Commercial Rooftop Units (CRTUs) Market Transformation Initiative

Appendix I: MTAB and Public Feedback

February 26, 2026

This appendix contains written comments and responses from the Market Transformation Advisory Board (MTAB), the Public, as well as links to the notes from the MTAB meetings where this content was discussed.

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1 Purpose

This document provides a comprehensive list of comments received from the Market Transformation Advisory Board (MTAB) and the interested public on the draft Commercial Rooftop Units (CRTUs) Market Transformation Initiative (MTI) Plan. Content from the draft MTI Plan was shared with the MTAB at meetings on Aug. 20 and Sept. 29, 2025. The MTI Plan was discussed with the MTAB at an in-person meeting on Nov. 12, 2025, and the full draft of the MTI Plan and Appendices was provided to the MTAB on Dec. 11, 2025. MTAB's written feedback was then collected on Jan. 9, 2026, and are presented in Section 2 with CalMTA's responses. In addition to MTAB's feedback, the CRTU MTI Plan was posted to the CPUC PDA site for public comments from Dec. 17, 2025, to Jan. 9, 2026. Public comments and CalMTA's responses are presented in Section 3. Aside from minor grammatic corrections for added clarity, all feedback that appears in this document is presented verbatim as submitted, with no edits made by CalMTA.

2 MTAB feedback

#	Source	MTAB Feedback Provided	CalMTA Response
1	Hayley Goodson	1.1 Market overview, Page 9: I recommend a footnote early in the Executive Summary that clarifies that "CRTU" is a term of art created by CalMTA for purposes of this MTI to distinguish the advanced RTU features/attributes being promoted from RTUs in general (see CRTU definition, p. 12). The Glossary should likewise distinguish CRTU from RTU in a more meaningful way.	A footnote has been added to the list of abbreviations (p. 7) to better distinguish the meaning of CRTU. The footnote in the executive summary (p. 9) that clarifies "CRTU" has been moved to an earlier location and updated for additional context.
2	Peter Miller	1.1 Market overview, Page 9: The meaning and use of the acronym CRTU could be clarified. The definition only appears in a footnote rather than the text. And there is frequent reference to "advanced CRTUs" which appears to simply mean "CRTUs."	An edit has been made to clarify the CRTU term.
3	Mary Anderson on behalf of the California Investor-Owned Utilities (IOUs)	1.1 Market overview, Page 9: Referring to the 1st paragraph of the executive summary--Calling out for advancing just CRTUs with variable speed compressors is not good because mandating a certain technology does not result in the best "bang for the buck." Fixed multi-speed compressors or staged compressors can potentially provide significant energy savings at potentially better value for California consumers. We suggest	Based on feedback received, we are revising our Tier 3 definition to be an RTU that meets Tier 1 and Tier 2 criteria and includes a variable speed (VS) supply fan. CalMTA analysis shows significant savings for the VS fan and Tier 2 will improve both part-load and peak demand performance but be more flexible for

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		instead to call for a certain efficiency level, preferably using IVEC, and allow OEMs to find the most cost-effective means of achieving that efficiency level.	manufacturers and use an industry-acknowledged specification.
4	Cyane Dandridge / Stephen Miller	1.1 Market overview: I'm curious how we might target facility managers (they seem more willing to wait and specify for replacement units)	We plan to target facility managers in marketing campaigns as part of Strategic Intervention #4.
5	Cyane Dandridge / Stephen Miller	1.1 Market overview: LAUSD discovered that operating costs for the new HP units are lower than for the previous gas units: I assume that previous gas units are older, so I'm not sure what this proves--I would assume efficiency would be better, but maybe not?	Cooling efficiency would presumably be better, but heating mode is where the biggest concern for utility cost increases lie, since gas fuel is traditionally less expensive than electricity per Btu. This is generally true for all electrification of gas end uses. However, the LAUSD experience shows that this is not always the case, especially in the most mild climates with smaller heating loads.
6	Fred Gordon	1.1 Market overview, Page 10: Edit.: "As recently as 2018." Clearer if written as "In 2018" right? I get what you're trying to do but it confuses re: the date of the study.	Thank you, revised.
7	Fred Gordon	1.1 Market overview, Page 11: Maybe substantive, re: the NOX standards. For rooftop units with only sporadic heating loads due to high internal loads (e.g. onsite data system in an office building), might some customers meet the NOX requirement with resistance heat?	The example of onsite data systems typically are served by AC-only systems. There may be a certain number of units that have small/sporadic heating loads, but we have not seen that to be a big part of the RTU market.
8	Fred Gordon	1.1 Market overview, Page 11: Edit. "spark gap." I think you mean "spark spread" That's what I always hear. I googled "spark gap" and got info about something different.	These terms refer to the same concept. https://blog.greenenergyconsumers.org/blog/closing-the-spark-gap-is-key-to-electrification
9	Fred Gordon	1.1 Market overview, Page 12: Clarify This section should say if each tier includes the requirements for prior tiers. Some info on that later in the text but doesn't cover all possibilities.	Thank you, revised.
10	Fred Gordon	1.1 Market overview, Page 12: Edit. Footnote 12. In this footnote "economizer faults" seems to mean the opposite of what you intend. How about "requires these features to identify economizer faults" or something like that?	Thank you, revised.

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11	Mary Anderson on behalf of the California IOUs	1.2 Vision, Page 12: Tier 1 - There needs to be more specificity of what features or requirements are rather than just "factory-installed sensors and integrated controls." Potential examples include airflow sensors, static pressure sensors, refrigerant pressure sensors, supply air temperature sensors, and return air temperature sensors. A loose definition would result in products being able to easily declare that they sensors and integrated controls. Almost every RTU built today has what an OEM might consider to be an integrated control. What is being integrated? what features need to be controlled?	We agree. We will tighten-up specifications as we move forward, and certainly before awarding any contracts based on CCC. In the short term, we may need to make compromises to meet the market at its current state. In the long term, we can work with AHRI and/or other standards groups to develop a defined, repeatable, reproducible test procedure and specification. A footnote to this effect has been added to Section 2.1.
12	Mary Anderson on behalf of the California IOUs	1.2 Vision, Page 12: Tier 2 -- There needs to be a very specific reason why 20% was selected. For residential products, ENERGY STAR HP is 6.3% higher cooling efficiency (split-system or HP), 4% higher heating efficiency (split-system), and 7.5% higher heating efficiency (package unit). The single-digit increases are a significant cost increase, and the proposed 20% increase causes a very high cost increase to the consumer. Is CCC needed for Tier 2? Why is CCC not mentioned here	CalMTA reviewed the DOE Technical Support Document (TSD) from the last rulemaking to select 20%. For units between 135-240 kBtu/hr, CalMTA selected the next higher efficiency level, which equates to 20% above code-minimum. For smaller units between 65-135 kBtu/hr, 20% over code was two efficiency levels (ELs) higher. CalMTA considers long-term (20-year) timeframes when analyzing benefits, goals, and costs. Our analysis, based on the DOE TSD, shows that costs for these units are approximately 60% higher now, and we expect these to drop to 30% over time. Our sensitivity analysis also shows significant TSB and favorable TRC even if costs do not come down as much. We expect CCC/Tier 1 products will be adopted more quickly and even though Tier 2 does not have CCC as part of the definition, some Tier 2 products will have CCC. The tiers were created for analysis, not exclusive incentives or advancing of one tier over another.
13	Mary Anderson on behalf of the California IOUs	1.2 Vision, Page 12: CRTU benefit Tier 3 -- While VSP compressors can "over-speed" to help keep ER from turning on, proper sizing is not mentioned. A properly sized multi-speed unit can also be effective in reducing energy consumption and keeping ER from turning on.	We do not expect that many contractors will want to increase the size of existing units as part of replacements, which could raise installation costs by requiring electrical or structural upgrades. We have revised the Tier 3 definition as indicated in response to comment #3.

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14	Mary Anderson on behalf of the California IOUs	1.2 Vision, Page 13: Last paragraph in 1.2 -- The text states that BPA data may indicate "nearly half of all centrally ducted HPs are now variable speed," but it is highly unlikely that this data is accurate. Preferably, CalMTA would obtain data from industry or distributors. Further, it is not appropriate to compare residential and commercial sectors in this manner. We can fully believe that MSHP are virtually all variable speed--CalMTA needs to consider that even if the numbers are correct in the BPA report, there are at least 500,000 systems sold, and of those about 70,000 of those are VSHP--14% of the total market, which is heating-dominated market. The statement that VSHP comprises "nearly" half of the HP market does not accurately reflect the entire picture.	We agree this is a surprising number, but is well-vetted by BPA and NEEA, two organizations known for thorough research. As noted in the report, this information does, as you recommend, come from distributors. The number quoted refers specifically to standard VSHPs and MSHPs that are only sold as centrally ducted systems and does not include systems that can be only ductless/low static. We believe this number to be accurate. While there are differences between the residential and commercial markets, with market interventions, it's not unreasonable to believe CalMTA could achieve directionally similar results.
15	Mary Anderson on behalf of the California IOUs	1.2 Vision, Page 13: Last paragraph in 1.2 --Expecting the same results in a more mild-climate commercial market as a heating-dominated residential market may not be a good assumption. There are various forces working on the market, and commercial markets are driven very heavily by cost.	Residential homeowners are also very concerned by costs. We have many avenues for intervention that we expect to work together and influence the market. With all of the other market forces: national and regional efforts to increase the efficiency and performance of RTUs, as well as local and statewide CA incentives, we expect, like many technologies, prices to drop over time.
16	Cyane Dandridge / Stephen Miller	Last line of the second to last bullet on page 12 has an open paragraph sign-- "CRTUs are also more likely to participate in utility DR)"	Thank you, revised.
17	Christina Torok	The vision for the market end state is vague. More specific/concrete vision would be helpful.	Thank you, revised.
18	Cyane Dandridge / Stephen Miller	1.3 Key Phase II research findings: Is this section missing?	The feedback form MTAB members were provided mistakenly included mislabeled and misnumbered sections. Other MTAB members noted this issue as well; those comments have been omitted for brevity.
19	Fred Gordon	1.3 Strategic interventions for Phase III, Page 13: Substantive: How can this succeed with small consumer financial benefits and non-energy benefits which are primarily societal but do not	One of our main goals is balancing affordability with savings. All CRTU features have financial benefits to the end user. Table 8 shows savings for the various

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		directly accrue to the customer? Is easier fault detection going to persuade customers to go for phase 1? What about the other two phases? This may be my biggest concern. 'Executive summary needs to present a compelling market case from customer perspective. This section describes how market actors are beginning to engage. This doesn't tell us what they or customers will prioritize as "best choice" down the line. The supply chain has many drivers and choices and a limited capacity for enhancing equipment.	features. All measures provide cost savings, except for Tier 1 when going from a gas pack to a Tier 1 HP RTU in PG&E territory. These are aggregated savings, but many users will see utility bill savings and will also increase the service life of their units. We expect that once contractors start seeing the benefits to them and their customers, they will promote them more and more.
20	Cyane Dandridge / Stephen Miller	1.3 Strategic interventions for Phase III: The Plan references a partnership with the Advanced Heat Pump Coalition. I wonder if there is an opportunity to leverage this group to effectively/ efficiently get the word out to California contractors and associated training organizations, to prepare for the uptick in need for trained contractors to support the broad-scale rollout of HP RTUs?	We're not aware that this group performs outreach to contractors, but we will confirm.
21	Mary Anderson on behalf of the California IOUs	1.4 Recommendations, Page 13: Item #1 -- it is unrealistic to think that MTA can influence OEMs to prioritize development of higher cost, lower volume variable speed RTUs over lower cost, higher volume base efficiency RTUs. MTA has already noted that these products are on the market. The primary reason more VS RTUs are not sold is cost. It is unclear how this activity can help significantly lower the cost of a VS RTU. Ideally, it would be shown how CCC helps lower overall cost--and this may be through unplanned or "unthought of" topics like technician safety, mentioned above.	We have revised our Tier 3 definition to be less prescriptive and not include variable speed as a requirement.
22	Mary Anderson on behalf of the California IOUs	1.4 Recommendations, Page 13: Item #3 is a very good way to help build scale. One of the best ways to lower cost is to increase volume. Having national tiers, as opposed to regional settings, is vital in moving towards higher volumes of higher efficiency products. The commercial RTU products have a very large range of options and configurations, so standardizing would be beneficial. Furthermore, this is another reason why target	Thank you for your input. A 20% increase in cooling efficiency matches CEE's advanced tier.

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		efficiency bumps should be single digit to low double digit, not 20%.	
23	Mary Anderson on behalf of the California IOUs	1.4 Recommendations, Page 13: Item #6 - This is a good thing to focus on. More effort should be put on item #3 and item #6.	Thank you for your input.
24	Hayley Goodson	1.4 Recommendations: Page 14: This section references "the demonstration project," which has not been mentioned before. Suggest changing to: "… the MTI demonstration project aimed at understanding and defining the CRTU business case for contractors." (language taken from p. 25, Strategic intervention 1)	Thank you, revised.
25	Hayley Goodson	1.4 Recommendations: Page 14: Suggest moving this sentence to the end of the first paragraph: "The CRTU MTI offers a critical lever for transforming a market segment that currently trends toward lowest-cost, code minimum replacements." It's important to emphasize that these changes won't necessarily happen on their own, creating lost opportunities in the shift towards CRTU electrification. The auto industry comparison might otherwise suggest something inevitable for RTUs.	Thank you, revised.
26	Jeff Harris	1.4 Recommendations: **General:** I have reviewed the documents and am in general support. I see responses to comments that I have made previously in the development process and want to commend the team for being responsive to MTAB input and feedback.	Thank you for your input.
27	Jeff Harris	1.4 Recommendations: **Codes and Standards:** The proposal incorporates references to codes and standards opportunities and correctly identifies needed coordination with other existing PA's and regulatory agencies. I just want to emphasize the significance and priority of this work relative to this particular product. Since the vast majority of sales are "emergency" replacements, sales will be driven largely by "code minimum" requirements since there will be little tolerance for additional incremental cost. I'm not recommending additional analysis	We agree that codes and standards have a potential role. Strategic Intervention #6 and MPI #21 include strategies and metrics related to C&S.

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		(except for adoption rate analysis - see below); just perhaps a recognition of the importance of C&S as a market transformation tool.	
28	Jeff Harris	1.4 Recommendations: **Adoption rates in light of C&S:** The TMA and BMA both have smooth exponential adoption curve growth rates. If a T24 or T20, or CARB standard was adopted, it would result in a step function in market adoption. I don't know if this would be worth the additional analysis but at least worthy of a few sentences in the narrative to highlight that the adoption rates do not assume any incremental adoption of C&S with significant impacts on the market.	Thank you, revised.
29	Jeff Harris	1.4 Recommendations: **Customer Bill Impacts:** Table 8, Page 50, illustrates impacts on IOU customers assuming different fuel baselines, i.e., electric or gas. In all electric baseline cases, there are positive bill savings but for electric baselines. But for gas baseline, converting from gas to electric has negative savings for customers. This should be a flag for the initiative to either focus on customers who would be purchasing electric units or to consider energy savings measures that would have positive energy savings at relatively minor incremental costs; e.g. low leakage dampers, improved shell insulation.	Table 8 includes results showing the average customer bill impacts when converting from gas to electric with the various tiers as described in the MTI Plan. For most cases when converting from gas to electric, the average customer bill impacts are close to cost neutral or slightly positive bill savings. We agree there will be instances that do not follow these trends, and we will continue to pay close attention to customer bill impacts throughout the implementation phase. We are seeking market impacts that spark customer interest and drive decisions to purchase electric options. Also, the team evaluated many other measures for savings, including RTU box improvements. However, the opportunities across the mild California climates were small compared to colder climates in other states, and more attention was given to the strategies and measures we've included in the MTI Plan.
30	Cyane Dandridge / Stephen Miller	1.4 Recommendations: I'm not sure about comparing a HP RTUs to a car. Consumers interact constantly with a car, and as stated above, one of the barriers is that consumers rarely interact with their RTUs.	The analogy is more geared towards contractors than end users, but we do expect as CCC becomes more advanced, end users will start to interact with them more frequently--similarly to the way homeowners

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			interact with smart thermostats and the phone apps that connect them.
31	Fred Gordon	2.2 Target market, Page 16: Clarification: New buildings are described as a "secondary market," yet in the early stages they may see the most success. Is there a better way to say this so it doesn't sound contradictory?	The document does not claim that new buildings will see the most success in early stages. By improving equipment, and therefore increasing stocking at distributors, some new construction projects will encounter more CRTUs.
32	Mary Anderson on behalf of the California IOUs	2.2 Target market, Page 16: In other sections of the report, MTA describes how the replacement market can be broken down into the planned replacement and the "three-minute" markets. These markets should be separated when it comes to how they should be addressed, because as noted elsewhere, in the "three-minute" market, what gets installed is whatever is on distributors' shelves. In the planned replacement market, people can wait longer to get what they want (on page 17, MTA says the three-minute market is 80% of sales).	Strategic Intervention #2 is directly aimed at making more efficient products available in distributors' equipment inventory. We also expect that Intervention #1 (manufacturer coordination, demo project) and Intervention #4 (contractor training and business marketing) to increase the demand of CRTUs and influence what distributors are stocking.
33	Mary Anderson on behalf of the California IOUs	2.2 Target market, Page 16: The report repeatedly says that the cost difference between non-tier and tier RTUs is expected to diminish, but evidence is not given to support this. It would at least be helpful to show that manufacturers agree this is the case, though this is unlikely.	While the experience effect is not universal, generally prices come down as manufacturers gain more experience building products. We also have a sensitivity analysis considering a slower, lower reduction in costs which still estimates over $300 million in TSB and a 2.0 TRC.
34	Hayley Goodson	2.3 Theory of market transformation, Page 16: Suggest changing first bullet point bold text to "Accelerating advanced heat pump adoption" to better match unbolded description and to align with discussion of opportunity "California's momentum in HP adoption" on p. 19.	Thank you, revised.
35	Fred Gordon	2.3 Theory of market transformation, Page 17: Substantive: I worry that CCC changes more than the "contractor experience". If they use it as intended by the initiative design, it changes the nature of the field tech experience and the contractor's organizational plan. I'm not sure if the field tech is the right one to monitor systems, or this job is centralized at the contractor.	We expect the demonstration projects will help build out the contractor experience and business case for all of CCC. Trane and Daikin both already offer remote monitoring and connected commissioning for their residential products. In a recent webinar they mentioned "improved installation, contractor and

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		This may depend on the size of the firm. Accountabilities in the contractor firm will be different depending on which roles contractors and staff play in monitoring fault flags and responding to them. It may be that technician oversight becomes different. This presents a market barrier, especially for the smaller contractors and customers who don't already have a formal a monitoring and maintenance function in-house beyond an annual filter changes and visual inspection. This helps explain why the project research found that many systems with CCC were not set up to work. At the moment few people are trained and nobody is accountable for seeing that it works.	customer experience" as the main reasons of their business case. (NEEA Product Council HP Commissioning on 1/26/26 https://neea.org/events/?_event_toggle=future&_event_type=product-council)
36	Mary Anderson on behalf of the California IOUs	2.3 Theory of market transformation, Page 17: First bullet, reference 16 -- MTA should use caution when referencing residential information to justify commercial applications. Further, it is also possible that a staged heat pump sized for heating load can provide adequate refrigerant heat capacity and still be a better, lower cost application than a VSP HP sized for cooling load.	We responded to these concerns in comments #3 and #14.
37	Mary Anderson on behalf of the California IOUs	2.3 Theory of market transformation, Page 17: 2.3.2 - Very correct that cost is key, and that the cost of high efficiency is significantly higher than base efficiency.	Thank you for your input.
38	Mary Anderson on behalf of the California IOUs	2.3 Theory of market transformation, Page 17: Market barriers -- It would be good to weight each one of these 5 barriers so that proper emphasis can be given to each. The first bullet is likely the largest barrier and the third bullet is likely the second largest barrier. Together, these two barriers are likely responsible for well more than half, if not three-fourths, of the barrier impact.	Thank you for your input. We have revised the introduction paragraph language for Section 2.3.2 and the order of its listed barriers. These edits add emphasis to the importance of the cost and product availability & readiness barriers.
39	Fred Gordon	2.3 Theory of market transformation, Page 20: Edit. Just above 2.3.4. Wasn't clear to me until 3rd read which program "this" referred to, CalMTA or utility? Replace "this" with a noun.	Thank you, revised.
40	Fred Gordon	2.3 Theory of market transformation, Page 20: Clarity. 2.3.4. I know the exec sum needs to boil things down, but some of these seem subjective. If you judge it appropriate, insert "specific	Thank you, revised.

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		criteria for triggering transitions are provided in Appendix F" Or "will be established during the program design" Or "These inevitably involve a significant degree of judgment. We will rely on our public processes to assure we are approaching them in a balanced way" Or something...	
41	Peter Miller	2.3 Theory of market transformation, Page 21: Is it possible to be more specific about the vision for a market end state? What would qualify as a "significant rise in market share?"	Thank you, revised. We envision that CRTUs will see significant rise in market share so that they represent more than 30% of sales by 2040.
42	Mary Anderson on behalf of the California IOUs	2.3 Theory of market transformation, Page 20: 2.3.4 -- The market may shift with incentives, but once incentives are gone, it is highly likely that the market will revert. This has been proven time and time again in the case of incentives that temporarily increase high efficiency sales (such as those for federal 25C tax credits) -- volume eventually shifts back to lower cost base efficiency without the incentives.	We have market-based interventions that do not rely on incentives to achieve permanent structural market changes. In addition, in contrast to many traditional resource acquisition programs, we are working on promoting higher-performance equipment – not only more-efficient equipment – with benefits beyond utility bill savings. Once CRTUs are experienced and appreciated by contractors, distributors, manufacturers, and end users, a portion of the market will purchase them, regardless of incentives.
43	Fred Gordon	2.3 Theory of market transformation, Page 21: Substantive? 2.3.5. Units with CCC "are shown through monitoring and evaluation by MTA or others to".....CCC savings are very dependent on brand variations in equipment design and functionality, the attentiveness of the techs to fault notices and the diligence and competence of the response. The evaluation needs to be tailored to the specific situation.	Thank you, the noted sentence in Section 2.3.5 has been revised.
44	Fred Gordon	2.3 Theory of market transformation, Page 21: Substantive? 2.3.6. Is cost-neutrality a realistic short-term goal? If not, perhaps add "to the customers in the demonstration sites, and in the long term, of product purchases". For VSDs I'm not sure it's a feasible long-term goal. To the extent drives come from a subcontractor they've got to be paid. Perhaps add "to the extent possible".	In the short term, we believe cost neutrality is realistic for Tier 1/CCC. Controls are a relatively low-cost addition, already, with some manufacturers offering some CCC features as standard on some models. MPI #7 is specifically designed to track this objective. We do not expect cost neutrality for other tiers but expect the incremental price delta to drop by 50% over the lifetime

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			of the program. We also have a sensitivity analysis around a lower price reduction.
45	Fred Gordon	2.3 Theory of market transformation, Page 21: Edit. First bullet after "This MTI plans to:" There is a sentence fragment after "the broader market". Is this an example of a technology target for the ESJ approach, or is this the primary technology target for ESJ?	Thank you, revised. CCC is the primary technology target for ESJ communities.
46	Fred Gordon	2.3 Theory of market transformation, Page 22: Substantive. Last "if". As discussed elsewhere in my comments I think you are understating contractor adjustments required for many or most contractors. Assumes that with adequate technical and business training and support contractors can adjust their business and profit model and internal structures to achieve savings and maintain or enhance net profits with the new equipment.	Responded previously in comment #35.
47	Fred Gordon	2.3 Theory of market transformation, Page 23: Clarity? I think you need to directly explain if replacement-friendly design is possible, and replacement is the dominant sales opportunity for manufacturers, why hasn't it happened? I think you have a case you can make, it's just not stated succinctly in one place. Part of your explanation is that you expect the market to grow, but, without the initiative, slowly, due to described market barriers. The initiative is to accelerate growth.	We do not expect manufacturers to make products specifically for the replacement market. We do expect that some features, specifically CCC, are inexpensive enough that manufacturers, motivated by the MTI interventions, will start offering CCC on lower-cost products. We have revised this section for clarity.
48	Fred Gordon	2.3 Theory of market transformation, Page 23: Substantive: Assumes that business culture and management systems (common language and understanding, contract provisions, training) are put in place to train, direct, supervise and compensate appropriate staff or contract personnel for AFDD response.	Thank you, revised.
49	Mary Anderson on behalf of the California IOUs	2.3 Theory of market transformation, Page 23: The assumption that if RTUs incorporate AFDD, then end users or contractors will respond to signals. The MTI should look closely at this issue. Larger building FDD studies show that building operators do not respond to events and need a third-party service to highlight the	Agree that this is a barrier. We expect to learn more during the demonstration projects about the business case for contractors and manufacturers. Please see comment #89 for more details about market indicators for contractor business case.

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		issues. This could be the contractor, but if the contractor relationship ends, something needs to be done. Maybe this could be done at the OEM level.	
50	Hayley Goodson	To ensure MTI Plan is digestible for a wider audience, suggest expanding reference to "eTRM savings numbers" to "California Electronic Technical Reference Manual (eTRM) savings numbers" and adding a footnote explaining, "The eTRM is a statewide repository of California's energy effiency deemed measures, including supporting values and documentation." (see https://www.caetrm.com/login/?next=/)	Thank you, revised.
51	Fred Gordon	2.3 Theory of market transformation: Substantive: Another barrier, or at least a challenge, is getting the national efficiency community and coordination organizations (CEE, DOE, ACEEE) to focus on promoting separate but integrated system requirements for heating-dominated vs. cooling dominated climates. Until there is a coherent set of signals going to the manufacturers, they will be hesitant to make the product development investments. The cooling specification that MTA wants to develop will be something of a latecomer to these forums. It is important to enter the national forums in a way that will not create the perception of competition. The existence of a third climate (warm and humid) whose needs may not line up with California's needs complicates this picture.	We continue to meet regularly with CEE, MN CEE, NEEA, and less frequently with DOE representatives, and are working on ways to coalesce the energy efficiency and utility community's requests to manufacturers. It may be that the "cold climate" units also meet the Tier 3 requirements, even if that is not CalMTA's specific need. We will continually emphasize the importance of efficiency, peak demand reduction, and operational efficiency through controls while working with these groups.
52	Cyane Dandridge / Stephen Miller	2.3 Theory of market transformation, 2.3.6 Environmental & social justice approach: The document states "While ESJ-specific strategic interventions are addressed in more detail in Sections 2.5 and 2.6, this approach reflects a commitment to ensuring that affordability, accessibility, and cultural relevance are not treated as downstream concerns but as core design criteria"-- I do not see a lot of integration of accessibility or cultural relevance in outcomes or tracking. I do see more evaluation criteria in the appendix (but did not see anything referencing cultural relevance).	Strategic intervention #4 ("increase training for contractors...") describes activities to ensure broad access and inclusiveness of training efforts by offering resources in multiple languages, accommodating various learning styles, and delivering content through trusted resources like CBOS. Medium-term outcomes linked to this intervention include "ensuring accessibility of trainings offered to ESJ communities" and availability of trained workforce across the state without cost-premiums in ESJ communities. We have

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			added detail in the short-term outcome for this intervention highlighting a more integrated distinction. While we do not have evaluation metrics specifically focused on assessing the cultural relevance of available training efforts and materials, we intend for this intervention to manifest in an increase in trained installers in ESJ communities. This is described in EQ19, which targets a milestone in which the percentage of HVAC companies with CCC-trained staff serving customers in DACs to have parity with the general population.
53	Fred Gordon	2.4 Strategic interventions, Page 25: Substantive. Strategic intervention 2. Would an objective be to build a shared product vision?	Thank you, revised.
54	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 25: CalMTA's strategies should focus on addressing the most challenging barriers first—particularly the "upfront" cost of highly efficient CRTUs (such as variable-speed heat pump RTUs that exceed federal minimum cooling efficiency by at least 20%) and the higher installation costs associated with structural requirements. These factors have contributed to slow market adoption. In addition, NEEA's assessment highlights that: • 95.5% of surveyed distributors are familiar with at least one ERTU product line. • 95% of contractors are familiar with ERTU models. • A majority of building decision makers report general awareness of ERTU product lines. Despite this high level of awareness, most market actors continue to view ERTUs as niche products for specialized applications—such as medical buildings or production facilities—rather than as direct replacements for standard RTUs. Incremental costs and structural challenges remain the primary barriers.	The NEEA study you cite refers to NEEA's version of an advanced RTU, which includes HRVs. HRVs are more of a niche product. We believe CalMTA's CRTU product definition relies on features that are more applicable to a greater portion of the market.

#	Source	MTAB Feedback Provided	CalMTA Response
		Therefore, CalMTA' s intervention strategies should be prioritized with the understanding that simply increasing the availability of highly efficient CRTUs may not substantially boost adoption unless these cost and structural barriers are addressed.	
55	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 25: SI-1 -- It is unreasonable to think that OEMs are going to spend a lot of time with MTA due to the wide range of other regulatory and market forces, such as DOE, tariffs, AHRI, ASHRAE, EPA, refrigerant regulations, safety standard changes, etc. An OEM will more likely spend time on achieving their individual goals rather than MTA's strategic product vision goals.	We recognize that we are working in a dynamic marketplace with external forces at play. CalMTA collaborates regularly with many other entities: NEEA, MN ETA, and DOE's HVAC challenge. Together, we encompass a large share of the market and believe we can influence manufacturers to favor the targeted product specifications.
56	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 26: Second to last bullet on this page -- OEMs will almost certainly be unwilling to share their cost structures and business models.	We agree that the information may be difficult to obtain and therefore have set our strategy so that this is not required as essential.
57	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 29: Similar to OEMs, distributors will most likely be unwilling to share stocking practices. MTA ought to consider that if all distributors are not stocking the higher cost CCC unit, then the project has much less likelihood of being successful. It is very easy for a contractor to call multiple distributors to find out prices and availability--If Distributor A has a CCC unit that is more expensive than Distributor B's lower cost non-CCC unit, the majority of the time the contractor will choose the lower cost option.	Market transformation efforts have been proven to successfully collaborate with distributors to influence stocking practices, education, and sharing of sales data. We will rely on relationship building and, if necessary, incentives to drive collaboration.
58	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 30: 10+ year -- It is not realistic to expect that RTU with CCC is "on par with" RTU without CCC costs, because more parts mean more cost.	Most sensors for CCC are already installed as part of control for RTUs. The costs for added sensors and control boards/logic are minimal. A recent CalNEXT Study reports that adding AFDD at the manufacturer adds $900/unit. Over time, it appears realistic to lower that to "on par"– especially as manufacturers already include CCC as standard on higher-end units. https://calnext.com/wp-content/uploads/2025/08/ET23SWE0037_Integrated-

#	Source	MTAB Feedback Provided	CalMTA Response
			HVAC-Rooftop-Unit-Remote-Monitoring-Systems_Final-Report.pdf
59	Fred Gordon	2.4 Strategic interventions, Page 31: Substantive. Strategic intervention 3. I'm thinking it would be valuable for the initiative to ally with utilities and states in the SW that have a similar dry and hot climate, California is big, but manufacturers hate to create specialized equipment in different regions, More big is better.	We agree. We have already met with SEEA (Southeast Energy Efficiency Alliance) and we presented at their summit last year. Currently, SWEEP (SW Energy Efficiency Partnership) and SPEER, the Texas equivalent, do not offer commercial-based heat pump replacements, but we will continue to monitor.
60	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 31: The 1-3 year outcome should not specify technology (VSP) but rather efficiency (IVEC/IVHE).	Based on MTAB and other feedback, we have changed Tier 3 requirements. See response to comment #3 for details.
61	Fred Gordon	2.4 Strategic interventions, Page 32: Substantive. As discussed above, training can't be just about the technology and the field role. Many HVAC firms are conservative about changing how they run their businesses focus. Many want to drop the box in the hole and set it up well enough to not get callbacks and maybe have a contract to drop by once a year, change filters and do visual inspection. If they have a role in fault detection it requires a continuous service relationship. They've seen their peers try changes to their basic business and go out of business. Most have no internal change management capability; it's hard enough to just keep staffed and keep going. Teaming with manufacturers will help with trust for any training on "how to make money with this new stuff".	We agree. Not all contractors will have the desire or capacity to take on remote monitoring. It is not critical to the success of the MTI that all contractors adopt remote monitoring. We do not assume that all faults will be responded to in our savings calculations; however, partial success/response to faults can still offer significant cost-effective savings. As mentioned above, some manufacturers are already exploring the business case and we expect more exploration in future years, and more learning to come from our demonstration projects.
62	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 34: SI-5 opening paragraph -- MTA does not address why existing programs have not increased the uptake of such products. Without knowing this, program costs may not be justified, even with incentives. If product uptake has not increased due to "inconsistent or conflicting product requests," ideally information on all such existing product requests would be published by MTA.	The features highlighted by CalMTA have not been available for long, or at least not recognized for long. We plan to increase awareness of the benefits of CRTUs and therefore expect CA incentive programs will start to incentivize them and curb costs in the near term, helping to spark longer-term market adoption.

#	Source	MTAB Feedback Provided	CalMTA Response
63	Fred Gordon	2.4 Strategic interventions, Page 36: Substantive, or maybe just clarity? New Building reads in the text like a secondary target, but in the strategy it seems critical to moving forward. How to make more consistent?	New construction is a secondary target, but by working to integrate CCC into code, we can ensure 100% adoption.
64	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 36: SL-6: Connected Commissioning and Controls -- Title 24 already incorporates some elements of CalMTA's proposal. For example, Fault Detection and Diagnostics (FDD) is required under Title 24 for CRTUs targeted by CalMTA (see Section 120.2(i)). Therefore, CalMTA should focus on specifying FDD enhancements that go beyond code requirements and demonstrate additional benefits and cost-effectiveness.	Title 24 currently only requires AFDD for economizers. We plan to work with manufacturers to expand AFDD to other critical components and operation, like condenser fouling, refrigerant loss through temperature and/or pressure sensors, and increased compressor power. Some manufacturers already offer this feature (e.g., Tempmaster Pro line offers refrigerant AFDD as standard.)
65	Mary Anderson on behalf of the California IOUs	2.4 Strategic interventions, Page 36: SL-6: App-based Startup and Cloud Connectivity - This trend is already occurring naturally across many products in the market (e.g., smart thermostats, smart speakers & assistant, connected appliances such as refrigerators, washers, smart watches for health metrics, notifications, and app ecosystem, etc.) No additional intervention is required, other than ensuring the adaptation of open, interoperable, and cybersecure standards. These standards are critical to minimize the risk of stranded assets resulting from market shifts or technological advancements.	We agree that this is an increasing trend, but our conversations with manufacturers indicate that some do not currently plan on offering these features. Our intent is to influence them and accelerate the overall trend by growing consumer/contractor demand.
66	Fred Gordon	2.4 Strategic interventions, Page 38: Substantive. Envision steps for developing and implementing the business-focused training- it will be different from the tech training.	Manufacturers have indicated that the business case for CCC is partially proprietary. They have told us that better installations are part of the business case but have other reasons that they're not willing to share. We expect that manufacturers will provide the business-focused training.
67	Fred Gordon	2.4 Strategic interventions, Page 38: Substantive. Consider using contact with ESJ communities and contractors to ensure that training is scaled to and integrated with the hiring processes for local and nearby contractors.	We agree that this is a good opportunity to pursue as we look toward target areas for early adoption and workforce education and training (WE&T) specific needs.

#	Source	MTAB Feedback Provided	CalMTA Response
68	Cyane Dandridge / Stephen Miller	2.4 Strategic interventions: For section 2.4, I think the term 'curb adapters' should be explained/ defined	A footnote defining curb adaptors has been added to page 12.
69	Fred Gordon	2.4 Strategic interventions: Substantive. ESJ impacts will include direct customer benefits from including ESJ district buildings in the pilots. In the pilot, most equipment and services will be free to the customer, and, to assure pilot success, the attention to assure that the installations and communications are as intended will be at their highest level, which helps assure that customers will not be left with puzzling problems. Also, contractors serving these communities will get early training and knowledge, which should help expand the use of the efficiency measures and practices after the pilot in those communities has ended.	Thank you for your comment. This is in alignment with our approach.
70	Cyane Dandridge / Stephen Miller	2.5 Environmental & social justice communities: I appreciate that strategic interventions for environmental and social justice communities are outlined in section 2.5. I wonder if there are any expected outcomes that could be in section 2.4 that would be a result of these strategic interventions, and the workforce element described in 2.6?	There are several expected outcomes in Section 2.4 and MPIs related to these interventions. Table 1 of Appendix F lays out specific equity-related MPIs. MPI EQ1: 40% of demonstration project CRTUs installed in DACs by 2029. MPI EQ19: The percent of HVAC companies with CCC-trained staff serving customers in DACs comparable (within 10%) to general population by 2031. We have added language to highlight these expected outcomes.
71	Cyane Dandridge / Stephen Miller	2.5 Environmental & social justice communities: Regarding language appropriate training and outreach materials for EJ considerations, we should also consider how to best reach the educational and training organizations servicing EJ communities are preparing future contractors and technicians for these regions.	Thank you for your comment. This is a crucial consideration for our request for proposal (RFP) design stage.
72	Mary Anderson on behalf of the California IOUs	3.1 Product Definition, Page 43: MTA ought to eliminate specification of "variable speed" for many reasons: In addition to those mentioned before, it is also very much possible that a RTU with variable speed could have lower efficiency than a RTU with staged compressors.	Based on MTAB and other feedback, we have changed Tier 3 requirements. See comment #3 for details.

#	Source	MTAB Feedback Provided	CalMTA Response
73	Hayley Goodson	3.2 Summary of key findings, Page 43: Suggest adding an intro sentence after heading to indicate source of "key findings," e.g., "CalMTA's Phase II activities produced the following key findings, which inform the design of this MTI."	Thank you, revised.
74	Hayley Goodson	3.2 Summary of key findings, Page 44: Suggest changing Finding 7 to state, "High switchover temperature HPs with backup ER heat strips can increase energy consumption and customer bills…" because current "impact customer bills" language is ambiguous.	Thank you, revised.
75	Mary Anderson on behalf of the California IOUs	3.3 Key product features and attributes, Page 44: 3.3.2 -- MTA ought to specify why 20% was chosen. As commented previously, we feel that is a very large cost increase. Ideally, there would be supporting analysis clarifying why 20% is better than 5% or 10% or 15%. Selecting arbitrary values significantly increases the probability of project failure.	Responded above in comment #12.
76	Mary Anderson on behalf of the California IOUs	3.3 Key product features and attributes, Page 44: 3.3.3 -- Mandating a technology like VSP compressors is not beneficial. Instead, of more importance is efficiency. Under the current suggestion, MTA would exclude a 18 IVEC staged 10-ton unit but allow a 16 IVEC variable speed 10-ton RTU. Ideally, MTA would change the specification to variable capacity, and perhaps provide a turn down ratio requirement and number of steps. As an example, some VSP may not turn down to less than 30% capacity while a staged system could get 25% capacity--it does not make sense to exclude the staged unit that has lower turndown and likely better part-load efficiency.	Responded above in comment #3.
77	Mary Anderson on behalf of the California IOUs	3.3 Key product features and attributes, Page 45: 3.3.3. --A properly sized staged RTU can provide adequate heating capacity and eliminate or significantly reduce ER heating. Furthermore, a DF can eliminate ER altogether, as well as minimize winter peaking for extremely cold days.	Responded above in comments #12 and #13.

#	Source	MTAB Feedback Provided	CalMTA Response
78	Peter Miller	3.3 Key product features and attributes, Page 47: Figure 2 is missing a units label for the y-axis (i.e. GW).	The title for Figure 2 has now been updated to note the y-axis units (GW). This image is borrowed from another source so we do not want to edit the image directly.
79	Fred Gordon	3.4 Product performance and research summary, Page 48: Substantive. I read here that while the first phase of the initiative focuses on CCC, none of the runs show CCC against baseline. Is this right or did I miss it? If it's so, then why?	Scenarios S03-CCC_AE and S08-CCC_GF capture the CCC technologies. This is discussed in Table 7, Figure 3 shows the energy savings modeled for those scenarios, and Table 8 quantifies the average annual facility bill impacts against the baseline scenarios.
80	Fred Gordon	3.4 Product performance and research summary, Page 50: Substantive. Table 8. With the exception of gas conversion, many of the cells show positive or negative changes to energy costs of five percent or less .The "all features" case has decent bill savings, but most participants won't see that for many years. With all the uncertainties of modeling these are not robust and reliable differences. Most of the cells show cost decreases, that's great. But modeling issues can be systematic and impact multiple cells. These modest bill impacts reflect the fact that greenhouse gas benefits are very big for these measures, but customers don't pay for the emissions, so they don't have any cost reductions when they are eliminated. This presents a significant challenge to the program at its outset. We can say that CCC will eventually have nominal cost but how do we scale up to get to that point? Are we planning to pay the manufacturers full incremental wholesale cost as it scales up so the consumers see no added cost? I also wonder, if most of the consumer benefits are from fuel conversion, whether there are enough benefits from electric replacement market to make it worth the investment.	We agree that the CPUC will see different benefits than the end user. While the end user will see nominal bill impacts, they also will see benefits in: 1) ease of use through remote connectivity, improved maintenance (because AFDD+ will alert of faults), and 2) presumably longer lifetime due to improved maintenance. CalMTA has significant incentives in the early MTI stages to help accelerate CCC (and other tier) adoption. After 5 years, we start to decrease these incentives because we expect the market to have more fully adopted them – not only due to price and savings, but because these are better products. CalMTA can remove incentives once the market ramps up adoption and plan for continued adoption.
81	Fred Gordon	3.4 Product performance and research summary, Page 50: Substantive. Given the info presented, I'm not entirely sure why we're not starting with the cooling efficiency in the first stage. From what I read it is market-ready. It doesn't require as big a change in contractor practices and business design.	Tier 1 is a low-cost and high benefit (not only energy savings benefit, but performance benefit.) We anticipate that contractors, technicians, and manufacturers will appreciate CCC even without the changes in business design because it delivers a better

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			installation. The only reason to install Tier 2, from a customer perspective, is costs. Tier 3 also has performance benefits, but of course that's expected later because the technology is not as developed and more expensive.
82	Fred Gordon	3.4 Product performance and research summary, Page 50: Edit. Figure 41 might be clearer and more consistent with the text if it showed total RTU square feet within each building type.	We agree that including numerical floor-area values alongside the percentage-based stacked bars in Figure 41 could improve clarity. However, we chose to present the data as percentages to emphasize the relative contributions rather than absolute values. The total floor areas are provided in the accompanying text at the top of Section 4.2 (8.8 billion total CA non-residential floor area, and 4.8 billion conditioned by a single-zone RTU). This allows readers to readily derive numerical values if desired. Adding explicit numerical labels to the figure would introduce additional detail that is not specifically essential to the interpretation of the results and could imply a level of precision that is not warranted, given that the underlying floor area data is drawn from multiple published sources (CEUS and ComStock). For these reasons, we have retained the current presentation format.
83	Mary Anderson on behalf of the California IOUs	4.1 Market Overview, Page 50: OEMs do not sell a product directly to the end user -- See Figure 142 on page 54.	CalMTA research shows that manufacturers develop contractual relationships with national accounts. The physical merchandise may go through a manufacturer rep, but our understanding is that the "sale" is direct.
84	Mary Anderson on behalf of the California IOUs	4.1 Market Overview, Page 50: Very true that "availability and price" are the most influential in roughly 4/5ths of the market, which is most of MTA's target market.	Thank you for your input.
85	Mary Anderson on behalf of the California IOUs	4.2 Target Market, Page 52: The analysts should look into the typical percentage of a warehouse that is actually conditioned by CRTUs. If this analysis assumes that the entirety of the floor space	We agree. CalMTA will be mindful of the distinction between total conditioned warehouse floor space and total warehouse floor space that has some area

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		of warehouses is cooled, that is overstating the total market. For most warehouses, only the office space is cooled.	conditioned when analyzing market potential and implementing strategies.
86	Cyane Dandridge / Stephen Miller	4.2 Target market: In EJ/ rural communities, given a high representation of small businesses with building owners acting as facilities managers, the awareness, access and availability of efficient installation of high-performance RTUs is ever more critical and highlights the need for education/messaging to this population, and for training of area contractors to encourage/support these solutions.	Thank you for the comment.
87	Fred Gordon	4.3 Current market state summary, Page 53: Substantive. Do we know if all or most RTUs are controlled by the BAS where it is present? I can imagine several scenarios where this would not be true. Also possible that sometimes BAS is in place, connected to RTU, but controls are not working due to commissioning issues, user knowledge, incompatible systems, etc. Maybe worth a footnote. Some of these RTUs might be good candidates for the initiative.	Even RTUs that are controlled by BAS can benefit from CCC. The remote connectivity is only one aspect of CCC -- the startup app and advanced AFDD can benefit whether controlled by BAS or not. This is not a critical characteristic.
88	Mary Anderson on behalf of the California IOUs	4.3 Current market state summary, Page 53: 4.3.4 -- It seems significant that most contractors (3 out of 4) don't recommend remote monitoring, which would be what is necessary with CCC.	One of the goals of our demonstration project, and of the entire MTI, is to educate contractors on the benefits of remote monitoring. Strategic interventions #2 and #4 address this barrier.
89	Cyane Dandridge / Stephen Miller	4.3 Current market state summary: Do we know why the majority of contractors would not recommend remote monitoring systems for RTUs? The roots of this perception could affect the approach to messaging and educating/training of the contractor community.	We didn't collect information on the reason. Potentially, they have not yet seen the benefits of remote monitoring. We expect the demonstration project will help build out the contractor experience and business case for all of CCC. Trane and Daikin both already offer remote monitoring and connected commissioning for their residential products, and in a recent webinar mentioned "improved installation, contractor, and customer experience" as the main reasons of their business case. NEEA Product Council HP Commissioning on 1/26/26

#	Source	MTAB Feedback Provided	CalMTA Response
90	Fred Gordon	4.4 Supply chain map, Page 56: Substantive. Suggest a thematic statement somewhere like: This initiative will only invest in elements that add value to those provided by other programs. That may be obvious to you but seems like a good value to put out to others.	A sentence was added in 2.4 Strategic intervention #3 to highlight this point.
91	Mary Anderson on behalf of the California IOUs	4.5 RTU Purchasers, Page 56: MTA interviewed 20 contractors but there are 11,300 licensed in CA -- the number of contractors interviewed represents only 0.2% of licensed contractors.	We are aware of this and for that reason, we consider the results presented here to be qualitative. The evaluation plan (Appendix F) calls for a quantitative, representative survey of contractors going forward.
92	Mary Anderson on behalf of the California IOUs	4.5 RTU Purchasers, Page 56: 4.5.1 -- Concur with the first paragraph. A very high percentage of replacements are "replace on failure." The report states that replace on failure typically resulted in opting for standard equipment given its availability and price point" -- this means that the two biggest factors are cost and what distributors stock.	Thank you for your input.
93	Cyane Dandridge / Stephen Miller	4.5 RTU Purchasers: From an EJ and broader market adoption standpoint, I'm wondering if the cost and hassle barriers (to switching to a different type of HVAC system) associated with an unplanned replacement call for some type of incentive?	The MTI Plan includes two distinct incentive strategies to reduce the upfront cost for all consumers. Strategic Intervention #5 describes CalMTA's plan to coordinate with external energy efficiency and other related programs in California to create consistent incentive offerings on qualifying CRTU products. CalMTA also proposes limited incentives at the manufacturer level, with contractual requirements that ensure they flow down to reduce the cost to the consumer, to stimulate development and promotion of products with targeted features.
94	Mary Anderson on behalf of the California IOUs	5.1 Collaboration at All Phases of MTI Development, Page 58: MTA notes plans to collaborate with other entities. Earlier in the report, MTA noted that other programs previously tried to increase the efficiency of RTUs sold, but there was no substantial increase. There are two significant things that MTA should report to MTAB and CPUC before CPUC authorizes an additional $40M of ratepayer money to be spent. First, it would be critical to	Previous programs have been more selectively focused on specific transactions or activities: typically providing incentives at either the end-user or midstream/ distributor level without accompanying efforts to break down market-level barriers or leverage market opportunities. CalMTA's initiative is multi-pronged, with six different strategic interventions, and works up and

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		explain why other programs have not been successful in pushing higher efficiency products. Without knowing the answer to that question, MTA has a high likelihood of also being unsuccessful. Second, it would be helpful to explain what MTA will do differently to succeed. For instance, does MTA have more influence on OEMs? Or, does MTA have more influence on distributors and their stocking plans?	down the supply chain to improve product, influence a variety of market actors, and spread awareness of various features in order to achieve our targeted market impact. Section 2.3.3 (Market opportunities and key leverage points) describes additional factors that will accelerate progress toward MTI goals.
95	Hayley Goodson	6.1 MTI program data and materials, Page 61: Suggest changing reference to "CE" (…"MTI incremental impacts and CE") to cost-effectiveness.	Thank you, revised.
96	Fred Gordon	7.1 Evaluation approach overview, Page 63: Substantive. Does not appear to include load research to validate savings from CCC. CCC is highly behavior dependent, requires revised working relationship between most contractors and customers, and also depends on how each manufacturer met the specification. Is there some other group committed to this load research, particularly for the pilot?	CalMTA plans to perform M&V on the demonstration project, which should be of sufficient size to begin to prove out the savings from CCC.
97	Mary Anderson on behalf of the California IOUs	8 Risks & mitigation, Page 66: Table 13 #2 -- Based on the earlier part of the MTI plan, 75% of contractors didn't recommend interactive controls. This wording seems to indicate that item 2 would have a high probability of occurring. Further, if CCC is not adopted it seems like the severity may be high.	One of the goals of our demonstration project, and of the entire MTI, is to educate contractors on the benefits of remote monitoring. Strategic interventions #2 and #4 address this barrier.
98	Peter Miller	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 7: This appendix refers to "efficient CRTUs," instead of "advanced CRTUs" as in the main body of the Plan. It seems that "efficient CRTUs," "advanced CRTUs," and "CRTUs" are the same.	Appendix B has now been updated to be more consistent with the MTI Plan by utilizing the term "advanced CRTUs" in place of "efficient CRTUs"
99	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 9: CalMTA's proposed AVP and availability are necessary but not sufficient conditions for transforming the market. Without addressing underlying economics—particularly upfront cost and payback expectations—	There seems to be a misunderstanding about the CalMTA forecasting model: economics are a key driver to market adoption; AVP and availability are constraints on adoption - not drivers.

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		the market response envisioned by CalMTA is unlikely to materialize at the projected scale. The CalMTA proposal and NEEA report differ fundamentally in how they characterize the primary barriers to market adoption of high-efficiency equipment: CalMTA's Perspective: AVP and product availability are treated as the principal "keys" to unlocking the market, modeled as share-weight multipliers that can significantly limit adoption if low. Under this framework, improving AVP and availability is assumed to naturally shift the market toward Tier 1–3 units. NEEA's Perspective: Even if these "keys" are in place, adoption remains constrained by high upfront costs and customers' requirement for very short payback periods, as reflected in CalMTA's 19% discount rate. This highlights a disconnect between theoretical market accessibility and actual purchasing behavior. Several NEEA findings challenge key assumptions in the CalMTA model: 1. Awareness Paradox: While CalMTA assumes awareness drives adoption, NEEA reports that ~75% of contractors are familiar with the technology, yet only ~25% recommend it. This suggests price sensitivity and customer economics—not awareness—are the binding constraints. 2. Role of Availability: CalMTA emphasizes availability, especially for emergency replacements. However, NEEA finds that even in planned replacements—where availability is not an issue—customers overwhelmingly choose lower-cost, code-minimum equipment. This indicates that high discount rates dominate decision-making, even when higher-efficiency options are accessible.	We believe the model works precisely as this comment says it should: decision-makers will not choose efficient units unless it is economically attractive (i.e., NPV of lifetime costs are better than the alternative), but even that is not sufficient because there must also be an improvement in (1) timely availability, and (2) awareness of the value proposition. NEEA has different RTU specifications than CalMTA. The NEEA RTU focuses on gas units with improved enclosures and energy recovery ventilators. Findings from NEEA's market progress report about awareness and contractor recommendations are not useful indicators for CalMTAs products.

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		CalMTA's own sensitivity analysis underscores this fragility: when AVP and availability improvements are assumed to be only half as effective, Total System Benefit declines from $595M to $403M. This suggests the forecast is highly dependent on variables that NEEA evidence indicates are not primary drivers.	
100	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 15: 3.1.1 -- Consumers face selection of code minimum or higher efficiency for either AC+GF or HP. Also, where is DF?	Thank you, the content has been edited to acknowledge dual fuel (DF) is a choice.
101	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 16: Section 3.1.1 uses a 20-year life. This conflicts with much lower estimates provided by owners and facility managers on page 10 of Appendix D. The footnote refers to the CPUC's expectation of a 20-year life, and we understand that is the value the MTA is expected to use. However, that should be made clear in the body of the text--otherwise users may think the 20 years is not credible.	CalMTA has added language to Appendix B to clarify that it uses the same values used in the CET for forecasting and cost effectiveness.
102	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 24: It does not seem like a logical assumption that install cost is the same for all Tiers--see comment in attachment 1.	Install cost is assumed to be $185 higher for the advanced RTUs (all three tiers) than for code-minimum units. We believe this is reasonable, based on our research.
103	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 63: It is unclear why 10T was used. DOE uses 7.5T to represent small (65K to 135K) and 15T to represent large (135K to 240K). See Section 5.3 on p. 5-4, Section 5.7.1.1 on p. 5-24, Section 5.8 on .p 5-27 of the TSD, Section 12.3.2.5 on p. 12-7, and Section 12.3.7 on p. 12-14.	10 tons was used to represent an average between the DOE's small and large units. Our market research in Figure 2 of Appendix D indicates that, of units between 3 to 20 tons by cooling capacity, over 60% are under 5.4 tons, 28% are 5.4 to 11.24 tons, and 12% are 11.25 to 20 tons. This size distribution of RTUs in California helped inform us that using 10 tons would result in a conservative and defendable pricing estimate.
104	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 65: Table 1 -- These costs severely underestimate real-world values. Per this table, a Tier 3 7.5-ton HP would cost $18K to install, but this is much less than what	The Captive Aire unit is a variable-speed DOAS system. A DOAS is designed primarily to provide 100% outdoor ventilation air, with integrated energy recovery and advanced control sequences to manage temperature,

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		MTA paid for their 6-T Captive air ($36,094 + $1663 for transition curb), and that was the lowest cost -- quotes were as high as $66,516.	humidity, and ventilation independently from the main HVAC system. The unit and price quote referenced in the CalMTA market characterization included advanced controls features and internet connectivity for remote monitoring and configuration, which contribute to higher equipment costs relative to standard variable speed HP RTUs intended for packaged rooftop applications. As a result, the reported incremental cost estimate of $3,800 per ton likely overstates actual costs. It also represents a single data point. CalMTA relied on this as a proxy for a Tier 3 efficient CRTU - prior to conducting additional research and analysis. We believe the cost estimates in the forecasting model are reasonable, based on our additional analysis. These costs will be reviewed as part of ongoing 3rd-party evaluation efforts.
105	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 65: DOE cost estimates are low for MPC -- one could expect as much as two times.	Responded above in comment #104.
106	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 67: $700 estimate for CCC -- This estimate is too low. MTA needs to be more specific as to how they arrived at that value.	Appendix B references research conducted for the Market Characterization report. That research is summarized in Table 11.
107	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 24-25, 65: DOE cost estimates are not inclusive of tariffs and other price increases in recent years.	The CalMTA model is driven by the relative cost of different products, so it is the difference in product costs that drive the choice. Rather than add additional uncertainty around inflation and tariffs into the forecast, CalMTA chose to make a simplifying assumption, which we believe is reasonable, that inflationary factors would be similar across product types (i.e., no material change to incremental cost of one over the other). This assumption is explicitly stated on p. 25.

#	Source	MTAB Feedback Provided	CalMTA Response
108	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach, Page 64-65: OEMs have argued in several comments submitted to DOE in response to various rulemakings that that the DOE incremental markup process is not representative of the real world.	Our aim is to develop estimates and assumptions based on the best available documented sources. Assumptions and sources will be critically reviewed by a 3rd-party evaluator, including recommendations for alternative sources and approaches, as appropriate.
109	Mary Anderson on behalf of the California IOUs	Appendix B: Market Forecasting and Cost-Effectiveness Modeling Approach: Technology costs should be cost-effective for the customer by 2040 for at least two of the three tiers.	The technologies are cost effective for customers over that period.
110	Peter Miller	Appendix C: Product Assessment Report, Page 12: The product definition in this appendix for a "CRTU" does not include the advanced features included in the definition in the body of the Plan.	The content was described in the Appendix C Product Assessment Report, but not as clearly defined as the main body of the MTI. Revisions have been made to the Appendix C Product Assessment Report for alignment.
111	Mary Anderson on behalf of the California IOUs	Appendix C: Product Assessment Report, Page 25: Section 3.4.3 -- Footnote 19 states,:"The new IVEC metric includes fan power at all temperatures while EER or IEER only accounted for compressor and condenser performance." This is not true. Fan power has always been included. The big change is that the tested external static pressure for IEER at full load is 0.25 in. water, and was significantly increased for IVEC.	The footnote has been modified to read "The new IVEC metric modifies the external static pressure and scales for the presence of economizing equipment to better represent real duct systems and ventilation components."
112	Mary Anderson on behalf of the California IOUs	Appendix C: Product Assessment Report, Page 45: The proposal acknowledges VRF and DOAS as alternative technologies and provides a comparison of their strengths and weaknesses relative to RTUs. However, other non-RTU solutions such as mini-splits, water source heat pumps, chilled water, and air-to-water heat pumps are not discussed as alternatives for single-zone applications. We recommend evaluating and addressing the role of these additional alternatives in the context of market transformation.	While some building owners may decide to replace their RTU with a different piece of equipment, like the ones mentioned in this comment, this is much more likely to be done when performing a whole-building retrofit, not when considering a single-unit replacement, which is our target market.
113	Mary Anderson on behalf of the California IOUs	Appendix D: Market Characterization Report, Page 10: The comment that building owners think that RTUs have a life of four years is concerning. If this is true, it will be hard to convince them to buy anything but the cheapest units.	We agree. This was a surprising finding and may be a lack of awareness from the owner perspective and/or a result of an unusual sampling of owners.

#	Source	MTAB Feedback Provided	CalMTA Response
114	Hayley Goodson	Appendix E: External Program Alignment & Coordination: I'm assuming that the application accompanying this MTI Plan will provide the discussion of "non-ratepayer funding sources" required by D.25-11-023 (pp. 22-23 and Ordering Paragraph 11(a)). So, I'm simply noting the absence of that discussion in Appendix E and the related Section 5 of the MTI Plan, both of which discuss leveraging to amplify MTI impact and create efficiencies. It may be worth adding a reference in the MTI Plan and Appendix E to the discussion of any pursued non-ratepayer funding sources and resource leveraging in the Application.	The CPUC application that includes the CRTU MTI Plan will include this discussion as directed by D.25-11-023. CalMTA will explore the addition of language to the MTI Plan itself to more explicitly clarify that coordination with external programs, including non-ratepayer-funded programs, will help us identify opportunities to cost-share or pool resources on MTI-related activities.
115	Christina Torok	Appendix F: Evaluation Plan: Similarly, the milestones are also a bit vague, such as MPI 8 and 9. Nine is particularly confusing, and 8 doesn't seem to be an objective milestone.	With regard to MPI #8, we intend to conduct quantitative surveys of contractors and end-use customers. We anticipate that the MTI 3rd-party evaluator will help refine the specific wording of this MPI based on actual survey question wording, with the aim of quantifying self-reported/perceived usability over time. We do believe usability will be an important metric to track. We will adjust the wording of MPI #9 to make it less confusing: *Percent of potential RTU buyers who demonstrate awareness of CCC, its capabilities, and its value*
116	Christina Torok	Appendix F: Evaluation Plan: For MPI 15, it seems like 'where available' is an important caveat and takes some of the meaning out of the milestone	It wasn't intended to change meaning, but it does seem to be redundant and unnecessary. We have removed the words, "where available."
117	Christina Torok	Appendix F: Evaluation Plan: MPI 17, 2040 seems a long way out to be very meaningful, nor qualify as a medium term MPI. Can there be a price premium target before 2040?	MPI #17 really pertains to Tiers 2 and 3, which we do expect to take time. That said, we have added a mid-term MPI pertinent to price premium.
118	Christina Torok	Appendix F: Evaluation Plan: I don't see an MPI related to having a workpaper, even though it's in the if/then series in the main MTI Plan.	While we do not have an MPI specifically tied to a workpaper, a workpaper is required in order for us to reach MPI #20. MPI #20: Number of California energy efficiency programs that adopt at least one CRTU element for incentives.

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119	Mary Anderson on behalf of the California IOUs	Appendix G: Risk Management Plan: There are two risks with CCC that are not discussed. The first is the measure's longevity, which entails two subrisks. One, manufacturers will not, in some cases, maintain the platform for the proposed twenty-year life of the equipment. There are examples of Nest thermostats losing their connectivity to the internet after ten years because the software contained security vulnerabilities that could not be fixed with updates. It is also likely that when manufacturers roll out a new software platform, they will not find it economical to continue support of older systems. Second, there is a significant risk that manufacturers will choose to monetize AFDD through a subscription service, which would likely lead some customers to cancel the service.	On the first point, we believe that RTU manufacturers have a much more vested interest in maintaining software over the life of the equipment. A $300 Nest is a much smaller investment, and it's not as surprising that they might discontinue supporting their product after several years. We agree discontinuation is a small risk. That being said, market actors would at least receive the startup and AFFD benefits up until discontinuation. On the second point, we currently have a cost included in our model adoption for a subscription service. These effects are included in the current analysis.
120	Mary Anderson on behalf of the California IOUs	Appendix G: Risk Management Plan: The second undiscussed risk is AFDD sensor failure. Sensor failure is a significant issue because replacing a sensor can cost several hundred dollars. Some studies show that sensor failures are 35% of fault detections. Users may perceive that AFDD costs more than running the unit unmonitored. Consider working with manufacturers to develop a sensor quality standard. This might be of interest to AHRI.	We have added language in Strategic intervention #6 to work with AHRI and manufacturers to develop a standard for CCC. A sensor quality standard could be an outgrowth of AHRI-1390 or a separate standard altogether.

3 Public comment

#	Public Feedback Provided	CalMTA Response
1	Please change NREL to National Laboratory of the Rockies (NLR)	Thank you, revised.
2	Do the Tiers stack or are they independent? Does Tier 2 include Tier 1 requirements? Did you look at a cost benefit analysis for each Tier? Are there certain building types and climates that benefit more from the different Tiers? It's not clear from the document.	Tiers 1 and 2 are independent. Tier 3 includes features of both Tier 1 and 2. Cost benefits by tier are detailed in Appendix B. Individual building benefits will vary by building type, climate zone, operational characteristics and more. Programmatic impacts including avoided costs and total system benefits are assessed at

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		the state-wide aggregate level and the aggregation details and weighting are detailed in Attachment 2 of Appendix B.
3	Did you consider the potential impacts of regional or statewide RTU end of life programs to recycle and reclaim parts of the old RTUs? When properly implemented there is a potential for cost savings to the owners. In addition, it provides an improved refrigerant recovery and management program.	Thank you for the suggestion. We are not planning to intervene in the RTU recycling process. It would be expected that participants in this program would follow all legal requirements.
4	The HVAC Technology Challenge specification also includes connected controls with load flexibility requirements and encourages enhanced AFDD.	Thank you. We hope for this program to align with as many nation-wide specifications as possible.
5	Can you quantify what is meant by significant rise in market share and add a timeline? Like greater than 25% by 2030.	Section 2.3.5 Market end state has been revised to add specificity. We envision the market share of CRTUs with all features is over 30% by 2040. Please see Table 1 of Appendix F for specific short-, medium-, and long-term program goals.
6	Did you consider working with utilities to look at utility rate structures that encourage HP RTUs over gas RTU? Also, consider potential programs and financial benefits for load shifting or DR?	Influencing utility rate structures to encourage HP RTUs over gas RTUs is not a strategy of this MTI. We will look to demonstrate the benefits of CCC for load shifting and demand response (DR) and financial benefits this may unlock for customers and utilities alike.
7	Should Strategic Intervention #4 be listed as Strategic Intervention #2?	While these interventions are similar, they have distinct focuses related to training. Strategic Intervention #2 is focused on working upstream with advocate distributors to train contractors. Strategic Intervention #4 is focused on development of downstream materials for the workforce and asset managers that are accessible to ESJ and non-ESJ communities.
8	Did you consider doing a study to understand typical RTU life cycles, operations, failures, replacements, financing, etc. in ESJ communities to identify barriers and possible solutions? We should not assume everything operates the same as other communities.	We agree. For these reasons our planned demonstration project will require at least 40% of its RTU installations to occur in disadvantaged communities.
9	Where did the 20% cooling efficiency target come from, and is it cost justified for all or most applications? 20% improvement over the 2029 federal minimums is a sizable jump in performance and the equipment may not be cost justified based on energy savings.	Please see comment #12 in the MTAB feedback section for more details related to this.
10	Section 3.2 Summary of Key Findings: Can you please reference the study or section of this report with the analysis that supports these findings?	Appendix C: Product Assessment contains the analysis supporting these key findings.

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11	Are you over specifying the product by requiring variable speed compressors? There may be less expensive technologies or product designs that achieve similar outcomes?	CalMTA's Tier 3 has now been revised. Please see comment #3 in the MTAB Feedback section for more details related to this change.
12	Section 4.4.5 RTU Manufacturers: York is now owned by Bosch and not Johnson Controls LG is developing CRTUs for North America and will have the available in 2027.	Thank you, Table 10 has been revised.
13	Maybe I missed this, but it is not clear if CalMTA plans to develop and release a full definition or specification for the CRTUs targeted for this program. The Product definition in Section 3 is not specific.	Our product definition has been revised with a more detailed specification. Additional details related to specific CCC requirements will also be shared prior to Phase III: Program Implementation.
14	Revise the definition of variable speed operation so it does not unintentionally exclude legitimate approaches to achieving the intended modulation performance. a. There are applications of variable speed compression that can meet the proposal's modulation objectives but fall outside the current definition. A broader, less prescriptive definition would allow for a wider range of design strategies while still delivering the same functional outcomes. The presumption that multi-capacity compressors cannot provide sufficient heating at cold outdoor temperatures is not correct when we consider the new test procedure in AHRI 1340. b. The consideration of operating levels in heating mode allows the manufacturer to engage more compressor capacity stages at cold outdoor temperatures thus delivering more heating from the vapor compression cycle and reducing the need for supplementary heating. Boost and Boost2 heating operating levels in AHRI 1340 are intended to test heating performance at cold outdoor temperatures, thus validating heating performance of multi-capacity RTUs – whether inverter-driven or otherwise	CalMTA's Tier 3 has now been revised. Please see comment #3 in the MTAB Feedback section for more details related to this change.
15	Allow dual-fuel heat pumps to qualify in any of the tiers. a. Dual-fuel installations provide an affordable pathway for commercial rooftop installations, where the cold-climate solutions are still nascent and offer less return on investment. Similarly, auxiliary electric heat can cause usage spikes that prevent the owner from realizing the energy cost savings. Since "reducing winter peak load" is a goal of the MTI, dual-fuel heat pumps are a solution that achieves electrification without negatively	We agree with the stated benefits of dual-fuel heat pumps. While our program interventions will focus on promoting CCC, improved cooling efficiencies, and variable speed fans, our specifications deliberately do **not** exclude gas back-up heat.

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	impacting grid stability. Dual fuel heat pumps are accessible and attractive decarbonization solutions that are essential to achieving near-term market adoption.	
16	Harmonize with CEE to the extent possible. a. CEE is in the process of developing a revised specification for commercial heat pump with input from industry on future products. The specification will use what will be new efficiency metrics in 2029 and will also include heating metrics for heat pumps. It is valuable to both manufacturers and incentive administrators to have harmonization of "high tier" performance criteria across various programs	We agree. CalMTA is an active participant in the CEE Commercial Air Conditioning and Heat Pumps Committee's Heat Pump Rooftop Unit Project working group.
17	Correct table references. a. It appears that Table 51 ought to be numbered Table 5, and Table 62 ought be numbered Table 6. In Table 61 (Table 6), the test procedure for rows where IVEC and IVHE values are stated should be AHRI 1340 rather than AHRI 340/360 alone.	Thank you, revised.