



# Room Heat Pumps Market Transformation Initiative

## Appendix F: Evaluation Plan

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# Contents

- 1 MTI evaluation..... 5
  - 1.1 Background ..... 5
  - 1.2 Overview ..... 6
  - 1.3 Evaluation objectives..... 6
  - 1.4 Market Progress Indicators and Milestones..... 8
  - 1.5 Data collection and analysis activities..... 9
- 2 Market characterization research..... 13
  - 2.1 Secondary data and literature review ..... 13
  - 2.2 Analyze California sales and program data ..... 14
  - 2.3 Primary data collection - customer and decision-maker surveys ..... 15
    - Residential consumer survey..... 15
    - Multifamily property manager interviews..... 16
    - Property manager survey..... 17
  - 2.4 Primary data collection - stakeholder and manufacturer interviews..... 17
    - Stakeholder, subject-matter experts and MTI staff interviews ..... 17
    - Manufacturer interviews..... 17
  - 2.5 Primary data collection - retailer data collection ..... 18
    - Brick-and-mortar and online retailer data collection..... 18
    - Timeline for data collection and analysis activities ..... 18
- 3 Program theory and program implementation review.....20
- 4 Evaluating market progress .....20
  - 4.1 Market adoption .....21
    - Collect data and identify gaps .....22
    - Calculate total units of adoption .....22
  - 4.2 Evaluating equity MPis .....22
  - 4.3 Evaluating causality .....24
  - 4.4 Forecasting, impacts, and cost-effectiveness review.....25
    - Incremental market adoption .....25
    - Total Market Adoption forecast.....26

**Appendix F: Evaluation Plan for Room Heat Pumps**

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



Baseline Market Adoption forecast.....26

4.5 Cost-effectiveness model .....27

4.6 Ancillary benefits and costs.....28

4.7 Reporting .....28

Attachment: MTI Evaluability Map .....29

**Appendix F: Evaluation Plan for Room Heat Pumps**

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



## List of Abbreviations

<b>Abbreviation</b>	<b>Definition</b>
AC	Air-Conditioning
AHAM	Association of Home Appliance Manufacturers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BMA	Baseline Market Adoption
CalMTA	California Market Transformation Administrator
CBO	Community-Based Organization
CEDARS	California Energy Data and Reporting System
CEER	Combined Energy Efficiency Ratio
CPUC	California Public Utilities Commission
EIA	Energy Information Administration
EM&V	Evaluation, Measurement, and Verification
ESJ	Environmental and Social Justice
ESRPP	ENERGY STAR Retail Products Platform
eTRM	Electronic Technical Reference Manual
GHG	Greenhouse Gas
GWP	Global Warming Potential
HARDI	Heating, Air-conditioning & Refrigeration Distributors International
HEER	Heating Energy Efficiency Rating
HVAC	Heating, Ventilation, and Air Conditioning
LI	Low-Income
MF	Multifamily
MPI	Market Progress Indicator
MTAB	Market Transformation Advisory Board
MTI	Market Transformation Initiative
PA	Program Administrator
RECS	Residential Energy Consumption Survey
RHP	Room Heat Pump
SF	Single-Family
SME	Subject Matter Expert
TBE	Theory-Based Evaluation
TSB	Total System Benefit
TMA	Total Market Adoption
TRC	Total Resource Cost
TRM	Technical Reference Model
UEI	Unit Energy Impacts

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# 1 MTI evaluation

## 1.1 Background

Market Transformation Initiatives (MTIs) seek to accelerate market adoption by deliberately inducing structural market changes that increase and accelerate market adoption and produce sustained market effects. CalMTA will adhere to well-established approaches to evaluating market transformation programs, as described in the [CalMTA MTI Evaluation Framework](#).<sup>1</sup> CPUC Decision 19-12-021 (the Decision), which authorized funding for and creation of a statewide Market Transformation Administrator (CalMTA), includes guidance regarding evaluation of MTIs and the overall market transformation portfolio. It calls for setting clear savings goals and other MTI metrics at the time the California Public Utilities Commission (CPUC) initially approves the MTIs to ensure a high level of accountability, and ongoing evaluation to reduce program performance risk. The Decision also establishes market research and evaluation roles for CalMTA, modeled after the successful approach created by the Northwest Energy Efficiency Alliance (NEEA).

Evaluation is essential to the development and successful management of market transformation programs. CalMTA and the CPUC's Energy Division will oversee implementation of rigorous and strategically focused evaluation, measurement, and verification (EM&V) practices, which will enable CalMTA management and stakeholders to gauge the performance of CalMTA and MTIs, verify incremental impacts, and improve the design and success of future MTIs. The Decision calls for "real-time" market evaluation, which will provide MTI program managers and implementers with continual feedback, allowing them to pivot strategies as needed to maximize the value delivered to California ratepayers.<sup>2</sup> Tracking of proximate and longer-term market progress indicators (MPIs) that are tightly aligned with the MTI's market transformation theory will reduce MTI performance risk and support timely decisions regarding ongoing investment or termination of investment in MTIs.

Per the Decision and the MTI Evaluation Framework, CalMTA and an independent third-party evaluator each have important evaluation roles in MTI Evaluation. CalMTA conducts market research and develops forecasts of MTI incremental impact and cost-effectiveness, while an independent third-party evaluator is responsible for evaluating market progress and causal influence of the MTI, and for reviewing estimates of MTI incremental impacts and cost-effectiveness. The Decision states that EM&V Plans should be developed with the support of an independent EM&V subject matter expert (evaluator) that is not financially interested or otherwise

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<sup>1</sup> The [CalMTA MTI Evaluation Framework](#) includes discussion of and references to these established approaches.

<sup>2</sup> The term "real-time" evaluation has been widely used in California and elsewhere to refer to ongoing program evaluation that provides timely feedback to support ongoing program decision-making, even if it is not delivered literally in "real time." This term encompasses all evaluation activities that provide timely insights to inform ongoing program management and is also sometimes referred to as "embedded evaluation."

### Appendix F: Evaluation Plan for Room Heat Pumps

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involved in program implementation. It also states that during Phase III, the MTA will actively administer each MTI and will provide real-time evaluation and feedback (as NEEA does for its programs) to the implementers.<sup>3</sup>

This document describes CalMTA's preliminary plan for third-party evaluation of the Room Heat Pumps (RHP) MTI. Per the MTI Evaluation Framework, CalMTA developed this preliminary evaluation plan with input from the Evaluation Advisory Group, a group of three independent evaluation experts, the CPUC CalMTA project manager, and the CalMTA market research and evaluation lead.<sup>4</sup> Final evaluation plans will be developed by an independent third-party evaluator, to be selected via a competitive bidding process after the MTI advances to Phase III: Market Deployment. CalMTA expects that the third-party evaluator may recommend refinements to the approaches and metrics described in this document.

## 1.2 Overview

The approach described in this RHP MTI Evaluation Plan employs theory-based evaluation (TBE), which is widely accepted as a best-practice for market transformation program evaluation.<sup>5,6</sup> TBE relies upon the MTI to have a program theory that clearly identifies the specific theorized market outcomes associated with the MTI strategic market interventions, along with their approximate timing. TBE also assesses causality between the market interventions and observed outcomes.

In addition to the proposed MPIs, this preliminary evaluation plan identifies data sources and evaluation approaches that the third-party evaluator can use to assess market progress, MTI causality, and CalMTA's estimates of MTI incremental impacts and cost-effectiveness. This plan focuses on third-party evaluation activities over the first five years of Phase III (that is, through CalMTA's initial funding period). It does not describe ad hoc market research studies, which will be conducted or managed by the CalMTA MTI team in a timely manner to inform "real-time" strategy decisions.

## 1.3 Evaluation objectives

The third-party evaluator will employ a TBE approach to assess observed market outcomes in relation to what was anticipated in the RHP MTI Plan. It will use the MTI program theory as the

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<sup>3</sup> California Public Utilities Commission. Decision 19-12-021 December 5, 2019. "Order Instituting Rulemaking Concerning Energy Efficiency Rolling Portfolios, Policies, Programs, Evaluation, and Related Issues." Date of issuance December 12, 2019. 321507615.PDF (ca.gov).

<sup>4</sup> CalMTA Market Transformation Initiative Evaluation Framework April 2024, <https://calmta.org/wp-content/uploads/sites/263/Market-Transformation-Evaluation-Framework-FINAL.pdf>.

<sup>5</sup> Prael, Ralph, and Ken Keating. November 2011. *Planning and Evaluating Market Transformation: What the Industry has Learned, and Possible Implications for California*.

<sup>6</sup> Rosenberg, Mitchell (KEMA, Inc.), and Lynn Hoefgen (Nexus Market Research). March 2009. *Market Effects and Market Transformation: Their Role in Energy Efficiency Program Design and Evaluation*. Prepared for California Institute for Energy and Environment Market Effects Program. [Microsoft Word - Market Effects and Market Transformation White Paper.doc \(escholarship.org\)](#).

### Appendix F: Evaluation Plan for Room Heat Pumps

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point of reference – assessing market progress against the theorized short-, medium-, and long-term outcomes and corresponding MPIs, and the extent to which the market interventions addressed the market barriers identified and caused the outcomes theorized in the logic model. The evaluator will conduct ongoing market monitoring via secondary data analysis and primary research to evaluate market progress and causality and, importantly, to provide ongoing market insights that provide real-time information to inform MTI strategy and improve performance. The evaluation will address these high-level objectives:

- Monitor market dynamics and characteristics; assess market developments
- Review and assess the MTI logic model and program theory
- Measure market progress and equity, per the MPIs
- Assess MTI causality per the logic model, using evidence-based assessments that use a “preponderance of evidence” approach and established market transformation evaluation best practices<sup>7</sup>
- Identify opportunities to adjust MTI strategy and tactics, to improve MTI effectiveness
- Review CalMTA’s baseline and total market adoption forecasts, and TSB and cost-effectiveness model inputs and assumptions
- Assess ancillary benefits and costs

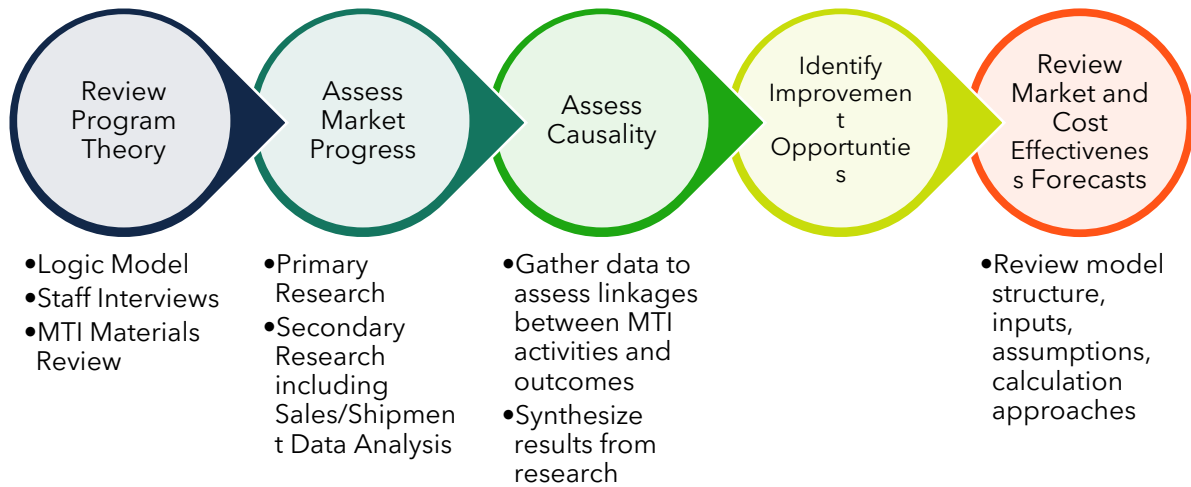
Figure 1 shows the evaluation approach for the first year. First the evaluator will review the program theory/logic model and assess whether the logic model accurately captures the implemented MTI interventions and outputs. During this step, the evaluator will also identify any gaps in MPI baseline data and determine what data are needed to assess causality based on the MTI’s theory of market transformation. Next, the evaluator will conduct primary and secondary research to measure actual units of adoption and assess equity and other MPIs. Third, the evaluator will synthesize the evidence gathered through multiple lines of research to establish MTI causality and to identify opportunities to improve the MTI’s effectiveness. Lastly, the evaluator will review CalMTA’s models for calculating incremental impacts and cost-effectiveness and make recommendations for improvement.

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<sup>7</sup> TecMarket Works. April 2006. "California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals." <https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/c/5212-caenergyefficiencyevaluationprotocols.doc>.



**Figure 1. Evaluation process**



### 1.4 Market Progress Indicators and Milestones

During the Program Development Phase (Phase II of the MTI), the RHP MTI team (the team) created a program theory of market transformation and a logic model, informed by product and market characterization research.<sup>8</sup> The RHP theory of market transformation describes the strategic approach to achieving the long-term market outcome envisioned by this MTI:

*The norm is to purchase a RHP instead of electric resistance space heaters and non-reversing air-conditioning (AC) window units, and RHPs are seen as a key technical solution to displacing greenhouse gases (GHGs) from inefficient heating.*

The MTI theory also describes strategies specifically designed to maximize equity.

During Phase II, the RHP MTI evaluation lead worked with the team to develop a set of MTI Market Progress Indicators (MPIs) against which market progress and MTI performance can be assessed, along with data sources that can be used to track progress against those MTIs. The team also completed a Baseline Market Characterization study, which established baseline values for many of the identified MPIs.<sup>9</sup>

Table 1 outlines the MPIs derived from the logic model interventions and outcomes, along with associated milestones, in the short, medium, and long term.<sup>10</sup> Equity-focused MPIs are *italicized* to

<sup>8</sup> See Appendix A: Logic Model and the Room Heat Pumps MTI Plan.

<sup>9</sup> See Appendix D: Market Characterization for Room Heat Pumps.

<sup>10</sup> Note that while some outcomes do not have associated milestones, but they all have MPIs. In these cases, the evaluator will rely upon MPI tracking combined with ongoing research and analysis to assess market progress. For



highlight their relevance to the environmental and social justice (ESJ) goals of the MTI. Each of the 20 MPIs is numbered with a letter representing different categories of MPIs - as they pertain to the targeted market actor or impact (for example, "M" for manufacturer outcomes, "R" for retail outcomes, etc.). In addition to those classifications, Table 1 categorizes outcomes and MPIs as "Primary Influence" versus "Secondary Influence." CalMTA made this distinction to distinguish between market interventions and outcomes that are a primary focus of the MTI and key to assessing MTI market progress and performance, versus those over which CalMTA may have less control over - in the case of RHPs, those that pertain to inclusion in other California programs, regulation of lower global warming potential (GWP) refrigerants, and electrification-enabling rate structures in California.

CalMTA also created a comprehensive evaluability map (see the attachment at the end of this document) that includes the MPIs and milestones shown in Table 1, along with the associated data sources that will be used to evaluate the MPIs, Milestones, and causality.

## 1.5 Data collection and analysis activities

CalMTA identified primary and secondary data collection activities and analysis tasks that would allow the third-party evaluator to evaluate the RHP MTI. Table 2 lists the evaluation research objectives, along with associated data collection and analysis activities, which are described in the text that follows. We anticipate that the selected evaluator will have suggestions for how to improve upon this plan.

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example, the evaluator will assess progress on awareness building by tracking the trends in related MPIs rather than setting a specific awareness target.



**Table 1. Logic Model Outcomes, MPIs, and Milestones**

<b>Intervention</b>	<b>Logic Model outcome - primary influence</b>	<b>MPI #</b>	<b>Timeframe</b>	<b>Market progress indicator (MPI)</b>	<b>Program milestone</b>
#1 Influence manufacturer development of window heat pumps that meet the needs of the California market through technology challenges, demand aggregation, and ongoing manufacturer engagement.	Manufacturers respond to specification with product plans and prototypes for CA-suitable products	<b>M1</b>	Short Term	Number of manufacturers engaging with CalMTA	2 manufacturers sign on to tech challenge by 12 months from contract execution
	Multifamily building owners value product and begin to purchase	<b>M2</b>	Short Term	Number of units covered by bulk purchase agreements	Agreements in place by 12 months from contract execution for MF bldg. owners/property managers to purchase at least 10,000 going forward.
	Availability of products that fit slider and casement windows and CA-suitable temperature performance grows. Some products are available with air filtration capability.	<b>M3</b>	Med Term	Number of Type 2 and 3 products for sliding and casement windows available for purchase	3 RHP Type 2 or 3 products for sliding and casement windows become available for purchase by 2030
		<b>M4</b>		Number of RHP products with air quality filtration capabilities available for purchase	4 RHP products with air filtration available by 2030
#6 Engage retail channel with midstream stocking incentives targeting low-income (LI) consumers	Prices decline, especially of CA-suitable products, relative to price of competing AC units and resistance heaters	<b>M5</b>	Med Term	Incremental cost of RHP vs. (1) Room ACs (2) Space heaters and (3) combined costs of space heaters and room ACs	Incremental cost declines compared to each alternative technology by 2029 and is equal to the combined price of window AC and space heater by 2030
#7 Support California policy and standard setting bodies in use of lower GWP refrigerants through manufacturer engagement, lab testing, and data	Growing number of manufacturers support use of lower GWP refrigerants	<b>M6</b>	Short Term	Number of manufacturers who document their support for use of lower GWP refrigerants	2 manufacturers formally support movement to use lower GWP refrigerants by the end of 2027
#2 Engage national collaborative on federal test procedures for products suitable for California climates and future ENERGY STAR specifications	ENERGY STAR Specification adopted for products that provide both heating and cooling (including portable forms of products)	<b>S7</b>	Short Term	ENERGY STAR specification	ENERGY STAR specification amendment in place by 2027
	An update to ENERGY STAR specification that includes separate tiers for moderate and cold climates		Med Term		ENERGY STAR specification amendment in place by 2030
	Manufacturers and market partners adopt more consistent product labeling, market confusion declines	<b>S8</b>	Short Term	Number of RHP manufacturers update product naming and descriptions	At least 3 RHP manufacturers adopt recommendations of the national RHP Collaborative to update product naming and description by the end of 2027
#7 Support CA policy and standard setting bodies in use of lower GWP refrigerants through manufacturer engagement, lab testing, and data	Key standard-setting bodies (i.e., ASHRAE and Underwriters Laboratories (UL)) amend guidance to allow the use of lower GWP refrigerants based on manufacturer feedback	<b>S9</b>	Med Term	Amended ASHRAE guidance to allow for use of lower GWP refrigerants	ASHRAE approves guidelines by 2029
#2 Engage national collaborative on federal test procedures for products suitable for California climates and future ENERGY STAR specifications	Federal efficiency standards add heating efficiency and increase stringency for cooling efficiency for all target HP products	<b>S10</b>	Long Term	Federal appliance standards	Heating energy efficiency rating (HEER) minimum standard in place by 2032
					Federal standards reflect at least a 10% higher CEER by 2032

Intervention	Logic Model outcome - primary influence	MPI #	Timeframe	Market progress indicator (MPI)	Program milestone
#6 Engage retail channel with midstream stocking incentives targeting LI consumers	Retail partners stock and sell more affordable products in ESJ predominant communities year around	R11	Med-Term	Share of RHP stocked in brick-and-mortar locations	Share of qualified RHP products in brick-and-mortar retailers participating in ENERGY STAR Retail Products Platform (ESRPP) reaches 8% by 2029
		R12		Price of RHP in brick-and-mortar locations in ESJ communities	Average price of qualified RHP products is lower in ESRPP stores in ESJ communities compared to other stores by 2029
Outcomes resulting from all strategic interventions and awareness-building interventions	Consumer awareness of benefits and features grow starting with multifamily markets and their key influencers	A13	Med Term	Percentage of LI and non-LI consumers aware of RHP products and their benefits (use for efficient zonal heating and cooling)	No specific milestone; evaluator will track MPI over time to assess progress
		A14		Percentage of LI and non-LI Property Managers aware of RHP products and their benefits	No specific milestone; evaluator will track MPI over time to assess progress
Outcomes resulting from all strategic interventions and awareness-building interventions	Market share of RHPs grows and standalone AC window units and electric resistant heaters decline	U15	Long Term	CA Market share (% of full category sales) of RHP	50% of window AC sales by 2036; 60% of space heater sales by 2036
Interventions	Logic Model outcome - secondary influence	MPI #	Time-frame	Market progress indicator (MPI)	Market milestone
#3 Gather and share usage and bill impact data across program partners that have supported product installations #4 Build market awareness of product benefits in partnership with aligned organizations and market partners like manufacturers and retailers	Programs begin to include RHPs as a measure	P16	Short Term	Number of California PA and regulatory bodies who include RHPs (as defined by MTI) in their program	At least 5 programs offer RHP as an eligible measure or directly install by 2028, including at least 3 LI programs
#3 Gather and share usage and bill impact data across program partners that have supported product installations #5 Support inclusion and bundling of product with energy efficiency and climate resilience programs that will reduce initial product and operations cost impacts for ESJ communities	More CA-suitable products installed in SF and MF homes through California decarbonization, energy efficiency, and weatherization programs	P17	Med Term	Number of programs promoting, incentivizing, directly installing RHP	At least 10,000 RHP units are installed through California programming by 2031
#8 Support advancement of electrification enabling rate structures to mitigate bill impacts of moving from gas to electric heating and cooling	Prevalence of electrification-enabling rate structures grows across the state	L18	Med Term	The number of policies or new electrification-friendly rate structures that the MTI supported that are proposed/referenced by utilities, regulatory bodies, etc.	At least three policy forums, partnerships, or opportunities that CalMTA engages with support the change to electrification friendly rate structures by 2029
#7 Support CA policy and standard setting bodies in use of lower GWP refrigerants through manufacturer engagement, lab testing, and data	Relevant state regulations updated to allow lower GWP refrigerants in room heat pumps	L19	Long Term	State regulations updated to allow for use of lower GWP refrigerants	Regulation updated by 2031
#1 Influence manufacturer development of window heat pumps that meet the needs of the California market through technology challenges, demand aggregation, and ongoing manufacturer engagement	Availability of products that use lower GWP refrigerants grows	M20	Long Term	Number of products available utilizing lower GWP refrigerants	At least 2 products utilize lower GWP refrigerants are available by 2034

Table 2. Research objectives and evaluation activities

Research Objective	Secondary Data/ literature review	Homeowner, property manager surveys	Market actor surveys, interviews	PA/SME/ stakeholder interviews	Retailer data collection	Distributor and Manufacturer sales and shipment data	PA program data review	CalMTA forecasting and C/E model reviews
Assess the theory of market change per the MTI logic model	X	X	X	X	X	X	X	
Monitor market dynamics and characteristics	X	X	X	X	X			
Track units of adoption	X	X			X	X	X	
Measure market progress, per MPis and milestones		X	X	X	X	X	X	
Evaluate equity	X	X	X		X			
Assess MTI causality	X	X	X	X	X	X	X	
Assess Incremental MTI Impact	X				X	X	X	X
Assess ancillary benefits and costs	X	X	X	X				

## 2 Market characterization research

CalMTA conducted a 2024 Baseline Market Characterization study<sup>11</sup> of the RHP market. That study characterized the market baseline conditions and values for some of the market progress indicators listed above in Table 1. This evaluation plan includes data collection activities that build on the research conducted in that study.

### 2.1 Secondary data and literature review

The Baseline Market Characterization study included an extensive literature review, drawing from various secondary data sources including the U.S. Census' American Community Survey, the Energy Information Administration's (EIA) 2020 Residential Energy Consumption Survey (RECS), and the most recent 2019 California RASS. These sources provided insights into appliance saturation levels, behaviors, and other insights relevant to single-family and multifamily California households.

The team also reviewed publicly available technical and market research documents, California regulatory filings, dockets, the CA Electronic Technical Resource Manual (eTRM), and conducted searches using tools including Google Scholar, Semantic Scholar, Science.Gov, and general internet research on RHP products. Lastly, the team analyzed pricing and product availability by reviewing manufacturer websites and online retailers.

The evaluator will leverage some of the same sources to inform the MTI Market Progress Evaluation. The evaluator will also, during the literature and secondary data review and throughout the course of their work, attempt to identify additional relevant data sources or literature, including new evaluations or market studies. The rest of this section discusses the data collection activities in more detail.

Data Sources may include the following, but the evaluator should recommend additional appropriate sources to address research needs:

- **U.S. Census American Community Survey** (source U.S. Census, accessed annually): The evaluator will use U.S. Census data to develop and refine survey and interview sample designs to reflect California's population. This will ensure that key demographic groups, defined by income levels, geographic areas, and household type and ownership, are appropriately captured.
- **CalMTA MTI program data and materials:** The evaluator will review CalMTA's program-tracking data to assess MPIs and milestones. This data includes information on midstream incentives, engagement and outreach activities, market partner agreements, and other materials related to CalMTA's RHP program activities. CalMTA and its eventual

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<sup>11</sup> CalMTA Room Heat Pumps Market Characterization Report, 2024. <https://calmta.org/wp-content/uploads/sites/263/Market-Characterization-Report-RHP.pdf>.

### Appendix F: Evaluation Plan for Room Heat Pumps

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implementation contractor(s) will capture data that aligns with the activities outlined in the MTI logic model, such as incentives provided, and outreach and engagement conducted.

- **EIA RECS data:** RECS from the EIA provides data to assess broader market adoption trends for HVAC technologies. Because RECS is updated infrequently (approximately every five years), its use will be limited, although it should be examined, especially after updates to inform the evaluators understanding of the market and serve as a broader reference point for long-term trends rather than immediate year-to-year shifts. The RECS data will be used to:
  1. Analyze patterns of adoption for HVAC technologies across various housing types (i.e., single-family homes and multifamily units).
  2. Track shifts in consumer preferences over time, offering insights into the market's progression toward HVAC solutions.

## 2.2 Analyze California sales and program data

The evaluator will analyze sales data from multiple sources (i.e. ESRPP and point-of-sale data from Circana and others) and determine the scope and market coverage, areas of overlap and whether there are any remaining gaps in the retail channel data. The evaluator will make recommendations on how to use the data to determine market adoption of RHP, as well as any other relevant MPIs. PA program data will also be analyzed to understand program-driven adoption levels.

- **Mid-stream incentive ESRPP retailer stocking and sales data:** Participating Mid-Stream Incentive ESRPP retailers will provide full category sales and stocking data for all electric HVAC technologies sold in their California stores. These data will include quarterly sales data, pricing, and market penetration of RHP technology. The evaluator will work with CalMTA to access these data annually and have access to CalMTA's analysis including sales and price trends, and summary statistics.
- **Circana data:** Circana data are based on actual sales for many California retailers, but it also includes forecasted sales for major retailers such as Home Depot, Lowe's, and Best Buy. However, since the ESRPP data include actual sales for these same large retailers, the combination of Circana's forecasted data with ESRPP's actual sales data will provide a more complete and accurate representation of the overall market for HVAC technologies in California. The evaluator will work with CalMTA to specify and potentially purchase these data to fill any gaps in retail sales data obtained through ESRPP. By merging these two datasets, the evaluator will be able to measure the total market for both gas and electric HVAC technologies, with a particular focus on RHP technology, across the entire state.
- **PA program and CEDARS data:** The evaluator will assess program participation by compiling program data and California Energy Data and Reporting System (CEDARS) data to account for market interventions by California program administrators (PAs) that report



their impacts in CEDARS. The evaluator will incorporate net-verified savings associated with program participation data into total market adoption estimates to avoid double-counting. This is discussed further below.

- **Other sources of purchase or shipment data:** The evaluator will work with CalMTA to gather shipment and sales data to assess sales across all channels. This may involve sources such as ENERGY STAR, Association of Home Appliance Manufacturers (AHAM), an appliance trade organization, Heating, Air-conditioning & Refrigeration Distributors International (HARDI), or CalMTA negotiated data sharing agreements with manufacturers and distributors or bulk purchase agreements.

### 2.3 Primary data collection: customer and decision-maker surveys

The evaluator will develop a sampling and research plan that allows for longitudinal tracking of key characteristics to measure progress toward achieving MPIs. The evaluator will clearly document data sources, the sampling strategy, and sample frame development so results can build on previous baseline and evaluation findings.

#### Residential consumer survey

The evaluator will field a residential consumer survey in the first year and in alternate years following that. The survey should build upon questions from the residential consumer survey used in the baseline market characterization research to allow statistically valid comparisons of changes in adoption, behaviors, attitudes, and knowledge of consumers regarding HVAC technology. The evaluator will refine the sampling strategy developed for the baseline market characterization study to better align it with the MTI's focus on ESJ communities and incorporate California's Disadvantaged Communities (DAC) designations to enable market progress assessment in these communities.<sup>12</sup> The evaluator will also update the sampling plan to reflect observed changes in the customer segments from the U.S. Census or other data. Table 3 contains the sampling plan from the residential consumer survey conducted during the market characterization, with proportions based on segment quotas. The baseline residential consumer survey achieved 790 completed surveys across single family and multi-family decision-makers out of the planned sample size of 800.

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<sup>12</sup> Disadvantaged Communities (DACs), designated by the California Environmental Protection Agency (CalEPA) as per Senate Bill 535, are defined by CalEnviroScreen 4.0: <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>. The baseline residential consumer survey used census data to identify those who live in census tracts or households at or below 80% of the statewide median income. This sampling approach was expedient for the baseline study, but the third-party evaluator should refine it, if possible, to better align with the MTI's focus on ESJ communities.

**Table 3. Baseline market characterization residential consumer survey sample plan<sup>13</sup>**

<b>Segment</b>	<b>Percentage</b>	<b>Survey targets</b>
<b>Home ownership status</b>		
Homeowners	55%	440
Renters	45%	360
<b>Income status</b>		
Below low-income threshold <sup>14</sup>	36%	288
Above low-income threshold	64%	512
<b>Housing type</b>		
Single-family homes	49%	392
Multi-family homes	49%	392
Other housing types	2%	16
<b>Region/Climate zone</b>		
Coastal areas	50%	400
Inland areas	50%	400
<b>Total sample size</b>	100%	800

### Multifamily property manager interviews

The evaluator will interview multifamily property managers in the first year of MTI implementation and in alternate years following that, to build an ongoing understanding of perceived barriers and motivations to the adoption of RHPs in multifamily housing. The interviews will include both property managers that serve both priority and non-priority populations<sup>15</sup>, and will target both coastal and inland multifamily property managers.

<sup>13</sup> This same survey was used for both the RHP and Induction Cooking Baseline Market Characterization studies.

<sup>14</sup> Low-income is defined by CalMTA's 2024 Baseline Market Characterization study as at or below 80% of the median area income. According to Assembly Bill 1550, low-income communities and households are defined as those who live in census tracts or households at or below 80% of the statewide median income or meeting the threshold designated as low-income by the California Department of Housing and Community Development's Revised 2021 State Income Limits.

<sup>15</sup> Priority populations, as defined by the California Air Resources Board, are census tracts categorized as either low-income or disadvantaged communities (DACs). See map here: [Priority Populations 2023 \(ca.gov\)](https://www.calmta.com/priority-populations-2023). DACs, designated by the California Environmental Protection Agency (CalEPA) as per Senate Bill 535, are defined by CalEnviroScreen 4.0: <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>. According to Assembly Bill 1550, low-income communities and households are defined as those who live in census tracts or households at or below 80% of the statewide median income or meeting the threshold designated as low-income by the California Department of Housing and Community Development's Revised 2021 State Income Limits.

### Appendix F: Evaluation Plan for Room Heat Pumps

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CalMTA completed 15 interviews with property managers in coastal and inland territories as part of the Baseline Market Characterization study, using the sampling plan outlined in Table 4. For that study, which also informed the Induction Cooking MTI, the team was unable to complete any interviews with non-priority property managers in Inland regions.

**Table 4. Multifamily property manager interviews sampling plan**

Climate region	Coastal	Inland	Total
Priority population	5	5	10
Not priority population	5	5	10
<b>Total</b>	<b>10</b>	<b>10</b>	<b>20</b>

#### Property manager survey

The evaluator will conduct a survey of California-based multifamily and single-family building owners and property managers who own or manage five or more units during each program cycle. The objective of this survey is to determine adoption trends of RHP technologies in the multifamily segment including awareness and attitudes towards RHPs. During the baseline market characterization, CalMTA used a stratified random sample of property managers, with quotas for climate zone, housing type, classes of properties, types of units (market rate or affordable housing) and utility. CalMTA completed 100 surveys with builders and property managers who owned/managed single family only (n=77), multi-family (n=16) and both single family and multi-family (n=7) properties. For the first evaluation, the evaluator will attempt to use a sampling strategy similar to the one CalMTA used during the baseline market characterization.

## 2.4 Primary data collection: stakeholder and manufacturer interviews

#### Stakeholder, subject-matter experts, and MTI staff interviews

The evaluator will conduct interviews with stakeholders and subject matter experts to inform the market characterization of RHP products. These stakeholders and subject-matter experts will include administrators, and implementers of California programs that promote efficient HVAC technologies, organizations conducting research and development, standard setting, and pilot efforts supporting deployment of the technologies, and community-based organizations (CBOs) and/or recipients of pilot funding or other programming. These interviews will inform an understanding of current program offerings and future program changes, customer perceptions and barriers to adoption, and market and technology trends.

#### Manufacturer interviews

The evaluator will conduct manufacturer interviews to assess the causal relationship and impact of interventions aimed at increasing product availability and innovation. While manufacturers interviews conducted as part of CalMTA's baseline market characterization focused on



understanding the product landscape, the evaluator interviews will focus on manufacturer responses to specific MTI interventions.

During the baseline market characterization, CalMTA conducted interviews with two of six manufacturers targeted for interviews. These interviews focused on understanding the manufacturers' opinions, plans for future products, and perceived barriers and opportunities for RHP products and adoption.

During Phase III: Market Deployment, the third-party evaluator will attempt to reach the same six manufacturers to track changes in attitudes or behaviors relative to the initial CalMTA manufacturers' interviews and surveys. The evaluator will also explore if there are additional manufacturers who should be interviewed based on market share, innovative products, or pricing.

## 2.5 Primary data collection: retailer data collection

The evaluator should develop a sampling and research plan that allows development of an understanding of stocking and promotional trends for RHP products in retail stores as well as attitudes and perceptions of retail staff through interviews.

### Brick-and-mortar and online retailer data collection

The evaluator will conduct visits of brick-and-mortar stores and conduct interviews with retail staff to track product availability, as well as stocking, pricing, and promotional practices compared to the baseline study, and any subsequent evaluations. CalMTA completed seven in-person visits to big box retail stores in northern and southern California, including Home Depot (two stores), Best Buy (two stores), Lowes' (one store), Costco (one store), Sams Club (one store). The evaluator will expand the sample to: include additional retailers including independents participating in ESRPP throughout Nationwide buying group; reflect other retailers in the midstream RHP incentive program; and include online retail stores - especially large online retailers like Amazon. Alternatively, the evaluator can recommend web-scraping to extract product information, augmented by retailer interviews, to assess consumer acceptance and stocking practices. Retail data gathering research should consider the seasonality of space heating and cooling product availability, since stocking for those single-function products varies by season.

### Timeline for data collection and analysis activities

Table 5 outlines the preliminary recommended timing for evaluation activities over the first five years of Phase III: Market Deployment and shows which of these activities were completed in 2024, as part of the Baseline Market Characterization study. This timing reflects CalMTA's current expectations regarding when each activity is likely to provide critical data and insights to inform evaluation of market progress and the ongoing need for MTI market strategy refinements. The third-party evaluator will update this preliminary schedule over time to address needs for ongoing market insights and progress evaluation, as CalMTA learns from experience and as the MTI implementation evolves.

## Appendix F: Evaluation Plan for Room Heat Pumps

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**Table 5. Timeline for data collection activities**

Data collection activities		Conducted in Baseline Market Characterization	Year 1	Year 2	Year 3	Year 4	Year 5
Secondary data and literature review		X	X	X	X	X	X
Analyze sales, shipment and program data	Sales and shipment data <sup>16</sup>		X	X	X	X	X
	PA program and CEDARS data		X	X	X	X	X
Primary data collection: customer and decision- maker surveys	Residential consumer survey	X	X		X		X
	Multifamily property manager interviews	X	X		X		X
	Property manager survey	X		X		X	
Primary data collection: market actors	Stakeholder and manufacturer interviews	X	X	X	X	X	X
	In-store and online shopping/web- scraping)	X	X	X	X	X	X
	Retailer interviews	X	X	X	X	X	X

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<sup>16</sup> Anticipated data sources are described in [California Sales and Program Data](#) section.

## 3 Program theory and program implementation review

The evaluator will conduct an initial review to compare the MTI program theory, logic model, and MPis against the market interventions implemented by CalMTA and the resultant outputs. After conducting MTI staff interviews and reviewing program documents, the evaluator will make recommendations on how to improve the program theory, logic model, and MPis.

After completing additional market evaluation activities, the evaluator will assess the extent to which the MTI interventions are addressing the market barriers and leading to the theorized outcomes. The evaluator will identify opportunities to improve the logic model and to refine market interventions to influence the market and make recommendations for doing so. CalMTA will provide to the evaluator the following information (where available):

- Tools, factsheets, and other MTI outputs
- Implementation and Marketing Plans
- Specifications and responses to technology challenges
- National collaborative agendas, meeting logs and notes
- List of key stakeholders with contact information
- List of MTI engagements and relevant Salesforce entries
- Forecast of incremental adoption
- Ex-Ante Impact Calculations
- Cost-effectiveness assumptions
- Any data or perspectives provided by program delivery contractors and partners to date
- Written agreements/contracts with market actors

The data will be reviewed to identify information needs to be addressed in primary and secondary research tasks.

## 4 Evaluating market progress

Market transformation experience has taught us that well-chosen and vetted MPis are critical to MTI risk management and success. Yet there has been a tendency to judge market progress primarily on units of adoption. This metric can be a misleading indicator of success for MTIs in their early years because market share and adoption typically increase slowly and accelerate only after addressing critical market barriers, such as - in the case of RHPs - availability of products appropriate for California's climate and window types, product availability in brick-and-mortar stores, product differentiation and labeling, and consumer awareness. Therefore, to appropriately

### Appendix F: Evaluation Plan for Room Heat Pumps

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evaluate market progress and ensure accountability, the evaluator must assess short- and medium-term MPIs that align with the logic model. While market adoption of RHPs is forecast to take several years to accelerate and become a strong indicator of market progress, the evaluator will assess units of adoption from the outset because they are a primary input of paramount importance to estimating MTI incremental impact and cost-effectiveness.

#### 4.1 Market adoption

Determining units of adoption is a key focus of the evaluation, because defensible measurement is essential for estimating the incremental energy impacts of the MTI. Market adoption estimation is also one of the most challenging components of the evaluation, because the RHP supply chain includes multiple sales channels including retail brick-and-mortar stores, online storefronts, and direct-to-consumer sales, as well as wholesale purchase pathways for builders and property owners and managers. To develop a complete picture of the market and calculate units of adoption across all sales channels, the evaluator must identify, procure, and “stitch” together. The evaluator will independently estimate market adoption through the following steps.

- **Identify all sales channels.** RHPs are sold through multiple sales channels, including brick-and-mortar stores, online storefronts, and direct-to-consumer sales, as well as wholesale purchase pathways for builders and property owners and managers. The evaluator will investigate and identify the complete set of sales channels for RHPs and competing portable HVAC products.
- **Finalize data sources for each channel.** CalMTA has identified the data sources shown in Table 6 for each of the identified sales channels. The evaluator will investigate and finalize the best data sources for each channel.

**Table 6. Data sources by sales channel**

Retail sales data	Manufacturer/Wholesaler data	Shipment data
Mid-stream incentive ESRRP retailer stocking and sales data	Negotiated data sharing agreements with manufacturers and distributors or bulk purchase agreements	ENERGY STAR data
Circana data		AHAM data
		HARDI data

- **Retail channel data.** The retail channel includes brick-and-mortar stores like Home Depot and online retail storefronts. The evaluator will estimate market adoption through this channel using full category sales data contractually provided to CalMTA from ESRRP-participating retailers - including data from big box retail stores, online retail storefronts, and independent retail stores through ESRRP partner Nationwide. The evaluator will supplement ESRRP data with purchased retail data, as needed, from additional sources like Circana - described in the “Secondary data and literature review” section.

#### Appendix F: Evaluation Plan for Room Heat Pumps

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- **Wholesale channel data.** Other sales channels may include wholesale distributors and/or direct online or bulk purchases from manufacturers. The evaluator may have access to data gathered through CalMTA negotiated data sharing agreements with manufacturer and distributor market partners or bulk purchase agreements to estimate data through this channel.
- **Supplementary shipment data.** CalMTA expects sales data from these sources to cover most of the California market, although there may be overlap and/or gaps across the datasets. We also expect some sources of data to include an estimate of their market coverage. To verify the total market size, the evaluator will coordinate with CalMTA to also gather shipment data from another source, such as AHAM, to serve as a point of comparison.

#### Collect data and identify gaps

The evaluator will assemble the available sales and shipment data, as described above. As with all data, there are expected to be gaps (e.g., non-reporting retailers). If the volume sold through non-reporting retailers as a percentage of the total market size as estimated based on shipment data is significant, the evaluator will identify non-reporting retailers and manufacturers, and conduct interviews with a sample of them to estimate how many RHPs are sold by them each year, to estimate the total sales from non-reporting vendors.

#### Calculate total units of adoption

The total units of adoption will be calculated by combining the reported sales data analysis and the estimated units of adoption for the non-reporting vendors. The evaluator will review these market adoption estimates and update them annually to calculate market share to assess MPIs.

## 4.2 Evaluating equity MPIs

Prior to conducting data collection, the evaluator will become familiar with the RHP equity MPIs and the plan to monitor progress over time. The evaluator will use both primary and secondary data collection to assess the equity Market Progress Indicators (MPIs) shown in Table 7 and will identify other equity MPIs it believes CalMTA should consider.



**Table 7. Equity MPIs and associated data collection activities**

<b>Market Progress Indicators</b>	<b>Data collection activities</b>
Number of California PAs and regulatory bodies who include qualified RHPs in their programs	Program Administrator Interviews, CEDARS data analysis
Number of programs promoting, incentivizing, or directly installing RHP	
Number of RHP units installed through California programming	
Percentage of LI and non-LI consumers aware of RHP products and their benefits (use for efficient zonal heating and cooling)	Consumer surveys, interviews with CBOs
Share of RHP stocked in brick-and-mortar locations; stocking trends are similar in stores in ESJ communities	Retail data gathering (brick-and-mortar sites and online site visits, sales data analysis), manufacturer and distributor interviews
Price of RHP in brick-and-mortar locations in ESJ communities	Retail data gathering (brick-and-mortar sites and online site visits, sales data analysis), manufacturer and distributor interviews
Billing and usage data/research compiled, published and shared by CalMTA	PA Interviews; Program Data; residential consumer surveys
Number of policies or new electrification-friendly rate structures that the MTI supported that are proposed/referenced by utilities, regulatory bodies, etc.	Utility rate proposals at CPUC rate proceedings and codes and standards C&S proposals at the CEC and CARB proceedings; Interviews with policy forums and partnerships
Market saturation in DAC communities, compared to non-DAC	Sales and shipment data, program partner data (such as bulk purchases, DAC-serving distributor shipment data, data from CBOs), future RASS data

The evaluator will refine the baseline survey instrument and sampling strategy to ensure market progress can be assessed and representative findings can be developed for low-income and DAC populations.<sup>17</sup> The evaluator should additionally develop findings for populations residing in and stores located in disadvantaged communities (DACs), as defined by CalEnviroScreen<sup>18</sup> and assess equity metrics and report progress in DAC vs. Non-DAC areas. “Disadvantaged communities” refers to the areas throughout California which most suffer from a combination of economic, health, and environmental burdens. The evaluator will rely upon a combination of the data collection activities shown in Table 7 to assess changes in retail sales, stocking practices,

<sup>17</sup> Low-income was defined by the 2024 Baseline Market Characterization Study as at or below 80% of the median area income<sup>17</sup> and low-income segments were screened using customized income thresholds for each county, as defined by the California Department of Housing and Community Development.

<sup>18</sup> [CalEnviroScreen | OEHHA.](#)

**Appendix F: Evaluation Plan for Room Heat Pumps**

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consumer awareness, non-energy impacts among adopters in ESJ communities, supply chain engagement, and cost reductions.

### 4.3 Evaluating causality

Causality assessment in market transformation programs is required to firmly link incremental adoption and other changes in the market to MTI interventions. The program theory and logic model include theorized linkages between interventions and market outcomes. By conducting research to assess the MPIs, the evaluator will gather data from multiple lines of evidence to validate those linkages and establish causality between MTI activities and outcomes. The evaluator will assess causality for each MPI where practical, to support the overall causality assessment.

The evaluator will conduct causality assessment based on a “preponderance of evidence” approach with methods including: document review; in-depth interviews with market actors, decision makers and stakeholders; and historical tracing. The evaluator will use empirical evidence from all data sources specified in the MTI Evaluability Map (see attachment) to determine whether observed market outcomes (as measured by the MPIs) can be traced back to MTI interventions and non-MTI market drivers.

For example, to determine whether the RHP MTI accelerated and increased market adoption of efficient room heat pumps, the evaluator would consider all the available evidence that the MTI interventions the logic model led to the theorized outcomes as well as evidence that those outcomes increased and accelerated market adoption. In addition, the evaluator will consider alternative explanations and causes for the observed market outcomes. Consideration of evidence to support alternate explanations of change is important to avoid confirmation bias.

Table 8 provides examples of some of the questions the evaluator may consider.

**Table 8. Causality assessment**

Causality question	Example data sources/evidence
Did the MTI’s demand aggregation strategy (property manager bulk purchase agreements) influence manufacturers to develop products appropriate for the CA market, including Type 2 and 3 products and products that fit sliding windows?	<ul style="list-style-type: none"> <li>• MTI salesforce documentation of meetings, conversations with manufacturers regarding Tech challenge</li> <li>• Manufacturer interviews – manufacturers indicate they were influenced by the MTI; the bulk purchase commitments led them to develop CA-appropriate products sooner than they otherwise would have</li> <li>• Absence of prior plans or known barriers at manufacturers in baseline surveys.</li> </ul>
Did the availability of those products contribute to greater market adoption?	<ul style="list-style-type: none"> <li>• Retailer sales data and inventory data on models available for purchase before and after MTI interventions</li> </ul>





Causality question	Example data sources/evidence
	<ul style="list-style-type: none"> <li>Property manager interviews - indicate CA-appropriate products influenced their purchase decisions</li> <li>Units sold over time</li> </ul>
Did the MTI enable utility programs to include RHPs? Would utilities have been able to include RHP measures without the MTI's market interventions?	<ul style="list-style-type: none"> <li>MTI salesforce documentation; timeline of events</li> <li>Stakeholder interviews</li> </ul>
Did the MTI interventions lead to increased product availability and increase adoption by lower income households?	<ul style="list-style-type: none"> <li>ESRPP data analysis shows increased sales in response to ESRPP engagement activities</li> <li>Retailer interviews - retailers indicate the ESRPP incentives changed stocking and promotional practices</li> <li>CBO interviews - CBOs indicate MTI engagement influenced installations</li> </ul>
Did the MTI's efforts to build awareness of products and their benefits lead to greater awareness and market adoption by consumers and property managers?	<ul style="list-style-type: none"> <li>Program materials and salesforce documentation of awareness-building efforts - in collaboration with the National RHP Collaborative</li> <li>Awareness of product and benefits increases in synch with promotional efforts</li> </ul>
Were the observed market changes caused by non-MTI alternative market dynamics or interventions? What market results could have occurred in the absence of the MTI?	<ul style="list-style-type: none"> <li>Historical tracing of observed market changes, including analysis of documentation, program materials, and timing</li> <li>California program administrator interviews</li> <li>Market actor interviews</li> </ul>

#### 4.4 Forecasting, impacts, and cost-effectiveness review

##### Incremental market adoption

During Phase II, the CalMTA RHP planning lead worked with the team to develop a forecast of incremental market adoption and energy impacts. CalMTA has developed forecasts for baseline market adoption (BMA) and total market adoption (TMA), along with estimates of unit energy impacts (UEI) and cost-effectiveness. CalMTA developed *ex ante* estimates of incremental MTI impacts (described in Appendix B of the MTI Plan) using the formula below.

$$\text{Net Incremental MTI impacts} = [(TMA \text{ units} - BMA \text{ units}) * UEI] - \text{utility verified impacts}$$

As part of ongoing evaluation efforts, the third-party evaluator will review model inputs, assumptions, data sources, and structure and will identify recommended revisions to improve the accuracy of impact estimates.

#### Appendix F: Evaluation Plan for Room Heat Pumps

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



### Total Market Adoption forecast

CalMTA will develop and regularly update a TMA model, incorporating actual sales or shipment data as it becomes available and then forecasting into future years. The evaluator will use the most recent data available at the time to estimate market adoption and make recommendations for updating the CalMTA model inputs.

### Baseline Market Adoption forecast

The evaluator will conduct a review of CalMTA's BMA forecast, including inputs and assumptions, and make recommendations for improvements according to the guidelines in the CalMTA MTI Evaluation Framework. Specifically, the third-party evaluator will identify any evidence from its evaluation activities that could suggest the need to refine the original BMA forecast. For example, if the MTI causality assessment were to identify a previously unknown significant market influence that preceded or was otherwise wholly independent of MTI market deployment activities, it could indicate the need to re-estimate BMA or otherwise reconsider program attribution and calculation of incremental market impacts.

The BMA forecast is a major determinant of the estimated savings attributable to the program. Given the challenges inherent in forecasting a counterfactual scenario, the BMA forecast may constitute the most significant source of uncertainty surrounding estimated savings. As such, under certain circumstances it could make sense to consider revising the BMA forecast.

However, it can be counterproductive to revise the baseline forecast unless it is truly warranted. The data most readily available to the evaluator are the efficient units appearing in the market over time, and those may well reflect effects caused by the MT program itself. There is a risk, therefore, that evaluators may attribute observed acceleration in efficient market units to an acceleration in the BMA when it is really a result of MTI market interventions. Revising the baseline upward in such a case would lead to underestimation of the program's accomplishments.

### *Guidelines for Considering BMA Revision*

Recommending a revision to the BMA forecast requires the evaluator to balance the desirability of incorporating relevant new information with the risk of mis-attributing MTI market effects to extrinsic market changes. To serve the best interests of California, the BMA forecast should be revised only when evaluators have a high level of confidence that one or more initial assumptions were incorrect, or some crucial element of the market changed independently of the initiative and that the MTI did not significantly contribute to an observed change in market adoption. CalMTA identified three scenarios that warrant consideration of revising the BMA forecast and two guidelines for whether the revision should be made. These scenarios and guidelines are detailed in [the MTI Evaluation Framework](#), and the third-party evaluator should review them carefully before reviewing the BMA Forecast.

In the first year, the evaluator will conduct a comprehensive review of the BMA forecasting model approach, along with inputs and assumptions. In subsequent years, the evaluator will revisit the



BMA forecast only if it identifies evidence from its evaluation activities that could suggest the need to refine the original BMA forecast.

### *PA Impacts*

The evaluator will review net verified impacts attributable to the PAs based on claimed and verified savings associated with claims data from CEDARS and evaluation findings. These impacts will be subtracted from incremental adoption (TMA-BMA) as shown in the equation at the start of this section, ensuring no double-counting of impacts between CalMTA and other PAs.

Per the MTI Evaluation Framework, verified PA impacts reported in CEDARS will be subtracted from incremental market adoption (Total Market Adoption - Baseline Market Adoption) to calculate incremental impacts attributable to the MTI and associated cost-effectiveness. CalMTA will, however, also report total incremental market adoption (TMA - BMA), because the RHP MTI Plan includes substantial interventions without which inclusion of these technologies in utility resource acquisition would not be possible. Although we have agreed to calculate incremental impacts without utility-verified impacts, it will be important for the third-party evaluator to qualitatively assess the MTI's influence on those PA impacts.

## 4.5 Cost-effectiveness model

As part of the ongoing evaluation, the third-party evaluator will review the cost-effectiveness model, and the model inputs, assumptions, and data sources, that CalMTA used to calculate cost effectiveness of the MTI. CalMTA's approach is fully documented in Appendix B of the MTI Plan.

Evaluating cost-effectiveness involves outputs from the market forecasting model as well as initiative costs, incremental measure cost, avoided cost, load shape, and UELs. This application of inputs considers the baseline installation conditions, baseline and efficient technologies, fuel types, target sector, and costs incurred by all stakeholders in the MTI implementation. Moreover, both the costs and benefits change over time, due to factors such as effective useful life, regulatory policy, electricity and gas rates, and initiative funding.

During the first evaluation year, the evaluator will review the inputs and assumptions, and the model used by CalMTA that inform the cost-effectiveness forecast, and in subsequent years, any updates made to the models. The review will include the following model inputs:

- **Incremental Adoption Forecast.** Incremental adoption will be forecasted as an input to the cost effectiveness model. The evaluator will review this forecast and make recommendations for improvement.
- **Incremental Measure Costs.** Incremental measure costs reflect the difference in cost between the baseline HVAC technology and RHP technology. For the full discussion of how the incremental cost was forecasted see Appendix B of the MTI Plan. The evaluator will review the incremental costs and cost trends applied in the CalMTA cost-effectiveness



model. The evaluator will determine, given recent market data and market conditions, if the cost assumptions are reasonable or need to be adjusted.

- **Unit Energy Impacts.** The methodology to develop UEI for RHP technologies is detailed in Appendix B of the MTI Plan. The evaluator will review unit energy impacts (including savings estimates, load shapes, and effective useful life), and assumptions and methodology to make recommendations for improvements, such as appropriateness of climate zones used in modeling savings.

## 4.6 Ancillary benefits and costs

In addition to reviewing the benefits and costs assumed in the MTI cost-effectiveness model, the third-party evaluator should identify and summarize non-energy factors and quantify them where feasible without extensive additional investment in data collection. These may include factors such as changes to level of service, increased availability of cooling, and improved indoor air quality (for units with air filtration capability), if they prove significant. Elements like service life will already be included in cost-effectiveness calculations.

## 4.7 Reporting

CalMTA anticipates that the third-party evaluator will produce an annual market progress evaluation report that summarizes findings from the prior year's evaluation research and analysis activities, along with recommendations to improve MTI effectiveness.



# Attachment: MTI Evaluability Map

The following definitions apply to the table below.

Primary influence: Primary focus of the MTI; keys to evaluating performance

Secondary influence: other orgs already working on this; the MTI had a hand in the change but different standard of causality

MPI categories:

- A: Awareness
- B: Builders
- L: Regulatory
- M: Manufacturers
- R: Retail
- S: Code/Standard
- U: Units

Logic Model Outcome - primary influence	MPI #	Time-frame	Market progress indicator (MPI)	Program milestone	Baseline	Data source - MPI	Data source - causality
Manufacturers respond to specification with product plans and prototypes for CA-suitable products	<b>M1</b>	Short Term	Number of manufacturers engaging with CalMTA	2 manufacturers sign on to tech challenge by 12 months from contract execution	0	Manufacturer interviews; program documentation	Manufacturer interviews; Salesforce documentation
Multifamily building owners value product and begin to purchase	<b>M2</b>	Short Term	Number of units covered by bulk purchase agreements	Agreements in place by 12 months from contract execution for MF bldg. owners/property managers to purchase at least 10,000 going forward	0	Program documentation	MF property manager interviews; Salesforce documentation
Availability of products that fit slider and casement windows and CA-suitable temperature performance grows. Some products are available with air filtration capability.	<b>M3</b>	Med Term	Number of Type 2 and 3 products for sliding and casement windows available for purchase	3 RHP Type 2 or 3 products for sliding and casement windows become available for purchase by 2030	0	Manufacturer spec sheets; retailer data; online shopping and shelf-stocking study	Manufacturer interviews; Salesforce documentation
	<b>M4</b>		Number of RHP products with air quality filtration capabilities available for purchase	4 RHP products with air quality filtration available by 2030	2	Manufacturer spec sheets; retailer data; online shopping and shelf-stocking study	Manufacturer interviews; retailer interviews; Salesforce documentation
Prices decline, especially of CA-suitable products relative to price of competing ac units and resistance heaters	<b>M5</b>	Med Term	Incremental cost of RHP vs. (1) Room ACs (2) Space heaters and (3) combined costs of space heaters and room ACs	Incremental cost declines compared to each alternative technology by 2029 and is equal to the combined price of window AC and space heater by 2030	See note.	Online shopping and shelf-stocking study; Manufacturer and Retailer Interviews	Manufacturer interviews; Salesforce documentation
Growing number of manufacturers support use of lower GWP refrigerants	<b>M6</b>	Short Term	Number of manufacturers who document their support for use of natural refrigerants	2 manufacturers formally support movement to use natural refrigerants by the end of 2027	0	Manufacturer interviews; documented statements of support	Manufacturer interviews
ENERGY STAR specification adopted for products that provide both heating and cooling (including portable forms of products)	<b>S7</b>	Short Term	ENERGY STAR specification	ENERGY STAR specification amendment in place by 2027	N/A	ENERGY STAR Specification	Public notices for ENERGY STAR specification updates; Salesforce documentation; interviews with ENERGY STAR
An update to ENERGY STAR specification that includes separate tiers for moderate and cold climates		Med Term		ENERGY STAR specification amendment in place by 2030	N/A	ENERGY STAR Specification	Public notices for ENERGY STAR specification updates; Salesforce documentation; interviews with ENERGY STAR



Manufacturers and market partners adopt more consistent product labeling, market confusion declines	<b>S8</b>	Short Term	Number of RHP manufacturers update product naming and descriptions	At least 3 RHP manufacturers adopt recommendations of the national RHP Collaborative to update product naming and description by the end of 2027	0	Online shopping and shelf-stocking study	Manufacturer Interviews; Salesforce documentation
Key standard-setting bodies (i.e. ASHRAE and UL) amend guidance to allow the use of lower GWP refrigerants based on manufacturer feedback	<b>S9</b>	Med Term	Amended ASHRAE guidance to allow for use of natural refrigerants	ASHRAE approves guidelines by 2029	N/A	ASHRAE documentation	ASHRAE updates for publications; Salesforce documentation;
Federal efficiency standards add heating efficiency and increase stringency for cooling efficiency for all target HP products	<b>S10</b>	Long Term	Federal appliance standards	Heating energy efficiency rating (HEER) minimum standard in place by 2032	N/A	Appliance Standards (Federal register)	Federal register notices, salesforce documentation; interviews with ENERGY STAR
				Federal standards reflect at least a 10% higher CEER by 2032	N/A	Appliance Standards (Federal register)	Federal register notices, salesforce tracking; interviews with ENERGY STAR
<b>Logic Model Outcome - primary influence</b>	<b>MPI #</b>	<b>Time-frame</b>	<b>Market progress indicator (MPI)</b>	<b>Program milestone</b>	<b>Baseline</b>	<b>Data source - MPI</b>	<b>Data source - causality</b>
Retail partners stock and sell more affordable products in ESJ predominant communities year around	<b>R11</b>	Med-Term	Share of RHP stocked in brick-and-mortar locations	Share of qualified RHP products in brick-and-mortar retailers participating in ESRPP reaches 8% by 2029	0%	Online shopping and shelf-stocking study; ESRPP data analysis	Retailer Interviews; manufacturer interviews; Salesforce documentation
	<b>R12</b>		Price of RHP in brick-and-mortar locations in ESJ communities	Average price of qualified RHP products is lower in ESRPP stores in ESJ communities compared to other stores by 2029	N/A	Online shopping and shelf-stocking study	Retailer Interviews; Salesforce documentation
Consumer awareness of benefits and features grow starting with multifamily markets and their key influencers	<b>A13</b>	Med Term	Percentage of LI and non-LI consumers aware of RHP products and their benefits (use for efficient zonal heating and cooling)	No specific milestone; evaluator will track MPI over time to assess progress	N/A	Consumer Survey; analysis of LI vs. non-LI	Preponderance of evidence from all data sources
	<b>A14</b>		Percentage of Property Managers aware of RHP products and their benefits	No specific milestone; evaluator will track MPI over time to assess progress	N/A	Property Manager Survey; analysis of LI vs. non-LI	Preponderance of evidence from all data sources
Market share of RHPs grows and standalone AC window units and electric resistant heaters decline	<b>U15</b>	Long Term	CA Market share (% of full category sales) of RHP	40% of window AC sales by 2035; 50% of space heater sales by 2035	0%	Sales data; Shipment data: AHAM	ESRPP retailer data analysis; Preponderance of evidence from other identified sources
<b>Logic Model outcome - secondary influence</b>	<b>MPI #</b>	<b>Time-frame</b>	<b>Market progress indicator (MPI)</b>	<b>Market milestone</b>	<b>Baseline</b>	<b>Data source - MPI</b>	<b>Data source - causality</b>
Programs begin to include RHPs as a measure	<b>P16</b>	Short Term	Number of California PA and regulatory bodies who include RHPs (as defined by MTI) in their program	At least 5 programs offer RHP as an eligible measure or directly install by 2028, including at least 3 equity focused programs	0	CA Program Administrator interviews or survey; PA program	CA Program Administrator Interviews or survey; Salesforce documentation
More CA-suitable products installed in SF and MF homes through California programs	<b>P17</b>	Med Term	Number of programs promoting, incentivizing, or directly installing RHP	At least 10,000 RHP units are installed through California programming by 2031	0	CEDARS data, CA Program Administrator Interviews or survey	CA Program Administrator Interviews or survey; Salesforce documentation



Prevalence of electrification-enabling rate structures grows across the state	<b>L18</b>	Med Term	<i>The number of policies or new electrification-friendly rate structures that the MTI supported that are proposed/referenced by utilities, regulatory bodies, etc.</i>	<i>At least three policy forums, partnerships, or opportunities that CalMTA engages with support the change to electrification friendly rate structures by 2029</i>	N/A	Documentation of support from policy forums and partnerships, interviews with policy forums and partnerships; utility rate proposals at CPUC rate proceedings and C&S proposals at the CEC and CARB proceedings	Interview with policy forums and partnerships; Salesforce documentation
Relevant state regulations updated to allow use of lower GWP refrigerants in room heat pumps	<b>L19</b>	Long Term	State regulations updated to allow for use of lower GWP refrigerants	Regulation updated by 2031	N/A	Appliance Standards	Public comments; Salesforce documentation
Availability of products that use lower GWP refrigerants grows	<b>M20</b>	Long Term	Number of products available utilizing lower GWP refrigerants	At least 2 products utilize lower GWP refrigerants are available by 2034	0	Manufacturer spec sheets; retailer data; online shopping and shelf-stocking study	Manufacturer interviews; retailer interviews; Salesforce documentation

