include creative financing solutions, and the building types they are focused on
    - Deeper exploration of available financing opportunities to build on the preliminary market scan
    - Mechanisms for disseminating information to the market, including building decision-makers and current program administrators
- In considering available resources [leverage opportunities], has CalMTA considered the impact of recent federal deregulatory actions?
    - Rick noted that the MTI's lifecycle extends well beyond the current administration and future regulatory policies are unknown. The MTI may have to adjust to policies as they evolve; strategies to respond to negative policy impacts are described in the Risks & Mitigation Strategies section of the Advancement Plan.
- High interest rates have significant impact on the commercial real estate sector's willingness to invest in building optimization.
    - Rick agreed with this and added that CalMTA staff believes that when banks or underwriters see the value and lower risk in upgrades, they may offer reduced interest rates for financing.
- In addition to the challenges supporting building energy management and BPS in rural areas (when compared to urban areas) as described in the Advancement Plan, SEI's work training and educating early career-building professionals indicates a similar discrepancy between individually owned and managed buildings vs. building portfolios, with the former more difficult to reach.
- NEEA has a parallel initiative in their portfolio and is very interested in collaborating across the West Coast as portfolio managers have properties in all states. This work indicates the need for innovative approaches to translate energy upgrades into financial benefits beyond simple payback (e.g., more leasable space or return on investment). Tax policy should be investigated further in California, as accelerated depreciation tax policies can be very influential on private capital investments.
- Investment cycles within a building can vary widely, and a pre-planned investment strategy focused on energy can influence proactive upgrades that benefit future upgrades (e.g., investing in envelope improvements before pursuing a planned HVAC system upgrade).
- Financing for multifamily properties is unique; many of these building owners tend to serve low- or moderate-income customers with different rules. The idea of using an ESCO or spending a lot of money on analysis for potential improvements is not as straightforward with this segment as it might be with other commercial buildings. Multifamily properties have limited capital so unless building improvements are no-cost or significantly incentivized, they may not be possible even if interest rates are very low. Education for energy advisors focused on multifamily properties would be a valuable addition to this MTI.

- Segmentation is important to commercial building market transformation, as the commercial real estate; municipalities, universities, schools, and hospitals (MUSH), and multifamily segments are all very different. Engaging public agencies who work with affordable housing, such as the health department or structural remediation programs, can create a clearer value proposition. This is supported by recent research from the Energy Trust of Oregon.
- If the distribution is weighted to highlight the "worst performers" from a building energy consumption standpoint, how much will the MTI focus on a relatively small group vs. a larger array of buildings?
    - Rick replied that the ease of identifying the worst performers means they are often the focus of BPS efforts, so substantial opportunity exists. However, CalMTA would be excited to impact a significant proportion of the broader commercial building market after more data is collected to yield insights into this potential.
- Many programs have attempted to influence this approach to energy optimization in the commercial building market. CalMTA should engage closely with these programs, particularly those in California, to better understand lessons learned and potential best practices. A capital investment planning tool like that described in the Advancement Plan may help bring together the many programs working to optimize commercial building efficiency performance in California and will create more certainty and consistency.
- Barriers to understanding and accessing the various incentive/rebate programs available to this segment will also need to be addressed, as indicated by SEI's work with building owners in the San Joaquin Valley. Providing tools, messaging, and effective training to energy professionals can position them as a one-stop shop for building owners/operators who can help navigate program eligibility requirements and applications.
- Federal policy deregulation means it may be hard to reach the goal of a 30% reduction in energy consumption – keeping things constant could be a sign of success if the market would otherwise fall back without MTI interventions.
    - Karen Horkitz clarified that forecasting assumes a baseline energy consumption that will be reviewed annually. If energy consumption starts increasing, we would update our assumption of baseline consumption and forecast what would happen in the absence of the MTI. CalMTA's evaluation framework will identify factors that would trigger reforecasting (such as significant regulatory or market disruptions) in the third-party evaluation.
    - An MTAB member added that the MTI forecast is a long-term vision. Activity like recent federal policy tends to be temporal and if the MT theory is strong, the impact can often be addressed by many other factors.
- In the context of California, research may be most beneficial if it focuses on system-level opportunities that result in benefits that are meaningful to building owners (e.g., increased building comfort reduces tenant turnover, deep retrofits lead to synergies

like reduced load or optimized HVAC) rather than looking at the impact of individual end-uses.

- The intersection between this work and California's load flexibility work creates a significant opportunity. Whole building approaches with automated controls can help solve peak load concerns and could potentially create a new revenue stream for building owners.
- Market access programs like MCE's FlexMarket could serve as a significant driver if energy professionals trained in whole building approaches become load flexibility aggregators.
- Research should seek to better understand barriers for customers who have opted not to pursue building upgrades in addition to barriers faced by active participants.
- Load flexibility benefits need to be better understood (e.g., whether there are incentives linked to them). Incentives will need to be cost-effective for all customers and it will be important to bridge the gap between customer expectations and actual performance in terms of savings.

Public Comment

No public comments were received.

Commercial Rooftop Units (CRTUs) Preliminary Field Study

Nick Fiore presented the scope and preliminary findings from a field study conducted to assess the impact of an all-electric heat pump RTU replacing an existing mixed fuel unit. Nick noted that the final report will be released in October with findings incorporated into the full MTI Plan that will be provided for public comment in November and finalized in December.

MTAB feedback included:

- Anomalies like the spike in activity on April 1st should be investigated further.
- Has CalMTA thought about how proprietary software/capabilities in this CRTU unit would be addressed by manufacturers in other products?
    - Nick noted that the U.S. Department of Energy specifies the components software should track, but CalMTA is not currently seeking to influence an open-source version of this software.
- Recognizing that the higher cost of these models will be a barrier for many customers, CalMTA should consider a tear-down analysis to determine how much cost could be taken out without compromising performance.
    - Nick said that no tear-down analysis had been conducted yet, but that CalMTA has been collecting the incremental costs for adding certain features. He agreed that upfront cost was a challenge, but that back-end software and controls have significant savings potential and could be replicated by manufacturers without other components that drive up costs.

- Controls can be invisible and hard to see when customers are making their decision about what RTU product to select. What guidance will help customers define which are "good" controls?
    - Nick noted that consistency on which data points need to be recorded will be instrumental to controls being widely integrated into CRTUs.

Residential HPWH Idea & Market Acceleration Summit Overview

Alexis Allan reviewed key milestones and the timeline related to the Residential Heat Pump Water Heating (HPWH) market transformation idea that is under development. She also shared details of a planned market acceleration summit at the end of August, including objectives, participant criteria, and post-summit activities.

MTAB questions and comments included:

- Will manufacturers, distributors, and contractors be represented?
    - Alexis confirmed that leading manufacturers as well as new/emerging companies were invited, as well as workforce representatives and other supply chain entities.
- From a policy perspective, CalMTA should ensure that there are attendees who will address rate structure (electric vs. gas) and innovative rate design.
- While the summit is focused on the California market, it may be valuable to invite representatives from other regions who have been working in the heat pump water heating market for some time.
    - Alexis agreed and noted that CalMTA was identifying additional invitees.

Application Update

Lynette Curthoys presented an update on the application filed to the California Public Utilities Commission (CPUC) on CalMTA's behalf in Dec. 2024, which would approve the Room Heat Pumps and Induction Cooking MTIs for market deployment. She identified all parties to the proceeding and related filing activity, summarized supportive and unsupportive issues, and reviewed the proceeding schedule. No MTAB feedback was received.

Overview of CalMTA Organizational Performance Review

Karen Horkitz shared scope considerations, preliminary scope and research questions, key tasks, and timeline for the organizational review of CalMTA that will be conducted by a third-party at the end of 2025.

MTAB feedback included:

- The future performance review is described in Decision 19-12-021. Is the organizational review also noted there, or is it a process proposed by CalMTA?

    - Karen clarified that the Decision includes two mentions of an evaluation that CalMTA believes to be an organizational review and which we subsequently proposed conducting at an earlier stage than the performance review.
- The theme of transparency in operations (planning activities) should be woven throughout the scope. CalMTA is operating on behalf of the public and strives for transparency and trustworthiness, so working this into the questions can demonstrate that the program is serving the public well.
- While research questions are preliminary at this stage, they should be vetted and contributed to by the CPUC, MTAB, and other key stakeholders before finalizing.
- CalMTA's pool of stakeholder interviewees should include a wide range of those who have commented on CalMTA materials (e.g., MTI Plans) or engaged in other ways, even if they have not directly participated in meetings.
- Interview prompts should include an "other" category or open-ended place where interviewees can share feedback about issues that are important to them that don't relate to specific questions.
    - Karen noted that interviews will be conducted in a way that ensures interviewees are able to share their thoughts regardless of the question format; interviewers will have the flexibility to adjust as the conversation unfolds.
- What is the budget estimate for the organizational review and what portion of CalMTA's overall budget is allocated to it?
    - Karen replied that CalMTA estimates a $75,000-$100,000 budget based on scope. Lynette added that this is included in the implementation budget in CalMTA's CPUC application.
- Two MTAB members expressed their strong support for this plan. NEEA went through a similar process early on and it was very helpful to understand how the organization was fulfilling its desired mission.

CalMTA Equity Update

Rachel Good shared an update on CalMTA's work to apply an equity lens to MTI development, including processes to provide consistent guidance for the MTI teams on equity integration, the equity impacts of CalMTA's strategy pilots and field studies, and engagement of the Equity Sounding Board through full meetings and consulting hours. Two MTAB members expressed support and interest in seeing the integration of equity feedback show up in future implementation of the MTIs.

CalMTA Website & Collateral Overview

Stacey presented a brief overview of CalMTA's redesigned website (https://calmta.org/) and accompanying collateral materials.

Public Comment

No public comments were received.

Next Steps & Preview of 2025 *Idea to Initiative* Campaign

Stacey reviewed CalMTA's MTI development and deployment process as well as the components of each MTI Plan as a precursor to sharing the structure and milestones for the Idea to Initiative campaign that will introduce key elements of the CRTU MTI Plan. She also reviewed upcoming MTAB meeting dates, locations, and topics. MTAB feedback included:

- In the upcoming CRTU MTI Plan, it will be interesting to see how Phase II research and other activities scale to the market. This is a commodity market with a wide range of manufacturers and large number of RTUs sold, the MTI will need to identify which features it seeks to promote and how it will drive market adoption.

The meeting was adjourned.

Attendees

MTAB Members

1. Mary Anderson, PG&E
2. Jennifer Green, MCE
3. Jeff Harris, Northwest Energy Efficiency Alliance
4. Peter Miller, Natural Resources Defense Council
5. Stephen Miller, SEI (proxy for Cyane Dandridge)
6. Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

1. Alexis Allan, Brio
2. Taqua Ammar, CalMTA/Resource Innovations
3. Lynette Curthoys, CalMTA/Resource Innovations
4. Nick Fiore, CalMTA/Resource Innovations
5. Rachel Good, CalMTA/Resource Innovations
6. Stacey Hobart, CalMTA/Resource Innovations
7. Karen Horkitz, Evaluation Lead, CalMTA
8. Jeff Mitchell, CalMTA/Resource Innovations
9. Rick Olson-Huddle, CalMTA/Resource Innovations

Guests

1. Mahlon Aldridge, Ecology Action
2. Don Arambula, Don Arambula Consulting
3. Peter Biermayer, CPUC
4. Rob Bohn, PG&E
5. Bryan Boyce, Energy Solutions
6. Paul Campbell, ICF
7. Cathy Chappell, TRC
8. Richard Chien, Bay Area Air District

9. Anders Danryd, SoCalGas
10. Lacy Estes-Hill, Rheem Manufacturing
11. Richard Fennelly, CoilPod LLC
12. Michael Flatt, Samsung HVAC
13. Erich Fleck, The Ortiz Group
14. Randall Higa, SCE
15. Bjorn Jensen, Consortium for Energy Efficiency
16. Ritika Kumbharker, Center for Energy and Environment
17. Jim Lutz, Hot Water Research
18. Cooper Marcus, QuitCarbon
19. Savannah McLaughlin, CPUC
20. Jim McMahon, Better Climate Research and Policy Analysis
21. Emily Pelstring, CPUC
22. Sepideh Rezania, Unrooz Solutions
23. Charlie Toledo, Suscol Intertribal Council
24. Carol Yin, Yinsight
25. Kate Zeng, SDG&E

MTAB Meeting Notes

August 20, 2025
Virtual Meeting

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting by welcoming attendees, facilitating introductions, and sharing the meeting agenda. She shared the conflict-of-interest policies established for both MTAB members and CalMTA and asked attendees to disclose any conflicts.

Stephen Miller from SEI (proxy for Cyane Dandridge) noted that they have workforce development programs that support Building Performance Standards, which is aligned with but not in conflict with CalMTA's Commercial Building Efficiency Accelerator idea currently in Phase I: Concept Development.

Stacey asked MTAB members for any comments regarding draft notes from the previous meeting (6/27). There were none.

Commercial RTUs: Market Characterization

Rick Olson-Huddle described key product definitions for the Commercial Rooftop Unit (CRTU) Market Transformation Initiative (MTI) under development, including the connected controls and commissioning targeted by CalMTA.

Cynthia Kan then presented the methodology and key findings from the CRTU Market Characterization study which ultimately informed refinements to the product definition, with support from Garth Torvestad of 2050 Partners.

MTAB questions and comments included the following:

- Are resistance-heated units outlawed by code? Many large buildings with RTUs tend to be cooling-dominated and utilize resistance.
    - Garth confirmed that generally resistance is prohibited as a primary source of heating.
- If research shows that 80% of RTU sales go through the distributor, how can we create a sales-weighted estimate?
    - Karen Horkitz replied that the 18 contractor interviews conducted by CalMTA, which had a preponderance of respondents in Southern California, did not yield enough information to confidently state the percentage of gas pack vs. heat pump RTU products beyond a range. Additionally, the only real saturation data to source is seven years old. CalMTA did see a fair amount of electric

resistance models installed in 2018 but believe these are being replaced by heat pumps as they retire.

- It's surprising that facility managers are more willing to wait for preferred RTU equipment than building owners – it seems like the facility manager would be more in tune with immediate facility needs (e.g., need for cooling on hot days).
    - Cynthia clarified that facility managers were more likely to plan replacements than respond reactively, so that impacts their willingness to wait.
- The product definition proposed by CalMTA includes a number of beneficial features, but are all weighted equally (e.g., savings distributed across the features) or are some more critical? The market includes disparate groups (contractors who want to sell features, building owners/managers who might want those features, etc.), but where is the beachhead market given that people have been trying to build the business case for controls for quite some time?
    - Garth noted that when prioritizing features, the avoided cost will be highest for cooling efficiency and variable speed capabilities. Modeling connected controls is challenging since the counterfactual is hard to determine, but we do know the savings are lower. It feels like this is the right time in the market to target RTU connectivity: the cost of sensors has dropped significantly and can now be addressed at the factory at a relatively low cost.
- For the "two-minute" purchase market estimated to comprise the majority of sales, what factors impacted their decision-making (price, product availability, etc.)?
    - Cynthia replied that price and product availability were the primary factors, but some nuances also emerged between building owners vs. facility managers. Building owners trust their contractor more but facility managers put greater trust in their peers as decision-making influences.
- What is the current prevalence/market share of each of the RTU features included in CalMTA's product definition?
    - Cynthia said that most of these features are not highly prevalent. Connected commissioning is standard on top-of-the-line models and optional on the mid-tier product lines, and usually not available on entry-level models. Variable speed capabilities are currently only included on very top-of-the-line models (5-10% of the market). Ultra-high efficiency cooling varies widely across mass market brands: some sizes meet our criteria and some don't. These brands often use the same size chassis for different product types, which can limit the number of components and result in reduced efficiency as the size increases.
- Does CalMTA's product definition include any box insulation or dampers?
    - Rick confirmed that while these features yield benefits, they are not currently in the product definition. Some requirements for dampers already exist through Title 24; however, research found that box insulation does not yield significant savings in most California climate zones.

- Do any proposed interventions include activities to influence or change Title 24 requirements? Given that sales are predominantly of the cheapest available products, codes/standards could have significant influence on moving the market forward.
    - Rick agreed and clarified that the intervention focused on coordination with other California programs includes codes and standards working groups' influence as an outcome.
- Interventions focused on influencing or coordinating with voluntary energy efficiency programs and codes/standards should be disaggregated, as these groups function very differently.
- How much does MT success depend on a functional market of maintenance contractors? In the Northwest, work improved when programs were offering incentives and conducting inspections, but the market reverted to old practices when those interventions stopped.
- If contractor interviews were a small sample size skewed to a specific region (Southern California), are there plans to expand this? Cold-climate heat pumps may be under-represented, although these represent a small percentage of overall statewide sales.
    - Karen replied that CalMTA's schedule to deliver a final MTI Plan by the end of the year does not allow us to conduct additional interviews before then. However, we will look at a sensitivity analysis and focus on understanding the market forecast from a range and not a discrete point. Once the MTI moves into market deployment, CalMTA will release an RFP for an evaluation contractor and anticipates that a quantitative survey of contractors expanding this sample will be one of the first activities the selected evaluator would complete.
- Is a California program supporting the Los Angeles school district's initiative to replace gas packs? CalMTA may be able to leverage this as a workforce training opportunity.

Commercial RTUs: Market Transformation Theory and Logic Model

Rick Huddle presented the key components of the CRTU MTI's MT Theory and Logic Model, including a vision for the future, market barriers and opportunities, strategic interventions, and theory of market change.

MTAB feedback included:

- CalMTA may want to think about contractors and technicians as two distinct groups. On the contractor side, we may need to gather info through the demonstration project that goes beyond technical factors (satisfaction, risk, whether a premium could be charged, etc.).
- The theory of change describes a roadmap and tiers of efficiency. Is CalMTA thinking about multiple tiers for the product definition? A definite roadmap and tiers will make it easier to speak to goals and where energy savings come from; a defined objective of phasing in advanced features will clarify MT goals over time.

    - Rick said that this was not yet being explicitly considered. CalMTA envisions that the controls package will happen first and might be a first tier, and variable speed capabilities or cooling efficiency could be a second tier.
- The two-minute RTU market (what's on the truck now) seems similar to the water heating market, which has been explored extensively. Is there potential to look at lessons learned/what's worked there?
    - Rick agreed that this was a good idea to explore.

Stacey asked MTAB members to share what surprised/excited them and what they'd like to know more about. Responses included:

- Surprised by:
    - Facility manager vs. building owner bifurcation
    - Prevalence of the two-minute market
    - Discrepancy between contractor and distributor sales data
    - The market share of heat pump RTUs already being sold in California
    - The existence of RTUs with cellular modems
- Excited by:
    - Connected controls and commissioning (CCC) — the confluence of improved sensors/AI to do better commissioning is an interesting idea and it would be great to harness innovation in that space
    - Commercial employers looking for seasoned experienced workers, since experience with residential HVAC contractors indicates that they are seeking less experienced workers so they have control over training
    - Possibility of Title 20 impacts – had initially written off due to federal pre-emption
    - Opportunities to leverage Los Angeles school district work
    - The large percentage of building owners/managers willing to consider switching from gas packs even if energy costs increase
- Interested in learning more about:
    - The standard-setting process, as this is a way of ensuring the right product is on the truck
    - How this market compares to the residential HPWH market
    - Motivating factors for the two-minute buyer and analysis of that, as understanding the details will be critical if they're 80% of the market
    - How the logic model is translated to the distributor level
    - How the MT approach could/should be bifurcated to address property owners vs. facility managers as decision-makers, since they seem like different audiences
    - Better understanding of the high variability in quality and durability of sensors
    - Opportunities to address operational cost increases via messaging

- Workforce-related strategies: ways to communicate phased/tiered approach to workforce so they can prepare, honing the list HVAC contractors, the need to mitigate potential workforce bottlenecks as California moves forward with something like BPS (has been an issue in New York City)
- External program coordination needs to be explored further, separating out voluntary programs vs. codes/standards
- Load flexibility options being built into products by manufacturers
- The potential for controls to strengthen the value proposition for HVAC contractors

Rob Bohn of Pacific Gas and Electric (PG&E) (proxy for Mary Anderson) also added that a member of his team participates in the Standards Technical Committee (STC) for AHRI 1390, which is the industry standard being developed for non-residential HVAC. The purpose of this standard is to develop communication protocols for smart grid interface for flexible loads for Commercial HVAC equipment and supporting systems and the scope will include commercial hydronic equipment.

Stacey discussed the elements of the MTI Plan and what appendices were covered today, as well as which will be addressed in future MTAB meetings.

Public Comment

- Cathy Chappell, TRC: In the codes and standards realm, Title 24 has been mentioned but is CalMTA looking into Title 20 update opportunities? Title 20 may be able to push more than federal standards and CCC integration.
  - Garth replied that CalMTA is interested but has not yet explored it extensively.
- Cathy Chappell, TRC: In addition to Advanced Heat Pump Coalition, has CalMTA been in touch with the California Heat Pump Partnership?
  - Rick confirmed that CalMTA has been coordinating with the CAHPP on multiple MTIs.
- Cathy Chappell, TRC: Does CalMTA plan to provide direct financial incentives to manufacturers? Regarding California program coordination: most of the programs listed do not provide equipment incentives. What do you expect the incentive connection to be?
  - Rick confirmed that CalMTA is planning on offering financial incentives to manufacturers early on, with a focus on CCCs to eliminate the cost differential. We would seek to encourage other programs to offer downstream incentives through our coordination approach

Review Commercial Building Efficiency Accelerator (CBEA) Advancement Plan Comment/Response Summary

Rick Huddle shared a summary of the feedback received on the CBEA Advancement Plan,

including common themes and next steps for finalizing this before moving into Phase II activities.

MTAB feedback included:

- Line items for every redundant comment may have made it easy to redline but it made the comment list voluminous and difficult to review.

Stacey reiterated the conflict-of-interest policy and what would trigger an MTAB member recusing themselves or stepping away as CBEA moves to Phase II: Program Development.

Public Comment

No public comments were received.

Next Meeting & Next Steps

Stacey reviewed the MTAB meetings scheduled for the remainder of 2025 and early 2026, which include both virtual and in-person meetings, as well as the key agenda items. Lynette added that the intent of the Idea to Initiative (I2I) series is to inform MTAB members and the public and ensure well-vetted MTI Plans, including the forthcoming CRTU MTI.

The meeting was adjourned.

Attendees

MTAB Members

1. Rob Bohn, PG&E (proxy for Mary Anderson)
2. Jennifer Green, MCE
3. Haley Goodson, TURN
4. Fred Gordon, Context Consulting
5. Jeff Harris, Northwest Energy Efficiency Alliance
6. Peter Miller, Natural Resources Defense Council
7. Stephen Miller, SEI (proxy for Cyane Dandridge)
8. Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

1. Lynette Curthoys, CalMTA/Resource Innovations
2. Rachel Good, CalMTA/Resource Innovations
3. Stacey Hobart, CalMTA/Resource Innovations
4. Karen Horkitz, KSH Advising
5. Cynthia Kan, The Cadmus Group
6. Jeff Mitchell, CalMTA/Resource Innovations
7. Rick Olson-Huddle, CalMTA/Resource Innovations
8. Garth Torvestad, 2050 Partners

Guests

1. Shelly Adams, Cascade Energy
2. Daniel Bailey, CLEAResult
3. Tobias Barth, MN CEE/ETA
4. Beth Braddy, Trane Technologies
5. Alamelu Brooks, Energy Solutions
6. Josaphine Bunnagel, PG&E
7. Paul Campbell, ICF
8. Rengie Chan, Lawrence Berkeley National Laboratory
9. Cathy Chappell, TRC
10. Colleen Collins, Resource Innovations
11. Maria Dahlin, N'de Apache Tribe
12. Craig David, PG&E
13. Victoria Engel-Fowles, NYSERDA
14. Lacy Estes-Hill, Rheem Manufacturing Company
15. Richard Fennelly, COILPOD LLC
16. Rocco Guaragno, Resource Innovations
17. James Hanna, Energy Solutions
18. Curtis Harrington, UC Davis
19. Harshad Inamdar, Rheem Manufacturing Company
20. Savannah McLaughlin, CPUC
21. Dominique Michaud, SDG&E
22. Carley Murray, NYSERDA
23. Joaquin Narvaez, West Coast Green Builders LLC
24. Rawad Abi Saab, Energy Solutions
25. Madeline Salzman, Earth Advantage
26. Shelby Sinkler, City of Palo Alto Utilities
27. Timothy Sisson, Trane Technologies
28. Roger Snow, Proteus
29. Rusty Tharp, Aozora Consulting
30. Carol Yin, ETCC
31. Kate Zeng, SDG&E

MTAB Meeting Notes

September 29, 2025
Virtual Meeting

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting by introducing MTAB members and reviewing CalMTA's internal and MTAB conflict of interest policies.

She then asked MTAB members for any comments regarding draft notes from the previous meeting (8/20). There were none.

Commercial Rooftop Units (CRTUs): Product Assessment

Garth Torvestad presented the purpose of, methodology for, and key findings from the CRTU Product Assessment report, including the details of the product definition and results of preliminary modeling/savings analysis.

MTAB comments and questions included:

- Is it accurate that CalMTA's modeling approaches were similar to those used for comparable work in the Northwest?
    - Garth confirmed that the approach was similar, although not all prototypes used were identical.
- Was modeling conducted for individual features or combinations of them?
    - Garth explained that CalMTA did look at combinations of different measures but focused on isolating each feature under consideration to identify which had the greatest potential benefit and which should be screened out.
- The team clarified that the commercial definition did not include multifamily buildings.
- What assumptions were made in developing the gas fuel baseline?
    - Garth noted that the team assumed a code minimum heat pump product and then factored in the impact of each individual feature.
- Modeling may underestimate the savings potential of some features when compared to real world performance.
    - Garth clarified that this modeling work was conducted primarily to identify which measures should be screened out due to low cost-effectiveness, and that as CalMTA moved into analysis of total system benefit (TSB), the team took an increasingly conservative approach.
- Variable speed capability enables load flexibility at partial load reduction while still delivering HVAC capabilities.

- What degree of confidence does CalMTA have in the quality and accuracy of sensors currently being provided by manufacturers?
    - Garth said that initial research indicated that factory-installed sensors were performing well, but that this is an important question and one that will be continually monitored.
- What is the business model around continuous connectivity?
    - Rick Olson-Huddle noted that building the business case will be a key objective of CalMTA's future work, specifically the demonstration project we intend to conduct.
- Two identified products with CalMTA's desired features, CaptiveAire and Greenheck, are not yet rated as a RTU by AHRI. Does CalMTA believe that they will be?
    - Garth replied that conversations with these manufacturers indicate that their testing has been done at a certified lab and would only need to submit required documentation to be rated. Rick added that while very few RTU products on the market now have all desired features, nearly all have the features targeted in the MTI's first phase.
- What is the cost comparison between other models and CaptiveAire/Greenheck? Is there any sense of the market share for each product?
    - Stacey clarified that cost and other related issues would be addressed by Cadmus in their presentation at the Nov. MTAB meeting.
- Thinking about the number of mixed fuel RTUs that do have variable speed compressors, it might be worth doing a separate analysis of cooling-only gas products with variable speed compressors that could be converted to a heat pump RTU with a reversing valve. How many other variable capacity products could be in the market now with the addition of a reversing valve? A key element in thinking about the future of this initiative is how hard would it be to actually get the market to move in that direction?
    - Garth noted that some manufacturers use multiple compressors that are fixed capacity with one variable speed compressor to get more or less the same effect. Setting VSP as the future goal is a good approach now, and in the interim other technologies might offer alternate paths to variable capacity.
- There is no Title 20 angle for these products as they are covered by U.S. Department of Energy (DOE) standards and federal pre-emption applies. Because Title 24 could capture other components or features beyond federal minimum efficiency standards. it has more potential from a codes/standards perspective.
- CalMTA should explore the potential role for California Air Resources Board (CARB) in this market, possibly exploring requirements for RTUs to be heat pumps as a way to reduce carbon emissions.
- Are the results of bill impact analysis in PG&E territory driven primarily by the demand charge, difference in fuel cost between electric and gas, or cooler northern climate zones? Would a higher Coefficient of Performance (COP) for the heat pump offset that?

    - Garth replied that the higher baseline use of gas, which is relatively inexpensive, and increased electric load in that case, is a primary driver. CalMTA was somewhat conservative in this modeling, and results indicate that even with added electric load, there are still savings.
- Since demand charges are one of the key drivers of cost for commercial customers in California, did CalMTA make an assumption about peak demand usage for these products?
    - Garth replied that modeling was done at the whole building scale (what a bill would have been in the whole building with baseline equipment vs. with the addition of the new technology) using a variety of different commercial rates. The modeling assumes a reduction in peak demand due primarily to cooling efficiency. The addition of the variable-speed heat pump doesn't yield any additional bill savings vs. that with just a Coefficient of Performance of 20 (a 20% improvement in cooling efficiency).
- Is the all-electric base case that was modeled a code minimum/federal minimum heat pump? Do the captured savings represent savings above that minimum?
    - Garth confirmed that was the case.
- Is the discharge temperature issue based on contractors setting equipment with a focus on avoiding callbacks and potentially going higher than most people need?
    - Garth noted that this issue may be unique to the specific site. Setting the fan to the high speed is common and so customers often do not get the full benefits of variable-speed fans. While that instance is likely very common, the discharge temperature issue may be less common. The question is really whether these features can be used to diagnose and resolve problems, and findings indicate that they can.
- It seems like multiple findings could be built into default factory settings for these systems. If fan energy use is a huge component of RTU energy consumption, any strategy to reduce fan usage would contribute to most of the energy savings.
- A future market discussion should explore the percentage of buildings with triple net leases, which would get into the split incentive issue.
- It will be useful to have a future discussion on how to factory set or automate these systems so that they are not using resistance heating unless actively adjusted by a user.
- What sources informed CalMTA's assumption about reduced sensor costs?
    - Rick Olson-Huddle said this was largely based on anecdotal evidence from market actors and that CalMTA will continue to seek additional data sources.

Public Comment

The following public comments were received.

- **Michael Deru, National Renewable Energy Laboratory (NREL):** I lead the DOE commercial HVAC technology challenge, so I'm very interested in this work that you're doing. One question I have is how will this be implemented? As I am working with all the different manufacturers and utilities across the country, and CEE, EPA, and ENERGY STAR, on the federal minimum standards, I'm always very aware of introducing new requirements that would cause confusion in the market. It doesn't help anybody and it makes it difficult for manufacturers to align with all the different requirements and regulations. It also makes a lot of confusion for building owners, especially those that have portfolios across the country and trying to manage different areas of the country. So how will this be implemented, and are you trying to align with these other requirements and not make special requirements here?
    - Garth replied that CalMTA was highly sensitive to not creating new hurdles but was also aware that while we've tried to align with existing requirements, current specifications are based on temperatures that don't make sense in California.
    - Rick added that CalMTA is very cognizant of the need for market alignment during implementation and has already been trying to work together with the market to influence specifications that include our desired features.
    - Michael added that his team was starting to address controls in this market and would reach out to discuss further.
        - CalMTA note: The MTI team and Michael met on Oct. 10.

Commercial Rooftop Units: Program Theory & Logic Model Review

Rick shared a snapshot of the MTI logic model as context for a deeper discussion on program theory and logic model.

MTAB feedback included:

- Split incentives are a barrier for one segment of the market but do not appear in the logic model. Is that because strategic interventions are focused on other segments?
    - Rick explained that that the split-incentive barrier was not a component of the logic model as it impacts only one segment of the market (leased spaces) and has limited impact on desired features beyond VSP. He added that CalMTA should quantify what portion of the market this issue impacts and that we may want to add it to the logic model based on this.
- In 2016, the DOE published a study that identified that leased commercial spaces account for approximately 50% of commercial building energy use. https://www.energystar.gov/sites/default/files/asset/document/DOE%20-%20Energy%20Efficiency%20in%20Separate%20Tenant%20Spaces_0.pdf
- The portion of the market that is the "five-minute market" (emergency replacement scenarios) almost feels like a barrier in and of itself. Because these customers have less time to make thoughtful decisions, first cost becomes everything.

    - Rick said that CalMTA has discussed the difference between emergency replacements in the residential and commercial markets. The commercial market functions differently and may offer more points of influence.
- Are equity customers and considerations addressed in the logic model?
    - Rick confirmed that the first and fourth strategic intervention have specific equity components, which will be described in the MTI Plan narrative.
- Is the Disadvantaged Community (DAC) target related to where the building is located or who owns it?
    - Rick clarified that this would be determined by the location of the building.
- Has CalMTA spoken with original equipment manufacturers (OEMs) regarding upstream incentives? Some utility interviews with major manufacturers indicated that they would prefer incentives go to contractors because they have the most influence on customer decision-making.
    - Rick said that CalMTA has not had these conversations yet but has engaged manufacturers to discuss potential involvement in the demonstration projects.
- How will the demonstration project impact distributor and contractor awareness and familiarity?
    - Rick said that CalMTA will work with 3-4 manufacturers to identify and engage distributors and that they will in turn engage contractors with whom they have established relationships.
- Contractor training as well as product availability and readiness go a long way in addressing the emergency replacement barrier. Midstream incentive programs can be effective in supporting suppliers to have the target RTUs available.
- Influencing stocking practices to ensure product is available for the "five-minute" market will be critical. But this goes beyond the RTU box – it also requires in-stock curb adaptors, which many units will require. It would be interesting to explore strategies that would remove that barrier, potentially through distributor incentives.
    - Rick said that CalMTA hadn't considered curb adaptor stocking practices as an extra barrier but will explore further.
- It seems like the increased weight of the RTU "box" with targeted features might trigger additional review of the building and inhibit adoption. Is this a barrier?
    - Rick stated that increased weight has not been an issue for the features CalMTA is targeting, particularly since gas pack RTUs are typically heavier. Energy 350 studied smaller units and didn't see a significant change in weight.
- Work with IMT resulted in lease language for RTUs to address some of the split incentive barriers (https://imt.org/resources/retail-rtu-green-lease-language/).
- The MTI team should review a CEE meeting presentation on the difficulties of running a commercial midstream program (https://cee1.my.salesforce.com/sfc/p/#1U0000011m3T/a/TR00000ADXd7/X0P6iR3yXXySBbOjzXZRnCljFBLqGWohmkymO46MNYo).

Commercial Rooftop Units: Market Progress Indicators (MPIs) & Milestones

Cynthia Kan shared the Market Progress Indicators (MPIs) and milestones derived from the program theory and logic model, including the process by which they were developed and the metrics linked to each strategic intervention.

MTAB comments and questions included:

- If CalMTA is targeting 50% of demonstration projects in DACs, it is important to assess the potential risk associated with new technologies for entities that do not have the resources of large affluent corporations. What safety net exists for RTUs that don't work or fail?
    - Rick acknowledged the importance of being thoughtful about this but noted that currently targeted features do not pose a high risk.
- Activities centered on development of a value proposition should specify whether that value proposition is for contractors or manufacturers.
- For MPI #9, it seems like there are two audiences: contractors (the initial audience, a high-value opportunity) and owners/managers who would get engaged through long-term monitoring.
    - Cynthia clarified that this MPI focuses on individuals making buying decisions (often building owners/managers), with contractors and other audiences addressed through other metrics.
- Metrics should go beyond contractors having a business model in place to capture the number of contractors actually using that model to run their business profitably.
- Getting the first wave of installers on board to promote this technology will be challenging without financial incentives.
- The CalMTA team should have a more in-depth discussion with the Title 24 team to discuss some of the details involved in moving desired features into code.
- In thinking about reaching equity customers, CalMTA should also think about the long-term costs of maintaining this new equipment.
- Has CalMTA vetted any of these MPIs with contractors or distributors?
    - Karen Horkitz replied that CalMTA's planned embedded evaluation will help the team understand how the market is reacting and allow us to learn and refine our approach as we move forward. MPIs follow directly from the current MT theory, which will evolve over time. They are also informed by the market characterization study, which gathered input from contractors and distributors.
- Engagement with incentive providers/program administrators will be helpful once CalMTA is thinking about market deployment.
- Transparency into when evaluation activities and strategy pivots will happen if/when they're needed will help build trust in the process.
- Working with national accounts that have "design standards" for each of their stores/restaurants might be another good intervention. In many cases, the design

standards are quite old and in need of updating. There may also be a split incentive issue due to the corporate branch dictating design standards but making the local store/restaurant management pay the energy bills and perform the maintenance.

- When it comes to metrics focused on DAC installation and workforce availability in DACs, CalMTA know yet whether commercial building HVAC installers tend to be very local or cover a large area?
    - Cynthia said that CalMTA's research indicates a high representation of businesses that originate from DACs who will be serving both DACs and non-DACs. MPIs therefore focus on the installation site location and not the installer's location.
- Many MPIs focus on connected controls and commissioning (CCCs) but CalMTA's product definition includes other features. If CCCs are very successful but other elements are not, how will this be addressed or how is it reflected in the plan?
    - Rick replied that the MPIs target different features beyond CCCs. CalMTA's adaptive management approach will ensure that the MTI adjusts and responds to market feedback as needed. The full MTI Plan will include a risk assessment plan that identifies potential risks and mitigation strategies.

Application Update

Lynette shared the details of the Proposed Decision and Alternate Proposed Decision released by the Commission in the proceeding that would approve CalMTA's first MTIs for market deployment. MTAB feedback included:

- How do the competing decisions get resolved at the Commission from a process perspective?
    - Christie Torok stated that all commissioners will vote on both the Proposed Decision and Alternate Proposed Decision at the next voting meeting with CalMTA's application on the agenda.
    - Hayley Goodson of TURN added that the two Decisions are completely equal documents and parties can comment on both. In some cases, reconciliation happens before the vote and the two documents are merged, but it is more typical to see red-lined versions of both documents reflecting public comments on the voting meeting agenda.

Public Comment

No public comments were received.

Next Meeting & Next Steps

Stacey reviewed the MTAB meetings scheduled for the remainder of 2025 and early 2026, which include both virtual and in-person meetings, as well as the key agenda items. Lynette added that the intent of the Idea to Initiative (I2I) series is to inform MTAB members and the public and ensure well-vetted MTI Plans, including the forthcoming CRTU MTI.

The meeting was adjourned.

Attendees

MTAB Members

1. Mary Anderson, PG&E
2. Haley Goodson, TURN
3. Fred Gordon, Context Consulting
4. Jeff Harris, Northwest Energy Efficiency Alliance
5. Peter Miller, Natural Resources Defense Council
6. Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

1. Lynette Curthoys, CalMTA/Resource Innovations
2. Rachel Good, CalMTA/Resource Innovations
3. Stacey Hobart, CalMTA/Resource Innovations
4. Karen Horkitz, KSH Advising
5. Cynthia Kan, The Cadmus Group
6. Jeff Mitchell, CalMTA/Resource Innovations
7. Rick Olson-Huddle, CalMTA/Resource Innovations
8. Garth Torvestad, 2050 Partners

Guests

1. Durinda Abraham, Community Corporation of Santa Monica
2. Peter Biermayer, CPUC
3. Rob Bohn, PG&E
4. Paul Campbell, ICF
5. Tom Chase, VEIC
6. Anders Danryd, SoCalGas
7. Michael Deru, NREL
8. Lauren Eagan, Evergreen Energy Partners
9. Rocco Guaragno, Resource Innovations
10. Curtis Harrington, UC Davis – Western Cooling & Efficiency Center
11. Randall Higa, SCE
12. Scott Higa, SCE
13. Harshad Inamdar, Rheem
14. Karthig Kathirvel, Rheem
15. Floyd Keneipp, Tierra Resource Consultants
16. James Masters, Rheem
17. Savannah McLaughlin, CPUC
18. Carly Norris, Resource Innovations
19. Emily Pelstring, CPUC

20. Kevin Ray, Rheem
21. Michael Rochmes, U.S. Green Building Council – California
22. Sebastian Sarria, CPUC
23. Allison Skidd, Rheem
24. Conner Walworth, Rheem
25. Kate Zeng, SDG&E

MTAB Meeting Notes

Nov. 12-13, 2025

In-Person & Virtual Meeting

Nov. 12, 2025

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting by introducing MTAB members and reviewing CalMTA's internal and MTAB conflict of interest policies. She called for MTAB members to share conflicts. There were none. She asked MTAB members for any comments regarding draft notes from the previous meeting (9/29). There were none.

CRTUs: Draft MTI Overview

Nick Fiore presented a brief summary of the CRTU Market Transformation Initiative (MTI), including the product definition, the need for improved RTUs, the advanced features targeted by CalMTA through a tiered approach. MTAB questions and comments included:

- In assessing the benefits of automated fault detection, where does CalMTA see the greatest potential for savings?
    - Rich Olson-Huddle replied that the biggest savings opportunities included the economizer (already in Title 24), condenser fouling of the coil, and reduction in refrigerant charge.
- The tiered phase-in of features is appreciated. Given the cost increase associated with reaching cooling efficiency at least 20% above the federal minimum standard, is there a reason to not target 10% in Tier 1 or 2 and bump the 20% target out to Tier 3 to ease the market transition?
    - Rick noted that Tier 2 is intended to be a middle-ground and will likely happen in the 5–10-year range, allowing sufficient time to prepare the market and bring the cost of all features down. Jeff Mitchell added that CalMTA conducted research to ensure the 20% target was reasonable for manufacturers and feels confident that it will be.
- Without the cost for this equipment going down, it will be challenging to accelerate market adoption. CalMTA should explore incremental steps to build market interest in efficient RTUs before expecting adoption of more expensive products.
- What market share is assumed for each tier and in what timeline?
    - Rick clarified that this would be addressed in CalMTA's presentation of baseline market adoption (BMA)/total market adoption (TMA) forecasts later.

- The tiers are outcomes and not tactics. The MTI will include market activities at each stage to build market confidence and drive down costs for each tier. There's time to work on the equipment cost and the cost of most things does drop over time.
    - Jeff agreed and added that the tiers are pathways manufacturers can follow to move the market in the direction CalMTA wants to see it go.
- What is the thinking behind putting 20% efficiency in Tier 2 and pushing variable speed out to Tier 3? Is this the right escalation of benefits?
    - Rick noted that cost and availability are both important factors to consider. Tier 1 is available now and does not represent a substantial cost increase, Tier 2 is currently available but more expensive, and Tier 3 is significantly more expensive and not widely available at this time.
- Can the 20% efficiency target be met with just a compressor, potentially leveraging invertor-driven technology, which is widely used in most markets outside of the U.S. The incremental cost of invertor-driven technology could go down significantly if California moved in that direction.
- Without any control verification process, variable speed does not often deliver efficiency. The benefits delivered by this technology in Europe and Asia don't always translate to U.S., where conditions are very different. While the inclusion of variable speed in Tier 3 seems positive, CalMTA should understand concerns about consistency/reliability and approach cautiously.
- Why is CalMTA looking at efficiency above a federal minimum standard vs. a California statewide standard?
    - Nick clarified that the federal minimum <u>is</u> the California standard, due to the pre-emption rule.
- The sequence of features is good. Without better commissioning and controls, it's unclear how that variable speed system is truly performing or what it costs. Remote query and diagnostics will help consumers understand system performance and adjust accordingly.
- The market must believe in this technology for the MTI to be successful. Other market research indicates that customers are used to dealing with breaks and contractors are used to fixing breaks, but neither segment is currently interested in investing in efficiency upgrades. The MTI logic model should convey how contractors can profit from the target products and how building owners will believe in/prioritize investing in something they're not currently investing in.
- Regarding connected controls and commissioning (CCCs), what consistency will exist across manufacturers? Will there be a common standard or interface or will each manufacturer have their own app. and approach?
    - Rick explained that while each manufacturer will likely have their own algorithm and approach to controlling the RTUs, we will work to ensure reliability, user-friendliness, and proper set up – probably through a qualified product list.
- Will the CCCs targeted by the MTI be inclusive of load flexibility (AHRI 1390)?
    - Rick confirmed that they will need to be able to receive a signal.

- With market research indicating the dominance of the emergency replacement market, the MTI will have to influence what features are included in the lost cost products available on the truck. This market needs sticks and not just carrots, and that usually means solidifying in codes and standards.
- The logic model would benefit from more connections to codes and standards, as there are many standards activities and potentially code activities that should be explored beyond Title 24 (e.g., AHRI, CARB, load flexibility through the CEC, etc.). The potential of these may not be guaranteed today but is future-looking.
    - Rick noted that it is important to differentiate between "two-minute market" and unplanned replacements, which represent about 80% of the market and aren't the same as the two-minute market. CalMTA's market research indicates that even in unplanned replacement scenarios, customers can be willing to wait for a better, more efficient product that yields savings even if the product cost is higher.
- Split incentives seem like a significant issue (40% of the market) and doesn't seem to be addressed through any interventions.
    - Rick said that CalMTA's market research indicates that owners/managers of leased facilities are willing to pay more for a more efficient product even with the split incentive, as these units will largely pay for themselves over time.
- Thinking about the split incentive issue, has any research quantified savings for the building operator (identifying faults sooner even if the energy savings go to the tenant) or could future demonstration projects do so? This could be a good strategy.
- Distributor/supply chain engagement and contractor/business owner marketing could be combined, as distributors often market to contractors, who then market to consumers. Education for distributors often flows down to contractors; there's a very strong connection between the two groups.
- Support was voiced for elevating the need for a "stick," which is going to drive changes as much or more than voluntary action in the commercial market.
- What is the general basis for the 20% threshold above federal minimum? For perspective, the federal minimum increase is 27-35% higher than today's standard.
    - Rick replied that CalMTA referenced the non-residential version of the DOE Technical Support Documentation when assessing the target of 20% efficiency improvement. These documents include tables with between 4 and 7 efficiency levels (ELs) along with incremental cost for each EL. In the last federal standard proceedings, these ELs were used to determine the appropriate requirements for minimum federal efficiency. In most cases, CalMTA believes a 20% improvement in cooling efficiency is just one EL above the EL selected for the updated federal standards (e.g., federal standards selected an EL of 3 [of 7], while the MTI is targeting an EL of 4 [of 7]).
    - Additional information was provided during Garth Torvestad's (of 2050 Partners) presentation at the 9/29 MTAB meeting: https://calmta.org/wp-

content/uploads/2025/09/Sept.-29-Full-MTAB-Presentation-.pdf. In that presentation, please refer to slides on IVEC vs. IEER and Cooling Efficiency.

- When are variable speed compressors not optimal for efficiency?
    - Jeff replied that a variable-speed-drive (VSD)-equipped compressor running at full speed may be less efficient than a fixed speed unit at the same speed due to losses through the drive.
- As an observation, once RTUs are deployed, coil and filter cleaning will be needed as a maintenance imperative, as this 2020 study shows: https://www.scientificbulletin.upb.ro/rev_docs_arhiva/rez910_100702.pdf. Has this item surfaced? Additional data can be found in this report: : https://k-cep.org/wp-content/uploads/2018/03/Optimization-Monitoring-Maintenance-of-Cooling-Technol…

CRTUs: Market Adoption Forecast

Karen Horkitz introduced staff who were presenting virtually, including Jason Christensen of Cadmus, Matt Wisnefske of Cadmus, and Cory Welch of Resource Innovations. She reviewed CalMTA's forecasting model and approach. MTAB feedback included:

- Is the discrete choice model sometimes two-stage--whether to purchase or not, and then what was actually purchased?
    - Karen confirmed that this is a two-stage model, which in this case, means the first stage is the customer decision to (1) stay with a gas pack vs. a heat pump RTU, and (2) when opting for a heat pump RTU, which option they pick.
- The MTI intersects with policy levers beyond gas phase-out policy. If Title 24 or Title 20 changes, for instance, is this reflected in the model?
    - Karen replied that the model does not assume any policy changes, as we took a conservative approach and erred on the side of not overstating potential market activities.
- Are estimated levels of RTU stock looking specifically at efficient RTU stock?
    - Karen said that CalMTA looked at the stock of all RTUs in our target market segment. Since the most current estimated useful life (EUL) for RTUs is 20 years, we assume a constant rate of failures and new purchases.

Jason presented assumptions, outputs, and analysis of the baseline market adoption (BMA) and total market adoption (TMA) forecasting. MTAB feedback included:

- As the price premium is reduced from 60% to 30%, at what point is this cost-effective for the customer? Is it cost-effective at 30% or at a later stage? Cost-effectiveness may be simple payback but can vary depending on the type of customer and decision (planned replacement vs. unplanned).
    - Karen asked to revisit this question later when presenting curves of adoption of different tiers over time.

- Does the awareness of value proposition (AVP) variable refer to the customer value proposition?
    - Karen clarified that this was a single variable used to represent the idea that contractors see a value proposition for both customers and themselves and therefore includes CRTUs in bids.
- Do CalMTA's calculations assume any rate reductions or lower premium for electricity over time?
    - Jason replied that all rates used were current.
- Does the availability variable refer to distributor stock availability?
    - Jason confirmed that this was correct; the slides represent the timeline for when CRTUs would be available in distributor stock vs. code-minimum products.
- Acceleration of adoption in Tier 3 seems higher than in Tiers 1 or 2.
    - Rick acknowledged this as deliberate strategy reflecting the tactics that would be deployed in the market at that stage as well as the benefits from variable speed equipment and potential for winter peak reduction.
- Is it accurate that the policy scenarios are focused on percentage of annual replacements vs. percentage of product in stock?
    - Jason confirmed that the policy scenarios relate to replacements. Some stock turnover models show trends over time in the BMA and TMA.
- Is the California Air Resources Board (CARB) part of the Integrated Energy Policy Report (IEPR) development process?
    - Smita Gupta (CalMTA team) replied that they were not directly part of the process. The California Energy Commission (CEC) has a working group that develops the IEPR every other year with updates in between. CARB collaborates with the CEC and their work informs the IEPR, but they are not in close lockstep with the development process. This also pertains only to electricity – gas planning is separate.
- Do the IEPR, CARB, and gas planning scenarios represent the full landscape of policy activities that could drive fuel substitution?
    - Smita said that IEPR is informed by the full policy landscape and is the best source of truth for this.
    - Karen added that CalMTA used the latest draft of the IEPR (2025) and that results from each scenario indicate that slowing the rate of policy drivers increases the value of the MTI. Future IEPR updates for commercial HVAC might be more ambitious, but at every juncture of MTI development, CalMTA has sought to tie our work to something real, accepted, and defensible in California while trying to be conservative about what is possible in the future.
- The MTI forecast doesn't have to be 100% "right," but rather reasonable – inputs will be adjusted as the MTI moves forward and learns from the market.

- The model doesn't capture the feedback loop between policy drivers and MTI influence on policy, but there isn't really a way to do that – it's just something for decision-makers to be aware of.
    - Karen noted that the baseline is informed by current policy scenarios.
- CalMTA may want to add a mechanism to capture qualitative or quantitative influence on policy and take credit for it.
- In BMA vs. TMA Base AAFS 2, it looks like the percentage of gas pack and electric resistance products are staying relatively constant and code-minimum heat pump products are what is converting to the tiers.
    - Jason acknowledged that incremental fuel substitution is relatively small and that code-minimum heat pumps are the products most often replaced by models with CalMTA's target features. CalMTA started all products at the same average age and did not model accelerated electric resistance replacements.
    - Karen added that in the AAFS IEPR scenarios, any fuel substitution that can be attributed to the MTI is a small fraction of overall fuel substitution in this market.
- It is surprising to see minimal impact on the electric resistance market since that has significant bearing on the grid.
    - Jason clarified that new electric resistance RTUs are being phased out in general. Stock turnover could happen faster than anticipated but savings are based on what the alternative installation would have been.

CRTUs: Cost-Effectiveness Forecast

Matt Wisnefske presented a summary of the cost-effectiveness model and approach and results of sensitivity analysis. In all scenarios, the CRTU MTI was found to be cost-effective, with a Total Resource Cost (TRC) of 2.65. MTAB feedback and comments included:

- Does the TRC represent the net of the cost and savings from utility incentive programs? While this is consistent with guidance provided to CalMTA, these are completely interdependent.
    - Karen noted that Appendix B of the full MTI Plan will also include a calculation of what the NEEA calls co-created savings as well as savings beyond the investor-owned utility (IOU) territories. Should California shift to a model of reporting savings jointly, we will have those numbers, but it is not part of cost-effectiveness now.
- Does the incremental measure cost reflect the difference between code-minimum heat pumps and CRTUs or gas pack products vs. CRTUs? What assumption is being made about electrification overall?
    - Matt replied that we used a unique set of incremental measure costs (IMCs) for each scenario and tier. The IMC is based on every potential installation case of type of equipment being replaced and type of equipment replacing it. CalMTA assumed that 100% of units in stock are electric by 2040.

- Is estimated incremental investment an annual number?
    - Karen said there would be $26.7M invested by 2031 and then incremental investments over each five-year period. This follows the traditional market transformation (MT) principle that initial upfront investment yields significant long-term benefits.
- It would be useful to have a cumulative investment row in addition to the incremental investment row.
- Which of the variables between Phase I and Phase II estimates had the greatest impact on TSB?
    - Karen shared that the state's gas phase-out had a substantial impact but was also fairly uncertain. The Phase II base case could be larger, but the modeling has focused on scenarios with a lower potential of success to be conservative in our estimates. Estimates in Phase I were based on a generic RTU model vs. the current product definition.
    - Lynette added that CalMTA's research also helped identify which product models would deliver the greatest savings in California.
- The MTI has potential benefits that aren't captured in these materials, such as helping pave the way for gas phase-out implementation in California.
- The table showing TSB in Phase I vs. Phase II should include a product definition row.
- The Phase I vs. Phase II table reflects the natural transition between high-level idea screening and diving into detailed assumptions and specific market conditions.
- For Sensitivity Analysis #2, which looks at price premium, it might be helpful to conduct something like a participant cost test to understand what uptake is reasonable based on reduction in price premium. If prices are not coming down, it seems like that will have a significant impact on adoption.
- The price premium slide seems counterintuitive: IMC doesn't seem like the only important variable and the TMA curve seems likely to be close to the BMA curve in a scenario where the price barrier was not greatly reduced. The sensitivity analysis should capture not only cost-effectiveness metrics but also what the adoption curves look like.
    - Jason agreed that it is reasonable to think that the price premium is related to availability and AVP (whether AVP/availability remain the same if the price premium does not come down), but these factors do not interact in the same way for the sensitivity analysis. There are countless permutations of how these variables might impact each other and it's possible that the price coming down would reduce the increase in availability and therefore increase adoption a little bit. The goal of the model is to show, in the most pessimistic scenario, what the MTI can achieve vs. what would be reasonable otherwise as well as the range of values and discrete steps along the way.
    - Karen added that an argument could be made that this work should not be presented as a standalone analysis, because it essentially says that when the price doesn't come down as much as expected in the MTI Plan, the AVP and

availability are not impacted and that doesn't seem realistic. But showing it on its own provides transparency into how the model works and these are marked clearly as "drafts," with other scenarios presented that show the variables combined.

- CalMTA should investigate potential regulatory levers that could be pulled to achieve the MTI's target market impact.
- It's important to establish early indicators and be patient with the market to capture what happens when products fail or market trajectory doesn't take off, which is possible in the first tier. Good market transformation requires taking risks.
- CalMTA should ensure that sensitivity analyses align with the risks identified in Appendix G of the MTI Plan.
- Tier 1 introduces new parties and market actors through load-shifting strategies, creating a new value stream that might also be interesting to capture.
- In considering which charts and graphs should be included in future iterations: Additional Achievable Fuel Substitution (AAFS) 1 and 3 scenarios are very valuable. There's less value in showing other rosy scenarios; CalMTA should stick to what other agencies are using as bookends. The sensitivity analysis for price premium is also less valuable, as it distracts from the impacts of the MTI.
- The CPUC is very sensitive to duplication of effort and there is quite a bit already happening in this market (e.g., manufacturers already making Tier 3 product). CalMTA will need to clearly lead with what MTI activities are complementary and new to ensure there's no perceived risk of inefficiency for an audience less familiar with MT. The MTI should be framed in a way that shows why it's more than the sum of parts that are already happening.
- Cost-effectiveness tests are valid and helpful ways to look at the MTI, but where do we see the economic benefits to customers/contractors? If the technology isn't appealing to the contractor network, it will be very difficult for the MTI to be successful. If there's no metric to track this, CalMTA should explore ways to show the impact qualitatively.
- There is great potential in load shifting but we need to have a good sense of the cost to unlock it and be very careful about how to leverage this opportunity.
- Experience in the last RTU negotiation for federal standards indicated that the maximum amount a standard can be increased is based on what is cost-effective for the customer. The cost premium of these products impacts both the mandatory and voluntary piece.

CRTUs: Appendix F: Evaluation Plan

Following an overview of CalMTA's evaluation approach from Karen Horkitz, Cynthia Kan presented the draft market progress indicators (MPIs), milestones, and data collection/reporting approach for the CRTU MTI. MTAB comments and questions included:

- If the inclusion of CCCs in Title 24 shows up in the MPIs, it should also show up in the TSB and cost-effectiveness modeling.

- For the MPI focused on CCC inclusion in contractor bids, it would be good to break out hardware, monitoring, and tracking/reporting, recognizing that some of this may be customer driven.
- Are there any MPIs or other mechanisms to track customer and contractor satisfaction with the products?
    - Karen noted that these metrics are included in MTI evaluation plan as both initial and ongoing factors.
- Does CalMTA have a strong understanding of the per-unit impact of CCCs and is this represented in our plan?
    - Rick replied that the team developed some estimates with the assumption that a set percentage of units have faults and a set percentage have those faults corrected.
    - Karen added that the evaluation process will include a review of the MTI's cost-effectiveness modeling, including analysis of per-unit impact. The evaluator's initial recommendations will help refine our approach and we will constantly seek out other data and reports. The demonstration project will also help refine estimates and better understand per-unit impacts.
- Tracking external programs outside of California that adopt CalMTA's CRTU definition should look at each target component of the CRTU vs. the full product definition.
    - Cynthia clarified that the intent is to include any tier and maintain flexibility, with the goal of showing coordination with these programs as a market signal that target products are being promoted in more than one state.
- 2029 seems late to target inclusion of CRTUs in energy efficiency/incentive programs, as NEEA, Minnesota CEE, CEE, and others are all actively working in this market now.
    - Cynthia said that CalMTA was trying to set up an achievable date given the complexities associated with securing alignment and agreement across these entities but would be thrilled to achieve this earlier.
- Challenges could arise if the right RTU product for California differs significantly from Northern climate products, as manufacturers are resistant to creating different products for different regions. Inclusion in programs outside of California where similar climate conditions exist (Nevada, Arizona, Texas, etc.) may be critical to getting manufacturers on board.
- Regarding the inclusion of CCCs in Title 24 as a milestone, is it worth broadening to include other policy mechanisms?
    - Another MTAB member noted that Title 24 is the only possible codes/standards pathway in California since RTUs are already regulated and federal standards don't usually include components.
    - Smita added that compliance pathways are possible through Title 24 and that CalGreen may be an option for more advanced and less cost-effective features.
- If codes and standards aren't factored into TSB calculations or MTI forecasts, why is inclusion in Title 24 a milestone?

    - Karen acknowledged consistency as an important piece of feedback: if something is a milestone, it should be built into cost-effectiveness and TSB modeling.
- It's important for CalMTA to consider another scenario with CCCs in which manufacturers discontinue old products, although there's no way to predict when this will happen.
- CCC savings are still largely unknown; while there are good estimates, they are highly variable. Is there any way to collect data before and after commissioning to understand real performance and refine modeling inputs? Researching the actual savings from CCCs vs. prior modeling seems important – because it is so operator-defined, behavior has significant impacts.
    - Cynthia replied that CalMTA is very interested in studying this. Long-term measurement and verification (M&V) through demonstration projects is a primary data collection task although it is not in the evaluation plan.
    - Rick added that demonstration project data will validate savings for various product components and assess the costs allocated for this M&V. 150 units is a decent sample size but some of the benefits of CCCs happen later (fifth year or beyond); we can at least get some pre- and post-data on commissioning.
- Is M&V also needed for a control group to compare demonstration project results to?
    - Rick noted that there was substantial existing data from previously completed studies demonstrating that RTUs are frequently not set up and maintained properly.
- It's important to have data about the ease of fixing RTUs when failure occurs or they are not performing optimally, as well was whether these products stay fixed. Studies indicate that getting them fixed could be difficult.
    - Rick agreed and added that demonstration projects will be the best way to figure this out.
- The 150-unit sample size is great but still relatively small compared to what the market should be delivering during the same period. Is there a way to engage with manufacturers, distributors, or contractors on non-demonstration project units to try to collect information like billing data or AMI data that would enable CalMTA to conduct a simplified analysis on more than the 150 units for which there will be detailed metering data? This broader data set could instill even more confidence in the results.
    - Rick agreed it would be interesting to expand the data set and that there might be an opportunity to leverage CCCs to get data without going through all the hoops that might otherwise be required.

Rick reviewed next steps for finalizing the MTI Plan and incorporating MTAB feedback. He invited MTAB members to take a step back and share what excites them about the MTI and what concerns them. MTAB responses included:

- One member said they were very interested in the MTI and supportive of moving it forward in the next application. The substantial activity happening in this market nationally at the MT level creates very exciting opportunities for collaboration. As a concern: increased adoption of electric RTUs will add to California's peak load and if the units go in with electric resistance back-up, that will need to be addressed in future iterations of the plan.
- Another member said they were excited for the potential impacts given the number of inefficient products currently in operation. There are concerns about economics from the customer perspective and knowing the historical challenges with HVAC evaluations. The MTI might be one of the best ways to deal with those challenges, but it will be difficult.
- Another member said they were very excited about this is an initiative – the team has done a great job and a tremendous amount of work. Concerns are consistency and economic issues from an equity perspective, as low-to-mid-range customers who don't qualify for assistance might slip through the cracks.
- Another member said they loved the tiered approach with VSD at the end. Customer cost is the biggest concern.
- Another member noted that they were nervous about how critical the demonstration projects seem to be, and that they wished this work could have been done in Phase II. They are most excited about doing something in the commercial sector that touches on so much of the built environment in California. The fact that these RTUs are a somewhat "invisible" product makes them seem like a good fit for MT.
- This work is important but has failed in the past, so it's exciting that the factors might be right for success now. The MTI will need a viable contractor business model (the customer value proposition makes sense) and to reach the national stage for manufacturers to be shifted toward this product line.
- A tracker mapping MTAB feedback received with MTI Plan changes would be helpful, as well as redlined changes to plan documents

Public Comment

No public comments were received.

The meeting was adjourned for the day.

November 13, 2025

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting with a review of the agenda and safety minute. She also noted that anyone who wanted to offer comments and wasn't able to the previous day could do so via an online form with the link provided in the chat.

CRAWS: Product Assessment

Rick Dunn from the CalMTA team opened the session with a review of the Commercial Replacement and Attachment Window (CRAWS) product definition of both the VIG and CSW products targeted by the MTI. Sarah Zahid of Cadmus presented the findings of the CRAWS market characterization study. Questions and comments from MTAB members included:

- Whether the study characteristics specific to MUSH buildings or market wide.
    - Sarah explained that the data was just for MUSH; the "other" label represents the balance of the market.
- Do we know the MUSH square footage for single layer or single pane windows?
    - Sarah said she will follow up with the statistic.
- Are the survey respondents for regulatory and program awareness for the MUSH segment or commercial market overall?
    - Sarah said it was MUSH market owners and managers but acknowledged that generally the slides need to include a reference to what part of the market is being represented.
- Did the study look at the representation of the value of these products on peak loads in CA during extreme events?
    - No, we did not look at the product performance in that scenario. Rick added that this analysis would come later.
- Are there reasons why it's cheaper to do the high efficiency product versus the lower efficiency product?
    - Rick explained that there is a range which overlaps. When you install VIG for a single pane, you don't need to replace the frame.
- But this is all cheaper than regular window replacements, correct?
    - Karen explained that they believed it would be cheaper but still needed to collect cost data to round out the data set.
    - Rick added that they are working with secondary window manufacturers to get estimates or look at buildings that have made replacements and get the cost information.
- Looks like you have the headline, but you don't have the data to support it.
- The other issue is that this is not the real choice since the other option is to do nothing.
    - Karen said this point is the key point and that the usual decision is to do an upgrade or replacement or nothing. The measure is definitely more expensive than doing nothing.
    - Rick added that once you get over the hump to do the swap, the choice is obvious. The products are out there, but the demand is not there.
- There is a category where these decisions can be made related to whole-building upgrades. In the examples of the projects at NEEA, were they going to upgrade the envelope and so the windows that were currently in the walls were not performing so when they decided to do the replacement, they chose to do the attachment solution rather than new windows.
    - Rick added that there are many pathways to solve this problem, but secondary windows offer a choice of better acoustics, comfort for a more affordable price.

- This is going to be a hard market if people can do nothing, but if they are doing an upgrade and have leaky frames then the VIG won't help.
    - Yes, CSW would be the choice in that case.
- What happens when you use VIG and put it into a leaky frame—who owns the problem?
    - Rick said this was going to be addressed in other aspects of the information to be presented to MTAB later.
- Re the cost, is this cost lack of information or is this misperception? It seems like there is a lack of information.
- ESCOs have their installers that they always use so when the installers are uncomfortable with the product, they are going to quote a higher price. This could be a training issue.
    - Rick added that there is such limited information available and it was clear that interviewed people did not know what the product was even though they said they did.
- We're talking about VIG like it's a product currently available in the market. How much VIG is produced and installed in any given year?
    - We don't have that, but really all the installations are going into new construction and international markets. International demand will help drive down the cost of VIG products. But we are going to have to build a use case for retrofits.
- Are the products made here and shipped?
    - LuxWall just announced a partnership with a German glass manufacturer. It's possible they would make it here and ship, but likely would be made where it's being installed.
- Is curtain wall part of the target market or is that outside of the MTI?
    - VIG is used in curtain walls, but whether this would be an application that would make sense still needs to be determined. We can look further into that.
- Does this include residential secondary window retrofits from storm windows?
    - No, this is strictly commercial although the technology is similar.
- When businesses have limited funds to use, they may decide that this is not the most important thing they can do.
- What is aesthetic benefit?
    - Aesthetic benefit relates to the pre-upgrade condition of the frames, which can look pretty bad. So, the post-upgrade look is better while preserving the historic building features of the original window.
- It's interesting that they don't find property resale value as a motivator. Maybe they are looking for shorter-term benefits.
    - Staff confirmed that data was collected from MUSH market decisionmakers.
- I want to raise split incentive issues. Tenant satisfaction was only ranked at 14%. Our task is to provide awareness about efficiency, noise reduction, and how the product will look.
    - Rick explained that being the MUSH market, the tenant is usually the owner so it would be different than if someone was leasing. One thing that typically

shows up is that there is low thermal comfort, and managers and owners think it's an HVAC issue and never consider glass.

- Since we're talking about MUSH market, it would be interesting to know what percentage of that is owner-occupied. You said that 60% is owner-occupied.
    - Rick said they weren't sure if they looked at that in the market characterization. Karen explained that the study was set up to represent the MUSH market and that the 60% statistic is the total market. Most of MUSH is owner-occupied.
- Just wanted to underscore what you all said about breaking out the owner-occupied segment and what does tenant satisfaction means if you're only interviewing owner-occupied properties? It would be good to know who was interviewed.
    - Some municipal buildings have space for tenants. They don't occupy all the space. The big take away is the tenant satisfaction is not a driver here for operators. They may be interpreting tenants as the person who is sitting in the building, and they may not be defining it as a leased tenant.
- Tenant satisfaction and thermal comfort seems to be in contradiction. I don't know what tenant satisfaction means.
    - Staff agreed to clarify in the market characterization report.
- I consider tenant satisfaction to be part of thermal comfort and other aspects.
- Simply by doing market research, you may have changed the market.
- Did you ask them how much they were thinking of changing the windows entirely?
    - There is some data on that and it's very infrequent. We asked that question, but we did not include it because we had limited confidence that respondents weren't confusing storm windows with this product.

CRAWS: Logic Model and Market Transformation (MT) Theory

Rick Dunn presented the logic model and MT theory for CRAWS. MTAB comments and feedback included:

- Can you elaborate on what the ESJ aspects of this MTI are?
    - Rick explained that currently a field test is going on in a school in a farming community. One of the big benefits is the reduction in dust and opportunity for improved indoor air quality due to the project. We believe also that there is a great ESJ workforce training opportunity for window installations.
- How are you planning on bringing in the HVAC contractors in relation to the window installations?
    - Rick shared that it's not so much the HVAC contractor, but more the project design and what is being specified for the system. We will want to do some training on reducing the size of the HVAC system due to better window performance.
- Can you say a little more about the utility outcome to integrate NEBs? There is an ongoing discussion about whether programs can or cannot claim benefits. If this is a near-term outcome, we need to be clear about what we will and will not be able to claim and if policy issues need to be addressed.

    - Rick stated that research shows that programs implemented in ESJ communities that brought non-energy benefits to help show value beyond the cost-effectiveness.
- If you're talking about ESJ programs, there is some additional flexibility because you are not trying to convert the NEB into a TSB or savings value.
    - Rick said ESCOs are probably more near term to see the financial benefit. Utilities will be longer, but we are going to work with utility programs to further define this.
- Having reviewed the New England work on NEBs, the value is represented in a range. You need to look to regulatory environment to figure out how this should be represented and if it needs to be a qualitative measure. Past studies have indicated that there are huge variables in this analysis.
- Thinking about how we could get NEBs integrated into utility programs, that is not near term if ever. This did come up in a state audit that recommended the regulators consider NEBs in cost-effectiveness, but even if the commission was moving in that direction, it would be at least five years. I think that focusing on ESCOs makes sense as it fits into the efficiency scheme. I do think communications materials explaining the benefit could be useful in the meantime.
- Looking at the financial benefits, think in terms of the lease stability, rent and asset value. If you can do all that without doing strict financial benefits, these are things that owners care about.
- Partners external from California—NEEA, ComEd, NYSERDA, MN CEE—are important. If we want to get the industry to mature, we need to build aggregated market demand and can do that across the national footprint.
- We want to get the market started so that it can exist on its own, but seeing the need for interim support from utility programs. There are limited utility dollars that will be available.
- Is AERC the ones who are helping determine frame losses as opposed to window losses?
    - Rick explained that AERC is not doing that research, it's the Lawrence Berkeley Lab.
- Increasing the number of products rated by AERC is really key. That's one of the major issues.
- VIG technology could be thought of as simply a competing product for sealed insulated glass products. It could simplify the logic model if CalMTA took VIG as a separate product available to compete with sealed insulated glass.
    - Rick said that CalMTA has been specifically considering which use cases are more appropriate for VIG.
- Have we looked at on-bill financing options within the utility programs.
    - Rick shared that we haven't looked at it, but it's one of the things we are considering for financing mechanisms to be included in the MTI plan.
- On bill financing requires lots of cash flow so we need to be careful.

    - Rick said the complexity of this particular MTI is that there is no one-size-fits-all. There are a lot of building blocks and it's a matter of how to pull those together.
- There's overlap with the logic model blocks that says awareness building with strategic partners represented by SEMs, utility programs, BOMA, IFMA, property decision maker positions. What is the difference between these interventions?
    - Rick explained that in some cases we would be the driver of communications and awareness. Then at some point, the market actors need to drive. All these companies are capable of taking on this role once we spark demand.
- We need to be careful not to work to develop market actors that are already engaged so I'm thinking of the next gen actors – those that build the curtainwall systems should be who we are thinking about it. The small CSW firms are likely to sell at some point so how do we set up the big outreach for success?
    - Karen said that it appears that the supply chain is underdeveloped, so we need to figure out who is going to bring this to scale and what do they need to successfully do that. The barrier we hear is cost. But one of the things that didn't come out of the research is that cost is the biggest barrier to anything. We're going to have to figure out how to get building owners and managers to take action and then they can make the choice.
- There are supply chain actors that could be champions beyond new construction. If we could get them to see the opportunity in existing building with the right business case, I'm hopeful this could get the market to turn.
    - Rick responded that this idea gets to the question of how do we go from what we're building today to a bigger footprint and who are the market actors that are going to get us there.
- Are there any results from the ComEd pilot?
    - Rick said that the early results are not in, but when they are available, he could share.
- I appreciate this way of breaking out the logic model. There is a: 1) we're going to renovate market; 2) we've got a crisis that we haven't figured out how to solve market; and 3) an I wasn't going to do anything market. That third market historically has been hard to move so recommend segmenting and focusing on the first two.
    - Rick questioned how much of the decision dynamics will be driven by the way electrification is impacting costs and dynamic TOU rates.
- Was the pilot the first time the contractor had installed the product? Were they a local contractor?
    - Rick explained that the contractor is local and they have done this type of installation before. The part that was new was onsite assembly.
- There are a lot of ifs in the theory that need to be overcome.
    - Rick agreed, but none of the ifs on their own are deal breakers.
- If you can get the people who have a problem with thermal comfort issues or those that are looking at a renovation, this could give you the momentum that's needed. These are big ticket items, but the value that the upgrade offers outweighs the cost.

Public Comment

Stacey Hobart called for public comment. There were none.

Application Update

Lynette Curthoys gave an update on the status of the Application under review by the California Public Utilities Commission (CPUC). She explained that it's hard to do planning when we don't have the final answer. Once we have the final decision, we will see what the implications are and bring those back to MTAB with some more specific plans for 2026 and the future years. MTAB comments and questions included:

- Do you have approval to spend Phase II money through April 3?
    - Lynette responded that we have Phase II money available to spend this year and next year.
    - Jeff added that one of the challenges is that we requested a Tier 2 Advice Letter for approval. Now that we have an application process, we are spending a lot more time in Phase II and need to figure out the budget for that.
- I thought the PD revision put more money in operations.
    - Lynette confirmed this was the case, but that it also extends the operations for another year. It's still $250M with no additional budget.
- Did you ever understand why at least one commissioner was against the larger induction market?
    - We are not sure, but we speculate that there was a feeling that induction is a market where there is other activity and movement so interventions in the larger market were not needed. Since the 120V focus is a new area, the decision pointed our efforts there.
- It was not clear in the APD, but it seemed like they were looking for non-CA ratepayer funds to be recruited to fund CalMTA. That is very different than manufacturer or other market actors' contributions.
    - That was in the decision. It says we need to show what we did to bring in non-ratepayer funds in the future application or what we investigated.

HPWH: Market Characterization Report

Jordan Decker of Cadmus reviewed the Market Characterization Study of the heat pump water heater market with the MTAB members. Comments and questions included:

- Is that really the true cost of installation or are contractors pursuing a higher cost of installation?
    - Jordan explained that the cost of the product is about $1000 more than standard gas or electric products. It's the installation where the high increased costs appears.
    - Karen added that we'll talk more about this later, but it does appear that there is an inflation of installation costs.
- Just to confirm, the share of electric v. gas is growing and the share of HPWH v. electric resistance is growing
    - Jordan confirmed that yes, they are growing, but still slowly.

- One of the observations at the beginning of presentation is that there are different rates of adoption in different regions. Is there any places where the adoption is clustered in parts of the state?
    - Jordan said that she would be talking about that later, but there are indications of where the adoption is strongest.
- On new construction, is the assumption that most of these are on the 2022 code, or are they on the 2019?
    - Jordan explained that is our current estimate post 2022. We have seen through stakeholder feedback that the code is driving higher rates of electric water heating in general.
- There were general questions about the supply chain WH market map as to what represented HPWH, new construction v. retrofit, etc. It was suggested that staff review the labels before posting the slides.
- As a CCA in the Bay Area, we have looked at data related to HPWH installation costs in our service area. Typical costs are $7,000 to $9,000 if the customer pulls the permit, uses a contractor, and pays for light construction that is needed. That does not take into account electrical upgrades. On the whole, the cost for utility bills did not go up as much as we thought they would.
- What's included in the installation costs specifically does it include the cost for panel upgrades?
    - Jordan clarified that that the average installation cost does not include the specific electrical work that could be needed. However, when we looked at the TECH data to estimate behind-the-meter electrical costs (not service upgrades), there was a range depending on what was needed.
- Do you know if in the California market there are contractors that are specializing in selling HPWHs as a volume model? If so, is that putting pressure on the market to bring down prices?
    - Jordan said that installers focused on HPWHs usually sell a large volume. They tend to create specialties within their companies to be able to provide the service and create a business model around this product. She added that the installers indicated that incentives are necessary to make this model work.
    - Karen added that we don't think we have seen a business started to focus on HPWHs or companies completely dedicated to HPWH products, but rather a preferred product within a range of options.
- Confirmed that the cost estimate of $6,000-$7,000 only includes work inside the building like dedicated circuits and other wiring, but not panel or service upgrades.
- One key factor for new construction is the elimination of electric and gas line extensions for mixed-fuel new construction that is having a major impact on choice to build all-electric and therefore HPWH adoption.
    - Jordan confirmed it may be a driver in that increasing saturation and is expressed in the study
- The electric rates and the spark gap may also be a factor.
    - Jordan explained that it's true that rates are a factor and where electrification rates are favorable, we are seeing consistently higher adoption of the products.

- Ther was a request for clarification about what installers think motivates customers to choose a HPWH and whether when they chose air quality and health benefits (which scored high), did they believe this was a switch from gas to electric.
    - Jordan clarified that this was how the installers answered so it is hard to say.
- It was noted that while bill impacts scored high, availability of incentives scored low.
- Emphasized that bill impacts are a big consideration in whether the customer chooses a HPWH or non-HPWH. This makes it seem like the framing of the technology by the contractor is certainly a driver.
- The rebate scored the lowest option as a benefit, but when you look at where the sales are happening, incentives are certainly a driver, and contractors are taking time to utilize them.
- Clarified that the permitting barriers were developed based on analysis from the residential survey, which is a customer survey, rather than from installer surveys.

HPWH: Logic Model and Market Transformation (MT) Theory

Alexis Allan invited MTAB member Jennifer Green of MCE to share her experience at the Residential Heat Pump Water Heating Summit in August. Jennifer encouraged everyone to look at the documentation from the event. She described key takeaways including:

- Need to work with distributors and manufacturers on what they want to sell. There are a lot of unique perspectives that need to be taken into consideration.
- Contractor education and training is key. Not just technical training, but also how to sell this product.
- There are a lot of programs in place, but it's important to think about what the state can do to successfully grow adoption. What consistently comes up is educating the contractors is most important.
- Permitting also came up as a challenge. She was not sure if this group could address that issue, but there are other groups looking at this barrier regionally.

Alexis then shared the logic model and market transformation theory on the forming heat pump water heating initiative. MTAB members' comments and questions included:

- It should be noted that permitting requirements are more onerous for HPWH. That is something that the initiative could work with local jurisdictions on to get the permitting streamlined.
- In areas where you have rooftop solar seems like an opportunity for HPWH installation.
    - Alexis agreed. This would be one of the market segments that the MTI would identify for HPWH installations.
- It will be important that the research that identified what installers think customers value is being fed into the training for installers as a learning loop.
- Would manufacturers move to lower GWP on their own?
    - Alexis responded that manufacturers will likely need to be shown a pathway to meet the low GWP requirement. They have been clear that they'll make the change when they have to.
- What is needed to make the coordination proposed in the strategic interventions happen? You have 30 or more programs with different rules and regulatory

requirements. Have you planned on how you are going to do that? It might be worth asking for changes to these programs to make this more viable.
    - Alexis said this is one of the first actions in Phase III planning.
- You could ask, but the Commission is likely to defer any policy questions to the omnibus rulemaking. I do think it's worth bringing up in the MTI Application but also would need to engage in the rulemaking process for these programs.
- ESJ programs may span different silos of policy decision making so you'll need to have a multi-pronged strategy to address these.
- The way you're talking almost implies that there's someone who must manage this effort to bring alignment within the CPUC rulemaking process.
- Would you try to align the incentive application processes across programs?
    - Alexis explained that there was some work to do there, but she didn't know if a statewide application process would be viable. However, we could work to have a statewide list of qualified products or other actions to bring the various incentives in line with each other.
- It sounds like all of these interventions are one level up from the customers.
    - Alexis confirmed that was true. We are trying to work with the people who work with customers, but not with customers directly.
- What does this mean for marketing and sales messaging and materials?
    - Alexis said we need to create materials that allow people to apply to their own marketing or create ready-to-use templates where a logo could be dropped in.
- Is the role of consolidating the research findings and planning being done already?
    - Alexis responded that we will need to do this step considering what is already in place and collaboratively with ETCC, CalNEXT, and others.
- Is the Wi-Fi demand management aspect of this MTI a separate activity? It doesn't work well yet, but could it? Do they all go to cell phones, is it optional, etc.?
    - Alexis explained that this would be covered later in the Product Assessment.
- Because this product is well developed and the market is active, it sounds like this MTI will be required to be flexible based on the situation on the ground once it's launched.
    - Alexis said she didn't have a lot of questions about what we want to achieve through the interventions. But how we will approach program coordination, for example, will be dependent on the landscape when this initiative launches.
- Wondering how long this MTI will take. Is this a 5-year or a 10-year MTI?
    - Alexis explained that we have work to do on the market progress indicators and market forecast modeling, but we are thinking it's 10 years minimum. Not all of these interventions would be implemented that entire time.
- Clearly underlying this MTI is that all of this activity already happening is resulting in significantly less than would be achieved with this MTI. There are certain barriers that this MTI can tackle that are not something traditional programs can address.
    - Alexis shared that some of this work focuses on breaking down the barriers that programs are facing. Through the summit we brought together people to figure out what their collective needs are, so we have already started this work.

- This is an example where the timeline for approval is a major challenge. We have a regulation coming that we are not prepared for and there's a chaos hazard where you are rolling out a standard with which people won't be able to comply.
- I appreciate the acknowledgement that the landscape is changing among 30 programs, but those programs are doing very different things, and we need that flexibility to adjust when this MTI is approved in the future.
- What does it mean to include new construction?
    - Alexis said we would try to bring more products into new construction projects to make installers more comfortable with HPWHs and drive near-term sales.
- A member encouraged the team to consider that by the time this MTI is starting to influence the market, permits will already be pulled and allowances for gas line extensions will be gone. Your data is somewhat lagging so you will need to update the strategy based on what is currently happening.
    - Karen agreed that there is going to be a lag and the timing misalignment creates a challenge.
- Hardy's State of the Channel data is one of the best sources for purchase information. Another is the California electric IOU reporting of annual numbers on electric versus mixed-fuel construction applications and energization.

Public Comment

Stacey called for public comments. There were none.

Next Meeting & Next Steps

Stacey Hobart explained the topics that will be shared at the future January meeting, planned meetings in March, and planning for the Application preparation and submission.

Meeting was adjourned.

Attendees

MTAB Members

Mary Anderson, Pacific Gas & Electric Company
Cyane Dandridge, SEI
Haley Goodson, TURN
Fred Gordon, Context Consulting
Jennifer Green, MCE (virtual)
Jeff Harris, Northwest Energy Efficiency Alliance
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

Jason Christensen, The Cadmus Group
Lynette Curthoys, CalMTA/Resource Innovations
Nick Fiore, CalMTA/Resource Innovations
Rachel Good, CalMTA/Resource Innovations

Stacey Hobart, CalMTA/Resource Innovations
Karen Horkitz, KSH Advising
Cynthia Kan, The Cadmus Group
Jeff Mitchell, CalMTA/Resource Innovations
Rick Olson-Huddle, CalMTA/Resource Innovations
Matt Wisnefske, The Cadmus Group

Guests

Jessamyn Allen, Silicon Valley Clean Energy
Beth Braddy, Trane Technologies
Corey Brophy, EcoGreen Solutions
Paul Campbell, ICF
Sebastien Csapo, Pacific Gas & Electric Company
Richard Fennelly, CoilPod LLC
Caitlyn Fosbery, Energy Solutions
Molly Garcia, MN Center for Energy and Environment
Myron Graessle, TRC Companies, Inc.
James Hanna, Energy Solutions
Randall Higa, Southern California Edison
Gregg Holladay, Bradford White
Calvin Johnson, GSA Energy Solutions
Ritika Kumbharkar, MN Center for Energy and Environment
Lin Lan, Rheem
Marisa Lee, Energy Solutions
Savannah McLaughlin, CPUC
Joaquin Narvaez, West Cost Green Builders
Derek Okada, Energy Solutions
Allison Skidd, Rheem
Rusty Tharp, Aozora Consulting LLC

MTAB Meeting Notes

January 29, 2026
Virtual and In-Person Meeting

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting by introducing MTAB members and reviewing CalMTA's internal and MTAB conflict of interest policies. There were no disclosures.

She then asked MTAB members for any comments regarding draft notes from the previous meeting (11/12-13). Fred Gordon mentioned several editorial updates for improved clarity of several bullets in the notes. Those updates have been made but documentation of the discussion points made have not changed.

Phase I MT Ideas: Industrial Heat Pumps & Low Carbon Calcined Clay Cement

Rick Dunn introduced the discussion of ideas currently in consideration for advancement, clarifying the process by which ideas are scored and prioritized. Corey Luker then presented the Industrial Heat Pump idea, including a technology overview, market opportunities (including potential beachhead markets), and preliminary Total System Benefits (TSB) analysis.

MTAB questions and comments related to this idea included:

- Are the targeted technologies mostly custom designs or standard? This would help clarify whether the MT approach will target upstream interventions or will need to address many one-off retrofits.
    - Corey replied that there is a wide spectrum of industrial heat pump design, ranging from fully packaged to one-off engineering-specific designs. The use of waste heat, a beneficial feature that dramatically improves efficiency, as a requirement is often what requires a more customized approach.
    - Rick added that this is an established market where some barriers have already been addressed, but opportunities still exist to create case studies that instill confidence in the technology and to create pathways toward adoption. There is more work to do on validating the performance of the technology and making it applicable for California, which will not happen organically without structured market transformation (MT) interventions.
- Are there specific end-uses or use cases that would be well-suited to a non-custom solution, as this might be an easier area to target?
    - Rick said this is something to explore in the next phase of development as part of efforts to identify beachhead markets for this technology.

- Will this make economic sense for facility operators? What is the customer payback? Even if the technology saves energy and has a positive TSB, customers won't necessarily see bill savings.
    - Corey confirmed that looking at cost-effectiveness at every level will be a next step if this idea moves forward. CalMTA's initial assessment indicates that there is a high upfront cost at this point but good lifecycle savings from improvements in efficiency.
    - Rick added that dairies and breweries have come up as market segments with a greater return-on-investment at this stage, but more analysis is needed.
- Thermal storage is similar to this technology in terms of functionality. How do industrial heat pumps compare competitively and what is the cost-effectiveness for the operator? There is a lot of variation with rate structures and industrial processes can have a high cost.
    - Rick said that this assessment will be a key next step – determining where we could scale demand and adoption in specific segments to bring costs down.
    - Corey noted that thermal storage can actually work with industrial heat pumps, so these are more complementary than competing technologies.
- What market-level differences between Europe and the U.S. have driven greater adoption in the former – different fuel mix, regulatory barriers, costs?
    - Corey replied that the spark gap/higher cost of natural gas in Europe is likely a significant driver there. Favorable regulation and policy play a critical role.
- Many high-tech manufacturers have greenhouse gas (GHG) emissions reduction goals and in the Northwest, this has led them to adopt electric resistance boilers – switching to industrial heat pumps would make good economic sense in these cases. It might be worth exploring this segment in California and looking at the role of industrial heat pumps in helping to meet corporate emissions goals.
    - Rick agreed and added that the team had also discussed looking at European-owned businesses in the U.S. (e.g., pharmaceutical), as their goals align with the European market despite site location.
- CalMTA could look at industrial heat pumps as a dual-fuel solution and not a complete substitute. Other entities in the Northwest have staged boiler replacements in a way that enables them to run the industrial heat pump for the base load without investing capital in every aspect needed to fully decarbonize their equipment, which maximizes economics and enables load-shifting.
- The benefits of this technology are almost entirely based in carbon emissions reductions, which links to rate impacts. CalMTA should track and explore this potential.
- Support was expressed for having industrial-focused applications in the MTI portfolio.
- The technology is promising but rate structure seems like a key barrier, and this is a very challenging issue that could limit the MTI's prospective success. If CalMTA's assessment indicates that rates won't be a major barrier or identifies other ways to address this issue, the idea would be more strongly supported.

- CalMTA should engage with firms like Bosch about what factors impact equipment decisions, since they have a strong presence in the U.S. but are Europe-based.

Rick asked MTAB members to rank their overall excitement about this idea by green (excited), yellow (neutral or unsure), or red (no way). Four members selected yellow; two opted for green. Most MTAB members who selected yellow indicated this was due to needing more time or information to assess.

Marcus Dimeo provided an overview of the Low Carbon Calcined Clay Cement (LC3) idea, including rationale for CalMTA's interest in this idea, technology description and benefits, and potential market opportunity and challenges.

MTAB questions and comments included:

- If most available data is from 2019, is CalMTA confident that cement plans are still burning coal, tires, and other fossil fuels?
    - Marcus confirmed that conversations with ACEEE, who conducted much of the market analysis, indicate that this continues to be the case, but CalMTA has been discussing opportunities to update this data in collaboration with ACEEE.
- Are cement plants subject to cap-and-trade; how does that factor into this analysis?
    - Marcus stated he was not sure how this applies to cement plants specifically but will explore further.
- If the California Air Resources Board (CARB) mandated a reduction in GHG emissions equivalent to what this technology would achieve, market transformation might not be needed – the market would move in that direction to comply.
- Cap-and-trade might be a more cost-effective way to accelerate adoption of this technology than MT. There are already conversations happening across the state about how to support the transition; CalMTA should investigate this potential approach further.
    - Rick agreed to the importance of investigating multiple drivers. He noted that plants are already investing in carbon sequestration, so there are different economic streams to explore.
- Are there cement manufacturers nationally who are already working on these products? Are the firms that produce these products national or local?
    - Marcus said that the active plants represent a mix of factors. CalMTA looked at federal grants to help identify plants that were approved for funding for retrofit opportunities and had LC3 as part of their plan.
- Are there competing blended cement solutions and how does LC3 compare?
    - Marcus replied that CARB outlines several blended cement products that could be used. CalMTA is looking into clay/LC3 specifically because of the lower temperature required to heat it, which promotes efficiency and yields heat savings, and because it is an abundant resource.

- In developing strategic interventions, CalMTA should emphasize which entities in California would be purchasing this product. CalTrans hasn't yet approved this material so it is worth understanding how to make sure vendors will accept it.
    - Rick clarified that CalTrans was not opposed to using the product, but that substantial testing was still needed to determine applications and where in the portfolio it fits as a plug-and-play solution.
- How does this fit into the broader context of MT if there are only seven plants in California to influence? Will the MTI make sense if these impact adoption nationally?
    - Jeff Mitchell agreed that it would be difficult to move the market without the MT because of the small number of end-users.
    - Rick added that this small pool posed greater risk for MT but also more potential impact and quicker path toward a transformed market.
- If the current fuel being replaced is coal but CalMTA is funded by electric and gas utilities, how will this work from a funding perspective?
    - Rick noted that SoCalGas has been interested in this technology and was exploring investing in this as a decarbonization solution.
    - Jeff added that converting a customer from coal to natural gas would yield significant environmental benefits.

Rick asked MTAB members to rank their overall excitement about this idea by green (excited), yellow (neutral or unsure), or red (no way). All MTAB members selected yellow.

CRAWS: Product Assessment

Stacey shared an overview of CalMTA's MTI Plan components and the Idea to Initiative process used to preview key aspects with MTAB prior to plan finalization.

Brian Meinrath then presented CalMTA's Product Assessment for the Commercial Replacement & Attachment Window Solutions (CRAWS) MTI, including the product definition, technical barriers and opportunities, competitive landscape, energy policy landscape, and preliminary findings from CalMTA's field study.

MTAB feedback included:

- What strategies could influence better incorporation of non-energy benefits (NEBs) into California's energy efficiency portfolios? Being able to quantify and count NEBs in these terms would be very useful including to be accounted for in some cost-effectiveness tests.
    - Rick replied that there are three target audiences impacted by NEBs, including policymakers who determine how NEBs can be counted in cost-effectiveness calculations. The other target audiences are financial (banks, ESCOs, insurance) and consumers. From a policy perspective, the California Energy Commission and others are already exploring work to quantify and monetize NEBs.

- There is consideration of NEBs in current regulatory conversations, especially for ESJ communities, and some flexibility exists to include these in cost-effectiveness tests like TRC. The ultimate decision lies with the committees overseeing these metrics.
- In developing strategic interventions for this MTI, CalMTA should address the fact that window upgrades are often motivated by factors beyond energy efficiency.
- In terms of cost-effectiveness tests, PAC has always been, on paper, of equal value to TRC, but has often been the threshold for evaluating ratepayer-funded programs. Highlighting PAC and Ratepayer Impact Measure (RIM) results may help convey the value of this MTI to ratepayers.
- Ultimately, CalMTA's work should ensure that there is a strong value proposition to guide customers who have to choose between CSW and primary replacements.

CRAWS: Logic Model Review, Market Progress Indicators (MPIs) & Milestones

Rick Dunn then presented a snapshot of the CRAWS logic model as a foundation for understanding the MPIs and milestones used to evaluate impacts of the MTI. Jun Suzuki presented CalMTA's MPI and milestone development process before sharing the proposed metrics that would be tracked and reported on for the CRAWS MTI.

MTAB feedback included:

- When quantifying NEBs, it would be useful to know which of them customers care about and value in their decision-making process.
- While the MTI itself is compelling, there are some concerns about how impact is being measured and whether this poses a risk for CalMTA. Inclusion in utility efficiency programs is a challenging metric since there are increasingly few HVAC programs due to cost-effectiveness challenges. On the ESCO side, creating demand will be critical – customers need to want the measure to be included regardless of payback; if they do, ESCOs will include it.
- CalMTA should think strategically about the timing of specific MPIs. Building awareness at the relevant moment is critical to its market impact – unlikely to drive adoption without awareness-building first.
- The MTI logic model and MPIs are extremely well-thought-out and clearly linked to market characterization research.
- Milestones regarding inclusion of CRAWS in California programs will be challenging and may not be possible. CalMTA should scale back the target or make sure MTI success doesn't depend on this.
- CalMTA should look closely at synergies with the Commercial Building Efficiency Accelerator (CBEA) and specifically incorporation of CRAWS in capital planning.
- As this technology relates to HVAC optimization, HVAC market actors make profits from selling more tonnage, so getting them to think about selling less tonnage due to

CRAWS will be counterintuitive. Architects/building decision-makers will need to address this upfront before engaging HVAC installers.

- Outcomes and solutions related to environmental and social justice (ESJ) communities are clear in the MPIs and greatly appreciated but should be more clearly reflected in logic model outcomes.
    - Rick replied that CalMTA would update this before finalizing the MTI Plan.
- The CPUC has had ongoing conversations about how to incorporate NEBs into the energy efficiency ecosystem, but if people are pursuing those benefits for reasons other than efficiency, CalMTA should look at organizations beyond EE programs to gain momentum in the market.
- There is an understandable tension between HVAC contractors who want to sell larger systems and window installers who lower HVAC demand. This may be similar to the heat pump water heating (HPWH) market in which electrical contractors and plumbers had to learn how to work together. Is the longer-term play encouraging HVAC contractors to work in tandem with window contractors – maybe profit-sharing – or even encouraging HVAC contractors to expand services to include windows?
    - Rick agreed this was an interesting strategy to explore further.

Public Comment

There were no public comments received.

Residential Heat Pump Water Heating (HPWH): Logic Model Review & Product Assessment

Alexis Allan walked through the draft logic model for the Residential HPWH MTI as a foundation for discussing the initiative overall.

MTAB feedback included:

- CalMTA should closely assess how the federal standard timeline aligns with the timeline for this MTI, since the standard might shift the electric resistance market significantly without MT intervention.
    - Alexis noted that a large percentage of California housing stock is gas-fueled so the MTI is not exclusively looking at electric homes. In order to use the electric resistance market as a catalyst, CalMTA will have to closely track the application process as that window of opportunity will get smaller closer to the federal standard.
- Is it accurate that CalMTA is looking at electric resistance as the target market?
    - Alexis clarified that this is one of the sub-markets that seems well-positioned for accelerated adoption at scale but is not the only one being considered. Specific sub-markets to target will be determined following MTI approval based on market conditions at that time.

Debra Brunk then shared results of CalMTA's Product Assessment, including product definition and key product features, competitive landscape, primary technological barriers and opportunities, policy landscape, and high-level energy modeling findings.

MTAB comments and questions included:

- Is there a reason to use ENERGY STAR certification vs. the Advanced Water Heating specification from NEEA, which includes some beneficial factors not required by ENERGY STAR?
    - Debra replied that CalMTA was seeking a specification with broad national implications while also focusing on products with high degrees of efficiency without features that drive up cost.
- It seems that one of the issues with high installed cost is contractor margins, which cannot be addressed at the manufacturer level.
    - Debra agreed with this statement overall but clarified that the presentation was focused on product-level drivers.
- When will the 2025 California Building Energy Code take effect?
    - Debra replied that the code took effect Jan. 1, 2026, but it will be a while before market activity reflects this.
- Thinking about the federal standards and timeline, does it make sense to support adoption-at-scale before the standard takes effect by driving the market toward higher voluntary standards during MTI ramp-up? If the standard does take effect, it will likely shut things down beyond that.
    - Debra acknowledged the potential opportunity to drive a significant increase in volume before the standard takes effect. CalMTA is also encouraging a Uniform Energy Factor (UEF) above the federal standard. The MTI is looking at ways to address this opportunity – ideally a market as large as California's will help get manufacturers prepared leading up to the standard.
- The federal administration is looking at ways to roll back the gas standard, which will make electric products even more expensive and add complexity to the market approach. Other activities would incent use of gas and deter adoption of HPWHs further. How does the MTI plan to address this?
    - Debra agreed that these were important points to consider that will be explored thoroughly before market deployment.
- The Advanced Water Heating specification address some attributes of the product (noise rating, extended warranty, etc.) that are valuable to the consumer experience beyond what's in ENERGY STAR. The California market has an opportunity to influence manufacturers to make product improvements that can address factors critical to market success. CalMTA should seriously consider including some of those features.
- What factors drive the increased electricity use for 120V products seen in the product assessment?
    - Debra said that 80-gallon products have more standby losses – the 120V product has to work harder due to product limitations (UEF of 2.2 vs. 3.3).

    - Jeff added that this does create an opportunity to improve the product over time if that is what the market needs.
- Most Tier 4 products in the Advanced Water Heating specification at UEF of ~4, which would create even greater savings.
- With the quick connect lines for refrigerants, CalMTA should look forward to the dismantling or removal of those lines. Technology exists that can enable a cleaner or easier removal.
    - Debra agreed and said that CalMTA wants to better understand refrigerant leakage and proper system charging.

Residential HPWH: MPIs & Milestones

Ellen Rubenstein presented the MPIs and milestones proposed as metrics to evaluate the market impact of this MTI.

MTAB feedback included:

- There are many installers in this market. Is CalMTA seeking to reach the largest installation firms to drive overall volume or 50% of all installers, knowing that will require getting many small firms on board?
    - Ellen replied that the MTI's primary goal was volume and that she would clarify the milestone.
- CalMTA should not feature inclusion of lower GWP refrigerants as an MPI, even if it's tracked. Many factors in the global market influence manufacturer decisions about refrigerants and California drivers alone may not be effective in moving the market.
- The metrics target very high penetration rates but far off in the future. Is there value in having lower targets earlier on?
- Similar to comments about refrigerants: California load management standards will result in 100% compliance with load shifting requirements. CalMTA should track this but it should not be included as a measure of the MTI's impact.
- Responsible disposal of refrigerants remains an opportunity to push the market, as pollution is released at the time of disposal, so CalMTA shouldn't exclude this.
- However, CalMTA might not be the right entity to address this – there is a substantial ecosystem of companies focused on refrigerant recycling and CalMTA might not be poised to take on the related risk factors.
    - Jeff clarified that CalMTA will not take the lead on this work but will be engaged in monitoring or supporting related activities to get the market ready and show overall impact.
- Preparing the market for SB 49 compliance is not a priority for some regulatory entities as along as the shift is cost-effective. Mechanisms for aggressively fining market actors for non-compliance result in high rates of compliance regardless. Some small players may not be aware of the related issues and will need support/education, but most others are.

- Refrigerants and demand response capabilities seem primed to happen without the MTI, so CalMTA should focus energy on other areas.
- Are the potential submarkets separated between new construction and replacement markets, which have very different considerations?
    - Ellen replied that part of the MTI's early work will be to determine which submarkets to focus on.
    - Alexis added that while the logic model identifies potential early submarkets, the market deployment phase will include a housing stock characterization and development of a tool to identify additional submarkets that can be reached at volume.
- The targeted 15% increase in HPWH sales should explicitly be in the existing buildings market since Title 24 will drive that regardless.
    - Alexis agreed that if the expected rate of adoption in new construction happens, CalMTA would exclude that market from this milestone. If, when this MTI kicks off, new construction entities have found workarounds or are not actively including HPWHs, this market might still be considered.
- If MTI interventions target the retail channel, is there a risk or more complications due to the increased complexity of HPWH installation?
    - Ellen confirmed this should be considered as modeling and MPI development are finalized.
- Installing electric resistance water heaters is very expensive in California, so the 23% saturation estimate seems aggressive.
    - Karen noted that the market characterization report provided a detailed analysis of data sources and assumptions behind this number but added that the team would follow up to discuss further and refine.
- 2037 is a long way away. CalMTA should include fractional numbers to assess progress earlier in the market deployment process.
- CalMTA should look at the inclusion of aligned messaging in programs by volume vs. percentage of programs (inclusion in several large statewide programs has a greater market impact than in many small rebate programs).
- One of the barriers identified for this MTI is the start/stop cadence of incentives, but nothing in the logic model or MPIs/milestones seem to track or influence that. If there was a statewide financing or incentive pool that was a guaranteed, consistent, reliable way to provide incentives for HPWHs, that seems like it would have greater impact than coordinating on messaging.
    - Alexis replied that the MTI wasn't necessarily trying to figure out how to make funding stable across the state but trying to create a consistent infrastructure of messaging and product requirements to keep market momentum consistent regardless of the incentive flow.
- ESJ considerations are not apparent in the logic model outcomes. They should be front-and-center and very visible.
    - Ellen said she would work with team to update and clarify.

- One key barrier is the limited customer value proposition/supply chain business case, which is impacted by higher upfront and operating costs. Where does rate design fit in – could entities curtail solar energy and give it away to any customer with a HPWH? Cal ISO curtailment indicates enormous value of curtailment that could be shipped to HPWH owners instead.
- Rate design is a thorny issue that is very hard to address and requires demand flexibility. The Codes & Standards program is currently doing testing that indicates many HPWHs do not respond well to AHRI 1430 and that substantial work is needed to get commands to HPWH – the market simply isn't ready.
    - Smita Gupta noted that there are electrification-friendly rates in development that can be positive for HPWHs with a fairly nuanced bill impact analysis.
- If most of the value of HPWHs is in carbon reduction then perhaps the Greenhouse Gas Reduction Fund (GGRF) should pay customers that adopt them. This is a different payment stream from a funding source beyond rate reform.

Induction Cooking Update

Elaine Miller shared an update on the Induction Cooking MTI, which is being refined based on results of the CPUC Decision that conditionally approved it. This included a discussion of new market entrants, details of the Decision related to narrowing the MTI's focus to 120V products, revisions to the strategic interventions based on that focus, and reforecasting approach.

MTAB comments and questions included:

- What is the rationale for the MTI's decreased focus on new construction and related building codes?
    - Elaine replied that the market is already moving toward induction, with other active parties supporting this transition, and that 240V products are the best fit for this market – not 120V.
- With the increased focus on multifamily retrofits, will there be more of an emphasis on working with programs that are specifically engaged with multifamily housing providers – such as the work CalMTA is currently doing with AEA/Eden Housing?
    - Elaine confirmed that this will likely be a key implementation area in the future Request for Proposals.
- Is there a risk that by investing too much in the 120V non-battery products, you inhibit the growth of the 120V-with-battery products?
    - Elaine noted that these are very different products with different use-cases, but that the risk would be monitored.
- Are there any opportunities for a retrofit battery that can be dropped into a 120V non-battery product?
    - Elaine said that she was not aware of any market activity in this area.

Clarissa Kusel then shared impacts of these updates on MTI budget and MTI Plan components, most of which will be shared as redlined documents or with attached memos.

- Why offer a $5 incentive to retailers for 240V products at all?
    - Clarissa clarified that this was not a conventional incentive, but the base fee needed to collect data.

Karen then provided a brief update on the reforecasting approach for this MTI, results of which should be available soon.

MTAB questions included:

- Did cooktop-only products get included in previous forecasting or only slide-in ranges?
    - Karen replied that the previous forecast included permanently installed standalone 240V cooktops but not 120V products. Because the MTI is now focused on 120V products, cooktops are excluded. The future third-party evaluator will review CalMTA's forecast/related assumptions and may flag the need to include standalone cooktops based on market factors.

Outcomes from the Decision and Update on 2026 Operations and Budget Planning

Lynette Curthoys provided a summary of the CPUC Decision on CalMTA's application for the first tranche of MTIs and subsequent impacts on CalMTA budget and operations.

MTAB feedback included:

- The CPUC has never approved a nonprofit before – or hasn't in a very long time – so there are many unknowns about what the transition plan and subsequent approval process will look like.
- CalMTA had previously discussed tracking spillover of benefits/savings to non-IOU utilities. Is that still happening?
    - Lynette clarified that this spillover doesn't show up in the TSB, which is specific to the IOUs. MTI Plan calculations do include all statewide efforts.
- Non-IOU utilities sometimes claim savings from IOU ratepayer-funding programs and might do so here, which is something to monitor.
- Given the six-year portfolio budget (2026-2031) authorized by the Decision, the CPUC will work with CalMTA on this transition well in advance to avoid a funding cliff.
- Is it correct that CalMTA's nonprofit transition plan would get filed at the end of 2028 and that the transition would be completed by 2031?
    - Lynnette confirmed this timeline.
- CalMTA could start planning for this transition before 2031 by securing bridge funding that would be sufficient to start doing the work.

- In case it's a useful precedent, Energy Trust of Oregon subcontracted to program administrators/implementers to start doing ramp-down activities as they were ramping up their own nonprofit transition.

MTAB Recruitment Process and Terms Ending

Stacey reviewed the terms of active MTAB members and recruitment schedule, with an application for new and re-applying incumbent members opening in early February.

Public Comment

No public comments were received verbally in the meeting. One comment was received via the online public comment portal, which is presented verbatim below.

Marty Turock/Cleantech San Diego: I have spent twenty years in cleantech, founded the CEC's Southern California Energy Innovation Network (SCEIN) innovation cluster in San Diego/SoCal, and was recently recognized as the CEC's 2025 Clean Energy Hall of Fame Lifetime Achievement Award recipient. My focus has been on leading over 2,000 energy efficiency project deployments with municipalities and discovering companies with disruptive technologies that are "no brainers"; i.e., the price and value proposition to their customer is obvious and without need of subsidy (e.g., LED lighting, VFDs/VSMs, Smart Power Strips, etc.).

I have watched with interest hybrid heat pump water heaters (HPWHs) offer high efficiency with the prospect to reduce grid load, but their cost and complexity have severely limited adoption. While they are best suited for replacing electric resistance water heaters in colder climates, affordability will remain a barrier, especially as federal tax credits and incentives have ended.

HPWHs can't avoid being expensive, as it requires two technologies (each compensating for the other's weaknesses), so it will always cost more than single-technology electric or gas heaters, and more to install.

From my current role as a Board Member of Cleantech San Diego, I have become aware of SCEIN portfolio company, Znrg Innovations, which has developed an AI-driven magnetic Immersed Induction™ water heater that is120V plug-in ready, offering the only affordable alternative to gas and electric heaters – no subsidy needed.

In 2025, Znrg's TRL 5 prototype completed eight months of testing proving the optimization of efficiency and performance. It matched gas heater performance using 85% less energy, and while not as efficient as HPWHs, its AI power management minimizes wasteful standby heating to achieve energy consumption comparable to HPWHs.

Znrg has composite (no-rust) tanks with a 15-year warranty and fits into a standard 40-gallon gas heater envelope. Znrg is ideal to maximize tax dollar subsidies to low-income communities, as 3 to 5 Znrg units can be installed for the cost of one HPWH.

Znrg offers a compelling value proposition to residential consumers across all socioeconomic communities. Further, Electric Utilities can benefit from Znrg's grid-friendly 1800W heating and AI power management software that's always minimizing power consumption (so it's essentially doing ADR all the time). In addition, the Znrg provides a viable solution for inclusion in the CPUC's upcoming SB 1221 pilot projects across California to accelerate transition of selected priority neighborhood decarbonization zones.

Znrg is currently preparing TRL 7 prototypes for in-home pilots and plans to begin manufacturing shipments by year's end. I would appreciate if CalMTA would please advise who would be the best point of contact to connect with Robert J Zwerling, Znrg's Founder and CEO, to provide guidance on how this exciting Znrg breakthrough can be included in either the current HPWH MTI or considered for its own MTI.

Thanks for your thoughtful consideration.

Next Meeting & Next Steps

Stacey shared the plan for upcoming MTAB meetings based on new MTI Plan and application timelines, targeting two virtual meetings in March and another meeting in April.

The meeting was adjourned.

Attendees

MTAB Members

Mary Anderson, Pacific Gas & Electric
Cyane Dandridge, SEI
Fred Gordon, Context Consulting
Jennifer Green, MCE
Jeff Harris, Northwest Energy Efficiency Alliance
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

Alexis Allan, Brio
Debra Brunk, 2050 Partners
Lynette Curthoys, CalMTA/Resource Innovations
Marcus Dimeo, CalMTA/Resource Innovations
Rick Dunn, CalMTA/Resource Innovations
Rachel Good, CalMTA/Resource Innovations
Stacey Hobart, CalMTA/Resource Innovations
Karen Horkitz, KSH Advising
Clarissa Kusel, CalMTA/Resource Innovations
Cory Luker, CalMTA/Resource Innovations
Brian Meinrath, 2050 Partners

Elaine Miller, CalMTA/Resource Innovations
Jeff Mitchell, CalMTA/Resource Innovations
Ellen Rubinstein, CalMTA/Resource Innovations
Jun Suzuki, CalMTA/Resource Innovations

Meeting Registrants

Joanne Bachmann, VEIC
Lauren Bates, Opinion Dynamics
Jonathon Belmont, BPA
Peter Biermayer, CPUC
Juan Carlos Blacker, NEEA
Britney Blankenship, Energy Solutions
Rob Bohn, PG&E
Corey Brophy, EcoGreen Solutions
Brittany Calderon, Friedrich Air Conditioning
Paul Campbell, ICF
Tom Chase, VEIC
Matthew Chill, Orange County Power Authority
Megan Ching, PG&E
Simone Cobb, Resource Innovations
Colleen Collins, Resource Innovations
Fernanda Craig, LA County
Sebastien Csapo, PG&E
Rachel DiFranco, City of Palo Alto Utilities
Laren Eagan, Evergreen Energy Partners
Lacy Estes-Hill, Rheem Manufacturing
Anthony Eulo, Silicon Valley Clean Energy
Senait Forthal, OC Goes Solar
Richard Fennelly, CoilPod LLC
Rafael Friedmann, Friedmann Clean Energy
Adin Hamilton, Alpen HPP
Mark Handy, C+C
Sue Hanson, EMC Insights
Jack Hawley, Clean Power Alliance
Julia Hegarty, U.S. Department of Energy
Pepper Hunziker, Tre'Laine
Gaby Ibarra, Peninsula Clean Energy
Harshad Inamdar, Rheem Manufacturing
Karthig Kathirvel, Rheem Manufacturing
Jason Leung, PG&E
Pui-Wa Li, CPUC
Alice Lideell, ICF
Jim Lutz, Hot Water Research
Cooper Marcus, QuitCarbon
Christopher McCabe, Resource Innovations
Savannah McLaughlin, CPUC
Scott Melberg, 350 Palo Alto
Vidhisha Moopnar, New Buildings Institute
Nataly Morales, Orange County Power Authority
David Murphy, BPA
Martin O'Gorman, Summit Appliance
Prathamesh Patil, Eversource
Emily Pelstring, CPUC
Edwin Reek, Daikin
Anthony Roy, Earth Advantage
Brady Seals, Stanford University
Shawn Shahrokhi, BC Hydro
Paul Storch, Summit Appliance
Christine Tam, City of Palo Alto Utilities
Marty Turock, Cleantech San Diego
Garett Valenzuela, C+C
Pranesh Venugopal, Orange County Power Authority
Abrielle White, RMS Energy Consulting
Rod Williams, Eco-logical
Michael Winka, Rutgers/NJIT/MSU
Kate Zeng, SDG&E
Robert Zwerling, Znrg Innovations

MTAB Meeting Notes

March 5, 2026 | 1-4 p.m.
Virtual Meeting

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting by introducing MTAB members and reviewing CalMTA's internal and MTAB conflict of interest policies. Jennifer Green noted that MCE is a community choice aggregator seeking to utilize and incentivize some of the technologies on which MTIs focus. Stacey confirmed that this does not represent a conflict of interest and that CalMTA seeks to work in concert with these external programs while minimizing overlap and duplication of efforts.

She then asked MTAB members for any comments regarding draft notes from the previous meeting (1/29). No MTAB comments were received. One member of the public noted a previously submitted public comment not reflected in meeting notes; CalMTA committed to investigating and updating notes to include this comment.

Commercial Rooftop Units (CRTUs): Appendix I Feedback Themes and Updates to MTI Plan

Rick Olson-Huddle shared a summary of the feedback received on the draft CRTUs MTI Plan via the public comment period on the CPUC PDA site, as well as actions taken by CalMTA in response to these comments. Common themes included: (1) concerns about mandating specific technologies, (2) cost and customer economics, (3) uncertainty about contractor adoption of connected controls and commissioning (CCC), and (4) lack of clarity in some definitions. MTAB comments and questions included:

- If the CEE "Advanced Tier" specification, which CalMTA's CRTU Tier 2 currently aligns, changes will CalMTA also modify their tier?
    - Rick clarified that CalMTA plans to keep the tier as currently established (targeting cooling efficiency at least 20% above the federal minimum standard) since that is how savings have been modeled.
- How will variable-speed compressors (VSP) be addressed in the 20-year MTI lifecycle, given that this is no longer part of the Tier 3 product definition?
    - Rick replied that market insight indicates that VSP will continue to gather momentum over this time -- Daikin recently introduced a lower tier VSP, Lenox released a VSP compressor on their high-efficiency unit, etc. While this will be important to moving the market forward overall, it is not a focus of the MTI.
- Is the goal for when the desired market end-state is achieved (CalMTA-defined CRTU products represent at least 30% of sales) ambitious enough?

    - Rick noted that this aligns with our thinking to date and added that this goal is for Tier 3 products with all desired features. The percentage of sales for Tier 1 products is estimated to be much higher.
- Concerns about contractor adoption of CCCs go beyond installation -- there is a larger scope of work change involved when it comes to actual commissioning. How will training, compensation structures, and staffing change to reflect this shift to ongoing maintenance and continuous improvement?
    - Rick said that the training piece seems relatively easy to influence but it may be more challenging to shift the workforce toward responding to calls. CalMTA's planned demonstration projects should yield good insight into the contractor experience and opportunities for intervention.

Revised Induction Cooking MTI Plan Update: TSB & Cost-Effectiveness

Elaine Miller presented modifications made to the Induction Cooking MTI Plan based on CPUC guidance in the Nov. 20 Decision, which asked CalMTA to narrow its focus to 120V technologies (with and without battery backup). She discussed the resulting shift in strategy impacts and budget. MTAB feedback included:

- The new construction market has been removed as a key target, but why would 120V products with battery not make sense for these buildings?
    - Elaine replied that it might, but market feedback indicates that it is not a significant play.
- Looking at the revised budget, why has the budget for supply chain engagement doubled?
    - Elaine clarified that 120V inductions products are a newer technology still in the early stages of development, so there is more complexity and more engagement needed to motivate development, encourage market deployment, and support related issues like ENERGY STAR certification.
- Has CalMTA had any conversations with major manufacturers about 120V battery products?
    - Elaine confirmed that CalMTA has been engaged in discussions with manufacturers for some time and that response has been varied: some manufacturers are very interested and want to bring it to their product development team, others say the batteries aren't ready for this mass deployment.
- Are 120V products with no battery really positioned for mainstream adoption? They seem to have limitations on cooking capacity.
    - Elaine said that preliminary research indicates these products won't be for everybody but that there are market segments where they are better-suited, particularly given the significantly lower cost.

Karen then provided an update on how adjustments to the MTI Plan impacted forecasting, including incremental adoption and measure costs as well as Total System Benefits (TSB). MTAB comments and questions included:

- Does CalMTA have data about how many range change-outs occur annually in California and what share of the retrofit market this represents? Karen said she would look up this data and report back after the meeting.
- The incremental adoption approach seems reasonable but there may be some spillover into the 240V market even if MTI is focused on 120V technologies.
    - Karen noted that CalMTA's forecast for 240V products shows some decline from the original forecast but still assumes interventions related to increasing awareness and interest in induction products will positively affect adoption of 240V products.
- Does that mean CalMTA will be able to claim some savings from 240V products?
    - Karen replied that the methodology for this has been extensively discussed. CalMTA believes that as a result of the investment in the MTI, there will be greater adoption of 240V products than there would be without the MTI.
- Is there a feature-to-feature comparison between the baseline product (gas ranges) and induction, which often has many special features to enable an apples-to-apples comparison?
    - Karen said that CalMTA conducted a broad survey of available products to establish a composite price based on those models vs. attempting a feature-specific comparison.
- How is the 10% decrease in market adoption of 120V products with batteries (the dominant energy-saving technology in this MTI) related to the 30% decrease in MTI energy savings?
    - Karen clarified that energy savings (gas + electric) are relatively low for most product types but more positive for battery-enabled units, so taking out 10% of those products has a significant impact on total savings. There are many different products included and six market segments, so quite a few variables at play. She said that she would follow up to provide additional information to MTAB. The follow-up response has been appended to these meeting notes.
- The recent CPUC Decision states that future MTI Plan applications must include sensitivity analyses in cases where cost-effectiveness is marginal. It is not required for the Induction Cooking MTI Advice Letter, but CalMTA should be prepared to respond to a question about this from the Commission.
- When proposing revisions to the Induction MTI, it would be beneficial for CalMTA to share its valuable discussion of trade-offs related to the narrower product focus. This helps illustrate how organic MTIs are and it's not just about replacing widget X with widget Y with no impact on the overall market – the whole picture is really important to keep in mind.

2026 Operations Plan & Budget

Lynette shared an overview of CalMTA's 2026 Operations Plan and Budget, which reflect recent guidance and strategy updates based on the Nov. 20 CPUC Decision. Various staff then walked through 2026 program milestones. MTAB feedback included:

- The budget indicates that CalMTA will seek to gather market data for residential initiatives. Is that not planned for the commercial MTIs?
    - Jeff agreed that data will be important to the commercial initiatives but is most critical to MTIs moving into market deployment, beginning with the Room Heat Pumps & Induction MTIs. It is relatively easy to add-on data for residential heat pump water heaters. Data needs for the commercial MTIs will be determined once they are approved for market deployment and move into implementation.
- Is there a comment or response period for the Induction Cooking MTI Advice Letter?
    - Lynette noted that there is a protest period, which CalMTA would have an opportunity to respond to.
- Within a year or two, CalMTA will want some sort of standard process for triggering a review of an MTI to see if it should continue moving forward. Market factors can evolve rapidly and may require a plan for deciding how and when we would re-evaluate.
    - Lynette acknowledged the importance of this and added that once implementers/evaluators are in place, this will be part of CalMTA's planning work.
- In considering this, CalMTA could look to policies established by NEEA about responding to market progress evaluation reports and obligations to third-party evaluators. While it is good to consider this, it is not urgent since CalMTA is just preparing to launch the first MTIs.

Jim Giordano then presented the 2026 Operations Plan Budget and its relation to the six-year budget authorized by the CPUC in its 2025 Decision. MTAB feedback included:

- CalMTA is making shifts now based on delays due to the required redesign of the Induction Cooking MTI and required application process for the second tranche of MTIs. The last application took almost a year, so the second tranche is likely to still be in Phase II in 2027. Should CalMTA make adjustments now to get ahead of that?
    - Lynette replied that the biggest impact on the 2026 budget came not just from the application process but from keeping the second tranche of MTIs in Phase II longer than anticipated, which requires ongoing market engagement and related work. To accommodate this, CalMTA looked for and will continue to identify efficiencies in operations and administration so that more funding is available for the second group of MTIs. The 2027-2031 budget allocations are still being revised and will likely go through a Tier 2 Advice Letter process to adjust as necessary.

- When will MTAB see the revised six-year table?
    - Lynette said this would happen at a future MTAB meeting, but the exact timing is still to be determined.

Public Comment

There were no public comments.

Next Meeting & Next Steps

Stacey shared the plan for upcoming MTAB meetings, including the virtual meeting scheduled for March 25, which will conclude the Res HPWH MTI Idea to Initiative sharing series with the TSB & Evaluation Plan. An in-person meeting in late April or early May will be used to present this information for the CRAWS MTI. The next MTAB meeting after this will likely not be scheduled until the fall.

The meeting was adjourned.

Attendees

MTAB Members

Mary Anderson, Pacific Gas & Electric
Cyane Dandridge, SEI
Hayley Goodson, TURN
Fred Gordon, Context Consulting
Jennifer Green, MCE
Jeff Harris, Northwest Energy Efficiency Alliance
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

Lynette Curthoys, CalMTA/Resource Innovations
Rachel Good, CalMTA/Resource Innovations
Jim Giordano, CalMTA/Resource Innovations
Stacey Hobart, CalMTA/Resource Innovations
Karen Horkitz, KSH Advising
Elaine Miller, CalMTA/Resource Innovations
Jeff Mitchell, CalMTA/Resource Innovations
Rick Olson-Huddle, CalMTA/Resource Innovations

Guests

Abe Cubano, TRC Companies
Abrielle White, RMS Energy Consulting
Allison Skidd, Rheem Manufacturing Company
Amruta Khanolkar, TRC Companies
Aubrie Hunt, Sonoma Clean Power

Barry Hooper, San Francisco Environment Department
Davi Ibarra, Southern California Edison
Emily Pelstring, California Public Utilities Commission
Erica Petrofsky, California Public Utilities Commission
Harshad Inamdar, Rheem Manufacturing Company
Kate Zeng, San Diego Gas & Electric
Maria Dahlin, N'de Apache Tribe
Martin O'Gorman, Summit Appliance
Marty Turock, Cleantech San Diego
Nicole Davis, Energy Solutions
Paul Campbell, ICF International
Peter Biermayer, California Public Utilities Commission
Priscilla Ortiz, Southern California Edison
Ritika Kumbharkar, Center for Energy and Environment
Robert Marcial, Pacific Gas & Electric Company
Savannah McLaughlin, California Public Utilities Commission
Sazi Bugay, FSI/Summit Appliance
Senait Forthal, OC Goes Solar

Response to questions from the March 5 MTAB meeting. Regarding questions and discussion about the decrease in the energy benefits component of TSB from $36M to $25M, which is disproportionate to the decrease in 120V battery-equipped units, the following clarifications have been provided:

- The forecast decrease in battery-enabled units is estimated at 17.6% – not 10%, as stated in the presentation. The slide bullet that erroneously stated 10% has been updated.
- TSB and its components (Energy, Grid, and GHG benefits) are calculated for each installation scenario, defined by the baseline equipment being replaced and the replacement equipment.
- The net decrease in energy avoided costs (30%) is not proportional to the 17.6% decrease in battery-equipped units (109 units) because that decrease is accompanied by an increase of 281 120V non-battery induction units.
- Non-battery induction units have negative avoided energy costs, which become increasingly negative over time.

MTAB Meeting Notes

March 25, 2026
Virtual Meeting

Welcome, Agenda & Conflict of Interest Declarations

Stacey Hobart opened the meeting with MTAB member introductions and reviewing of the conflict of interest (COI) policies. She called for any COI concerns to be raised and there were none. She then asked MTAB members for any comments regarding draft notes from the previous meeting (3/5). No comments were received.

Residential Heat Pump Water Heating (HPWH): Draft MTI Plan Overview

Alexis Allan shared a summary of the market transformation strategy developed to accelerate adoption of HPWH in California, including identified market-level opportunities, barriers that will need to be addressed, the strategic interventions developed by CalMTA, and areas of potential coordination/collaboration with external market partners.

MTAB comments and questions included:

- Thinking about the opportunity to aggregate market demand by segment, can existing programs be sorted by segment as it stands now or would this be a new approach?
    - Alexis replied that current programs might offer tiered rebates for electric-to-electric conversions vs. gas-to-electric but aren't focused on specific housing type segments. CalMTA anticipates nuance between segments that would be developed further in Scale-Up Plans and will conduct an inventory of existing programs prior to MTI market deployment, which will inform coordination planning.
- How will workforce development activities supported through the MTI actually results in work for contractors, especially those in ESJ communities?
    - Alexis agreed that for trainings to be effective, they must actually create a pathway to sales. The MTI's segmented approach is designed specifically to drive business for contractors. The MTI would not directly deploy trainings but rather equip existing training providers with the information and resources needed to help contractors capitalize on the market potential of these identified segments.
- Are bulk purchases a potential strategy for accelerating market momentum?
    - Alexis confirmed that we are interested in exploring this, as the topic was discussed at our Residential HPWH Market Acceleration Summit. Some targeted sub-markets will be positioned for early acceleration and CalMTA will

conduct the engagement needed to hit the ground running, which may include some mechanism for volume discounts.

- How will access to the proposed market database be handled? Will it be public access or only for select market actors?
    - Alexis noted that while the details of implementation would be determined later, we currently anticipate that specific permissions would be in place to incentivize collecting and providing the required data points (e.g., only manufacturers who share data could access all other data).
- How will the data collection effort be different than Heating, Air-conditioning & Refrigeration Distributors International (HARDI) data or Air-Conditioning, Heating, and Refrigeration Institute (AHRI) shipment data?
    - Alexis said these data sets don't offer the desired level of granularity or help us understand where in California the products are installed. Our plan for this database is inspired by work done in the Northwest, which enabled visibility into hot spots for adoption around the region and allowed market actors to see how they compared to the overall market

Residential HPWH: Appendix F – Evaluation Plan

Ellen Rubinstein presented an overview of proposed evaluation objectives, key market progress indicators (MPIs) and milestones, and related data collection activities for the Residential HPWH MTI.

MTAB feedback included:

- An important early indicator will be whether external parties perceive the MTI as helpful in filling gaps and complementing their efforts within the first two-to-three years. This will likely come from the partner interviews conducted as part of the embedded evaluation.

Residential HPWH: Market Adoption

Karen Horkitz introduced the process used to forecast the impact of the MTI on market adoption, including a high-level overview of the modeling approach. Isaac Schultz then shared the model inputs and assumptions before presenting the forecasting results.

MTAB comments and questions included:

- Why did CalMTA decide to use unit-cost data from the eTRM and not actual program data from TECH Clean California?
    - Isaac clarified that TECH data reflects incentivized installation, which our model isn't exclusively trying to forecast, and that eTRM is a widely understood and easy-to-cite data source.
- This approach makes sense from a cost-effectiveness standpoint but it's important to break out the cost of the HPWH itself (vs. panel upgrades) from the purposes of

informing intervention strategies. The equipment costs don't look accurate if they're meant to be the HPWH product alone.
    - Karen replied that TECH data is the primary source for the eTRM and CalMTA concluded that numbers do align with the TECH database. Panel upgrades are not included but the cost of labor that goes into the equipment cost value may include factors like permitting or a dedicated 240 circuit. CalMTA has a hypothesis about what specific factors feed into this cost and will validate prior to MTI Plan finalization
- eTRM data is intended to be as transparent as possible, so it's surprising to hear there are challenges with this data.
    - Karen clarified that this wasn't a flaw of the data but that additional investigation was required to better understand it.
- Even with cost reductions, is it accurate the lifecycle cost of a 240V HPWH will be ~30% more than a gas water heater for the foreseeable future?
    - Isaac confirmed that this was correct on average, but that there are many possible scenarios in which this isn't true.
- What Uniform Energy Factor (UEF) is assumed in this analysis? It might be worth doing some sensitivity analysis to determine what UEF would achieve cost parity and focus MTI efforts there.
    - Isaac said that CalMTA used a weighted average for the analysis of customer economics. Total System Benefits (TSB)/cost-effectiveness analysis gets split out into assumptions about what percentage of the market adopts models with a specific UEF.
- Is it possible to reach cost parity for 50% of the market?
    - Isaac confirmed that there were multiple scenarios in which cost parity or cost savings could be achieved based on rate structure and climate zone.
- Regarding product availability, why – when the 2029 standard takes effect – is the market share of HPWHs so slow to lift off? The 2029 standard will require electric water heaters to be HPWHs so the slow ramp doesn't seem to make sense.
    - Isaac noted that the fuel substitution segment is only indirectly impacted by the federal standard.
    - Karen added that this is informed in part by composite research data, while CalMTA's sensitivity analysis explores different potential impacts of the MTI and federal standard.
- One identified barrier is that there's not enough demand for HPWHs to motivate supply chain stocking, but this will change in 2030.
    - Karen agreed that the standard change will make HPWHs more available, but CalMTA is using product availability to describe whether gas water-heater owners have the choice of a HPWH when replacing their unit. This distinction may need to be described more clearly in CalMTA materials.
- In the electric resistance market, the federal standard UEF is only 2.2. If the MTI targets a UEF of 3 or better, some savings could be claimed by the MTI on top of the federal

standard and this might be worth investigating. It seems likely that manufacturers will try to meet the minimum federal standard rather than exceeding it, but there's still potential for incremental savings.
    - Karen replied that CalMTA explored the potential of modeling this opportunity but concluded that the federal standard might result in an influx of lower-cost models that meet the standard. We may revisit this scenario in the future.
- Title 24 certainly points to HPWH as the right choice for new construction now, but when the federal standard takes effect, Title 24 may need to evolve. This might create an opportunity to add points for HPWHs with a higher UEF, which would unlock new construction savings that aren't currently captured.

Residential HPWH: Total System Benefit and Cost-effectiveness

Isaac continued presenting with a focus on the Total System Benefit (TSB) and cost-effectiveness modeling for the Residential HPWH MTI, including inputs and results of sensitivity analyses.

MTAB feedback included:

- Has CalMTA made any assumptions about incentives from current Program Administrators (PA) in the baseline?
    - Isaac clarified that most baseline units are assumed to have been incentivized/installed through external programs but the adoption forecast doesn't track this specifically.
    - Karen added that the set percentage of PA impacts subtracted from the forecast applies entirely to assessing incremental market impacts and not the baseline.
- The total count of incentives going through PA programs would need to be reduced by a net-to-gross assessment of what percentage would have occurred without the MTI, which would then feed into the baseline.
    - Karen acknowledged this as a great point.

Public Comment

No public comments were received verbally in the meeting. One comment was received via the online public comment portal, which is presented verbatim below.

Frank Sandtner: *I attended the March session and wanted to add a data element that was not discussed but is absolutely critical – performance of the various HPWHs in the market. We are working with AWHI and have developed a labor-only extended warranty program that has the side-benefit of creating performance data for all HPWH models. The claims management system we are using will be able to show first-year failure rates for GE, Rheem, American Standard and AO Smith. It will show the percentage of failures that get replaced across brands. It will show failure rates for the 120V product versus the 240V product. I am happy to discuss*

further with you and partner to get TECH Clean California plumbers to offer the extended warranty which establishes the product performance dataset.

Next Meeting & Next Steps

Stacey shared CalMTA's plan for the remaining scheduled meetings in 2026.

The meeting was adjourned.

Attendees

MTAB Members

Mary Anderson, Pacific Gas & Electric
Cyane Dandridge, SEI
Hayley Goodson, TURN
Fred Gordon, Context Consulting
Jeff Harris, Northwest Energy Efficiency Alliance
Peter Miller, Natural Resources Defense Council
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Karen Horkitz, KSH Advising
Jeff Mitchell, CalMTA/Resource Innovations
Ellen Rubinstein, CalMTA/Resource Innovations
Isaac Schultz, CalMTA/Resource Innovations

Guests

Paul Campbell, ICF
Anders Danryd, SoCalGas
Natalie Flores-Rios, SCE
Carlo Gavina, SoCalGas
Will Graswich, CPUC
Jillian Greene, Resource Innovations
Evan Kamei, Energy Solutions
Jason Leung, PG&E
Jenna Lusczynski, TRC Companies
David Murphy, Bonneville Power Authority
Peter Mustacich, Silicon Valley Clean Energy
Joaquin Narvaez, West Coast Green Builders
Derek Okada, Energy Solutions
Frank Sandtner, Nationwide
Shawn Shahrokhi, BC Hydro
Marty Turock, Cleantech San Diego
Garett Valenzuela, C+C

Forecasting Follow-Up Items: MTAB Meeting – March 25, 2026

On March 25, 2026, several MTAB members had questions about the HPWH market adoption and cost-effectiveness forecasting model that staff could not answer on the call. This memo summarizes their comments and provides a response for each of them. It has been appended to the meeting notes as part of the record.

Q1. What is the source and what are the components of the measure cost data assumed by the model? Why would CalMTA utilize TRM data rather than TECH program data?

A1a. CalMTA chose to use eTRM data because it represents up-to-date market-wide data for gas-to-electric installations. In general, CalMTA defaults to using CPUC approved values, unless there are valid reasons to deviate from those (for example, they don't represent the market targeted by the MTI).

After the discussion at MTAB, we clarified the following:

- The source of the eTRM equipment data is inflation-adjusted webscraping data from major CA retailers – collected in 2024 and updated to 2026 based on state inflation data
- The equipment category includes more than the cost of the water heater unit: it includes the water heater; and for a 240V HPWH, a gas line cap, a new circuit breaker and running wiring and conduit to the new 240V HPWH. Those additional equipment costs are one of two reasons the unit costs shown on the slide are higher than prices seen at retail
- Equipment and labor costs include a 40% markup to account for various non-equipment costs such as ancillary material, taxes, contractor or vendor markups, fees, and contingencies. This markup generally aligns with assumptions used by the Department of Energy in their 2024 technical support document for HPWH[1]. This is the second reason those equipment costs are higher than what is seen at retail stores
- The source for labor data is RSMeans hourly rate and hours for plumbers installing an electric water heater (not specific to a HPWH). It is possible that this understates the true installation costs, however – as mentioned above - the eTRM data also includes a 40% markup – which seems adequate to cover any difference.

Decision: Based on this information, CalMTA will continue to use values from the eTRM data to determine incremental costs.

[1] U.S. Department of Energy.2024." Technical Support Document: Energy Efficiency Program for Consumer Products and Commercial and Industrial Equipment: Consumer Water Heater"

A1b. CalMTA agrees that costs will decline as a result of the 2029 federal standard, and that decline is represented in the BMA forecast. It is part of the MTI program theory that costs will decline more with investment in the MTI, due to the market interventions described in the MTI Plan.

In the MTAB presentation, Isaac Schultz showed a slide that included equipment and installation costs, along with assumed decline in equipment and installation costs for the BMA and TMA forecasts.

Decision: After further discussion and analysis of the data, CalMTA has decided to simplify the cost decline assumptions by applying a single cost reduction rate to total installed HPWH cost for BMA vs. TMA (rather than separate reductions for equipment vs. labor). This will be documented in the HPWH MTI Plan Appendix B.

Q2. How will the new federal standard affect CA Title 24 requirements? Should we consider specifying a higher Uniform Energy Factor (UEF) to get more favorable bill impacts and allow us to claim some delta from the federal electric water heater standard? Would specifying a higher UEF allow us to claim some incremental impact for more efficient units?

A2a. The 2025 Title 24 rules anticipated the federal standard, so they will not be further affected by it. The prescriptive path requires NEEA Tier 3 HPWH efficiency, while the performance path is compared against the federal standard (required by the rules of federal pre-emption). Moreover, Title 24 makes it difficult for builders to qualify using the performance path without installing higher efficiency HPWHs.

A2b. The MTI team discussed the possibility of including new construction in its incremental impact forecasting. However, we concluded that there was little or no opportunity for incremental impact in that segment because 2025 Title 24 is already designed to make it very challenging for builders to install HPWHs that are lower efficiency than the NEEA Tier 3 specification, and the performance path already references the forthcoming federal standard.

A2c. The MTI team discussed the possibility of including assumed shift of market adoption to higher efficiency units than would otherwise be purchased – an impact that could be particularly significant if manufacturers introduce lower efficiency, "builder grade" models that just meet the federal standard. However, we concluded that it would be difficult to defensibly forecast what proportion of the market would install lower-efficiency units. If ongoing market assessment reveals a trend toward lower-efficiency units, we can reconsider the possibility of quantifying the impact of the MTI on driving market uptake of higher efficiency products.

Q3. Should product "recommendation and availability" have more of a jump after the new federal standard takes effect?

This nomenclature and modeling parameter has drawn a lot of comments – particularly regarding the term "availability". This parameter is meant to represent market barriers targeted by the MTI. Per the MTI logic model, multiple market interventions are designed to overcome the barriers to installer recommendation of HPWHs – particularly in cases of fuel substitution. These include developing a California product roadmap that meets the needs of California households and providing resources for installers that increase their confidence and comfort with recommending HPWHs more broadly.

After reflecting on the MTAB discussion, CalMTA has modified this parameter to focus on installer recommendation (i.e., the proportion of customers for which installers recommend a HPWH). CalMTA used the installer survey conducted in 2025 to estimate the current and forecast baseline values for installer recommendation. Details of these estimates will be documented in the HPWH MTI Plan Appendix B.

Q.4. How do proposed CARB rules and adopted BAAQMD rules in Bay Area factor into the market adoption?

The BAAQMD zero NOx regulations were not reflected in the TSB and cost-effectiveness numbers presented at the MTAB meeting, however, we incorporated them into the final numbers in the MTI Plan, with detailed assumptions about the impact of the new rule provided in the HPWH MTI Plan Appendix B.

Unlike the BAAQMD regulation, CARB rules are still pending. CalMTA has incorporated the impact of CARB regulation into a "CARB regulation" scenario, to illustrate the potential impact on the MTI incremental TSB and cost-effectiveness of the proposed regulations being adopted as currently proposed. The results of this alternate scenario are presented in HPWH MTI Plan Appendix B.

Q.5: Do the assumed PA-verified units include units already assumed in the baseline? If so, CalMTA would be subtracting them twice.

The assumed PA-verified units are incentives on "incremental" units, that would not be installed without the MTI. CalMTA doesn't currently have a solid estimate of the number of HPWH incentives expected by PAs, absent the MTI, but we plan to true up the incremental PA-verified units based on program administrator budgets for HPWH incentives, when that

information becomes available. CalMTA will update the PA-verified baseline and incremental units as part of the annual third-party evaluation.

Q.6: Are there installation cases that result in a ratio of ownership cost for HPWH to gas water heater of less than or equal to 1.0? The MTAB slide (Slide 75) that shows total cost of ownership never decreasing below 1.3 is concerning.

While the MTI strategy and market interventions are focused on identifying market segments and installation cases that will not increase utility bills, the numbers presented on the slide represent averages that reflect both higher up-front costs of HPWHs versus gas water heaters, and bill impacts. We expect up-front costs to decrease over time, but we assume that 47% of units receive incentives to offset up-front cost differences.

With regard to the operating costs that drive bill impacts, the MTI is designed to identify and target segments for which lifetime operating costs would be at parity or lower by installing a HPWH. It will require additional research to identify these segments, but they are likely to include customers on CARE rates and electrification-friendly rates, and may include those with rooftop solar, propane water heaters, and other segments yet to be identified.

MTAB Meeting Notes

May 6, 2026
Hybrid (In-Person and Virtual) Meeting

Welcome & Agenda

Stacey Hobart opened the meeting with a review of the meeting agenda and MTAB member introductions, including two new members: Jillian Rich from the Sacramento Municipal Utility District (SMUD) and Abhilasha Wadwha from the California Public Utilities Commission (CPUC). She celebrated MTAB's third anniversary and asked MTAB members to share their hopes for the next three years.

She then asked MTAB members for any comments regarding draft notes from the previous meeting (3/25). There were none.

Commercial Replacement and Attachment Window Solutions (CRAWS) Market Transformation Initiative (MTI) Plan Overview

Nick Fiore presented an overview of the CRAWS MTI, including the market opportunities and potential benefits, target audience for CRAWS adoption, and strategy to promote a cost-effective "envelope first" approach to building decarbonization. Rick Dunn shared an overview of the non-energy benefits (NEBs) associated with CRAWS technology and the impact for building owners, financial institutes, and utilities. MTAB questions and comments included:

- Customer willingness to pay is not necessarily a quantitative benefit but does relate to the viability of the MTI. To determine how valuable NEBs are, CalMTA will need to confirm they are relevant to building decision-making from an analytic/cost-effectiveness or strategic perspective.
- While the MTI strategy should absolutely leverage and seek to take advantage of the NEBs opportunity to promote adoption, the TRC cost-effectiveness test is indifferent to ratepayer subsidies. The PAC test might better reflect NEBs if it's true that the ratepayer subsidy is lower than it would be otherwise. NEBs are critical to conveying the value proposition of CRAWS products but their value to utilities is less clear.
- The impact of NEBs on customers' willingness to purchase CRAWS products is important and good to see, but are contractors willing to sell these products instead of a full replacement?
    - Rick replied that value propositions vary for distinct market segments and that the contractor value proposition will likely evolve over time – it will be important not just to define the core value proposition for contractors but also determine when and how to share it.

- Benefits messaging should also capture the relative time and operational impact of CRAWS products. Installation of a secondary window could be completed by contractors in one day but a full window replacement could take weeks or longer and would require the building to be empty.
- Are the NEBs associated with CRAWS products more significant than with other MTI technologies? Why are they such a critical focus here?
    - Rick clarified that appliances and other products tend to get replaced more frequently than windows, so the decision-making process focuses on which appliance to purchase. With windows the baseline is often doing nothing at all, so the NEBs are critical to inspiring action.
- The ecosystem of strategic energy management (SEM) programs could be tapped into, as NEBs would factor into this. CalMTA might want to also consider adding the benefit of moisture control.
    - Rick agreed and noted that that California Energy Commission (CEC) and CPUC are both pursuing research into how to quantify and potentially assign monetary value to NEBs.
- The Energy Trust of Oregon found that SEM program participants had a higher rate of investment in capital energy projects, so this is likely a good market to address. Building a viable new retrofit market is the definition of market transformation, so this MTI is exciting.

Nick walked through identified market barriers and challenges for the CRAWS MTI, which CalMTA will seek to address. This was followed by Rick presenting the product definition of commercial secondary windows (CSW) and vacuum-insulated glass (VIG). MTAB feedback included:

- Replacement measures are often included in plans for required building upgrades. Because windows typically aren't, the capital isn't allocated and there may not be money available to invest in them.
- The one disadvantage of CRAWS products compared to full window replacement is that it does not address thermal losses associated with the frame itself.
    - Rick acknowledged this issue but noted secondary windows can help with frame losses because these products are sealed around the existing frame, not just attached to the glass, they create an insulation bubble around the frame and do reduce thermal losses.
- Since the MUSH market is a target for this MTI, this may include many historical buildings that are over 50 years old. Are there specific benefits for this segment?
    - Rick affirmed that because historical buildings are typically prohibited from full window replacement there has been a lot of early success in this segment.
- From a customer perspective, maintenance training and warranties for these products will go a long way in building trust and potentially demand since it would mitigate concerns about equipment failure and should be built into the installation process.

    - Rick agreed this would be important overall. CSW products are AERC-rated and have manufacturer warranties. For VIG products, there is no control over the frame and it is unclear who owns the warranty, which is one of the reasons CalMTA didn't model this technology as a component of the MTI at this stage.
    - VIG is more of an emerging technology than CSW. While there are engineering estimates for its efficiency gains, less is known overall and the products are not rated. In light of these risks, CalMTA will continue to validate the potential benefits of this technology if it's included in the MTI.

CRAWS: Market Adoption Forecast

Isaac Schultz provided an overview of the CRAWS adoption forecast model. MTAB comments and questions included:

- Will CalMTA distinguish between north-facing windows where glare is less of an issue? Robust data sets exist that could be purchased from companies that conduct 3D building modeling to narrow down to factors like this beyond the current estimates.
    - Isaac noted that in the current stage of MTI development, a larger-scale model that factors in building orientation and feeds into calculation of window area energy savings provides a sufficient basis.
    - Smita Gupta added that once the MTI moves into the market deployment phase, more granular data may be warranted and this will be explored.
- The rationale behind using DEER at this stage makes sense, as it's familiar and vetted by the CPUC, whereas more granular data sets are less familiar and may not be as trusted. More precision belongs in the implementation stage and using a data set that's familiar to the Commission and used in other active energy efficiency programs feels like a good conservative approach.
- CalMTA should consider how the pre-NAICs code and building type categorization in the pulled sample (from the California Commercial End-Use Survey [CEUS]) compares to the disposition and how any differences might impact CalMTA's findings. If the difference between modeled and corrected building types appears in published results, that could help the team understand areas of vulnerability.
- This market has been challenging for energy efficiency programs to address but it is very important, so it is worth waiting to attempt for more precision and keep moving forward with the current approach.
- Because MTI is looking at the entire stock, this modeling seems more like a retrofit market penetration model rather than a replacement market analysis that would look at a share of the stock. As a reality check, it would be good to know the rate of renovation on eligible buildings and whether CalMTA expects to get more than what would happen naturally.
    - Isaac said that this presentation would show the rate of expected installations against the baseline (without MTI interventions).
- Because this is a fuel-agnostic MTI, is SoCalGas's service territory included?

    - Staff committed to checking on this question. The response is included in these meeting notes for the record.
    - Response: In response to the question and discussion about subtracting impacts in non-IOU service territories, we reviewed and revised our methodology to include gas system impacts in gas IOU service territories that are served by POUs. See Appendix B, section 3.5 of the CRAWS MTI Plan for detailed documentation of the approach.
- Is the MTI's target growth rate looking to double the current trajectory?
    - Isaac confirmed that the MTI was targeting this significant acceleration.
- The non-MUSH growth rate is much closer to the MUSH growth rate than might be expected from the MTI's focus on MUSH market. What assumptions about spillover impact that?
    - Rick clarified that this growth won't occur at the same time. CalMTA expects the non-MUSH market to take off later and to still be below the MUSH market. A similar rate of uptake can occur over time but it will take longer to build the value proposition. For the non-MUSH market, statewide BPS might be a "stick" that complements the "carrot" of CRAWS benefits.
- The MTI is trying to accelerate adoption of this technology but it seems like the growth rate will start slowing down relatively early in the lifecycle, even as costs go down.
    - Isaac replied that this does not mean that adoption will stop but the cost impacts are different than other MTIs. The materials that go into manufacturing CRAWS are already widely available so the economy of scale is different.
    - Rick noted that while CSW material costs are unlikely to change significantly, labor costs likely will decline significantly through MTI workforce development efforts. For VIG, there are more opportunities for material cost reduction but less for labor costs, since glazers are already doing this work. Utility rates can help the value proposition but don't necessarily factor into this modeling.
    - Jeff Mitchell added that CalMTA will look into this more. In the adoption curve, the inflection point reflects the transition from the easier-to-reach market to the harder-to-reach market.
- Labor, materials, and mark-up are the primary factors that impact cost. MT often requires installers to go from a competitive premium to an innovation premium, which creates opportunity to drive cost down -- the MTI will need to figure out how to get them to do that.
- In its application, CalMTA should highlight strategies specific to the equity market/environmental and social justice (ESJ) communities and communicate the benefits CRAWS delivers to them.
- The MTI's long-term outcomes include increasing the number of municipalities that cite CSW in their planning, but this should occur earlier since amending climate action plans can take years.

    - Rick clarified that while outcomes reflect the final result, there are short-term activities that would start much sooner, including building awareness with municipalities.
- The value proposition for CRAWS needs to include some kind of guarantee/warranty, either beyond what manufacturers are currently offering or highlighting that warranty, to ensure no remediation will be needed and to mitigate risk/maintenance issues. Negative word of mouth can set the market back significantly and drive consumer pushback.
    - Rick agreed this was an important point. Influencing adoption of emerging technologies often requires working with manufacturers to assuage perceived risk. The current CSW warranties are about 2 years; if CalMTA finds out that is insufficient we can work to drive extended warranties. More work is required to understand what's needed for VIG and get manufacturers to warranty products that are installed in frames they don't own or make.
- Precision during the implementation stage may help strengthen the business case. The business case is more likely to pencil out where higher energy impacts are possible, which could depend on different climate zones, building orientations, etc., so when the averages that go into this forecast are "de-averaged," the technical potential of energy savings could look quite a bit different.
- Looking at the differential between MUSH and non-MUSH segments in 2047, how much of that is about it being harder to move the non-MUSH market and the barriers associated with buildings that are likely not owner-occupied?
    - Rick said that the non-MUSH market doesn't experience the associated energy savings if they're not paying the utility bills so it will really be about quantifying benefits like increased asset value, which will take longer to realize. For the MUSH market, benefits accrue on the first day.

Meet & Greet with Equity Sounding Board Member

Alicia Bohigian of Self-Help Enterprises, one of the eight active members on CalMTA's Equity Sounding Board, shared her background and experience participating in this group. MTAB members engaged in an informal discussion with Alicia based on her presentation.

Public Comment

No public comments were received.

CRAWS: TSB and Cost-Effectiveness

Isaac provided an overview of the process, inputs, and results of CalMTA's Total System Benefit (TSB) and cost-effectiveness calculations for the CRAWS MTI as well as sensitivity analysis findings. MTAB comments and questions included:

- CalMTA should explore whether any CRAWS products are included in existing custom projects. This is probably not significant but would be helpful to acknowledge.

- Newly approved measure packages usually come before inclusion in programs -- where did the CSW measure package come from?
    - Jeff replied that CalNEXT developed this measure package so there may be intentions to include it in programs, but this is to be determined.
- As programs are rolled out with measures that have new approved workpapers, sometimes the real-world values are different and the Program Administrator (PA) needs to adjust based on actuals. Does CalMTA have a plan for corrective action if the TRC/TSB isn't what we anticipate now?
    - Jeff said that as the MTI moves into market deployment and gathers real-world data, models will be updated and reported to MTAB. The numbers presented now will not be the numbers shared in 10 years, but starting with this conservative number is a good approach.
- Since CalMTA doesn't know if the true TRC is above or below 1.0, it would be viewed positively if CalMTA can argue that this estimated TRC is on the low-end and that the odds of overperforming are better than the odds of underperforming.
- The risk assessment in each MTI Plan isn't necessarily a corrective action plan but looks at variables that could be different in reality, which seems to be well addressed.
- As a qualitative rationale, the CPUC is very interested in advancing measures that don't increase grid demand and CRAWS would fall into that category. The decarbonization proceeding also includes a directive to pursue strategies that avoid panel/infrastructure upgrades. CalMTA may want to analyze load-shedding/peak-shifting potential, even if that was estimated at a high level.
- Why do lower CSW costs not take the TRC above the base case?
    - Isaac replied that as product cost decreases, more end-use customers are able to adopt the technology, resulting in larger initial total market potential. However, this expanded market pool also includes additional load shapes and scenarios that offer a lower return-on-investment to the end-use customer. The lower incremental cost per unit leads to higher adoption and higher TSB, but the total incremental costs to the customer increase at a higher rate than the total TSB, resulting in a lower overall TRC.
- A 30-year estimated useful life (EUL) seems extremely feasible and seems to significantly impact TRC, so modifying the product definition seems worth considering.
    - Jeff agreed that CalMTA would explore this and that the current 20-year EUL aligns with the approved eTRM, which is the source of most available data.
- The sensitivity analyses seem to indicate the success of this initiative is relatively immune to market variables – the TRC estimate holds up over a range of circumstances.
- If BPS takes effect, it would likely drive demand and supply will follow, so there might be some intersection between this and the lower product cost scenario. CalMTA may want to explore what that looks like.

- The CEC's first round of BPS standard-setting will likely be more akin to benchmarking and won't fully kick in for eight years or so.
    - Rick said that the later timeline for actual BPS implementation is somewhat accounted for but CalMTA will continue to dig in deeper and adjust timelines as needed.
- Are changing electrical/gas rates factored into this analysis?
    - Isaac replied that they were not since CRAWS products do not directly consume fuel of any sort.
- Sensitivity analyses demonstrate that the two ways to provide the greatest incremental benefit to the MTI are technology-related (30-year EUL) and lower measure cost (significant increase in adoption).
- Capturing VIG cost but not benefits in this modeling is a hedge but accommodates some unusual considerations and could be a beneficial hedge.
    - Rick noted that the incremental spend for VIG is modest overall. The work to get VIG ready to model is largely led by national labs – and the benefits could be notable.
- Extending the EUL should also factor in savings reductions due to product degradation.
    - Rick replied that CalMTA has talked to manufacturers about this. Most savings come from low-E films, so even if the U-value goes down, savings should stay relatively constant for well beyond 30 years.

CRAWS: Appendix F: Evaluation Plan

Jun Suzuki walked through the process used to develop the CRAWS Evaluation Plan and the proposed market progress indicators (MPIs). MTAB feedback included:

- Looking at the total sales goal for the state and not just the sales claimed by the MTI, how much of an increase is this over baseline?
    - Jun replied that the current baseline is near zero so most of this would be incremental.
- In thinking about market indicators, it would be challenging but impressive to get HVAC-only upgrades to include windows first -- perhaps CalMTA could conduct sensitivity analysis to see the impact.
- The influence of NEBs on decision making is very different than quantification of NEBs, so these shouldn't be conflated -- they may be linked but not sure how often.
- CRAWS is a favorite MTI and there's a strong desire for it to succeed, but some of the MPIs may not fully demonstrate the success of the MTI or could prove too difficult to back up. The medium-term outcome of ESCOs recommending CRAWS feels hard to achieve, for instance, as getting salespeople to do something different can be very challenging.
- As access to this data becomes more available and adoption increases, CalMTA could look at what's actually happening in building energy consumption.

    - Jeff acknowledged that the models used to estimate impact don't always reflect real-world conditions due to variance in building stock.
- In looking at PA program data, is this inclusive of meter-based analysis/normalized metered energy consumption (NMEC) analysis to look at actual reductions in energy use? And then will evaluations assess how close we are to that estimate?
    - Rick said that the MTI is not seeking to evaluate measure-/user-specific energy savings as a milestone.
    - Jeff noted that MTI demonstration projects will help produce real-world savings estimates to refine these models. The PA program data component is referencing the fact that savings claimed by other programs are subtracted out from the incremental savings to avoid double-counting.
- As data becomes available during market deployment and adoption increases, it may be worth examining what is actually happening in terms of building energy consumption or energy intensity.
- What PA programs will be a key source of data for the evaluation?
    - Jeff clarified that this would be any relevant data reported in the California Energy Data and Reporting System (CEDARS), which may show up in different ways (e.g., non-metered energy savings or program cost data) but should be able to be backed out by CalMTA in the needed format. CalMTA is focused on deemed savings.
- If CalMTA does have the bandwidth to conduct its own M&V, it might be good to look at more accurate meter-based analysis instead of deemed. The CPUC has made this happen for other implementers.
- Does CalMTA intend for any CRAWS work to ultimately end up in the statewide codes and standards major alterations track?
    - Rick said that the magnitude of the renovation triggers code already and there are already Title 24 requirements for renovations of a certain size.
    - Jeff added that MT usually ends with a lastingness mechanism, which is often locking it in as a code or standard. For this particular measure, the target market is about 14% of the overall market so CalMTA considers the desired outcome one in which CRAWS is standard practice for the scenarios where the economic benefits are strongest. BPS or other policies may arise that open up the opportunity to lock this in in some way.
- Major alterations would typically already include window upgrades, but maybe there's a conversation to be had with the CEC while CalMTA is at this conceptual level – is there a midpoint where a certain code has been triggered that is not major alterations? In the early stage of LED promotion, some aspects were not captured in major alterations but still triggered code through factors like light fixture changes. Maybe CRAWS falls in a similar spectrum before major alterations.
- Targeting inclusion in climate action plans feels out of place. CRAWS products may be better suited to 5-10-year plans used to steer capital investments, since climate action

plans rarely get down to the measure-specific level. CalMTA may want to look at the state architect's office, campus master plans, CalGreen, or reach codes instead.

- NMEC is a very difficult tool for capturing real-world building energy performance and it is not desirable to burden the MTI with a modeling problem. Energy savings are always going to be modeled, and it seems better to refine and build on modeling and currently available data than pursuing NMEC.
- Installer training should happen sooner – it's important to ensure these products are installed properly and in a way that's noted by manufacturers right from the start. Does CalMTA assume there will be some activity around CSW in 2027 while waiting for the CPUC decision to enable 2028 to be an effective measurement milestone (testing awareness in 2027 before measuring it in 2028)?
    - Jeff replied that CalMTA is assessing what's possible in the interim phase now, but the 2029 milestones reflect the impact of activities that would begin sooner.
    - Lynette Curthoys added that CalMTA is trying to solve the challenge of having initiatives in Phase II longer due to the required application process vs. Advice Letter and the associated budget impacts for the second tranche of MTIs.
    - Rick clarified that 2029 is the measurement/evaluation point and not when activity starts. Manufacturers have been willing to engage sooner but proof of concept is still needed for large-scale action. CalMTA is hoping tee things up so once the demand signal is there, manufacturers can hit the ground running.
- Custom programs offered by the IOUs or other PAs could potentially manage or co-pay for installation management.
- The exit strategy for this MTI still needs to be clarified. Deeming technology into a BPS would be very difficult to implement and faces a lot of potential political opposition.
- Could the PAs or CalNEXT do something to provide a market assist that encourages manufacturers to spend more on business development while CalMTA is waiting for CPUC approval?
- Rather than, or in addition to municipal climate action plans, CalMTA should consider specifying BPS requirements that will drive adoption of CSW.

Application Overview

Smita Gupta shared a high-level summary of the contents and strategy for CalMTA's second application requesting CPUC approval of MTIs for market deployment. MTAB feedback included:

- CalMTA should clearly convey the benefits of each MTI beyond TRC, particularly those with lower TRC estimates, such as the potential impact of CRAWS in schools.
- The significant GHG reduction benefits estimated for the second tranche of MTIs seems important for the CPUC to consider.
- Affordability continues to be a major concern for the CPUC, so application messaging should address the ways these MTIs improve consumer/ratepayer affordability. There

are different ways of talking about why this is worthwhile for ratepayers to fund and it is important to make that pitch.

- Looking at the cost compared to the TSB, the investment seems relatively small in terms of immediate impacts, especially given the scale of what things cost in California. Part of the messaging should communicate that the minor investment yields very large benefits over time, and that's the value of MT.
- The application should capture the myriad benefits of these MTIs when describing the second tranche's value: there are system benefits, customer/individual participant benefits, non-participant benefits, etc. Having a portfolio that increasingly touches more customer segments is valuable for buy-in, so telling the story of expanding beyond residential MTIs and building a diverse, well-balanced portfolio will be important.
- With regard to CRAWS, the office sector is in crisis and owners/developers are likely to triage buildings into bins: the smaller ones they can convert to residential, another bin that they will try to make competitive, and another bin that will be abandoned.
- Owners will be looking for low-cost ways to stay competitive or make properties suitable for residents. CRAWS can be that solution and help "rescue" buildings that might otherwise be abandoned, which creates a kind of public value.
- This tranche brings in the cross-sectoral value of going beyond just residential and commercial and focusing on the MUSH market brings in public institutions that are cash-strapped. It creates a way to invest in municipalities and communities with a strong equity component and provide value there.
- Specific to CRAWS, the MTI represents an opportunity that could otherwise be truly lost. While the measure obviously saves energy, if somebody is going to upgrade an HVAC system there is a chance to prompt building owners to ask to have the envelope evaluated at that time. Maybe the contractor won't sell it yet, but if the building owners know how to ask for that evaluation and look at things simultaneously then the MTI does reduce impact on the grid. It's been really hard to make window programs pencil out as resource acquisition programs and there are so many barriers, but windows are one of the best enabling measures to help reduce the impact of other energy consumption in buildings.

Public Comment

No public comments were received.

Next Meeting & Next Steps

Stacey shared CalMTA's plan for the remaining scheduled meetings in 2026.

The meeting was adjourned.

Attendees

MTAB Members

Mary Anderson, Pacific Gas & Electric
Cyane Dandridge, SEI
Hayley Goodson, TURN
Fred Gordon, Context Consulting
Jeff Harris, Northwest Energy Efficiency Alliance
Peter Miller, Natural Resources Defense Council
Christie Torok, California Public Utilities Commission

Participating Staff & Consultants

Lynette Curthoys, CalMTA/Resource Innovations
Rick Dunn, CalMTA/Resource Innovations
Nick Fiore, CalMTA/Resource Innovations
Smita Gupta, CalMTA/Resource Innovations
Stacey Hobart, CalMTA/Resource Innovations
Jeff Mitchell, CalMTA/Resource Innovations
Isaac Schultz, CalMTA/Resource Innovations
June Suzuki, CalMTA/Resource Innovations

Guests

Don
Arambula, DAC
Alicia Bohigian, Self-Help Enterprises
Rob Bohn, PG&E
Sazi Bugay, Summit Appliance
Paul Campbell, ICF
Julie Cantor, MCE
Brianda Castro, Central California Asthma Collaborative
Deepti Dutt, Energy Solutions
Maureen Guttman, Energy Solutions
Randall Higa, SCE
Aubrie Hunt, Sonoma Clean Power
Martin O'Gorman, Summit Appliance
Emily Pelstring, CPUC
Stephen Selkowitz, Lawrence Berkeley National Laboratory
Jeff Staller, West Monroe
Allegra Steenson, Pacific Northwest National Laboratory
Simpson Tanner, Energy Solutions
Gabriel Taylor, California Energy Commission