Room Heat Pumps Market Transformation Initiative

Appendix I: MTAB Feedback

December 18, 2024

This appendix contains written comments and responses from the Market Transformation Advisory Board (MTAB) as well as notes from the Nov. 20 MTAB meeting where this was discussed.

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CalMTA is a program of the California Public Utilities Commission (CPUC) and is administered by Resource Innovations.

Purpose

This document provides a compilation of comments received from the Market Transformation Advisory Board (MTAB) on the draft Room Heat Pumps Market Transformation Initiative (MTI) Plan and CalMTA's responses to those comments. Content from the draft MTI Plan was shared with the MTAB at meetings on Sept. 19,2024, and Oct. 25, 2024. Complete notes from all MTAB meetings are included in Appendix 4 of the Application to the California Public Utilities Commission. The full draft MTI Plan was provided to the MTAB on Nov. 14, 2024 and then discussed at an in-person meeting on Nov. 20, 2024. Comments from the document and the meeting were then collected by Nov. 27, 2024, and are presented here with CalMTA's responses. Note: All feedback that appears in this document is presented verbatim as submitted, with no edits made by CalMTA.

Source	Feedback provided	CalMTA response
Fred Gordon	General: I have not reviewed the appendices; will do later if I have time after reviewing induction cooking. Generally, I think this is a good plan. Comments are mostly to sharpen the proposal. I think it's important to include some scenarios in the cost/benefit section that consider what the benefits are if there are not effective fuel choice rates, or if there is not a viable solution for casement windows. Also, if there is not advancement in controls to synch RHPs with central systems. The first seems important for equity goals. The second may not be important quantitatively but that's good to show. The third may limit the applications for single family. Is it a big or small deal? I can't tell without a simple scenario analysis.	We agree that scenario planning for the three scenarios mentioned here would be helpful. However, due to the high TRC for RHPs they were deemed not needed at this time. In combination with our risk assessment, we will explore conducting these scenarios in the future.
Fred Gordon	General: In general, the plan doesn't seem to acknowledge technical barriers, like equipment defects and installation difficulty that exist in the current-day RHPs. These can be addressed but there doesn't seem to be plans to do so.	Additional language has been added to Section 2.2, Intervention 1 regarding additional manufacturer engagement on product improvements and sharing results from the RHP self-installation pilot. We have also added a footnote to this section regarding the ongoing engagement that CalMTA product and strategy team

Source	Feedback provided	CalMTA response
		members conduct with leading RHP manufacturers. This work will continue in 2025 as CalMTA prepares for Phase III work.
Fred Gordon	Page 13: Comment FG5. Your explanation that this will initially target electric heat within the low-income market, and probably not impact gas low income until/if rate structures support fuel switching is much clearer now. The staging is important to avoid it appearing like the program will have perverse financial effects on people with limited funds.	Thank you for the comment.
Karina Camacho	Section 1.1: I like the point on "lack of suitable products for most California climate zones"	Thank you for the comment.
Christie Torok	Section 1.3, Bullet 2: Or how is efficiency compared here (bill savings, BTUH). Add a footnote to explain.	We updated the bullet to clarify that this result was total energy savings based upon modeling results.
Christie Torok	Section 1.3, Bullet 4: Do you have separate figures for casement and sliding? These are so different from one another; it would be helpful to distinguish. Also, the link seems to have nothing to do with window types, or even heating systems.	CalMTA currently does not have definitive figures on the proportion of casement and sliding windows but has planned activities for 2025 to further define the quantities. We agree that the link in the footnote did not have the right information, and it has been removed. We have evidence, from a limited set of homes through the RHP self-installation pilot, that sliders are far more dominant than casement windows. We will initially focus on a technical solution for slider windows and then consider options that fit in casement windows through installation adaptations.
Christie Torok	Section 1.4, Bullet 7: The TSB calculations include a negative value for the refrigerant that is introduced for fuel sub installations, using the RACC, correct?	For fuel substitution installations, increased refrigerant leading to negative refrigerant values would only occur if the space was not previously air conditioned. This does not occur during fuel substitution if the heating previously provided by natural gas is replaced by a heat pump when that same area was previously air conditioned by either central air or a window air conditioner, since that would lead to overestimating negative refrigerant values.
Randall Higa	General: There are some really good and interesting research findings in this plan showing that the market is already on the verge of taking off. However, this MTI could use more development in order to increase stakeholder confidence. The	We have completed market characterization research and the necessary product assessment during Phase II to deliver the plan of action represented in the MTI Plan. As a new technology in a dynamic marketplace, there may be aspects of the RHP technology

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	MTI Plan seems to be a plan for further Phase 2 activities to vet technologies and market interventions, with a lot of unknowns in critical areas such as product performance. The MTI plan is also missing required elements, per D.19-12-021 Appendix C: "Content Requirements for Market Transformation Initiative Plan". The CalMTA could improve this plan by going through each item in that Appendix C and verifying that each has been fully addressed (and it may help to provide section numbers so the reader can find these required elements easily).	that are unknown at the start of Phase III. This is a common situation for long-term market transformation. While the CPUC reviews this MTI, we will continue to work with manufacturers and acquire more data on the use of RHPs. Waiting, however, runs the risk that this technology will evolve without the needs of the California market being met in the near term. We created the MTI plan template modeled from Appendix C D.19-12-021. For a full crosswalk between the elements in Appendix C and the MTI Plan sections, refer to Exhibit MTA-06 Chapter 1 in the application materials.
Randall Higa	General: Key among the missing elements are areas the CPUC called out as concerns: "In particular, we are concerned about the process for setting savings goals and attributing savings to particular programs and program administrators" - D.19-12-021, p. 73. Although this MTI relies upon RA programs and aims for a code or standard, these savings are not broken out (as per the Decision), and there is no discussion of how savings would be attributed to those programs, let alone any discussion of "inclusion of C&S into the cost effectiveness methodology".	This MTI doesn't include savings from mandatory codes and standards, and that is why such savings are not broken out or identified. With regard to the Decision p.73 reference, this topic was a key focus during development of the MTI Evaluation Framework, which culminated in a consensus for how to handle MTI savings attribution and will be followed.
Randall Higa	General: Relatedly, the MTI plan could do more to address RA program coordination specifics, especially if the CalMTA relies upon incentive programs to deploy RHPs within 1-2 years, as stated in the plan. The MT Framework devotes an entire chapter to coordination with the Rolling Portfolio, with examples of the level of detail a Rolling Portfolio Coordination Plan should include (e.g. demonstrations of "support from, and coordination with, all related RA programs"; a schedule for ramping down incentives, roles that related programs can take to reduce customer confusion, etc.) Because this is the only Application that the CalMTA will be filing, with subsequent MTIs to be filed as Tier 2 Advice Letters, it is critical that the CalMTA's approach to these areas of CPUC concern is presented in these first two MTI Plans, somewhere.	CalMTA has ongoing coordination meetings with program administrators (PAs) leads, the Codes & Standards working group, the California Energy Commission, and others. Those will continue throughout the lifetime of the MTI and include firms that are ultimately chosen for implementation in Phase III: Market Deployment. Appendix E lays out the approach to aligning the MTIs with the EE portfolio of programs. Because we are over a year out from implementation, it would be difficult to define specifically what this alignment would look like at this stage. This information will be further developed in 2025 and be included with additional details in the RFPs issued to solicit implementers for the initiative. Bidders will be required to respond to how they would address this coordination and work plans to guide this future collaboration will

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		be co-created with PAs that have programs with incentives or other aspects related to the RHP initiative.
Randall Higa	General: The plan could be strengthened by providing specifics about the MTI's timeline, both in terms of activities and dependencies between outputs, and in terms of the timeframe of expected benefits (separate from codes and standards (C&S), per the Decision). Although not stated as such, it seems there are actually two MTIs: One to install Consortium for Energy Efficiency (CEE)/ENERGY STAR-specified Portable Heat Pumps within the next 1-2 years through incentive programs, targeting customers with existing electric heating (so the baseline is inefficient electric heating), and another MTI to develop and deploy ENERGY STAR-specified Type 2 and Type 3 Window Heat Pumps to customers with any fuel type (so the baseline is inefficient electric and gas heating). If that is an incorrect description, it would be great if the CalMTA can provide a one or two sentence ""elevator pitch"" that captures the MTI's approach. The MTI Plan should lay out the timing of Window HP vs Portable HP adoption curves, particularly since they have different market barriers and the CalMTA intends to allocate resources differently to each type of measure over the duration of the MTI.	CalMTA sees this as one MTI per the Logic Model and given the market dynamics we plan to leverage (CEE/ENERGY STAR). Please see the Logic Model in Appendix A for details. Through the life of the MTI there is a role for all four types of heat pumps in California climates and window types and they will require a mix of interventions that can both be focused (like Intervention 1 – Manufacturer Engagement's focus on Types 2 and 3) but also can be broad, like the marketing (#4) and the RHP collaborative (#2). Market transformation strategy seeks greater synergy and leverage in implementing all of these as one initiative rather than parsing out each submarket. The current version of PHPs fit a need for several years for slider and casement windows, and we intend the future state to include new form factors of WHP, but there may be higher performance PHPs as well. It should also be noted that there are already high efficiency Type 4 saddlebag heat pumps that can be deployed immediately in California.
Randall Higa	The plan seems to indicate that the energy, grid, and GHG system benefits would accrue at different rates across the lifetime of the MTI (e.g. most GHG system benefits would come with fuel substitution in the later years of the MTI). It would be useful to see the forecasted timing of TSB achievements against the schedule of cost effectiveness (Appendix B, Table 26) to understand why payoffs from MTIs cannot be discussed on the same scale as from RA programs. The Plan should align the references (please see other feedback form from Randall Higa for continued comments).	We're not completely certain what is meant by "why payoffs from MTIs cannot be discussed on the same scale…" For purposes of this response, we interpret that to refer to the 20-year time period for assessing ROI (per the MTI Evaluation Framework, and as discussed at the 11/20/2024 and prior MTAB meetings). To clarify, the delayed ROI is not a result of most GHG benefits coming with fuel substitution; fuel changing use cases account for less than 20% of forecasted market adoption over the 20-year period, and there are substantial GHG benefits associated with the non-fuel substitution scenarios. The reason MT initiatives require a longer evaluation time-period is because they seek to make lasting

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		structural changes in the market, which take years, before there can be substantial acceleration of market adoption. Details on these structural changes and the market barriers they address are described in Section 2.1 of the MTI Plan and include production of units appropriate for California's climate and window types, along with product labeling, availability, and awareness of benefits.
Randall Higa	Section 1.2, Page 10: Should the vision also include better product labeling and products that can be used for all popular window types?	CalMTA has included language on window configurations. Product labeling is an early step as part of the MT process and is discussed further on in the Plan.
Randall Higa	Section 1.2, Page 10: While the goal of this MTI is to "deliver affordable, climate-appropriate RHPs," it is crucial to ensure that these products are not only delivered but also installed and performing as intended. To achieve true market transformation, it is important to go beyond technology transformation, which is already being addressed by Emerging Technologies and C&S. Market transformation requires changing customer perceptions and behaviors. Therefore, the vision should be restated to emphasize how these products will improve customers' lives. For example, highlighting the benefits such as increased comfort, energy savings, and reduced environmental impact can help in gaining customer acceptance and trust. By focusing on these aspects, the MTI can ensure that the new products are not only adopted but also embraced by the market, leading to a sustainable and lasting impact.	CalMTA has added language to the MTI vision to include these customer benefits. In addition, CalMTA does include a manufacturer engagement strategy to help fill current product gaps for both dominant slider windows and climate types. This gap is currently not being filled by emerging tech work in California.
Randall Higa	Section 1.2, Page 10, Bullet 1: Replace “northern climates” with “cold climates” since Southern California has mountain and desert areas that can get down to 12 degrees and below. Do currently available units work below temperatures 0 degrees?	This edit has been made.
Randall Higa	Section 1.3, Page 10, Bullet 2: This implies that some of the heating baseline is electric resistance which has not been allowed in any residential new construction since the 1970s (Title 24). In Southern California, there is likely very little electric resistance	CalMTA is using EIA RECS 2020 survey data for existing HVAC which reports that 32% of multifamily and 8% of single-family existing homes use electric resistance as the primary heating source. These data are also consistent with the 2019 CA RASS

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	heating. Does "zonal gas heat" mean ducted central heating? Most multifamily homes in Southern California likely have gas wall furnaces.	survey which we checked as an independent confirmation. "Zonal gas heat" generically refers to any non-ducted gas heating source, with the most common type being gas wall furnaces. This is mentioned in Section 3.3.4 with detailed breakdowns in Appendix B, Table 5 as part of the modeling analysis.
Randall Higa	Section 1.4: This plan seems to lack some due diligence that was called for in the Adopted MT Framework's Stage Gate model. The collaboratively developed Framework lays out what stakeholders need in order to have confidence in an MTI's potential for success. In the Framework, Stage 4 deliverables were to include "completed pilot test reports or other MT concept strategy testing reports". Strategy testing was to occur in Phase II before the MTI application stage, so that the MTA "may determine that an MTI is not feasible to deploy as initially planned, or the market has deviated from the initial logic model assumptions and criteria. In these cases, the MTA should abort further spending on the MTI…for MTIs that are not discontinued, an MTI Plan will then be developed by the MTA." (D.19-12-021, p. 112) One of the deliverables of strategy testing phase was supposed to be "completed pilot test reports." This plan does not seem to include the results of all the proposed strategy pilots. For those that have early findings, those findings (including the strategy pilot methodology), should be included. In particular, the ESRPP pilot was intended to determine whether ESRPP can target ESJ communities with special pricing (from midstream incentives). Can the CalMTA speak specifically as their strategy pilot findings on ESRPP's ability to offer different prices based on ZIP codes? How will CalMTA prevent residents from non-ESJ communities from taking advantage of the lower prices?	To clarify, the ESRPP strategy test objectives were not to offer different prices based on zip codes, but whether ESRPP could improve the assortment of products utilizing targeted upstream incentives. For the three strategy tests, the team has been using learnings in real time to inform our MTI strategies, and those learnings have been incorporated into our program strategies and logic. Status updates on progress toward pilot objectives will be posted to the CalMTA website prior to the filing of the CalMTA application, and a more thorough assessment will be finalized in 2nd and 3rd quarter of 2025. In addition, CalMTA staff want to stress that MTI plans and strategies are living documents, the team will continue to engage with market stakeholders through 2025, and all learnings will be incorporated into our program strategies prior to the launch of Phase III activities.
Randall Higa	Section 1.4, Intervention 7: How is CalMTA going to "conduct manufacturer engagement?" Who on CalMTA staff is an expert in safety standards? Who is their expert in lab testing? Who on	We revised this bullet to clarify that CalMTA will support efforts on safety testing with other experts in the lead. CalMTA will ensure that any recommended changes we support are backed by experts

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	CalMTA can influence standard development? Is CalMTA / CPUC going to provide funding for safety research?	and data to promote safe and responsible changes. Specifically, the manufacturer engagement for this intervention will be to ensure there is alignment, interest, and support backed by data from other markets (Europe) from RHP manufacturers on creating new products that could take advantage of adjustments to the safety regulations.
Randall Higa	Section 1.5: Page 11: What are the grid benefits resulting from fuel substitution from gas to electric?	There is a net positive grid benefit of $26M, due to a large positive benefit on the efficiency case (switching electric resistance heating for more efficient heat pumps, and a smaller negative benefit for fuel substitution (adding electricity for heat pumps when replacing gas heating).
Randall Higa	Section 1.5, Page 11: There don't seem to be any Recommendations here: who are the recommendations for?	The recommendation made at the end of section 1.5 is that the CPUC approves the Room Heat Pump MTI to advance to Phase III based on the findings in Phase II.
Randall Higa	Section 1, general: (Continued from other feedback due to length limitations) The Plan should align the references to "low-income" vs "limited-income" vs Equity vs DAC, etc. The MTI should use the same criteria and language as the EE portfolio and Income Qualified Portfolios. It is also unclear how the MTI will be coordinated with the EE program portfolio or the IQP portfolio.	In our work to drive statewide market transformation, CalMTA is coordinating with a wide range of energy-related programs in California promoting heat pumps and specifically RHPs, including those outside of the PAs' income-qualified portfolios. As such, language about household income describes the customers served through some of these programs, rather than the formal categorization of the program itself. CalMTA has added a footnote defining "low-income" and has updated the MTI Plan to remove the use of "limited income." Section 5 of the MTI Plan describes the activities conducted by CalMTA to align and coordinate with programs serving ESJ communities or low-income customers, with greater detail provided in Appendix E.
Randall Higa	Section 1: The Plan also seems to be underestimating Baseline Market Adoption (BMA); please see comments below.	An edit has been made.

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	Page 9, Paragraph 2: Replace "…self-installed in a standard 120V outlet…" with "self-installed and be plugged into a standard 120V outlet…"	
Randall Higa	Section 1, Page 9, Paragraph 2: Does this imply that the baseline is inefficient gas heating and inefficient electric cooling?	An edit has been made.
Randall Higa	Section 1: Abbreviations, p.7 (and throughout document) – spell out on first reference	Thank you for your comment.
Randall Higa	Any reference to GWP should specifically include the following: • What version of IPCC (Intergovernmental Panel on Climate Change) report is used. Practically all regulations, including CARB, use IPCC 4. • What length of time is considered (how many years). Most regulations use a 100-year factor. • Define terms like "lower GWP" or "low GWP" – specific values must be given to avoid confusion. Different people/entities have varying definitions of what "low GWP" means. Low GWP is often considered 750 or less (for 100-year IPCC 4), especially for HVAC products. Even EPA calls 700 GWP IPCC4 100yr as "low GWP" For 100-year IPCC 4 GWP of 10 or less, the term "ultra-low GWP" is often used. In Section 3.4 there is some clarity (Low GWP (150), Ultra-low (no value)), but note that low-GWP here doesn't align with EPA's definition. This should be explained upon first reference.	The GWP100 values are discussed in a footnote in Section 3.4, but we have updated the footnote to include the information that we are following the CARB practice of using 100-year GWP values from IPCC 4. This intervention is aimed at enabling the future use of Low GWP refrigerants, as defined in CA SB 1206 (GWP100 < 150). We updated this first mention of refrigerant GWP to include a footnote with this explanation in section 2.1.6.
Karina Camacho	Section 2.1: This is a good point "Higher operating costs in fuel substitution scenario. Under many current rate structures, when a consumer substitutes from a less expensive energy source like gas to an electric system, it can increase energy bills despite the efficiency gains. This is especially a barrier or ESJ communities.	We agree and have included this barrier, especially for ESJ communities, in the MTI Plan. The improved efficiency of the RHP will help, but better rate structures that don't penalize a consumer for moving to electric heat are needed for ESJ communities in particular.
	Section 2.1: "With IAQ filtration features, these products will benefit ESJ communities who often suffer from higher levels of compromised IAQ." This is going to be especially important for	We agree. Providing climate resilience, especially for more vulnerable communities, is one of the opportunities and benefits of RHPs that we plan to leverage in our interventions. Once

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Karina Camacho	inland communities and those impacted by wildfires. There is a climate resiliency component that should be capitalized.	manufacturers bring more products to market that provide air filtration capability to improve IAQ, we will ensure that we target those most vulnerable through MTI intervention deployment.
Karina Camacho	Section 2.2: What's the plan to gather usage and bill impact data? Working with the IOUs to complete data requests for public agencies has posed a greater challenge than expected for the RENs. Just something to keep in mind that CalMTA may be slowed down here. I suggest creating agreements with the IOUs to make it easy for customers to authorize access to data. Think about UtilityAPI or GreenButton.	We recognize that gathering usage and bill impact data can be a challenge. This will be part of the coordination planning with PAs and other described in Appendix E. We are also currently gathering lessons learned from other programs, CalMTA's RHP installation pilot, and information on what manufacturers can gather via their product sales.
Karina Camacho	Section 2.4: If only a handyman or local contractor is needed, it would be good to educate local contractors at the Home Depot contractor pick up sites. Passing out flyers that these products are now available in the store and that clients may need help. This can also be an education opportunity as many contractors outside Home Depot and Lowe's may benefit from these products as well.	As we develop specific engagement plans with retailers, including Lowes and The Home Depot, we can explore how best to reach this audience and engage their "Pro Desk" services which might reach many independent contractors and service providers.
Karina Camacho	Section 2.6: These are great!	Thank you for your comment.
Christie Torok	Section 2.1.1, Paragraph 3: The plan seems to consistently bundle casement with slider windows and they are very different. Can you differentiate? At very least say “slider and/or casement windows”	We edited Section 2.1.1 to clarify that the initial priority is to ensure product availability for slider windows, and secondarily for casement windows. Based on the RHP installation pilot and conversations with local CBOs who work with a variety of multifamily housing stock, slider windows are far more prevalent than casement windows.
Christie Torok	Section 2.1.2, Paragraph 1: Target market: Is this saying that unless different rates are adopted the technology only makes sense for those with existing strip heat & double hung windows? It isn’t clear that bill rates can or will change any time soon.	We are not saying that if more electrification-friendly rates are not adopted, then RHPs only make sense for those with inefficient electric heat and double-hung windows. We are saying, in the near-term, those with inefficient heating will benefit the most from RHPs. This is especially true if household also has double-hung windows given that existing window versions of RHPs (both saddlebag and window box units) could be used are more efficient than the

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		portable versions. Those that have gas heating will experience a bill increase in most scenarios without some rate increase support or changes to bill rates for electrification. This is a barrier for all electric products that replace gas options. Given what we have learned about the new income-graduated fixed charges with bills like SB 1999, we expect this barrier can be mitigated over time.
Christie Torok	Section 2.1.9: Do we need to (or should we) consider a scenario where this is cut/unavailable?	We have called this out as a risk to this MTI with a mitigation strategy in Appendix G, Risk 15. If IRA incentives are discontinued, this could slow adoption, but we do not think the MTI is completely dependent on them. As a mitigation strategy we could push for greater adoption of RHPs through programs (to help reduce initial product costs) in the near term. Over time CalMTA expects, as consumers understand their benefits and manufacturers respond through more mass production and selling through retail channels, the upfront costs of RHPs, especially newer form factors and climate types, will see price declines and the MTI will not require IRA incentives or large customer incentives.
Christie Torok	Section 2.1.9: There is a huge push to lower electric rates already. This doesn't seem to be something CalMTA could effectively 'lobby' for. It is desired across the board, but challenging for reasons that are much larger and systemic, having to do with wildfire, T&D, etc.	We agree and did not intend to imply that CalMTA's role would be to "lobby" for electric rates in Commission proceedings or at the Legislature. Instead, as outlined in our MTI Plans, we see our role related to electrification rates as supportive in nature, supplying those who lead on this with data on bill impacts, demand-response capabilities, and details on additional benefits to consumers. As this is a barrier across multiple MTIs, CalMTA will explore additional ways we can work across the programs to support greater adoption of electrification rate structures and mitigation strategies to benefit multiple MTIs (induction cooking and RHPs). Any efforts would be done in consultation with the CPUC program manager.
Christie Torok	Section 2.2: I am not sure this makes sense or is an appropriate role for CalMTA. It might be worth a meeting or research into the rates proceeding at CPUC to see what the prospects are and	CalMTA staff does not envision our role would be to "lobby" for electrification rates; nor do we think that would be appropriate. As a program of the CPUC, we would seek guidance from our CPUC contract manager on what CalMTA's appropriate role could be.

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	when/how you might lobby, to get a better sense of whether it's worth it.	We agree with your comment that it would be helpful to meet with the CPUC Energy Division's sections involved in rates and do additional research into the relevant proceedings that may impact electrification rates. We see that electrification rates appear to be in scope in the most recent scoping memo in the building decarbonization proceeding: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M534/K700/534700375.PDF.
Christie Torok	Section 2.2: Have you done the bill impact analysis using CARE and non-CARE rates?	We have performed bill analysis using CARES rates, which is reported in Section 6.4 of Appendix C. Because CARES discounts electricity at a higher rate compared to natural gas, we find that fuel substitution is better for consumers on CARES rates compared to standard rates. We have added a summary sentence of the CARES findings in Section 3.3.4.
Christie Torok	Section 2.2: Are you aware of the income graduated fixed charge initiative that is coming? And how would it impact ESJ rates and bill impacts of electrification?	We are not aware of any forthcoming CPUC or Legislative action on the income graduated fixed charge. We are aware that two very recent bills to cap the fixed fee were not adopted Assembly Bill 1999 (located in AB-1999 Electricity: fixed charges) and Senate Bill 1326 (located in SB-1326 Electricity: fixed charges).
Cyane Dandridge	Section 2.2: Intervention 6, typo: are responsible the majority should be responsible for the majority	This edit has been made.
Cyane Dandridge	Section 2.3: The first bullet referring to strategic intervention 1 will only have a positive outcome for ESJ communities if there is a focus on bulk purchase with MF properties in ESJ communities, which is not explicitly stated.	This is our intention, and we edited the section to make it clearer.
Cyane Dandridge	Section 2.4: Please use local maintenance or small contractor in place of handyman	This edit has been made.

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Randall Higa	Section 2.1.4, last bullet: Define what is meant by "regulatory resistance…". EPA regulations allow R290 (propane) for these products (see SNAP Rules), as long as the products are certified to appropriate safety standards. Current safety standards do allow for very small charge (~114g), albeit that quantity is not adequate for capacities needed in this product. CalMTA should be cautious about promoting products that safety experts deem as non-compliant to current safety standards.	We have revised the barrier to be clearer. It now says, "U.S. safety regulations restrict the charge level of room heat pumps below what is deemed safe in Europe."
Randall Higa	Section 2.1.6, 3rd bullet: What is meant by "ultra-low GWP". The statement "Policies have changed in California that … allow manufacturers to use ultra-low and natural refrigerants in their RHP products" is misleading because CA policy does not go beyond safety standards mentioned above, which effectively do not allow propane due to safety concerns.	In this section, we are describing a future market state that would indicate that the MTI could begin transitioning out of the market where these refrigerants could be used by manufacturers. CalMTA's role would be supportive of others doing this work across the required state and national bodies/policies that touch regulations on this. We have revised the language of this bullet to describe it as a future market state.
Randall Higa	Section 2.1.7 last bullet: CARB requirements mandated 750 GWP or less for all RHP manufactured effective 1/1/2023, so "low GWP" is already in place in CA. (This is mentioned on p.33, which should be referenced earlier when discussing the topic)	We have provided a revised definition of "low GWP" in previous sections and are targeting products that are less than 150 that are not currently on the market.
Randall Higa	Section 2.1.8: Extreme care must be taken when considering potential risks. Smoking could be an ignition source for leaked refrigerants, even a release in small quantities. Even 30g to 40g of hydrocarbon can cause extremely violent. An RHP would likely have about 10X the refrigerant quantity as a household refrigerator.	We agree that extreme caution should be taken in adjusting safety requirements for flammable refrigerants within residential buildings. Our intent is to follow the guidance of experts and the best available data as to what are safe charge limits for RHPs with class A3 refrigerants. CalMTA will be supporting other experts in this field in compliance with safety concerns.
Randall Higa	Section 2.1.9: Theory / Assumption, 5th bullet: CalMTA & CPUC should be cautious with "lab testing" aspect that would be used to show hydrocarbon product is safe. Funding could be provided, but the actual testing and safety standard development should be left to experts. Significant testing/research will be necessary to allay safety concerns.	We agree that any safety testing would be led by and performed by experts in the field and well-respected laboratories. CalMTA's role will be to provide support to other experts doing this work. We have revised the intervention language to reflect this.

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Randall Higa	Section 2.2: Strategic interventions, initiative #7 (p.25-26): Even a "small amount" of a hydrocarbon refrigerant can be dangerous. CalMTA should more clearly state what is meant by "regulatory resistance." The "opportunities" listed are not a function of Low GWP. There are already initiatives in place to consider propane (and other) refrigerants. Proposals have been submitted to ASHRAE 15.2 to allow use in "indirect" systems (but RHP is not "indirect").	CalMTA is aware that hydrocarbon refrigerants can present risks. We are relying on experts to determine what level of hydrocarbon refrigerant is safe for use in a RHP. We look towards the regulations in Europe as an indication that there may be safe charge levels above what is currently allowed in the US and would be in support of further research and discussion by experts to determine whether an adjustment to the charge limits can be made that maintains a high level of safety for consumers.
Randall Higa	Section 2.1.9: Theory/Assumptions, 3rd bullet: Care should be taken to ensure good comparison of samples to where the product is most likely to be used, especially ensuring adequate documentation of actual ambient conditions (dry bulb and wet bulb temperatures) to determine impact. Assumption is "best use" cases – what about "worst use" cases?	We agree that all field data are not created equal, and we will strive to generate and obtain high-quality field data with sufficient detail to assess product performance and compare energy usage across different locations and products.
Randall Higa	Section 2.1, Page 12: Are RHPs available as VCHPs? Since RHPs are presumedly less expensive and less efficient than a ductless mini-split unit, are they as cost-effective over the life of the equipment?	There are several variable-capacity heat pumps available in the RHP category currently, and our understanding from talking to manufacturers is that all RHPs will be variable capacity starting in 2026 to meet the more stringent CEER standards. The two new saddlebag RHPs are variable capacity and have comparable efficiency to ductless mini-split heat pumps, so the cost to operate the RHPs should be comparable to ductless mini-splits (although there is limited data on their reliability or typical lifespan since they are new products).
Randall Higa	Section 2.1, Page 13: Note that the largest concentration of electric resistance spacing heating homes may be at Leisure World Laguna Hills and Seal Beach where there are over 10,000 homes that were built with electric resistance ceiling cable heating systems. Upon a recent visit to Seal Beach, ~5 to 10% of the homes had mini-split outdoor its in front of their homes. SCE did offer heat pump incentives in the early 1990s, but it is unclear how many units still have electric resistance heating. However, as stated above, the majority of homes in California have gas	This is a good opportunity to pursue as we look toward target areas for early adoption.

Source	Feedback provided	CalMTA response
	heating. Another target may be those areas where zonal electrification occurs in areas where gas lines which require expensive maintenance are not repaired and equipment is replaced to become all-electric.	
Randall Higa	Section 2.1, Page 14, last bullet: Lower GWP refrigerants may also have toxicity issues. The barrier is also the fact that RHPs are indoors or partially indoors which causes more concerns for more flammable and toxic refrigerants.	We agree that any introduction of a new refrigerant can have unintended consequences. We are adding a comment to the MTI plan stating the intent of CalMTA to follow the guidance of experts and scientific research to ensure that any refrigerant options promoted by CalMTA follows all required guidelines and is free from any known potential negative consequences for consumers.
Randall Higa	Section 2.1, Page 14: Portable HPs can be quite noisy especially at higher speeds.	CalMTA acknowledges that this could be a barrier but did not feel that it rose to the level of "key barriers." The noise of portable heat pumps is an issue that may reduce customer satisfaction. The new styles of saddlebag and U-shape have the outdoor fan and compressor isolated from the indoors and operate much more quietly thus increasing customer satisfaction. CalMTA anticipates that once we have more products that fit more windows of California building stock and are suitable for the state's climates zones, this MTI will prioritize the saddlebag and U-shaped heat pumps because we anticipate that consumers will prefer these forms over portable versions, and they are more efficient.
Randall Higa	Section 2.1, Page 14: This seems to be missing some key behavioral market barriers that were called out in Appendix C. Key among them: Customers need to coordinate operation of a RHP with any central HVAC, and customers need to change their behavior by using a RHP instead of the central HVAC.	CalMTA acknowledges that this could be a barrier but did not feel that it rose to the level of "key barriers." We will track this barrier through consumer and manufacturer engagement and then identify key messages and consumer instructions to include in RHP consumer education. Space conditioning is a common customer strategy to reduce central HVAC and we thinks this barrier will be overcome by partnering with manufacturers, consumer messaging, and growing familiarity with the operation of these products.
Randall Higa	Section 2.1, Page 14: These are promising market trends and forces, and their contribution to the market adoption curve needs to be presented.	These market dynamics informed the model and market adoption forecasts. See Appendix B for details.

Source	Feedback provided	CalMTA response
Randall Higa	Section 2.1, Page 15: There is an opportunity to improve the ducting of portable HPs through casement windows that require windows to be partially open with uninsulated duct collar assemblies.	Our main priority is to make sure consumers with slider and casement windows have a future product that is comparable in performance to those offered for double hung windows. When we work with manufacturers, we will also encourage improvements to portable units, installation kits, and sealing. This has been added to the section under Intervention 1 - Manufacturer Engagement. This work has already begun based on lessons learned from the RHP installation pilot with direct feedback to the manufacturer of things we have learned through the pilot.
Randall Higa	Section 2.1, Page 15: Sufficiently low first cost and operating costs should also be included.	We say in the first bullet "affordable ENERGY STAR certified RHPs exist in the market." Inherent in the ENERGY STAR process is consideration of both affordable and lower first cost, which the MTI effort will track this over time.
Randall Higa	Section 2.1, Page 15: MTI should note that air quality regulations may soon disallow gas appliances from being sold.	We are aware of possible air quality regulations and have engaged CARB and the other air quality districts on how their future regulations may apply or impact RHP adoption. They were supportive of CalMTA's focus on this product as it will fill a HP product gap for multifamily and small spaces. Yet, we hesitate at this time to include this as a large part of the strategy and exit strategy because of to the uncertainty of timing and impact. Although these regulations will likely help RHP adoptions, CalMTA believes this MTI will be successful without a gas ban. In addition, if the gas bans do go into effect, we think many gas wall furnaces in existing buildings will likely last for a long time, so the existing building stock will only gradually change with such a ban.
Randall Higa	Section 2.1.6, Page 15: Please define or give a sense of what is meant by "wide assortment", "sufficient product selection" and "increasing market share".	These are all metrics that we will be tracking and details on milestones are included in Appendix F: Evaluation Plan.
Randall Higa	Section 2.1.7, Page 15: The 2nd and 3rd scenarios “roll up” into the first scenario. Achieving the 2nd and 3rd scenario without achieving the first indicates that the MTI has failed to win hearts and minds.	We expect to succeed at all four outcomes listed in this section.

Source	Feedback provided	CalMTA response
Randall Higa	Section 2.1.7, Page 15: First bullet, add, "or gas" after "resistance." Also, is the word "backup" necessary (the 2nd bullet uses the term "primary heating")	We have added the word "gas" to the first bullet and removed the term "backup."
Randall Higa	Section 2.1, Page 16: In addition to "electrification-friendly rates" there needs to be mentioned that RHP efficiencies need to also increase to reduce operating costs.	This edit has been made.
Randall Higa	Section 2.1.8, Page 16: Regarding "landlord restrictions" can there be any landlord restrictions for RHPs, especially where electricity may be master metered?	If the units are master metered, then there likely would be no restrictions as the building owner would make that decision. For renters, their building owners may restrict installation based on window configuration requirements or a preference for more permanently installed devices.
Randall Higa	Section 2.1, Page 17, 1st major bullet, 1st secondary bullet: Add the California goal of carbon neutrality by 2045 since this MTI will extend past 2030.	This edit has been made.
	Section 2.1, Page 18: Add something like, "If manufacturers have a "commodity" line of RHPs."	This is certainly in line with the MTI's approach as we would need to move these products to commodity-like products to be successful.
Randall Higa	Section 2.2, Page 19: Add something like, "commodity product line targeted for sale in big box, home improvement, and other types of mass market retailers." Also, when discussing products for slider and casement windows, it must address the ducting configuration for portable HPs. There also should be a comment addressing sealing (and installation in general) of HPs and ducts that are mounted in windows.	Please see comment above. In addition, we have added language to the manufacturer engagement strategy and product assessment plan to work to improve installation kits for RHPs including the portable units.
Randall Higa	Section 2.2, Page 22, 23, 24: Replace "electric resistant" with "electric resistance and gas". It may also be worthwhile to mention that SCAQMD/BAAQMD will be disallowing the sale of gas heating appliance during the life of this MTI causing the market to be more dependent on affordable (to buy and operate) RHPs.	This is included in the market opportunities bullet "Public health and clean energy momentum is driving an overall push for heat pump adoption." When this happens, this will help the sale of RHPs, but we do not think the program is dependent on it as mentioned in previous sections.
Randall Higa	Section 2.2, Page 24: For opportunities, improved labeling may be something that the Federal Trade Commission has under their	We will explore how FTC labeling unfolds for this new product category and how this impacts the overall labeling and consumer

Source	Feedback provided	CalMTA response
	jurisdiction (i.e., EnergyGuide Labeling)? This comment may be applicable on other pages as well.	descriptions of RHPs as part of the manufacturer and national collaborative interventions.
Randall Higa	Section 2.5, General: The adopted market transformation framework states that the MTIs shall be assessed using TRC and PAC with a focus on modifying three categories: C&S savings, timeframe of costs and benefits, and net-to-gross methodology. This plan should follow the MTI guidance per ordering paragraph (OP) 11 in D.19-12-021. In the section on "Inclusion of C&S into the CE Methodology", the market transformation framework directs the MTA to address: What is the methodology for calculating and including voluntary vs enforceable C&S? What is the "timeframe of costs & benefits separate from C&S"? What is the "Net-to-gross methodology" (for incentive programs)? In particular, the C&S savings should be called out as a separate category of savings from incentive-driven savings, and the plan should provide a rough timeframe of when C&S savings might occur (to be revisited and updated with each annual market progress report). The methodology of the C&S savings calculation should also be made clear. While there is a detailed discussion of which S-curve is most appropriate for the MTI, the adoption graphs shows what are essentially straight lines. Typical C&S savings graphs show a non-linear and large increase in savings and adoption once a code or standard has been adopted. The CalMTA's Evaluation Framework further states: " CalMTA will conduct and share additional research and analysis during Phase II of the MTI lifecycle: we will refine the MTI market adoption and baseline forecasts, estimate TSB and cost effectiveness using the 3X rule, and conduct sensitivity analyses to understand the implications associated with different market adoption curves." This analysis needs to be included in the submitted MTI application.	The RHP MTI does not count savings associated with enforceable Codes & Standards. However, in future MTIs that do include pursuit of enforceable codes or standards, we agreed to use the 3X rule prescribed by the decision. CalMTA is unaware of any Decision guidance regarding voluntary standards (nor of the existence of voluntary building codes). As noted in another response, CalMTA analysis doesn't include benefits specific to voluntary standards such as ENERGY STAR; MT initiatives use voluntary specifications and standards as a tool to influence product availability and to drive innovation to increasingly higher standards. Such voluntary standards are not an end unto themselves but rather, a means to achieve accelerated/increased market adoption of energy efficient products. The three methodology "modifications" used to calculate cost-effectiveness of the RHP and other MTIs is documented in the MTI Evaluation Framework, and for each MTI in Appendix B of the MTI Plan, including the "net-to-gross" methodology. The MTI Evaluation Framework states that we will conduct sensitivity analysis to better understand usage of the "3X rule" vs. alternatives, however, the RHP MTI doesn't apply the 3X rule or claim any savings from mandatory codes & standards, so there would be nothing to analyze for this MTI.

Source	Feedback provided	CalMTA response
Christie Torok	Section 3.2: This intro refers to RHPs, but the rest of the section mostly references WHP or PHP. It's a little confusing, and probably should be reviewed to make sure the terms are being used intentionally/correctly throughout.	In certain areas, we specifically refer to window heat pumps (WHP) or portable heat pumps (PHP) when we are referencing a feature or the performance that is specific to one of these product types, but in the Competitive Analysis section (3.2) the majority of these comments apply to all MTI products and should be referring to RHP generally. We have updated this section to correct the inadvertent use of WHP within this section.
Christie Torok	Section 3.2.1: Is there a reason for using Window Heat Pump here and Room Heat Pump elsewhere?	As with the above comment, in this case it should be RHP and has been corrected.
Christie Torok	Section 3.3: Should this just say "RHPs"?	This edit has been made.
Christie Torok	Section 3.3.4, Figure 5: How is the y axis reflecting kWh when the light blue line includes natural gas heating use?	In this case, the natural gas energy was converted to kWh, but for clarity and consistency, we are revising the graph to units of BTU, which is more common for fuel neutral energy consumption.
Christie Torok	Section: 3.3.4: "I'm confused about terminology. I thought Room HP was both free standing (i.e. portable) or window ("WHP"). So it would seem like the title to the chart should say RHP, and the two rows should be 'PHP" and "WHP" I did notice a reference to 'through the wall' HP in the product definition discussion, which is hardly discussed. Was that a mistake?"	The naming on this graph has been updated. Through-the-wall products are a sub-category of room heat pumps, but it does not include packaged terminal heat pumps (PTHP). This is purposely a part of the product definition since CalMTA believes there is an opportunity to replace existing through-the-wall air conditioners. It is not mentioned extensively since this is a relatively minor part of the overall strategy.
Christie Torok	Section 3.3.4, Figure 6: I'm not understanding this chart. The x-axis isn't labeled (are these dollars per month)? Does this show a monthly savings of $153? The paragraph above says something about $51 savings per month which I don't see.	This is the annual bill impact, not monthly. The x-axis will also be labeled for more clarity. The numbers that correspond to the graph are in the preceding paragraph.
Randall Higa	Section 3.1: Capacity targeted is 8,000 to 14,000 Btu/h. While that encompasses most of the market, there is still substantial volume at greater than 14,000 Btu/h.	This range is just a guide and not a hard limit, but it is based upon the requirement that a RHP be plugged into a 15A circuit. The majority of RHP/WHP above 14kBTU are 240V (and possible some 120V/20A).
Randall Higa	Section 3.4: Better air filtration will require more fan power. Many RHP products today have filters that are MERV 1 to MERV 4.	The potential competing factors of filtration efficiency and energy consumption are noted in Section 2.4 of Appendix C. In talking with

Source	Feedback provided	CalMTA response
	Going to MERV 13 is going to require significantly more fan power.	manufacturers, it appears that the required fan penalty for high efficiency filtration is less on RHPs compared with central HVAC systems, since the overall fan power required is less in a single zone system compared to a central ducted one. We believe this is a consideration that needs to be addressed through normal product development.
Randall Higa	Section 4.1.1: To avoid confusing terminology, don't say "heat pump enabled room AC" instead just say room heat pump (if that term includes window and portable).	This edit has been made.
Randall Higa	Section 4.1.1: As opposed to 'through the wall'? I'm confused as to the role of 'through the wall' units in this MTI	This edit has been made.
Randall Higa	Section 4.2, Table 5: Should this just say "RHP". The whole doc needs a review for consistent and efficient terminology regarding portable HP, WHP, PHP, RHP, window HP, and HP enabled window AC/portable AC. Not sure where through the wall fits in.	This edit has been made.
Randall Higa	Section 4.1.3: "RHP can provide savings in large homes by providing zonal heating and cooling". Is CalMTA promoting replacement of central split systems with RHP or portable heat pumps (PHP)?	This edit has been made.
Christie Torok	Section 5.2, Table 6: Shouldn't ZEEP be on this list? Or is that included in local and regional incentive programs.	Programs that were still in the launch or planning phase during development of the MTI Plan are not included in the table. However, the language below the table references "other equity-focused residential electrification programs like PG&E's zonal equity electrification pilot" and ZEEP is included in the list of programs flagged for future coordination in Appendix E.
Randall Higa	Section 5, General: The MTI Plan does not seem to contain all the elements of D.19-12-021 Appendix C: Content Requirements for Market Transformation Initiative Plan. It would be useful for the CalMTA to include in their cover letter the list of required elements and where the reader should go to find that element. For the RPH MTI Plan, more details are needed on RA program coordination, and in particular, the nature of their active "support	CalMTA has ongoing coordination meetings with program administrators (PAs), the Codes & Standards working group, the California Energy Commission and others. Those will continue throughout the lifetime of the MTI and integrate firms that are ultimately chosen for third-party implementation in Phase III: Market Deployment. Appendix E lays out the approach to aligning the MTIs with the EE portfolio of programs. Because we are over a

Source	Feedback provided	CalMTA response
	from and coordination with" the proposed MTI. " If the MTI includes an existing RA program, present a RA coordination plan that demonstrates support from, and coordination with, all related RA programs. This plan could offer a fixed free-ridership rate for the resource programs for an interim period. This plan may also present a schedule and process for updating free ridership assumptions and for phasing out the resource programs altogether over the longer- term, in sync with the progress of the Market Transformation Initiative." D.19-12-021, p. 163. Specifically, name the programs that you expect to offer incentives, and explain if you are proposing a change to free ridership, a plan to ramp down incentives, or other options. For Room HPs, the relevant existing programs likely include the Statewide HVAC program or the Statewide Plug Loads & Appliances programs. Per the Decision: What are the positive overlaps? What are the negative overlaps? What have those programs agreed to do, in support of or coordination with this MTI? How will this MTI impact their savings potential over the duration of the MTI, or at minimum, in the next 1-2 years, which is when this MTI expects utility incentives to be offered.	year out from implementation, it would be difficult to define specifically what this would look like at this stage. We have met with most of the PA leads for the priority programs listed in Table 2 and will continue to meet with them through 2025, as they plan for program updates, to agree on the details to be included in the RFPs issued to solicit implementers for the initiative. Bidders will be required to respond to how they will address this coordination. Work plans to guide this future collaboration will be co-created with PAs that have incentives in the future or other program aspects related to the RHP initiative. This work plan would describe alignment between the MTI and programs and mitigate any overlaps. Savings attribution approached are explained in the MTI Evaluation Framework.
Randall Higa	Section 5, General: The MTI plan suggests that the Energy Savings Assistance (ESA) Program in the income qualified assistance programs proceeding may be leveraged to help offset costs of bulk purchasing. Have the ESA program administrators agreed to this and do they have the ability to coordinate with this MTI? How will this MTI impact the ESA's ability to meet goals? How will attribution for market adoption be shared with the Income Qualified Programs?	CalMTA has participated in multiple meetings with the ESA implementation teams and is supporting development of a room heat pump measure package for potential eTRM submittal in collaboration with PG&E's program management team. The opportunity for bulk purchase of products has been raised. In general, market transformation will increase the availability of products that are appropriate for California climates and buildings stock at a broader range of price points. This will enable ESA programs to be more successful. The approach to savings attribution is described in the MTI Evaluation Framework.
Christie Torok	Section 6, Page 48: Either footnote the decision number or replace this with D.19-12-021	This edit has been made.

Source	Feedback provided	CalMTA response
Randall Higa	Section 7: MT Framework calls for a net-to-gross methodology, likely for the incentive-based interventions. Please provide this information.	CalMTA refers to its "net-to-gross" methodology as "net incremental impacts." The equation for calculating that appears in the MTI Evaluation Framework and in Appendix B of the MTI Plan.
Christie Torok	Section 8, Page 52: Lobbying for electric rate structures it a big, expensive and highly uncertain undertaking. There is a rates proceeding and team at CPUC, of course, and it may make sense to check in with them to understand what and when the income graduated fixed charge will do, and what the prospects are for electrification friendly rates. I am assuming you are using CARE rates for ESJ communities in all the bill impact analysis, correct?	We agree that it would be important to talk with CPUC team who currently work on this to better understand how CalMTA and this MTI can be supportive to this process. As mentioned in an earlier comment response, we have looked at CARE rates and impacts to ESJ consumers.
Randall Higa	Section 8: Include a discussion of exit criteria if a high or medium risk materializes that cannot be mitigated. Do any of these risks, particularly the ""high severity"" risks, mean that an MTI would not succeed? Ideally, the high severity risks would be addressed during Stage 4 ""Strategy Testing"" so that CalMTA could "abort further spending on the MTI"". If the CPUC approves this plan, these risks need to be mitigated early in the MTI so that ratepayer funds are not expended on an MTI that has low probability of succeeding.	We agree that high risks need to be mitigated early in the life of the MTI to avoid large investments of rate payer funds being spent on something that may not work out. We have detailed what we mean by severity of risks in the instructions to the reader in Appendix G. We will monitor all risks carefully but especially the two in the risk table that we have labeled as potentially having "high" impact. The first involves manufacturer response to being able to meet our product needs for California. Based on conversations that we have already had with manufacturers; we have labeled the probability of this risk occurring as "low." In addition, this is one of the first interventions CalMTA will implement, so we will know early if this really is a problem. The second risk labeled as "high" is the overall movement to more electrification-friendly rates. As we have stated, we see CalMTA's role in this as supportive (and it impacts all measures that move consumers to electric products), but we also see this as having a "low" probability of occurring given current momentum on this in CA, especially on impacts to the ESJ communities who will most benefit from RHPs.
Randall Higa	Section 8: Describe how the mitigation approach of "reward the one known manufacturer that currently has the product with the entire MF order" ensures that the single-manufacturer supply chain can absorb this demand.	We know that one manufacturer has a product that could likely fit in slider windows because it is available in Europe and our manufacturer contacts have expressed interest in bringing this product to the CA market. If they end up being the only

Source	Feedback provided	CalMTA response
		manufacturer to respond to the tech challenge, then they will get a very large, guaranteed order for RHPs and this will create interest on the part of other manufacturers who will see the opportunity over time. We do not think this will result in a supply chain issue because the manufacturer is a large, well-establish and this product is not in the R&D phase. This is much like how the NYCHA Tech Challenge in New York has played out.
Randall Higa	Appendix B, General: Per D.19-12-021, p. 73: "In particular, we are concerned about the process for setting savings goals and attributing savings to particular programs and program administrators." These need to be included in this plan. The cost-effectiveness needs to include costs and benefits of C&S. Where are the benefits of C&S from ENERGY STAR and CEE specifications shown? The impacts of these specifications need to be specified in the BMA, so that stakeholders can see that they are appropriately sized and excluded from CalMTA claims.	The process for setting savings goals and attributing savings were addressed in the MTI Evaluation Framework. The RHP cost-effectiveness includes all program costs. It doesn't include benefits specific to ENERGY STAR and CEE specifications. MT initiatives use voluntary specifications and standards as a tool to influence product availability and to drive innovation to increasingly higher standards. Such voluntary standards are not an end unto themselves, but rather, a means to an end which is accelerated/increased market adoption of energy efficient products.
Randall Higa	Appendix B, General: It is unclear what the MTI program baseline is because it is unclear what is included in the BMA. For greater clarity, and to allow assessment of the CalMTA's estimates feeding into BMA, the BMA/TMA figures should break out C&S savings and RA program savings, per the market transformation decision.	There are no C&S or RA program savings assumed in the RHP BMA because there is currently extremely minimal market adoption of qualified products. As noted in the MTI Evaluation Framework, the BMA only includes RA units in cases where there is already an existing program. For programs that result from collaboration with the MTI, CalMTA subtracts all forecasted PA units and savings from TMA-BMA and associated savings. With regard to clarifying what is in BMA, Appendix B describes the approach used to forecast CalMTA's market adoption. A third-party evaluator will perform a comprehensive review of CalMTA's market adoption model in the Year 1 MTI evaluation.
Randall Higa	Appendix B, Page 6: The BMA seems to be vastly underestimated, reaching only 3% by the end of 20 years for both SF and MF households. The SF estimate seems to correspond to the 25% Delphi Panel estimate, but the MF estimate seems far	The low saturation in 2045 in the baseline is driven by current unavailability of CA-appropriate products (Type-2/3 products that fit sliding windows, which are the dominant form of CA windows). The barrier is detailed in the MTI plan. The assumptions, data

Source	Feedback provided	CalMTA response
	below even the Delphi Panel's 25% estimates, even though the Delphi Panel agreed that adoption in MF households would be more promising. The anecdotes, market data, survey data and other sources of data used by the CalMTA to develop the BMA should be shared in this plan, and the weighting of these other data should be described clearly.	sources and rationale for adoption are detailed in Section 4 of Appendix B.
Randall Higa	Appendix B, Page 6: These figures don't show the non-linear increase in adoption due to upcoming ENERGY STAR specifications, upcoming CEE specifications and associated IRA incentives. This has the potential for CalMTA to claim credit for ENERGY STAR, CEE, and IRA incentives-driven adoption. How will those impacts be accounted for? If these are supposed to be part of the BMA, then it seems unlikely that they would be lumped in with all other interventions and only be credited with the adoption of fewer than 244K units (Table 1), while the MTI would be credited with 1,429K units, at the end of 20 years.	We don't anticipate a non-linear increase in adoption due to the ENERGY STAR and CEE specifications. New specifications don't generally produce that type of impact without accompanying programs and incentives. The impact of IRA incentives is assumed to be small in the BMA forecast because it's unclear when RHP units will become qualified and how many qualified units there will be. In addition, we wouldn't expect there to be a large increase in adoption without the MTI interventions focused on manufacturers to bring California-appropriate units to market.
Randall Higa	Appendix B, Page 7: Note that the C&S program savings also only reflect savings within IOU service territories, not statewide savings. The share of savings that accrue to the C&S programs will actually need to be increased to account for the share that is claimed by LADWP and SMUD and other POUs. That share is not included in the California Energy Data and Reporting System (CEDARS), so simply subtracting CEDARS savings is not sufficient. This is just one example of how subtracting RA savings claimed on CEDARS would overestimate the MTI's impact. CalMTA should explain how these issues will be addressed in the BMA and TMA estimates.	No C&S savings are claimed for the RHPs or Induction Cooking MTIs.
Randall Higa	Appendix B, Page 8: The GHG benefits need to be broken out by product efficiency vs fuel substitution, in case electrification rates do not change since that is named as a high severity risk. What are the TSB without fuel substitution? Because there are so many	CalMTA is running a scenario that assumes no fuel substitution use cases and will report the resulting changes to TSB and cost-effectiveness in Appendix B.

Source	Feedback provided	CalMTA response
	contingencies and factors yet unknown, it may be useful for the CalMTA to model different scenarios to demonstrate that TRC and TSB benefits would still warrant funding of the MTI even if the high severity risks materialize.	
Randall Higa	Appendix B, Page 16: Please provide more details about the discussions with manufacturers and subject matter experts. Did they concur that CA-appropriate RHPs would not be commercially available until 2036, even with the IRA incentives and upcoming CEE/ENERGY STAR specifications?	CalMTA's product and strategy team have had multiple conversations with a subset of RHP manufacturers. In those discussion, manufacturers were largely unaware of the specific needs of California climate and window sizes. As mentioned earlier in the Section 2.2 strategy sections, manufacturers to date have largely been focused on the needs of other climate zones like the Northeast part of the country whose housing stock has larger numbers of older, double-hung windows and colder climate needs. RHPs are a newer product category, so it is not surprising that manufacturers were not yet focused on products specific for California market. For the BMA, we estimated that they would, eventually, focus on this product gap and deliver appropriate products to the California market. This estimation was based on professional experience in working with manufacturers on other HVAC products and product development cycles. The impact of IRA incentives is assumed to be small in the BMA forecast because it's unclear when RHP units will become qualified and how many qualified units there will be. In addition, we wouldn't expect there to be a large increase in adoption without the MTI interventions focused on manufacturers to bring California-appropriate units to market.
Randall Higa	Appendix B, Page 17: The estimated baseline adoption rate is very low, only 2–2.5% by 2045 and "the year of saturation to be 2067 in the absence of the MTI". The BMA estimation result implies that, in the absence of the proposed MTI, very low building electrification would be achieved for homes that can be electrified using RHPs by 2045, when the state is expected to	The BMA forecast specifically focuses on RHPs as a distinct product category and should not be interpreted as a comprehensive projection of heat pump adoption in California. The low adoption rate reflects the market dynamics for RHPs - specifically limited availability of CA-appropriate products. In absence of CA-appropriate products, households in the market for zonal HPs are

Source	Feedback provided	CalMTA response
	achieve carbon neutrality. Did the BMA estimation properly consider existing, expected, and possible market intervention related to state policy goals, regulations, building electrification initiatives? (Continued from first feedback form due to length) • Achieving carbon neutrality (See second feedback form) • Achieving carbon neutrality by 2045 • CEC's efforts on achieving 6 million heat pump installations by 2030 • CEC Equitable Building Decarbonization Program • Air quality management district and California Air Resources Board (CARB) zero-emission space and water heater standards. • Title 24 advocacy on all-electric design requirements • Page 17: While the Appendix states that ""similar"" technology adoption curves were used, EVs and mobile networks do not come immediately to mind as ""similar"" technologies. Please explain how EVs and mobile network adoption curves are appropriately similar technologies for the purpose of modeling RHP adoption.	expected to purchase mini-splits as is discussed in Sections 4.2 and 4.3. Further, low BMA for single family is a result of our assumptions that single-family households with central systems (the majority of single-family households) will largely adopt central HPs for HVAC. Trends for the adoption of other technologies by residential sector were used to inform the effect of policy interventions on S-curve parameters. We changed the text to remove the word "similar."
Randall Higa	Appendix B, Page 28: The reasoning behind Table 16 could be clarified to better explain the attribution of RHP adoption. If programs are expected to offer incentives for RHPs within a year or two, while the MTI is still in its early stages and Type 2/Type 3 window heat pumps (WHP) are not yet available, it raises questions about the attribution of only 10% of RHP adoption to these programs. It would be helpful to specify who is responsible for the remaining 90% of adoption. It's unusual to propose an inverted-V attribution curve if there are only two market actors being considered.	The net incremental adoption (TMA minus BMA minus units due to PA-verified savings) are attributed to the MTI. We updated the content to mention it explicitly in this section. We also discuss this in the Executive Summary. The 10% attribution during early stages of the program are expected to be incentivize adoption of currently available models of portable heat pumps and windows heat pumps that fit vertical windows. We do not have any information to conclude that the suggested schedule is unusual.

Source	Feedback provided	CalMTA response
Randall Higa	Appendix B, Page 33: Can you show the weighting of each of these replacement/displacement scenarios in the development of the BMA and TMA?	The information is provided in the table in Section 4.5 (allocation of net incremental adoption of RHPs to various modeled installation conditions).
Randall Higa	Appendix B, Page 37: In Table 23, does "RHP" mean only WHPs, or does mean either WHPs and PHPs? Please clarify. (The earlier discussion pointed to the limited product efficiency improvements for PHPs.)	RHP here refers to WHP. We've now changed RHP to WHP in this table.
Randall Higa	Appendix B, Page 49: Although this Attachment states that BMA uses the Delphi Panel's estimates of shape and steepness of the adoption curve, the rest of the Plan seems to only use the shape and steepness of the SF household adoption forecasts. The Delphi Panel seemed to think that adoption by MF households would be faster and sooner than SF households, and there seemed to be greater agreement about this than for the SF adoption forecast. Please explain. Using the SF forecast vs. the MF forecast would err on the side of being slower. The BMA should err on the side of being faster and sooner.	The S-curve fitted on median of multifamily and single-family forecasts by the Delphi yielded similar rate of growth for both (approximately 0.10; Table 10), and year or inflections and years to reach saturation (Table 9). The multifamily and single-family curves differed in terms of maximum market potential and is consistent with the assumptions as reflected in Table 10.
Randall Higa	Appendix C, General: Why was appliance recycling strategy pilot not implemented? Were there any lessons learned from further development of that strategy pilot that warranted its cancellation (and what did CalMTA do with the remaining budget)?	While CalMTA's original plan for the Strategy Pilot included holding in-store AC turn-in events as a third objective, this portion of the pilot was ultimately removed from the scope after participating retailers communicated that they were unable to have room heat pumps available in time for a summer event. CalMTA will continue to monitor the market to identify optimal timing for revisiting this pilot component, potentially in Phase III: Market Deployment. All changes in Strategy Pilot scope were, and will continue to be, shared with and guided by the Market Transformation Advisory Board (MTAB).
Randall Higa	Appendix C, Page 19: Ideally, the severity and extent of the "negative interactive effects between RHP and a central HVAC system would be tested and known prior to the MTI plan. What is the contingency if it turns out that these negative effects cannot	We agree this is something CalMTA intends to continue to explore and understand better, but we should note that the behavior of offsetting central HVAC with window AC and space heaters is something that consumers have done for decades. We know many people use this as a bill reduction strategy, which can work similarly

Source	Feedback provided	CalMTA response
	be mitigated by behavioral interventions? Are there any dependencies between this study and other MTI activities?	for RHPs. We believe there is a clear path forward to savings through this same behavior with RHPs. The one caveat would be to increase customer awareness and education to keep HPs in either cooling or heating only mode (depending upon the season) to ensure the HP doesn't work against the central system (i.e., the heat pump cooling while a central gas furnace is trying to heat). We think there are additional benefits through automated control between a central HVAC and RHP and also demand response behavior, but we see these as efforts that can be refined and improved in the future.
Randall Higa	Appendix C, General: This MTI proposes a need for Type 2 and Type 3 RHPs because existing RHPs optimized for cold climate may be less efficient and may be more costly/heavier. To further strengthen this argument, CalMTA should provide a comparison of the relative efficiency/cost/weight of the existing Type 1 and Type 4 products in the market and provide an estimate of the efficiency/cost/weight of Type 2 and Type 3 products using linear interpolation.	We agree that the cost versus performance balance is very important for the success of RHP adoption, particularly with ESJ consumers. We have indications that products coming to market in 2025 will significantly improve the first-cost affordability of RHPs while maintaining acceptable performance. From early indicators, this price versus performance of new Type 2/3 products would be different than a simple projection and thus we feel it is more important to let the new products speak for themselves when they are announced within the next year.
Randall Higa	Appendix C, Page 21: CalMTA should explain the degree to which energy efficiency is affected by filtration is already known. What is the timing of this study, and are there any dependencies of other activities upon the results of this study? Are the costs of the monthly filter replacements included in the cost-effectiveness consideration?	There are several existing studies on the addition of MERV 13 filtration to central ducted HVAC systems that are reported in Appendix C section 3.2. The cost of filters is not currently included in cost effectiveness, but the benefits of improved air quality are also not quantified.
Randall Higa	Appendix C, Page 36: Has the CEC indicated interest in setting standards that ban window ACs with resistance heating from being sold in California? If so, please provide documentation or reference.	The statement in this section was only referring to what is currently possible in code, but we do not have any indication that there is a plan to create a ban on resistance heating. We removed this statement to avoid confusion.
Randall Higa	Appendix E, General: Per D.19-12-021, there needs to be a Rolling Portfolio Coordination Plan, with Stage 3 delivering the initial development of a Rolling Portfolio coordination plan. How	We have completed the necessary market characterization research, product assessment, and other research during Phase II to deliver the plan of action represented in the MTI Plan. As a new

Source	Feedback provided	CalMTA response
	does this MTI impact the existing programs (including Resource Acquisition, Market Support, Equity, and C&S)? Please see comments on Appendix B.	technology in a dynamic marketplace, there may be aspects of the RHP technology that are unknown at the start of Phase III. This is a common situation for long-term market transformation. While the CPUC reviews this MTI, we will continue to work with manufacturers and acquire more data on the use of RHPs. Waiting, however, runs the risk that this technology will evolve without the needs of the California market being met in the near term. We created the MTI plan template modeled from Appendix C D.19-12-021 and believe all aspects have been fully addressed.
Randall Higa	Appendix F, Page 10: 4 RHP products with air filtration - Type 2 and 3 only, correct? Please specify.	No, this milestone is not specific to Type 2 and Type 3 units. The milestone pertains to the four RHP products of any type, which is an important first step/milestone to broader market adoption in the long term.
Randall Higa	Appendix F, Page 15: The MTI Plan should subtract the gross savings from the PA programs. Otherwise, this MTI is likely claiming market effects caused by the PA programs that have been in the market for decades. There may be clever ways to attribute the delta between gross and net savings claims, such as collaborating with the impacted program to freeze or change their net-to-gross ratio as suggested by the CPUC. Such details should be explained further in the in a Rolling Portfolio Coordination Plan, or in the cost effectiveness section discussing net-to-gross methodology (per the Decision).	CalMTA will subtract net savings (rather than gross savings) because market effects caused by PA programs are included in the BMA forecast, which anticipates market adoption resulting from market, technology, program, and policy trends. This issue was discussed when the MTI Evaluation Framework was being developed. It's also worth noting that RHPs have not been actively promoted by PA programs but will revisit if incentives are added to programs in the future. CalMTA is not forecasting savings for this MTI from changes in codes and standards.
Randall Higa	Appendix F, Page 10: The CPUC said "milestones and contingencies established in the Plan should dictate continuation or termination of the MTI" - D.19-12-021 Attachment A. How are these milestones to be used for dictating continuation or termination of the RHP MTI? Does missing one MPI milestone dictate the end of the entire MTI? Please provide details on how the CalMTA plans to manage the MTI using these milestones, and	Missing one milestone does not dictate the termination of the MTI. CalMTA presented an MTI Performance management approach at the 11/20/2024 meeting (see PowerPoint presentation, slide 66). The approach is based on transparent reporting of market progress, per the MPIs and milestones in the MTI Plan - as assessed by a third-party evaluator. CalMTA will update MTI scorecards at least annually (with some metrics more frequently) and will update MTAB at quarterly meetings. When an MPI is falling short of

Source	Feedback provided	CalMTA response
	the conditions under which missing milestones would dictate the termination of the MTI.	milestones, the scorecard will report on that and other relevant findings in a timely manner as part of MTAB quarterly updates and bring recommended actions for discussion.
Randall Higa	Appendix F, Page 10: There are many other advocates for ENERGY STAR, ASHRAE, and UL standards. How will the evaluator assess how much influence should be attributed to CalMTA for the eventual adoption of standards by these bodies? Is CalMTA claiming all attribution for any achievements by the national RHP collaborative?	The MTI evaluation approach doesn't depend on assigning an attribution proportion to CalMTA versus other advocates. Theory-based evaluation instead seeks to assess evidence that the MTI contributed to the Logic Model outcomes and/or that the outcome would not have been likely without the MTI intervention, based on a preponderance of evidence.
Randall Higa	Appendix F, Page 11: The classification of "Programs begin to include RHPs as a measure" as only a secondary influence MPI (P16) raises some questions, especially given that Intervention #4 (Build market awareness) has the largest line item in the Years 1–5 cost estimate (Appendix H) at $2,000,000 per year for five years. Similarly, P17 (more RHPs installed through CA programs) also seems to be impacted. How will this MTI convince the general public about the RHP's benefits if the MTI is not a primary influence in persuading programs to include RHPs and in their successful adoption?	The RHP Logic Model includes substantial investment in awareness-building activities that go beyond encouraging inclusion in other CA programs. These include developing compelling messaging, co-marketing, and product selection tools with manufacturers and retailers, and building awareness among influential entities in the single-family and multifamily markets. Key points of influence include programs that would offer incentives on this technology or include it as a no-cost measure to income-qualified customers, but also multifamily property management firms that will be key decision makers for the rental market. The MTI will also leverage manufacturers' marketing efforts and leverage and support marketing efforts of other national RHP collaborative members' efforts. CalMTA classified program influence as "secondary" in response to feedback from MTAB and the Evaluation Advisory Group, who suggested it because they recognized that CalMTA doesn't ultimately control the number of programs that adopt RHP as a measure.
Randall Higa	Appendix F, Page 15: The MTI Plan states it is serving "low-income" customers (using the DCHP definition of low-income) while this evaluation plan is evaluating Disadvantaged Communities. These populations are different, even if there is	The MTI Plan describes strategic interventions targeting ESJ communities (see p. 11 of MTI Plan for definition). The evaluation must use a sampling methodology that tracks as closely as practicable to that ESJ target. The baseline consumer survey

Source	Feedback provided	CalMTA response
	some overlap. The MTI should use the same criteria and language as the EE portfolio and Income Qualified Portfolios.	sampling plan used DHCD's low-income definition, which we acknowledge isn't a perfect match with the MTI's ESJ target. In the Evaluation Plan, we acknowledge that imperfection and state that the third-party evaluator should refine the sampling strategy to more closely match the ESJ target. We suggested that be done by trying to incorporate CalEPA's DAC definition. We edited the text in Appendix F to make this clearer.
Randall Higa	Appendix F, Page 23: The Equity MPIs are all upstream and midstream metrics. There is only one MPI that considers impact on the end use customer. Some MPIs should be focused on the benefits to the end use customer (such as number of installations by equity segment customers, and also comfort, health, IAQ).	Market saturation (adoption) in DAC vs. non-DAC communities is a key MPI and is specifically focused on end-users. Billing and usage data will also be focused on end-users in DAC communities. In additional we intend to conduct ongoing interviews and surveys with ESJ market partners and their clients, to ensure we collect ongoing information about the impact - including benefits and any unintended harm - to targeted communities. We edited Section 4.2 to make these evaluation activities clearer.
Randall Higa	Appendix F, Page 24: The evaluation needs to consider "alternative explanations" for the results: Who else has been working towards achievement of the same outcome? Why was the MTI's intervention more effective than those of the others? Who expended a greater effort and/or budget towards this outcome? Considering alternative explanations when assessing causality is a requirement of rigorous assessment. Without considering alternative explanations, there is strong risk of confirmation bias during evaluation.	Section 4.3 has been edited to include this.
Randall Higa	Appendix G, General: The MTI Plan should contain milestones and contingencies that "dictate continuation or termination of the MTI", per D.19-12-021. Which of the medium and high severity risks would warrant termination of the MTI if they were actualized? What steps is the CalMTA taking to address those risks early, before ratepayer funds are further expended on a non-viable MTI?	How CalMTA defines risk categories is detailed in the introduction of Appendix G. Appendix F also contains milestones and how we will track progress. CalMTA presented an MTI Performance Management Approach at the 11/20/2024 meeting (see PowerPoint presentation, slide 66). The approach is based on transparent reporting of market progress, per the MPIs and milestones in the MTI Plan - as assessed by a third-party evaluator. CalMTA will update MTI scorecards at least annually (with some

Source	Feedback provided	CalMTA response
		metrics more frequently) and will update MTAB at quarterly meetings. When an MPI or aspects of the MT Theory is falling short of milestones, it will report on that and other relevant findings in a timely manner as part of MTAB quarterly updates and bring recommended actions for discussion.
Randall Higa	Appendix G, General: The MTI Plan should explain the risks of continued IRA incentives and other potential changes as a result of the new administration. What are the CalMTA's plans to track the appetite of the market for decarbonization technologies and what triggers would cause a review of market interventions?	We have revised the risks in Appendix G that are associated with both IRA funding and future ENERGY STAR specifications. CalMTA staff will track this closely, like all risks called out in Appendix G. CalMTA presented an MTI Performance Management Approach at the 11/20/2024 meeting (see PowerPoint presentation, slide 66). The approach is based on transparent reporting of market progress, per the MPIs and milestones in the MTI Plan - as assessed by a third-party evaluator. CalMTA will update MTI scorecards at least annually (with some metrics more frequently) and will update MTAB at quarterly meetings. When an MPI or aspects of the MT theory is falling short of milestones, it will report on that and other relevant findings in a timely manner as part of MTAB quarterly updates and bring recommended actions for discussion. This will apply to both the RHPs and Induction Cooking, which represent two decarbonization technologies.

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