Advancement Plan Feedback Response

Portable/Window Heat Pumps

This document provides a comprehensive list of comments received from both the public and the Market Transformation Advisory Board (MTAB) on the draft Portable/Window Heat Pumps Market Transformation Initiative (MTI) Advancement Plan and CalMTA's response to those comments. The draft Advancement Plan was posted to the California Public Utilities Commission Energy Division's Public Document Area for public comment between Dec. 6-20, 2023. Visit calmta.org to access updated Advancement Plans. Note: All feedback that appears in this document is presented verbatim as submitted, with no edits made by CalMTA.

Source	Feedback Provided	CalMTA Response
Public (Unknown)	The report refers to "low GWP refrigerants" and "ultra-low GWP refrigerants." Just for clarity these should be defined. Right now, the CARB standard for air conditioners/heat pumps is GWP 750. That is "lower", but 750 times CO2 cannot be called "low." Terminology aside there should be a consideration of how much a difference getting ultra-low refrigerants approved quickly would make. And there should be explicit recognition that ultra-low GWP portable and windows heat pumps using propane are widely available in other parts of the world and that the IEC has approved over 900 grams -- but that the US has not followed suit. Finally, the report should advocate that the CEC pressure CARB to do another rule-making that recognizes that portable/window heat pumps with ultra-low refrigerants are needed now and will be required in, say, 3 years. This should give regulatory bodies the time they need to catch up to Europe and Asia. Thanks for considering these views.	We will update the Advancement Plan to define both "low" and "ultra-low" refrigerants, which are already available in parts of Europe and Asia, and their possible use in portable/window HPs. We will also add the suggested research question regarding the impact of rapid regulatory approval for ultra-low GWP refrigerants. Products using propane are available in other parts of the world and we plan to learn more about the challenges manufacturers currently face associated with using these propane-based products in California. Regarding the urgency of enabling technologies like portable/window heat pumps to use ultra-low refrigerants, we will look for opportunities to advocate for that, especially through manufacturer engagement.

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Public (Abram Canant)	For portable units, I would suggest differentiating between products that (in cooling mode) reject heat to indoor air and then exhaust the heated indoor air to outside, and those that have two ducts so that heat can be rejected to outdoor air only. Exhausting indoor air to outside increases infiltration into the building, which can greatly undermine space cooling and heating efficiency. The net heating and cooling efficiency including induced infiltration effects should be considered before promoting these products for space conditioning in CA.	The proposed MTI includes a focus on portable heat pumps. Portable heat pumps are all two-duct systems, rather than a single-duct system that would use the room it is serving as the source of its heat.
Public (Unknown)	I want to express my support for the development of this program. It has been trialed in the Bay Area with good success, and when coupled with air purifiers delivers meaningful resilience and quality of life benefits for households. I believe New York City also has a similar program for portable heat pumps (partnered with Gradient and Midea), which suggests this is a viable approach. Please implement it!	Thank you for your comment and support. Updates on CalMTA's progress will be available throughout 2024.
MTAB (Southern California Edison)	Comments or questions regarding "Product, Service, or Practice Definition." Please define “low” and “ultra-low” GWP refrigerants. The advancement plan seems to use these terms interchangeably.	We agree about the need to clarify the definition of low GWP (<750) and ultra-low GWP and we will make those edits to the Advancement Plan and ensure the terminology is used correctly and consistent throughout the document.
	Comments or questions regarding "Product, Service, or Practice Definition." Describe the R&D work necessary to transform the market to bring portable products to the market at this time	CalMTA’s proposed research plan is described in Section 5 of the Advancement Plan. As we learn more, we will update this with additional research activities as they are identified.
	Comments or questions regarding "Product, Service, or Practice Definition." Explain the rationale for including these two products together in one MTI. Portable and window heat pumps are separate products with separate barriers and appliance standards agencies. Please refer to	CalMTA combined portable and window heat pumps because both product types meet the goals we have set for this MTI. These goals include the requirement that the equipment can be installed without professional help and that renters can own the equipment and take it with them when they move. We do not believe there is a conflict, as some of the same

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	comments by the Statewide C&S Program, submitted separately on the PDA, for more details.	manufacturers make both products, and we expect the test procedures will be similar. We may implement intervention strategies unique to each product type as we learn more about the market, but at this time CalMTA believes that we gain efficiencies if implemented together as one product category. If completion of the research phase indicates that it would be beneficial to separate these out, we will consider splitting them into two individual MTIs.
	Comments or questions regarding "Market Transformation Theory and Opportunity." Appendix 1, Table 2 "Stage 2 Portable Heat Pumps" forecasts total market adoption through 2045 (as a result of the MTI) to be primarily in households that already have one or more portable space conditioning unit (max 50% for SF, max 67% for MF), and only 10% for the segment with central AC, and 10% for the segment without space cooling at all. While an adoption rate of 10% by customers with central or no space cooling is not insignificant, most of the expected adopters already own a portable unit and do not need convincing on some of the key listed benefits of portable HPs. Is this MTI primarily is designed to "upsell" to customers with existing portable space conditioning, and not primarily to increase the market and "acquire" new customers who previously did not have any portable space conditioning? This is important to clarify because there are far fewer barriers to upselling than for selling to brand new customers. Arguably, the greater need and perhaps greater adoption will occur by customers who do not currently have any space cooling and are faced with dangerous warming trends, such as the farm workers in the Central Valley. The MTI Advancement Plan should address feasibility of an MTI that expands access of portable cooling to the more vulnerable populations who currently do not have any cooling, while simultaneously providing efficient heating.	Appendix 1, Table 2 does not provide a forecast of Total Market Adoption (TMA), but rather shows the assumed values for inputs to one of the Bass model parameters (m - maximum market saturation) by baseline equipment condition. This MTI is not designed primarily to upsell customers with existing portable equipment. The table represents our current assumptions about the maximum market saturation among these subsegments. In Phase II of CalMTA's process, we will review all assumptions to enhance understanding regarding populations with no space cooling to assess if this assumption should be revised. We will also assess opportunities to expand access to portable cooling in vulnerable populations as part of Phase II research and market pilots.

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	In the logic model, "Public health and climate resilient benefits" don't seem to be the same type of market vehicle as the other Opportunities listed. Please clarify the market opportunity to leverage with this MTI.	As we learn more about these possible benefits, we will develop a full, more formal logic model that incorporates what we learn from the market characterization and other research conducted in the next phase that will address this comment.
	Table 1 seems to confuse MTI progress indicators (the table name) with data that will be used to inform the MTI development, (column name). While ESRPP sales data seems reasonable for informing the development of an MTI, is the MTI's long-term progress intended to be tracked through ESRPP sales data? It may be less confusing to defer discussion of MTI Progress Indicators until the MTI Application. This table should focus on metrics for informing the MTI development.	ENERGY STAR® Retail Product Platform (ESRPP) data may be one source of data that will inform a set of long-term Market Progress Indicators (MPIs). Our approach will depend upon whether sales data acquired through ESRPP will continue to be available consistently over time. We described potential metrics demonstrating market progress in the Advancement Plan upon request of the CPUC. After completing the next phase of research and data collection through our proposed ESRPP strategy test pilot, we will develop more refined metrics and pursue associated data collection efforts.
	Similarly, long-term Equity Metrics seem to depend upon ESRPP sales data. Please clarify whether this is the intention.	As described above, ESRPP data represents one potential data source used to inform MPIs for this market, including metrics used to track progress made on equity. Additional equity metrics are likely to be identified during the next research phase and through our proposed strategy test pilot. That said, we understand that the ESRPP data will allow us to report on specific zip codes, which will provide insight and document sales volume in environmental and social justice (ESJ) community zip codes over time.
	The hardware that comes with portable heat pumps to connect the hose(s) to the window appear to allow leakage and are not insulated. The same concern is with the mounting hardware that is included with	If part of the consumer value proposition is the technologies' purported potential for self-installation, we agree that this could be a significant barrier. We

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	window heat pumps. These deficiencies should be considered in the MTI Advancement Plan.	have identified "installation barriers" as something we need to verify and learn more about via a strategy test pilot that will be finalized early in 2024. We will involve manufacturers in this strategy pilot to share what we learn in hopes of influencing installation improvements.
	Comments or questions regarding "Gap Analysis." For this and all Advancement Plans, please include the results of Step 4 "Top ideas checked against CA activities" in the CalMTA funnel graphic. Please describe the gap that CalMTA seeks to fill with this MTI.	Details of our initial review of existing California activities can be found in Section 6: External Program Review and Stakeholder Engagement. This market understanding will be further developed as CalMTA begins initial MTI outreach and research.
	There may need to be a market assessment of target market buildings to determine what percentage have double-hung windows	We appreciate the suggestion to conduct research related to double-hung window prevalence and will add this to our research plan. The strategy test pilot referenced above will investigate installation scenarios in homes with and without double-hung windows.
	Comments or questions regarding "Research and Program Development Plan." Assessing cold climate capabilities appears twice in Table 3, and more technology assessment studies are being proposed for Seasonal Heating Capacity than for Seasonal Cooling Capacity. This seems to suggest that the CalMTA plans to spend more money assessing cold-climate attributes, which is not as great a concern in California as it may be for other states, unless the effort is focused on grid impacts of heating load. The MTI Advancement Plan should also evaluate the 20-year EE savings potential of cold-climate capable HPs, and then allocate a proportionate budget and effort to assessing cold-climate performance.	Cold-climate heat pumps are mentioned twice in Table 3: first, in our assessment of the importance of cold-climate capabilities and second, as part of our cost assessment. We agree the primary benefit of cold-climate heat pumps in California is the potential for reducing grid demand during very cold weather. However, Draft 1 of the proposed U.S. Environmental Protection Agency (EPA) test procedure for room heat pumps creates a cool-climate category that will operate to 17ºF, so cold-climate heat pumps may not be as important. The new room heat pump test procedure will be addressed in the next draft of our Advancement Plan.

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		From a market research standpoint, we plan to characterize the market to understand current space heating needs generally and assess the value proposition of heating from a consumer's standpoint to help inform whether this heating use-case is important to prioritize or if the MTI will be primarily focused on air conditioning (AC) needs.
	Comments or questions regarding "Research and Program Development Plan." The 20-year savings projections for this and all MTIs should include a decreasing need for cold-climate performance over time, due to the unfortunate realities of climate change. NREL has a climate change normalized Typical Meteorological Year (TMY) that this impact into account.	Thank you for your comment and for identifying this resource. We will review NREL's TMY data and opportunities to use it in our analysis.
	Comments or questions regarding "Research and Program Development Plan." Some of these MTI Advancement activities seem like MTI implementation activities. For example, is the CalMTA proposing to inform, develop, review and evaluate new test procedures that would be acceptable to DOE and other code-setting agencies, and only then gather lab and field data on installed HP performance to inform the MTI Application?	CalMTA sees coordination with the U.S. Department of Energy (DOE)/EPA regarding test procedures as a long-term intervention that is just one component of our plan. In the near term, we plan to gather field data and information about the availability of current products, and will engage manufacturers on product development plans. We will also deepen our understanding of the current state of test procedures, manufacturer responses, and identified next steps to support ongoing engagement with DOE and other state and national players. As the products evolve and improve, our approach to coordinating with DOE and other entities will also evolve in future iterations of the test procedure and standards process.
	Comments or questions regarding "Research and Program Development Plan."	We agree that duct designs for casement and other types of windows should be pursued.

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	The MTI Advancement Plan should investigate other hose mounting techniques for portable heat pumps in buildings without double hung windows.	CalMTA's proposed strategy test pilot will investigate installation scenarios including documenting and studying hose mounting techniques.
	Comments or questions regarding "External Program Review and Stakeholder Engagement." Please note that partners outside California like NEEA or NYSERDA have colder climates where cold climate performance is a priority. This may not be the case in California.	We are aware of this, and we will prioritize the specific needs of California in these conversations.
	Comments or questions regarding "External Program Review and Stakeholder Engagement." Please share feedback received from all sources to date in the draft advancement plans.	CalMTA will post all feedback received and our replies.
	Comments or questions regarding "External Program Review and Stakeholder Engagement." Engagement with the Statewide Codes and Standards Advocacy programs will be critical to ensure coordination with ongoing work being done related to this MTI idea. Please refer to separate comments submitted by PG&E, Lead Program Administrator representing the IOUs for the Statewide Codes and Standards Advocacy programs.	CalMTA is committed to coordinating productively with statewide programs and specifically with the Statewide Codes and Standards (C&S) Advocacy team leading this important work. We have had several meetings with the C&S team to discuss our development of these market transformation ideas and have identified a cadence for regular future meetings with the C&S team and energy efficiency (EE) program directors at the investor-owned utilities (IOUs), as well as identified subject matter experts (SMEs) for each target technology, throughout the research phase of MTI development.
	Comments or questions regarding "Initial Cost Estimate, Timing and Expected Results."	CalMTA agrees that it is vitally important for CalMTA to maximize program alignment and leverage. We have facilitated multiple meetings with the C&S team and IOU EE directors to discuss the MTI development

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	The MTI advancement plans could do more to leverage IOU and other PA expertise in identifying what information already exists on each of the research topics. Further secondary research and coordination with the IOUs and other PAs, will help ensure that future costs estimates are accurate and that all studies in this Advancement plan are necessary.	process and our Batch 1 Advancement Plans in particular. Moving forward, we will continue to meet with the C&S team, EE program directors, and identified SMEs for each target technology to support the MTI research phase. We will also continue identifying and reaching out to other energy efficiency programs and stakeholders in California to build collaborative relationships.
	Comments or questions regarding "Initial Cost Estimate, Timing and Expected Results." The MT Adopted Framework included a 7 stage "stage-gate" model that describes the decision points at which stakeholders agreed they would like to have visibility and feedback. Now that Batch 1 has been identified, future MTI Advancement Plan development should establish an ongoing, sustainable process that more closely follows the suggested Stage Gate model.	CalMTA follows a CPUC-approved stage-gate process. The Advancement Plans are the last Stage 2 deliverables for Phase I, which describes the work that will occur in Phase II. As our research progresses in Phase II, we will use the CalMTA website, MTAB meetings, and stakeholder outreach meetings to share our findings and the ways in which they inform development of the MTI strategy.
	Comments or questions regarding Appendix 1: TSB Estimation Approach Please explain: How many experts were on the Delphi panel and what were their areas of expertise? What were their initial estimates of the Bass model parameters? What was the methodology? Did you take the average of their final estimates, or did they reach unanimous agreement?	CalMTA used a mini-Delphi panel method to forecast market adoption of portable heat pumps. Our Delphi panel consisted of three experts, each with more than 20 years of experience in the energy and environment sector, and two experts with specific experience in market transformation who support the CalMTA project. Panel members based their forecasts on secondary research and their own industry knowledge. We applied the Bass Model framework and asked panel members to estimate the adoption level of portable heat pumps using three parameters: maximum potential market saturation (m), coefficient of innovation (p), and coefficient of imitation (q). The last two parameters capture the adoption rate by early

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		and late adopters, respectively. The panel members gave separate forecasts for single-family and multi-family households. We conducted two rounds of surveys. In the first round, we collected qualitative comments from the panel members to identify additional data needs for market and technology characterization. In the second round, we provided this data along with the anonymized forecasts of all three panel members. We did not seek consensus among the panelists, but rather used the average of their Bass parameter values (m, p, q) to generate the Baseline Market Adoption (BMA) forecast. According to the BMA forecast developed through this process, 5-11% of single-family households and 17-24% of multifamily households will own a portable heat pump by 2045. We should note that time constraints influenced panel composition (a three-person panel instead of representation from all stakeholders, including manufacturers and retailers) as well as the number of rounds of the Delphi panel process. CalMTA plans for a Delphi panel with broader representation in Phase II.
	Comments or questions regarding Appendix 1: TSB Estimation Approach Were you using California data as inputs to the Delphi panel? The estimates seem very aggressive for California. It would be useful to understand what the CalMTA's process is when there isn't California-specific data.	CalMTA presented California data to panel members, including data that characterized the current penetration of heating and cooling systems disaggregated by single-family and multifamily households in California in 2020 (U.S. Energy Information Administration [EIA] Residential Energy Consumption Survey [RECS]). Panel members were

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		also provided with the distribution of portable heaters and portable/window or wall AC units in California based on EIA RECS 2020.
	Comments or questions regarding Appendix 1: TSB Estimation Approach The MTI Advancement Plan should explain if the TMA forecasts include successful code or standard adoption.	Yes, both BMA and TMA incorporate the impact of current and expected codes and standards adoption (any intervention that is outside of CalMTA).
	Comments or questions regarding Appendix 1: TSB Estimation Approach CalMTA should review with the MTAB their market assumptions and data sources used for TSB estimates, to ensure that all TSB estimates are consistent with the CA EE framework.	Appendix 1 of the Advancement Plan highlights key assumptions used to develop preliminary (Phase I) Total System Benefit (TSB) estimates. CalMTA is currently working on revising Appendix 1 to provide complete, detailed documentation of all sources, assumptions, and methods for TSB estimates, as well as Total Resource Cost (TRC) and Program Administrator Cost (PAC) ratios. During Phase II: Program Development, CalMTA will conduct additional market and technology research on portable/window heat pumps as described in the Advancement Plan. Based on that research, the team will refine TSB and cost-effectiveness estimates for the MTI. These refined estimates and their detailed methodology and assumptions will be included as part of the MTI Plan required for advancement from Phase II: Program Development to Phase III: Market Deployment. CalMTA staff are available to review sources, assumptions, and methods at any time, however; we anticipate the greatest scrutiny to occur after we have updated this information based on Phase II research.

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	Comments or questions regarding Appendix 1: TSB Estimation Approach Please include a description of how TRC and TSB were calculated and whether or not this differs from the TSB inputs and calculations that are required from the IOU EE programs.	TRC and TSB were calculated in line with IOU requirements for EE programs, with costs and benefits modified to accommodate a statewide value. Utility/climate zone avoided costs are averaged by the share of customers from each of the three largest IOUs and with average values applied to the remaining portion of California served by other utilities. TRC includes all avoided cost categories, including electric/gas/greenhouse gas and refrigerant benefits, program costs, incremental measure costs, etc. The Avoided Cost Calculator and projected lifetimes savings were also used to generate TSB.
Public (Enervee)	Importance of safe, affordable financing options to overcome financial barriers. We therefore request the following additions to the Advancement Plans in all relevant sections (including the logic model): Barriers: Add "lack of access to capital" to the list of barriers Strategic Interventions: Add "facilitate access to capital": "Engage private lenders and philanthropic partners to ensure that safe and affordable loan products are available to those facing financial barriers". Philanthropic dollars, for example, could be used to buy down interest rates for those facing the greatest financial barriers. Outcomes: Add "Financing is available, so consumers can pay for [portable/window heat pumps] or [induction cooking appliances] with affordable monthly payments."	While we recognize that cost is a likely barrier and financing may be an important intervention as is described, the logic model included in our Advancement Plan is conceptual. As we learn more in this next phase, we will consider strategies to lower cost or make the product more affordable to consumers through financing or other mechanism and provide the update in the final version of the logic model included in our full MTI Plan.
	Opportunities to better leverage statewide online marketplace: Implement an Enervee Score for cooking appliances.	Our approach to addressing financing in the MTI logic model is described above.

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	Gain an understanding of the role of financing and the interplay between layered financial incentives and financing to empower target communities to purchase these technologies at retail. This will also provide data on the level of incentives needed by different consumer segments to optimize the design of incentive programs, such as the IRA HEAR rebates and the statewide Equitable Building Decarbonization incentives. Gain an understanding of the potential to expand retail fulfillment partners and inventory; leverage OEM and retail fulfillment partner financial contributions to reduce the purchase price of the technologies; and engage leading manufacturers and retail partners in co-marketing. Enervee is currently facing limitations sourcing induction cooking appliances and portable/window heat pumps, and the pilot could address this. Work with retail fulfillment partners to develop a portable/window/room air conditioner haul-away and recycling program to ensure proper end-of-life handling of refrigerants. Over one-third of those purchasing refrigerators and freezers via ca.enervee.com have voluntarily paid to have their existing appliances professionally recycled. Explore opportunities to engage utilities and other program administrators in efforts to market these technologies via the statewide online marketplace and cross promote the online marketplace and other programs	The intervention strategies for this MTI include coupling proper recycling of older AC units that pose risk for refrigerant leakage and long-term disposal interventions for portable/window HP products. More details on specific tactics will be addressed in the MTI Plan.
	Work with iBank and philanthropic partners to understand opportunities to reduce the cost of financing for those facing the greatest financial barriers (for example, by providing low-cost lending capital or funding interest rate buy-downs).	We will consider the financing barrier during the next phase of research, which will then inform strategic interventions and other tactics deployed through this MTI to overcome the cost barrier.

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Public (CalNEXT)	The CalMTA Portable/Window Heat Pumps Draft Advancement Plan represents an opportunity help California meet its decarbonization goals. CalNEXT offers the following comments for your consideration. CalNEXT supports the proposed MTI focus on portable/window heat pumps but continues to advocate for additional diversity in packaged window heat pumps. Alternative designs including new thru-wall and wall-mounted packaged heat pumps offer similar value propositions in comparison to split heat pumps but offer more permanent installations and ventilation options important to multifamily, schools, lodging, and other building applications	We will consider your recommendation around other alternative designs and submarkets to heat pump technology both within this MTI but also for possible inclusion in future MTIs. The current MTI is built around the opportunity for self-installation and self-ownership for the target consumers. If other products offer that opportunity, we will consider including it in this MTI.
	As DOE, EPA ENERGY STAR and CEE are all currently engaged in the development and modification of test procedures, standards and specifications related to window heat pumps, additional clarity of the MTI role may be beneficial. Initial pricing of new window heat pumps has been in the $3,000 range, there may be some question as to whether leveraging ESRPP will be the best channel for accelerating market adoption. It would be important to leverage the strength of the existing trade ally and distributor channels supported through TECH Clean California and the IOU managed Comfortably CA programs, in addition to the ESA program. Multiple ongoing and completed projects through NYSERDA, NEEA, EPIC and CalNEXT involve product testing and coordination would be of benefit to avoid duplicative efforts	We acknowledge the important and valuable work already being done on test procedures, standards, and specifications related to portable and window heat pumps. CalMTA will leverage that work to accelerate the adoption and eventual improvements of future iterations of these products. For example, we seek to influence the evolution of these products to include features like use of ultra-low refrigerants, air filtration, and easier installation practices. While the work currently being done is critical, additional engagement of retailers/manufacturers and awareness-building among end-users will be needed to achieve these goals. We are aware of a single cold-climate product on the market at the price point mentioned but note that mild-climate heat pumps are available for less than $1,000 and portable/moveable products priced in the $400-500 range. We believe the cost of the current

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		saddle-bag models is being driven by colder climates and will not be as relevant in most California climates. For portable/window heat pumps products that fall in the < $1,000 range, we believe retailers and the ESRPP will be a useful distribution channel as these products can replace the purchase of a window AC unit. Regarding leverage of existing trade ally and distributor channels supported through TECH Clean California and Comfortably CA, we agree that they are a likely distribution channel for the saddle-bag versions of this technology and plan to coordinate accordingly. We also plan regular communication with New York State Energy Research and Development Authority (NYSERDA), Northwest Energy Efficiency Alliance (NEEA), California's Electric Program Investment Charge (EPIC) program, TECH, Comfortably CA, and CalNEXT to avoid duplication and enhance leverage.
Public (Pacific Gas & Electric Company)	Strategic interventions for portable heat pumps should be limited in scope and focus on USRPP and building customer awareness. Currently, portable air conditioners (Portable AC) are the primary focus of the ENERGY STAR specifications, test procedure development, and manufacturer marketing. Financial incentives are the best approach to engage white goods manufacturers in supporting market adoption or technological changes in this nascent market. For example, the USRPP changed the refrigerator specification in 2021 to require two-stage compressors.	We will leverage ESRPP for these products and have identified an intervention around building consumer awareness. That said, we still anticipate a need for California-based entities to engage in national conversations with DOE, EPA, Consortium for Energy Efficiency (CEE) manufacturers, and other national partners on future product evolutions.

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	Only one US manufacturer produced a two-stage refrigerator product in 2020, which national retailers did not stock. After the 2021 rebate, the sales of two-stage refrigerators increased to 54,000 in PG&E's service territory. USRPP program engagement should dramatically impact the product adoption and retailer and manufacturer focus. As the market adoption increases, the consumer cost should decrease.	We plan to leverage the ESRPP platform and engage with retailers to support these objectives. A proposed strategy test pilot in 2024 will use the ESRPP infrastructure to target both portable/window heat pumps and induction ranges and cooktops.
	NCSA is collaborating with DOE consultants to support an updated specification for the Portable Heat Pump (Portable HP) test procedure. This change in specification will occur in 2024 or later; therefore, additional support from the CalMTA is currently unnecessary. Updates on the test procedure and specifications will be shared with the CalMTA at future C&S and MTA coordination meetings.	CalMTA will leverage all past and active work related to the current test procedure and look forward to supporting future updates to this technology throughout the 5-10-year timeline of this MTI.
Public (Southern California Gas Company)	Product Availability: The draft Report indicates that portable and window heat pumps have limited availability and those few available products do not have the preferred capabilities (low-GWP, dual-ducting, etc.). The Report should indicate how long it will take for this product to be available to the California consumer, especially with the low GWP feature. If such products will not be available in California over the next few years, then the MTI should include offramp options to suspend the initiative in favor of more immediate and promising MTIs.	We will investigate the timing of the product's availability for the California market as we engage in this next phase of research. If we find that products with the features we seek to include cannot be made available in the California market within the typical MTI timeframe of 5-10 years based on market progress indicators, we will identify steps to either mitigate the challenges or discontinue the effort if challenges cannot be remedied.
	Risks and Possible Mitigation Approach The draft Report assigns a low risk for consumers who will experience higher electrical bills and potentially lower gas bills. Previous window/room air conditioner programs have resulted in electric load growth, especially during peak periods throughout California's summer season. The Report should look at the impact of these technologies on load growth and the financial impact on all customers, especially those ESJ households that are typically located in hotter California climate zones. The Report should assign a high severity for these identified risks.	This risk level was informed by an assumption that most portable heat pumps will displace window or room AC units (existing or new purchases) and therefore provide a cooling alternative with lower electric consumption. The research will validate that assumption. From the perspective of a window or room AC baseline, the risk for higher electrical bills is low. However, we agree with the concern about adding load and cost where there was none previously and agree this should be reviewed. The most

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		appropriate place to assess the impact on electric bills will be among households participating in our proposed strategy test pilot. CalMTA will incorporate that point into our pilot research plan.
	External Program Review and Stakeholder Engagement The draft Report identifies various potential overlaps with current programs offered by local jurisdictions and utilities. The Report should look at coordinating with all the utilities and Portfolio Administrators (PA) in California on future leveraging opportunities. The utilities and PAs, including those third-party program providers, have existing long-term relationships with key market actors (e.g., large, and regional retailers) within the appliance industry, which should be utilized to ensure efficient coordination with utilities and PAs program portfolios.	CalMTA understands the vital importance of maximizing program alignment and leverage. We have conducted multiple meetings with the statewide C&S team and IOU EE directors to discuss our MTI development process and our Batch 1 Advancement Plans in particular. Moving forward, we will continue to meet with these critical stakeholders and identified SMEs for each target technology to support the MTI research phase. We will also continue identifying and reaching out to other energy efficiency programs and stakeholders in California to build collaborative relationships.
	Preliminary Estimate of TRC and PAC Tests The draft report estimates preliminary TRC and PAC ratios of 14.11 and 310.76, respectively. These cost-effectiveness ratios appear to be quite high considering the technologies typically operate during peak demand periods. The Report should provide a detailed showing of the assumptions supporting these high estimates.	Appendix 1 of the Advancement Plan highlights key assumptions used to develop the preliminary (Phase I) TSB estimates. In response to comments/questions received, we will update the Appendix to clarify our methodology for calculating values using an approach consistent with the IOU EE requirements, with costs and benefits applied to develop a statewide value. We fully agree that CalMTA needs to provide complete, detailed documentation of all sources and methods for TSB estimates, as well as TRC and PAC ratios, and we are currently revising the Appendix format and content to provide that information more clearly and completely. During Phase II: Program Development, CalMTA will conduct additional market and technology research on portable/window heat pumps as described in the Advancement Plan. Based

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		on that research, the team will refine TSB and cost-effectiveness estimates for the MTI. These refined estimates and their detailed methodology and assumptions will be included as part of the MTI Plan required for advancement from Phase II: Program Development to Phase III: Market Deployment. The MTI Plan will also include an evaluation plan and a data collection plan to support ongoing evaluation.
	BMA Assumptions The draft Report assumes that local governments will restrict gas hook-ups for new homes over the next 20 years. The Report should include what estimates were used and provide the references supporting this assumption.	In developing the forecast, we did not treat this as a specific input. We asked the mini-Delphi panel members to factor in all the current and future trends in the market, technology, and regulations when they developed the initial Phase I estimate for the BMA. However, we did not require them to analyze these trends separately and predict their outcomes. A more rigorous analysis will be completed during Phase II, including a full Delphi process that will ask experts to document the rationale associated with their forecasts.
Public (TRC Companies, Inc.)	TRC supports the proposed MTI focus on portable/window heat pumps and transforming the residential market sector as a priority. Alternative designs such as new thru-wall and wall-mounted packaged heat pumps offer similar value propositions and offer more permanent installations and ventilation options so parallel efforts should continue looking for ways to advance such market sectors and technologies.	We agree that thru-wall and wall-mounted packaged heat pumps are possible solutions for certain markets, but they do not meet this MTI's current product description, which focuses on not requiring professional installation and/or allowing renters to own the equipment and transport it with them when they move. CalMTA will continue to include these additional products in our market scans, and can adjust this MTI in the future if we see opportunities to bring the other products to our target market.
	While product improvements such as ultra-low refrigerant and grid connectivity are important, we suggest focusing on removing market barriers for currently available products as a starting point. We see a lot of emphasis on ultra-low GWP refrigerants in the MTIs, however, since	CalMTA will consider this input as we develop our strategy. Market transformation programs are typically long-term endeavors with product features evolving over a typical 5–10-year timeframe. The use of ultra-

Source	Feedback Provided	CalMTA Response
	most of these products are closed loop systems, "ultra-low GWP refrigerants" should be a secondary priority for this particular MTI. Once there is demand, product advancements will take place especially since CARB will have their regulations passed as well. We suggest market transformation effort with available products and continue with product development effort in parallel, so that the MTI does not have to wait for the low-GWP products to be ready.	low GWP refrigerants is a long-term goal and should not prevent CalMTA from pushing products in the near term that currently provide customers with some of the benefits. This initial plan will be informed by Phase II research and pilots, and our strategy may evolve based on findings from these activities.
	This MTI targets existing residential multifamily and small single-family homeowners and renters. We suggest further market segmentation effort which will help define the baselines. Residential multifamily and single family covers a wide range of baselines. Segmentations may include building types (single family, multifamily attached, multifamily detached, low rise, midrise etc.) system types (gas /steam systems, electric resistance, single zone vs. multi-zone), space load profiles, climate zones etc. We suggest clear segmentation of the market to help understand the applicability and focus targeted efforts.	We agree that the MTI should include additional market segmentation to understand the applicability and focus for targeted efforts, and will add this strategy to Table 3 of the Advancement Plan. Research in Phase II will help better define these segments.
	The MTI plan has identified upfront costs as one of the key market barriers, developing a cost benefit model to articulate the pay-back for buildings owners would be critical to convey the value propositions of high efficiency features and the associated higher upfront costs. We suggest in addition to TSB, finding a metric that really matters to consumers – such as operational and first costs - and address those concerns directly.	We generally agree with this statement: CalMTA assumes product cost is a significant barrier and plan to validate that assumption with research. The most appropriate place to assess the impact on electric bills (operational costs) will be among households participating in our proposed strategy test pilot. CalMTA will incorporate that point into our pilot research plan. This information will help us better articulate the cost-benefit model with payback for different customer segments to inform awareness-building and messaging for this product.
	Since these are self-install, DIY units, we suggest pilot testing of field installations done by residents and tenants (not contractors) on some sites to make sure these truly can be installed by consumers without equipment issues. Since these are window hung units, it will be good to	CalMTA's proposed strategy test pilot seeks to test this specific feature, as we believe self-installation to be a key component of the technologies' value proposition. To verify that these products can indeed be self-

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	validate safety installations to confirm that they are not knocked out accidentally or fall out during an earthquake, etc.	installed and understand the challenges residents and tenants face in installing the products themselves – and under what circumstances they need contractors and/or building staff to assist them – we plan to partner with community-based organizations (CBOs) who are already working in these markets.
MTAB (Fred Gordon)	Comments or questions regarding " Market Transformation Theory and Opportunity." "Summary: I think this is a potentially useful and productive market transformation initiative. As described below, I am not clear whether this could be effective without some advanced features which may be quite a stretch. I also don't see plans (or reference to someone else's plans) to understand the amount that this equipment is used in the field, which is critical to understanding energy savings.	We expect product features to evolve over the timeline of this MTI. For example, products available in 2024 may not yet be able to include air filtration or use of ultra-low refrigerants, but we will push for these features as a possible higher product tier over time. That said, our experience demonstrates that under the right circumstances, manufacturers can be willing to develop new designs (like saddle-bag versions of this product) to fill the market gaps, resulting in increased competition and reduction in purchase price. We plan to track customer usage of the portable/window heat pumps deployed in the strategy test pilot for this MTI in 2024. We also plan to leverage findings from NEEA and NYERSDA regarding how customers use these products and how they interact with the other HVAC equipment in their homes.
MTAB (Fred Gordon)	Comments or questions regarding " Market Transformation Theory and Opportunity." Page 3 offers the prospect of several characteristics that are not in this equipment. Grid enabled, modern refrigerants, air filtration. To what extent is this initiative justified by these features? Would it stand without them? Are these features any more likely to appear on these systems than other equipment?	CalMTA believes that even without added features, the technology described in this Advancement Plan justifies a market transformation approach. Portable/window heat pumps fill an important heating, ventilation, and air conditioning (HVAC) niche for renters and owners of small spaces. Their ability to be self-installed and supplant the need for window AC units also provides significant benefits to California.

Source	Feedback Provided	CalMTA Response
	Perhaps there are two distinct initiatives or stages here: 1. Help foster and promote portable/window units that save a lot of energy compared to resistance equipment, are widely available, identifiable, and affordable. 2. Explore less certain but promising plus prospects, such as those limited above. Or do you think is 2 necessaries to do 1? IF so, this initiative seems pretty speculative. I worry about trying to get it all and getting not much.	We see these features as the near-term, most impactful benefits of the products. At the same time, we envision these products offering greater consumer and environmental benefits through added features like grid enablement, better refrigerants, and air filtration. We anticipate that manufacturers will be able to add these features over time, leading to a Tier 2 product that will enhance the consumer experience – particularly to ESJ community members who will benefit from improved indoor air quality through the air filtration capability. The decision to split these two tiers into different initiatives can be addressed after the research phase and after we engage manufacturers and other partners on possible product evolution. CalMTA seeks to better understand the specific barriers that need to be addressed for these features to be added. If we find that these features have unique barriers and require different interventions, we may split the MTI into two distinct initiatives.
	Comments or questions regarding " Market Transformation Theory and Opportunity." Page 8- the logic diagram doesn't seem to include improvement to basic equipment installability, quality of parts, proper wiring, etc. These were pretty big issues for the window units in an Energy Trust field test. It is possible that some manufacturers are past these problems. Do you know?	We recognize that some technical improvements to existing products are needed. We are aware of these challenges and plan to learn more in this next phase of research and through the strategy test pilot. Initial conversations with manufacturers indicate that they are working on improvements to self-installation; the proposed pilot will provide additional information on needed improvements and/or guidance on assistance that would benefit certain consumer segments. The updated version of our logic model included in the full

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		MTI Plan will address this comment and clarify CalMTA's approach.
	Comments or questions regarding " Market Transformation Theory and Opportunity." The first outcome on page 8 focuses on project purchases. It may be also important to say that this equipment is specified as part of limited-income retrofit initiatives and is a go-to solution for underconditioned spaces.	We will explore this as a strategy for coordination with existing programs that already target limited-income retrofits.
	Comments or questions on " Gap Analysis" We don't know exactly where these will go, or how they will be used, so we don't know what the loads will be. Is somebody looking into this- the actual loads as used (not lab)? I know it's not time yet because we're still improving the equipment and just starting to think about marketing, but it's important. I am thinking about a Portland program that installed cooling in low-income dwellings in Portland. It was lightly used because the occupants were worried about electric bills. Some wouldn't use it in extreme heat events which were life-threatening. If that's a role of another California body--to do the load research, not just estimate--that's good to note.	CalMTA will update our savings estimates during Phase II after we have completed the next research phase and strategy test pilots. We have identified this as a need, and seek to learn how these products are installed and used in both the strategy test pilot and through additional product assessment research.
	Comments or questions regarding "Research and Program Development Plan." "Page 9, table 1. Unclear what "market share" means. Does it mean that out of the window and portable units, the % that meet program specifications? "If so, maybe: Market share of portable/window heat pumps that meet qualifications" Or share of home AC capacity sold more broadly?	CalMTA defines market share as the percentage of all window/portable ACs and, separately, space heaters, that are portable heat pump products. We have not defined a specific qualified product yet, but where data allows, we will also investigate and report on the market share of heat pump models with characteristics of interest, such as ENERGY STAR certification and certain technical capabilities. We will update Table 1 of the Advancement Plan to clarify this point.

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	In this table, I didn't see "we have products from multiple providers that work as described and intended to meet basic or advanced specs." Seems like an important early market indicator.	Regarding product availability/variety, we agree with this suggestion and will add it to Table 1.
	Comments or questions regarding "Initial Cost Estimate, Timing and Expected Results." Page 24. First line should state time period for each budget. If it's only initial activities and more will be required say so.	We will update Table 10 of the Advancement Plan to include a timeline for each task.
	Comments or questions regarding "Initial Cost Estimate, Timing and Expected Results." Page 25. Same comment. I'm mainly trying to clarify the relationship between these budget tables and the >$25M. I think I know what it is, but it's not clear to me from this part of the doc.	We will modify the introduction to Table 11 of the Advancement Plan to clarify that it is meant to summarize the lifetime costs, timeline, and expected results over the course of the entire MTI. Other tables that appear earlier in the Advancement Plan outline timelines and costs for specific activities conducted by CalMTA in Phase II.