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Phase I Disposition Report

June 2024

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

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List of Abbreviations

Abbreviation	Definition
AoA	Aggregator of Aggregators
ACCES	Association of California Community and Energy Services
ACEEE	American Council for an Energy-Efficient Economy
AEA	Association for Energy Affordability
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BAS	Building Automation Systems
BMA	Baseline Market Adoption
BTU	British Thermal Unit
CALCTP	California Advanced Lighting Controls Training Program
CalMTA	California Market Transformation Administrator
CBE	Center for the Built Environment at the University of California, Berkeley
CBECC	California's Building Energy Code Compliance Software
CBECC-Res	California's Building Energy Code Compliance Software – Residential
CEC	California Energy Commission
CEDARS	California Energy Data and Reporting System
CEDMC	California Efficiency and Demand Management Council
CEE	Center for Energy and Environment
CET	Cost-Effectiveness Tool
CHPWH	Central Heat Pump Water Heater
CPUC	California Public Utilities Commission
CRI	Color Rendering Index
CSW	Commercial Secondary Window
DAC	Disadvantaged Community
DER	Distributed Energy Resource
EEC	Energy Efficiency Council
EIA	Energy Information Administration
ETCC	Emerging Technology Coordinating Council
EPRI	Electric Power Research Institute
ERTU	Efficient Rooftop Unit
ESJ	Environment and Social Justice

ESRPP	ENERGY STAR® Retail Products Platform
ESS	Energy Storage System
EUL	Effective Useful Life
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
GHG	Greenhouse Gases
GWP	Global Warming Potential
HID	High-intensity Discharge
HPWH	Heat Pump Water Heater
HVAC	Heating, Ventilation, and Air Conditioning
IMC	Incremental Measure Cost
IOU	Investor-Owned Utilities
LADWP	Los Angeles Department of Water and Power
LBNL	Lawrence Berkeley National Laboratory
LED	Light Emitting Diode
LLLC	Luminaire Level Lighting Controls
MT	Market Transformation
MTAB	Market Transformation Advisory Board
MTI	Market Transformation Initiative
NBI	New Buildings Institute
NEI	Non-energy Impact
NEEA	Northwest Energy Efficiency Alliance
NREL	National Renewable Energy Laboratory
P4P	Pay-for-Performance
PAC	Program Administrator Cost
PDA	Public Document Area
PG&E	Pacific Gas & Electric
PNNL	Pacific Northwest National Laboratory
QI/QM	Quality Indicator/Quality Measure
RECS	Residential Energy Consumption Survey
REN	Regional Energy Network
RFI	Request for Ideas

SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
SHG	Solar Heat Gain
SMUD	Sacramento Municipal Utility District
SPR	Single Pane Replacement
TEC	The Energy Coalition
TFP	Total Factor Productivity
TSB	Total System Benefit
TMA	Total Market Adoption
TRC	Total Resource Cost
TRM	Technical Reference Model
UEF	Uniform Energy Factor
UEI	Unit Energy Impacts
VEIC	Vermont Energy Investment Corporation
VFD	Variable Frequency Drive
VIG	Vacuum Insulated Glass
WE&T	Workforce Education and Training

1. Introduction

In December of 2019, the California Public Utilities Commission (CPUC) issued Decision 19-12-021 (Decision) establishing a comprehensive market transformation (MT) framework. The MT Framework called for the creation of a market transformation administrator (now known as CalMTA) and an advisory board to CalMTA (the Market Transformation Advisory Board or MTAB). It also provided funding for CalMTA to develop and implement a portfolio of market transformation initiatives (MTIs).

Market transformation is a proven process of strategically intervening in a market to create lasting change. In the context of CalMTA, these lasting changes work to deliver long-term, cost-effective energy efficiency and support California's goals on greenhouse gas (GHG) reduction, workforce development, and equity.

Resource Innovations was selected by the CPUC in late 2022 as the administrator to create and manage a portfolio of MTIs for the benefit of California ratepayers using the program name CalMTA. In collaboration with the MTAB, CalMTA developed a process to solicit, score, and prioritize concepts that may be developed into MTIs. Through a Request for Ideas (RFI), stakeholders and market actors were invited to submit information about viable technologies or practices that would support CalMTA's goals.

The CPUC Decision directed CalMTA to document the RFI results in a report to the MTAB along with a list of submissions rank-ordered by their score.[1] CalMTA's **Stage 1 Disposition Report**, finalized in January 2024, fulfilled that requirement. The Decision also directed CalMTA to prepare a second, more comprehensive report that summarizes all activities related to scoring and selection of submitted ideas along with CalMTA recommendations for ideas to advance to Phase II: Program Development.[2] This **Phase I Disposition Report** fulfills that requirement. For more information about the phases of MT development, visit https://calmta.org/mti-development.

1.1 Overview of MTI scoring & selection

CalMTA has developed a multi-stage process to select an initial set of MTIs to submit to the CPUC for approval. The process builds on a two-stage scoring and selection method described in the MT framework with additional steps to provide clear guidance to submitters and support CalMTA's portfolio development. The steps are illustrated in Figure 1, summarized in this section, and further described in the Submission Scoring Results section in Section 5. This Phase I

[1] CPUC D. 19-12-021, pp. 107
[2] CPUC D. 19-12-021, pp. 110

Disposition Report describes the CalMTA team's scoring and selection process through Stage 2 scoring.

Figure 1. Overview of CalMTA scoring and selection

Self-screening: The RFI submittal form asks several screening questions to ensure submitter ideas meet the CalMTA requirements. If the submitter responds "no" to any of the self-screening questions, they are encouraged to further develop their idea before submitting.

Threshold review: This initial review by the CalMTA team ensures that basic requirements are met. The primary objective is to confirm that the ideas would save energy and that there is enough information to be scored.

Stage 1 scoring: scan & identify ideas: An initial pass at the scoring of each idea provides a basis for ranking the ideas so that only those with the best potential are advanced to the next stage: Develop & Assess Ideas. The Stage 1 scores are based on the CalMTA team's expertise and judgement, so the Stage 1 scoring can be conducted quickly and with limited investment of resources.

Stage 2 scoring: develop & assess ideas: The ideas that advance to Stage 2 are scored with additional rigor around Total System Benefit (TSB) and cost-effectiveness potential. Scores for this stage are based on preliminary estimates developed using secondary data sources, light research, and energy modelling.

Portfolio optimization: This comprehensive view of the ideas occurs after Stage 2 scoring to sort among qualified ideas to ensure that the set of MTIs eventually selected delivers on the desired portfolio characteristics as described in Section 2.4.

2. Scoring framework

The CalMTA team developed the following elements to execute the scoring and selection process described in Section 1.1:

- **Scoring categories** are broad categories under which one to three criteria are grouped. The scoring categories represent the policy or other priorities that drive the selection of the MTIs.
- **Scoring criteria** are the specific metrics or values that are used to calculate the scores. The criteria roll up to the categories.
- **Category and criteria weights** are the values placed on each category and criterion to determine the MTI score.

- **Scoring rubric** provides the structure and definitions for each criterion that allows the scorer to assign the score to each idea and supports consistent scoring across multiple scorers.
- **Portfolio characteristics** are the policy objectives that need to be reflected in the ultimate mix of MTIs.

2.1 Scoring categories & criteria

The scoring categories and the individual criteria within each are presented in Table 1 and defined and described in more detail in Appendix B. These are the same across the two stages except for the Participant Cost/Cost-effectiveness criteria:

Stage 1. The scorers' assessment of the reasonableness of the participant cost is used to score Participant Cost as a proxy for Cost-effectiveness in this stage. At this stage, there is not enough information on the ideas to assess cost-effectiveness more accurately.

Stage 2. In this later stage, Program Administrator Cost Test (PAC) and Total Resource Cost Test (TRC) are estimated to score Cost-effectiveness. The TRC represents the effects of an MTI on the entire market and gives an indication of the rate of return of the MTI to both the utility and participants. The PAC measures the costs of an MTI based on program administration costs (including incentives) but excludes any costs incurred by participants. This means that the costs in the PAC are defined similarly to supply-side resource alternatives which do not include direct customer costs.

Table 1. Scoring categories and criteria

Category	Criteria
Total System Benefit (TSB) **A single metric that encompasses energy savings, grid benefits and reliability, and GHG impacts**	Energy TSB
	Grid Benefits TSB
	GHG Impacts TSB
Product Readiness **An indicator of the supply chain maturity/product availability**	Readiness
Participant Cost/Cost-effectiveness **Assesses the overall estimated cost of the MTI against its benefits**	Participant Cost (Stage 1) PAC & TRC (Stage 2)
Environmental and Social Justice (ESJ) Impacts (Equity) **Assesses whether the MTI will provide beneficial impacts to ESJ communities or leverage existing community resources in its execution**	Beneficial Impacts to ESJ Communities
	Partnership Opportunities with ESJ Communities

Non-energy Impact **Captures the benefits or impacts (in addition to energy savings and greenhouse gas emissions reductions) that the MTI will deliver**	Non-energy Impacts
MT Alignment **Ensures that the MTI aligns with key aspects of MT theory and presents a strong MT opportunity**	Innovation Characteristics
	Leverage Points
	Sustained Benefits

The CalMTA team considered including "workforce development" as a stand-alone scoring category but determined that it was more appropriate to capture workforce development within other categories. Insufficient workforce is often identified as a barrier that might limit market diffusion. Workforce development, however, is also an effective strategy for removing the barrier of lack of contractor awareness and support for a technology or practice. In other cases, an MTI could provide an opportunity to grow a contractor base, improve the skills and capabilities in the industry, or create a new delivery or support channel. This could provide significant value, specifically when targeted toward rural or low-income communities. For these reasons, the CalMTA team scored workforce development opportunities as follows:

- Initiatives that provide workforce development in ESJ communities received credit in the beneficial impacts to ESJ communities.
- Workforce education and training (WE&T) was captured as a non-energy impact (NEI) when a WE&T effort (existing or new) could be leveraged to support the initiative.

Similarly, the team discussed including "risk" as a standalone scoring category but determined that MTI risk is best managed through the careful selection of MTI ideas using a robust scoring and selection process. With MTI selection, risk is minimized by ensuring the technologies or practices are commercially or near-commercially available, and opportunities have strong MT alignment (see Table 2). These two categories specifically reduce the likelihood of investments that would not effectively result in savings. In addition, the portfolio optimization exercise, discussed in a later section, will examine overall risk at the portfolio level to confirm that the MTIs selected are expected to bring the value and benefits that most align with CalMTA goals. This will provide a conscious assessment of risk and value across the portfolio.

2.2 Category & criteria weights

The CalMTA team established scoring weights to prioritize each of the six categories and the criteria within them. Table 2 presents the proposed weights for each category and criterion. Because Stage 2 uses PAC and TRC calculations to score Cost/Cost-effectiveness, but Stage 1 only uses Participant Cost as a proxy, the weight for cost-effectiveness is increased in Stage 2 to give more weight to TRC and PAC.

Table 2. Category and criteria scoring weights for Stages 1 & 2

Category	**Category Weights**	**Criteria**	**Criteria** Weights
Total System Benefit	25%	Energy Savings	30%
		Grid Benefits and Reliability	30%
		GHG Impacts	40%
Product Readiness	10%	Readiness	100%
Participant Cost/Cost-effectiveness	Stage 1: 5% Stage 2: 10%	Participant Cost (Stage 1)	100%
		Cost-effectiveness: TRC (Stage 2)	50%
		Cost-effectiveness: PAC (Stage 2)	50%
ESJ Impacts (Equity)	15%	Beneficial Impacts to ESJ Communities	65%
		Partnership Opportunities with ESJ Communities	35%
Non-energy Impacts	Stage 1: 15% Stage 2: 10%	Non-energy Impacts	100%
MT Alignment	30%	Innovation Characteristics	20%
		Leverage Points	50%
		Sustained Benefits	30%

The CalMTA team used an Excel-based scoring tool to calculate weighted scores for each idea and objectively rank them based on the criteria and weightings. The scoring tool ensured that the ideas were scored consistently using the defined criteria. The tool applied weights to the individual criterion score and aggregated them across scoring categories to develop a total, weighted score for each idea.

2.3 Scoring rubric

A scoring rubric was developed to guide the process by defining the scale and values used to score each criterion. Each criterion has a set of clearly defined score options that were developed to be applicable to all types of ideas (for instance, technologies, services, practices, delivery approaches, etc.) and have been appropriately differentiated for use in Stage 1, which is a high-level assessment. Stage 2 includes an assessment based on more in-depth information from research and analysis of available secondary resources.

The scoring rubric is presented in Table 3 and more detailed score options and instructions are provided in Appendix B.

Table 3. Scoring rubric

Category	Stage 1: Scan & Identify Ideas		Stage 2: Develop & Assess Ideas	
	Criteria	**Scoring Scale**	**Criteria**	**Scoring Scale**
Total System Benefit	Energy Savings Potential	Low, medium, high	Energy TSB	Low, medium, high
	Grid Flexibility Potential	Low, medium, high	Grid Benefits TSB	Low, medium, high
	GHG Reductions Potential	Low, medium, high	GHG Impacts TSB	Low, medium, high
Commercial Readiness	Readiness	Low, medium, high	Readiness	Low, medium, high
Participant Cost/Cost-effectiveness	Reasonable Participant Cost	Yes/No	MTI Cost-effectiveness: PAC	< 1 = No ≥1 = Yes
			MTI Cost-effectiveness: TRC	< 1 = No ≥1 = Yes
ESJ Impacts (Equity)	Beneficial Impacts to ESJ Communities	1-5	Beneficial Impacts to ESJ Communities	1-5
	Partnership Opportunities with ESJ Communities	1-5	Partnership Opportunities with ESJ Communities	1-5
Non-energy Impact	Non-energy Impacts	1-5	Non-energy Impacts	1-5
MT Alignment	Innovation Characteristics	1-5	Innovation Characteristics	1-5
	Leverage Points	1-5	Leverage Points	1-5
	Sustained Benefits	1-5	Sustained Benefits	1-5

2.4 Portfolio characteristics

A set of portfolio characteristics identified and shown in Table 4 below represent the policy priorities that need to be sufficiently addressed within the portfolio but may or may not be addressed within each individual MTI.

Table 4. CalMTA portfolio characteristics

Portfolio Characteristic	Key Portfolio Question
Geographic, Sector &	Is there sufficient balance and coverage across market sectors, end uses, and technologies? Do the initiatives' potential benefits sufficiently cover California?

Technology Diversity	
Ramp Rate/Timing	How quickly will impacts accrue?
ESJ Relevance	Does the portfolio address equity sufficiently?
WE&T Support	Does the portfolio sufficiently address WE&T?
Risk Profile	Is the risk profile of the portfolio acceptable?
Investment Required	What mix of MTIs optimizes the portfolio budget?
Policy Alignment	Does the portfolio align with California's clean energy and climate goals?

CalMTA, in collaboration with the MTAB, will monitor the portfolio against these characteristics over time and may propose rebalancing or specifically targeting characteristics through an RFI if the portfolio has gaps or begins to deviate.

2.5 Intake questions

The intake questions, completed by the submitters and presented in Table 5, were designed to solicit information in narrative form rather than data points corresponding to the scoring criteria. The CalMTA scoring team used their expertise to take the information provided by the submitter and relate it to the scoring criteria.

Table 5. RFI intake questions

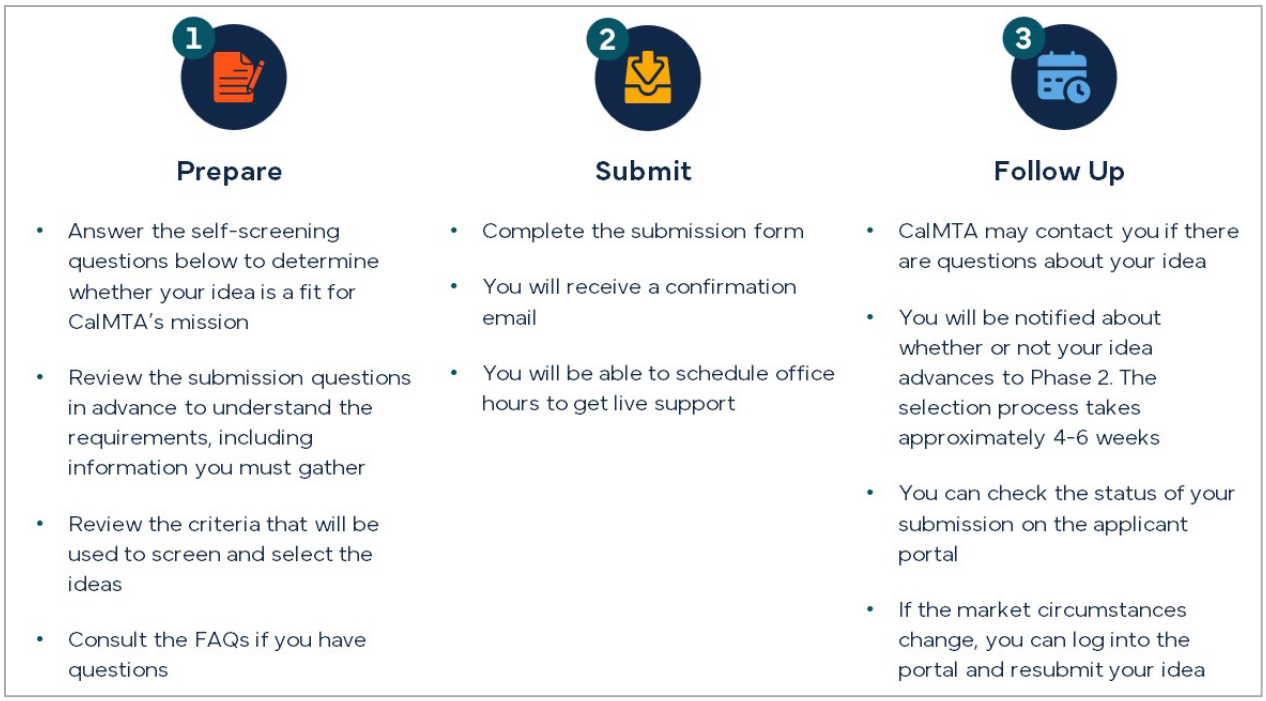
Product Description & Benefits
Please describe the technology or practice. *(2,000 characters)*
Describe how the technology or practice saves electricity or natural gas, reduces peak demand, and/or reduces GHG emissions. *(800 characters)*
Are there additional benefits that your technology or practice will provide? If so, please describe these benefits. *(800 characters)*
Target Market Description
Describe the target market sector and customers that will benefit from your technology or practice in California. For example, commercial, industrial, single family residential, multifamily residential, agricultural, etc., and, if applicable, key subsector. Be sure to specify whether it will benefit hard-to-reach customers, low-to-moderate income markets, disadvantaged communities, etc. and how. *(800 characters)*
Where, specifically, is the technology or practice available? Is it available to consumers in California? Please provide an example of a specific outlet or service provider, if possible. *(800 characters)*

Describe how the technology or practice is (or will be) delivered to the market. For instance, will it be available for direct purchase by the consumer through traditional retail establishments, or will it be available only through installation by a licensed professional, or something else? Is there a well-established distribution channel that can be used, or would one need to be developed or adapted? Also include information about any partnerships, including those with community-based or environmental/social justice organizations, if applicable. *(4,000 characters)*
What is your best estimate of current market adoption of the technology or practice? For instance, how many units or what percentage of the target market(s) have already adopted the technology or practice? (*1,200 characters)*
Market Adoption Barriers
What is keeping the market from adopting your technology or practice? Please list the key market barriers. *(2,000 characters)*
What limitation(s), if any, does the technology or practice have that must be overcome? What are the technical barriers, if any? *(4,000 characters)*
Beyond the standard or base case technology or practice, what are the alternative competing products or services (direct and indirect), and how does your technology or practice compete with them? *(2,000 characters)*
What type of market interventions, assistance, or support do you think are necessary to overcome the identified barriers? *(2,000 characters)*
Additional Information
Is there any additional information that would be helpful in evaluating your proposed idea? *(800 characters)*
If available, please provide names and links to any recently completed studies, workpapers, measure packages, whitepapers, industry publications, articles, interviews, and other supporting documentation related to this idea. *(2,000 characters)*

2.6 Intake portal

Decision 19-12-021 directed CalMTA to develop an intake portal where market actors and other stakeholders could submit their ideas for MTIs. The team developed such a portal with a process and requirements that were clear and easy-to-follow, and the submitters had access to supporting resources. Self-screening questions provided the submitter a way to determine whether their idea was a good candidate for market transformation. Guidance language navigated submitters through a logical flow of information from the broader CalMTA website, to the "Participate" landing page, and ultimately to the "Idea Portal" for submission. A simple graphical element illustrated the stages of the intake process and included links to supporting information.

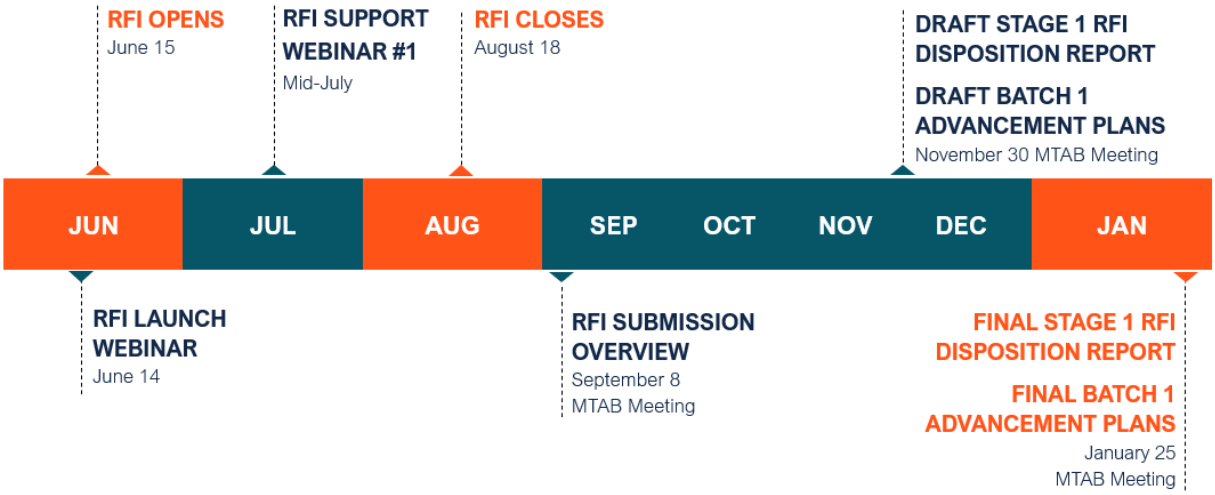
Figure 2. Steps to submitting an idea



3. RFI outreach

The Idea Portal was opened for the initial round of solicitation, which lasted from June 15 to August 18, 2023. CalMTA anticipates reopening the RFI portal in 2024 and reviewing ideas that were held for research/refinement in the 2023 RFI. The figure below illustrates milestones in the 2023 RFI timeline.

Figure 3. RFI timeline



3.1 Key RFI outreach activities

The RFI was an opportunity for CalMTA to engage with stakeholders to promote the chance to submit It was also a chance to educate various audiences about market transformation and the creation of a portfolio of initiatives for California. As such, we took a tiered approach to outreach, including general notices, RFI briefings, and direct invitations to submit.

Stakeholder Segments

RFI outreach efforts engaged energy efficiency organizations, market actors, and potential allies and advocates with the intent of reaching stakeholders that were: (1) likely to have interest in submitting an idea; and/or (2) able to share the RFI with a network of potential participants. In addition to MTAB members and subcontractor firms, outreach segments and example organizations included:

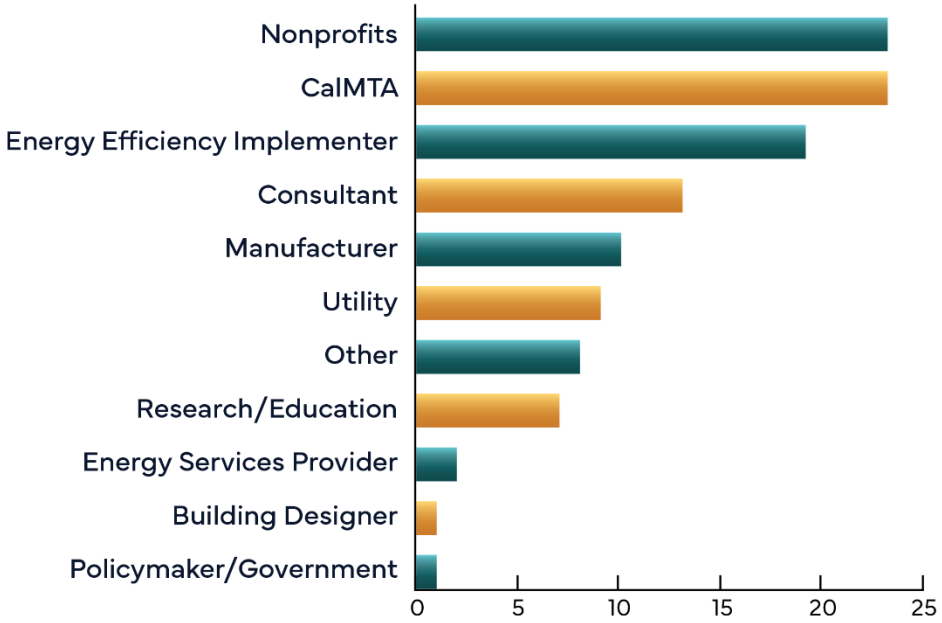
- **Industry experts and implementers with California presence** such as the American Council for an Energy-Efficient Economy (ACEEE), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Building Decarbonization Coalition, California Efficiency and Demand Management Council (CEDMC) members, Center for Energy and Environment (CEE), Electric Power Research Institute (EPRI), New Buildings Institute (NBI), U.S. Green Building Council, The Energy Coalition (TEC), and Vermont Energy Investment Corporation (VEIC).
- **Research laboratories and centers** such as the Center for the Built Environment (CBE) at the University of California, Berkeley; Lawrence Berkeley National Laboratory (LBNL); National Renewable Energy Laboratory (NREL); and Pacific Northwest National Laboratory (PNNL)
- **ESJ and WE&T organizations** such as the Association of California Community and Energy Services (ACCES), Association for Energy Affordability (AEA), Build it Green, California Advanced Lighting Controls Training Program (CALCTP), The Climate Center, Climate

Resilient Communities, Energy Efficiency Council (EEC), Redwood Community Action Agency, Rising Sun Center, Self-Help Enterprises, and Suscol Intertribal Council

- **Regional utilities and energy providers** such as the California Investor-Owned Utilities (IOUs), Sacramento Municipal Utility District (SMUD), Los Angeles Department of Water and Power (LADWP), and Regional Energy Networks (RENs)
- **Emerging or advanced energy efficiency technology stakeholders** such as statewide codes and standards IOU leads, CalNEXT program, Cleantech San Diego, Statewide Gas Emerging Technologies Program, Emerging Technology Coordinating Council (ETCC), and California Technical Forum

In Figure 4 below, is a list of the submitter industry roles as they self-selected.

Figure 4. Submitter industry roles



Outreach Activities Conducted

RFI outreach efforts included the following primary activities:

- **Public awareness-building:** CalMTA generated widespread awareness of the RFI through two webinars with a total of 112 registrants and 32 on demand views, MTAB meetings that were open to the public, regular push email notices, and an active social media presence via a LinkedIn showcase page.
- **Direct outreach:** CalMTA team, subcontractors, and the MTAB members sent personalized emails with RFI information to their networks with an invitation to submit an RFI response or schedule a meeting to learn more about the process. Our team conducted 32 briefings and group presentations with stakeholders who: (1) were

identified as high-priority organizations; or (2) requested an introductory meeting. These meetings are listed in Appendix D.

- **Industry events:** CalMTA team and program partners shared information about the RFI process at numerous events attended by target audience members, both through collateral distribution and more formal presentations. Notable events included:
    - CEDMC Spring Forum
    - ACEEE 2023 Industry Summer Study
    - 2023 ASHRAE National Conference
    - 14th Annual California Climate & Energy Forum
- **Share toolkit:** To broaden CalMTA's reach on information-sharing, the team developed an online toolkit to share with key allies who are supportive of our work. The toolkit included sample talking points, social media posts, blog/newsletter articles, PowerPoint slides, and easily downloadable graphics. These resulted in extended outreach including articles in industry publications (e.g., the CPUC's monthly newsletter and the California Climate & Energy Collaborative's wEEkly update).

3.2 Submission support

CalMTA offered two primary pathways where potential submitters could get specific information and assistance on development of their ideas.

Office hours: To provide RFI submitters with immediate support and resolve any open questions, CalMTA offered on-call office hours where potential submitters could set a 1:1 appointment with MTI experts on the team. In total, 14 prospective submitters scheduled an office hours appointment and six of these participants completed an RFI submittal after meeting with the CalMTA team.

Q&A discussion board: Through the RFI Idea Portal, users could ask questions and receive answers from CalMTA via an online discussion board by clicking an "ask a question" link. All questions received a publicly posted response within 24 hours, enabling other interested parties to view previously asked questions and answers. In total, 14 questions were posted to the discussion board.

3.3 Feedback on RFI

After the RFI closed, the team held a debrief to collect feedback summarized in Table 6. The areas for improvement have been addressed in planning for the future RFI to be released in the first half of 2024. Future cycles will more specifically target gaps in the portfolio that could not

be filled with ideas from the first RFI (for example, limited ideas were submitted for the industrial sector).

Table 6. Feedback on RFI experience

Topic	What worked well	Areas for improvement
Idea portal	-Interface was easy to navigate and user friendly -MTI scoring team could find ideas and update status or add notes -Q&A board	-Login challenges for users because of username confusion -Word/character limit online didn't align with submitters' Word documents
RFI structure	-Questions were clear and straightforward	-Clarification of process and link to future contracts/compensation -Need definitions for MT alignment and other criteria
Outreach & response	-Submission support services were well-utilized; webinar registration was high	-Need to engage diversity of market actors -Future cycles to target balancing MTI portfolio

4. Summary of MTI ideas received

When the RFI closed on Aug. 18, 2023, CalMTA had received a total of 117 (including 22 ideas submitted by the CalMTA team) submissions from 63 unique submitters with 55% of those entered on the final day. As part of the RFI process, the CalMTA team scanned viable technologies and practices and submitted developed ideas, which were reviewed and scored in the same manner as external proposals. In all, the ideas addressed a range of target markets with most ideas focused on the commercial and residential sectors. While many of the ideas were centered around a product or technology, there was a fair showing for practices and services. The breakdown of these aspects is shown in Figures 5 and 6.

Figure 5. Target markets of submissions

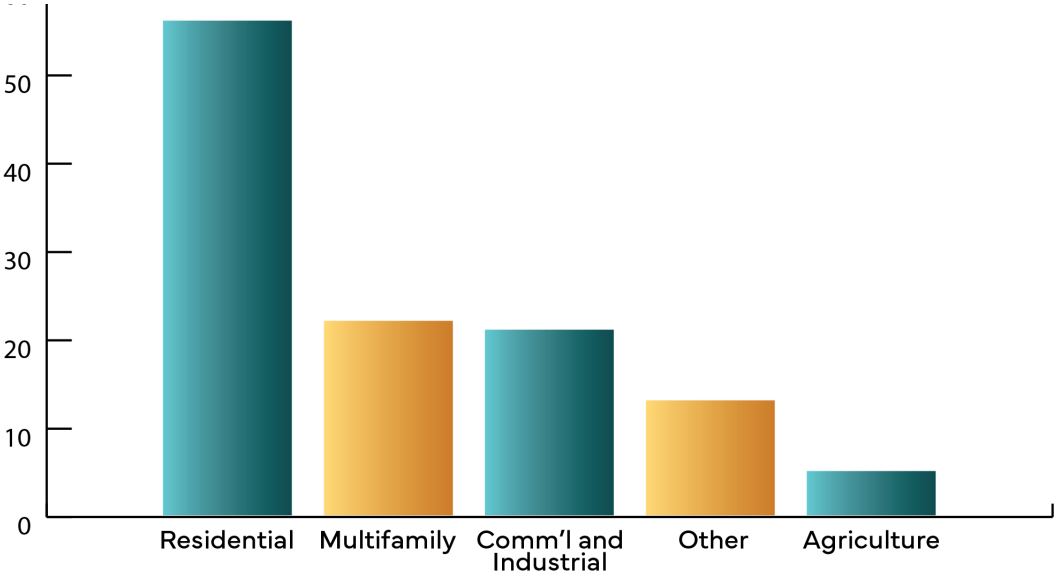
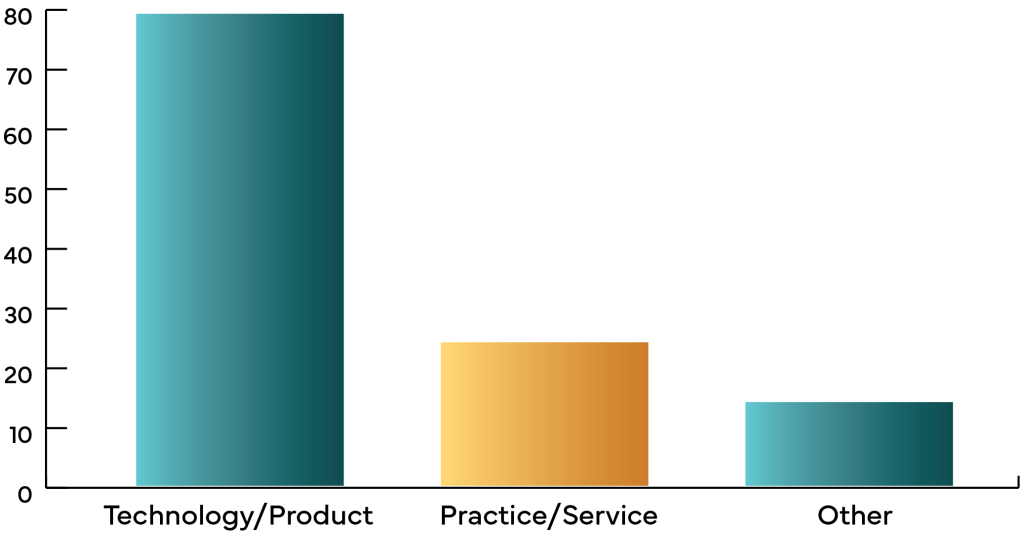
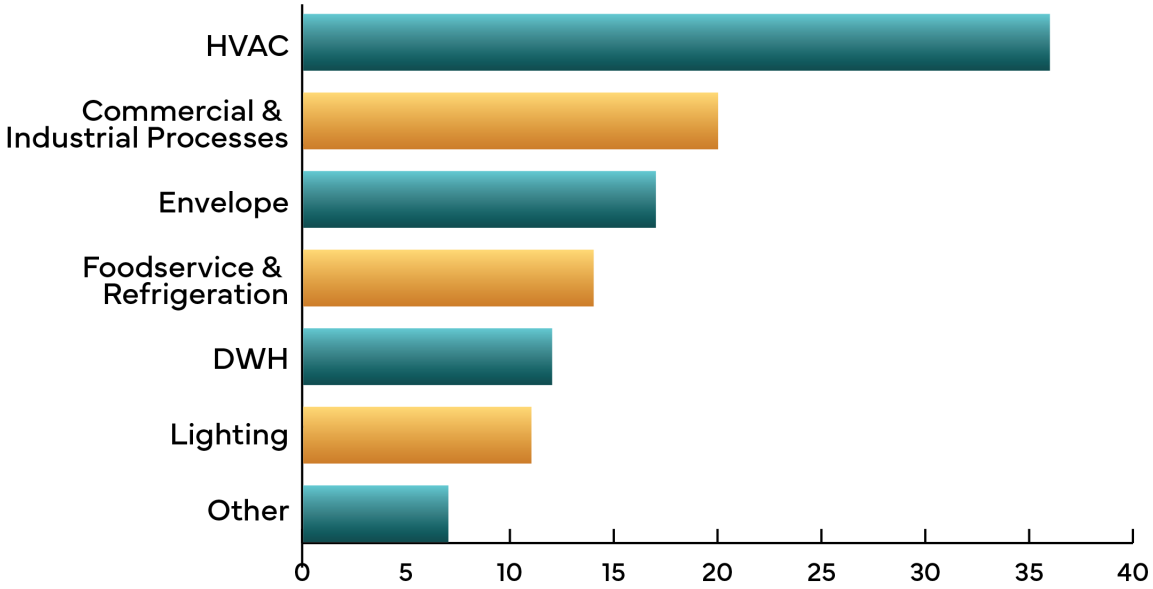


Figure 6. Product type categories



The "other" category of Figure 6 captures ideas that do not fit cleanly into either the technology/product or practice/service categories. Examples include an idea to support the enforcement of Title 24 and another to introduce legislation to support municipal streetlight ownership. There was also diversity in load type and end uses across the submissions as depicted in Figure 7.

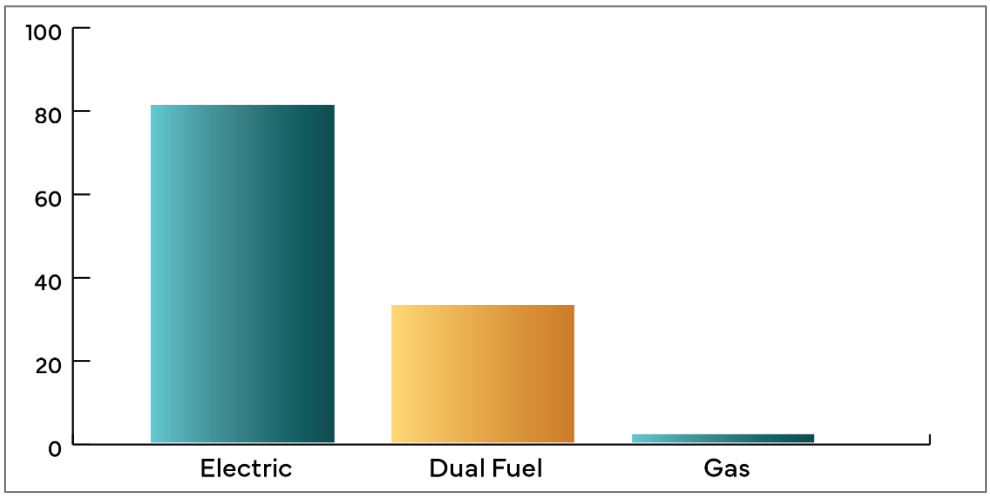
Figure 7. Submissions by load type



The "other" category in Figure 7 captures ideas with load types that do not tie to a building load type. Examples include an idea to change the Warren-Alquist Act to capture greenhouse gas reductions, an idea for a statewide consumer products marketplace, and an idea to promote a certification for high performance homes.

The submissions addressed both gas and electric fuel types. Many submissions involved promoting electric equipment to replace an existing appliance running on either electricity or natural gas. In these cases, the idea was classified as dual fuel as shown in Figure 8.

Figure 8. Submissions by Fuel Type



4.1 Notable groups of ideas

Perhaps the most significant observation is that 34% of the ideas prominently featured heat pumps. In some cases, these ideas promoted a heat pump as a stand-alone product for heating, cooling, and water heating (for single-family and multifamily residences as well as commercial buildings). In other cases, they were included as part of broader strategies to improve the overall efficiency of a building or facilitate its decarbonization. Finally, there were ideas geared toward workforce development and training to help accelerate heat pump adoption and create career opportunities for disadvantaged communities.

In addition to the strong presence of heat pumps, there were other end uses that generated significant interest. One of these was food storage and service. Another was the opportunity to create efficiency and mitigate the high global warming risk posed by refrigerants. Potential improvements in the efficiency of the cooking process itself were addressed for both residential and commercial kitchens. Notable among submissions was the presence of induction cooking. Also, as with heat pumps, some of the ideas were oriented toward workforce training.

The building envelope was the focus of 17 ideas with several related to evolving window products and others that proposed utilizing shading and insulating technologies. For commercial and industrial processes, there were 15 ideas that involved process monitoring, controls, and efficient motors and pumps. Finally, there were two ideas that sought to create synergy with the growth of the electric vehicle (EV) fleet by promoting new EV charging options that have the potential to improve grid flexibility during peak hours.

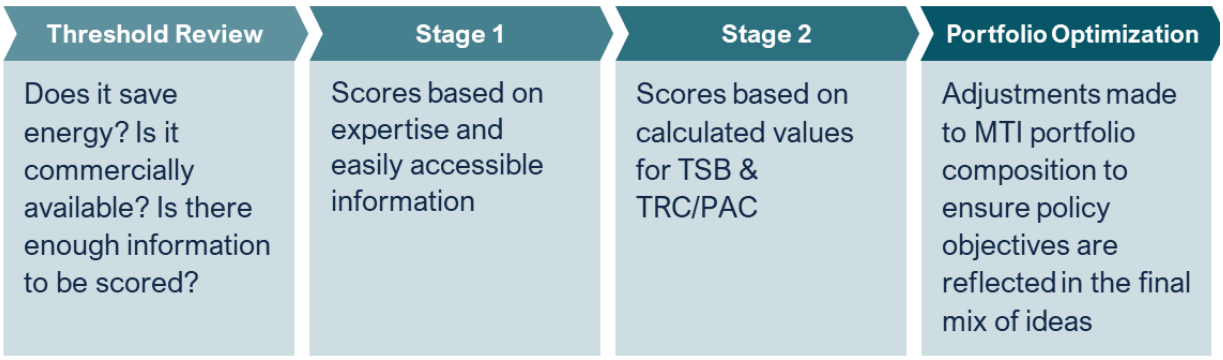
Taken together, many of the submissions complement, and in some cases duplicated each other, so some ideas were combined into a single idea and scored together where it made sense to do so. The process undertaken by the team to combine ideas is described in the following section.

5. Submission scoring results

The scoring process, illustrated in Figure 9 below, was designed as a multi-stage process with each stage applying a greater level of rigor to the advancing ideas. The initial threshold review is an administrative review to ensure that the submissions are an appropriate fit for market transformation investment. Stage 1 ranks the submissions so that rigor and resources required for Stage 2 scoring are applied to the ideas with the greatest likelihood of success.

In Stage 1, the scoring team members assign scores based on the information in the submission supplemented by their expertise and limited research. The ideas that score the highest in Stage 1 advance to Stage 2 where a greater level of effort is used to determine the score. Stage 2 relies on secondary research with more time dedicated to investigation and analysis. Lastly, a portfolio optimization step identifies policy priorities to be addressed across the portfolio but may or may not be addressed within a particular idea.

Figure 9. Steps to advancing ideas submitted through the RFI



5.1 Threshold review

The threshold criteria requires that an idea provide energy savings, is near commercial availability and the submission has enough information and the appropriate level of specificity to allow the idea to be understood and scored by the review team. An example of an idea that did not produce energy savings, and thus did not make it beyond threshold review, was one that proposed to convert hemp into biofuels to provide energy. Of the 117 ideas submitted, 25 did not pass the threshold review. Descriptions of those ideas are provided in Appendix C.

5.2 Stage 1 scoring

At the outset of scoring, each scoring team member reviewed the submission and any supporting documentation provided by the submitter. The scoring team held an initial meeting to discuss the idea and ensure that each scorer had a clear and consistent understanding of the technology or practice being proposed. If there was any light secondary research that could support the scoring, this was identified and assigned to a scoring team member.[3] Lastly, the scoring team clarified the applicable market sector, the baseline assumption for both energy savings and cost, and the decision type applicable to the idea (for example, whether the idea would address/promote normal replacement or early replacement of a technology).

Next, each team member developed their individual scores for the submission. Two scorers – from the CalMTA program staff at Resource Innovations and 2050 Partners – scored each idea across all criteria. Cadmus developed scores for Non-energy Impacts and MTI Cost and Cost-effectiveness, and The Ortiz Group scored the Equity criteria. This structure provided the scoring team with both adequate resources and subject matter expertise to complete the scoring. In a few instances other subject matter experts were consulted.

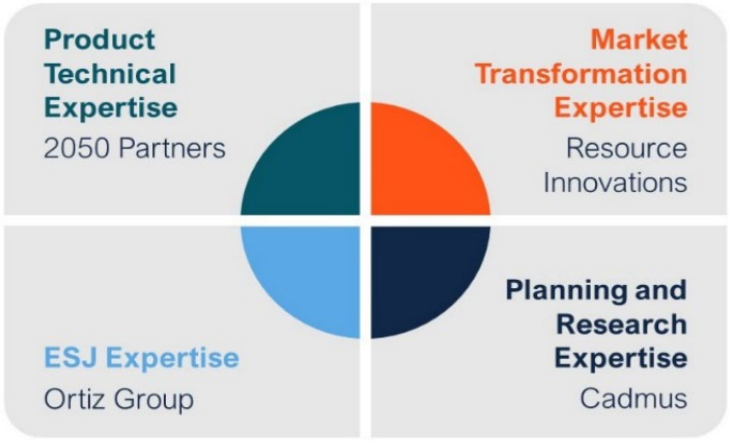
[3] In addition to the secondary research identified within the initial scoring meeting, each scorer conducted their own research to support their understanding of the idea, as needed.

After each scorer developed their individual scores, the team held an alignment meeting to review and discuss the idea. When the scorers were not aligned, they shared assumptions behind their ratings and discussed them until they reached consensus on a single score for each idea.

The scoring team modified the above process slightly after the RFI closed on August 18 to accommodate the spike in submissions received on the last day of the RFI. Two scoring teams were formed and the ideas were allocated to one of the two teams, allowing CalMTA to double their throughput. 2050 Partners and CalMTA program staff at Resource Innovations each designated two scorers: one on each of the two scoring teams. Team members from Cadmus and The Oritz Group both maintained a single scorer for all ideas (meaning that the same team member was on both of the two scoring teams). This modification was successful in providing the necessary resources to complete the Stage 1 scoring in a timely manner. Because all the members had been involved in the scoring discussions of the initial (pre-August 18) ideas submitted, both teams were able to consistently apply the scoring criteria to their assigned ideas.

The Scoring Team

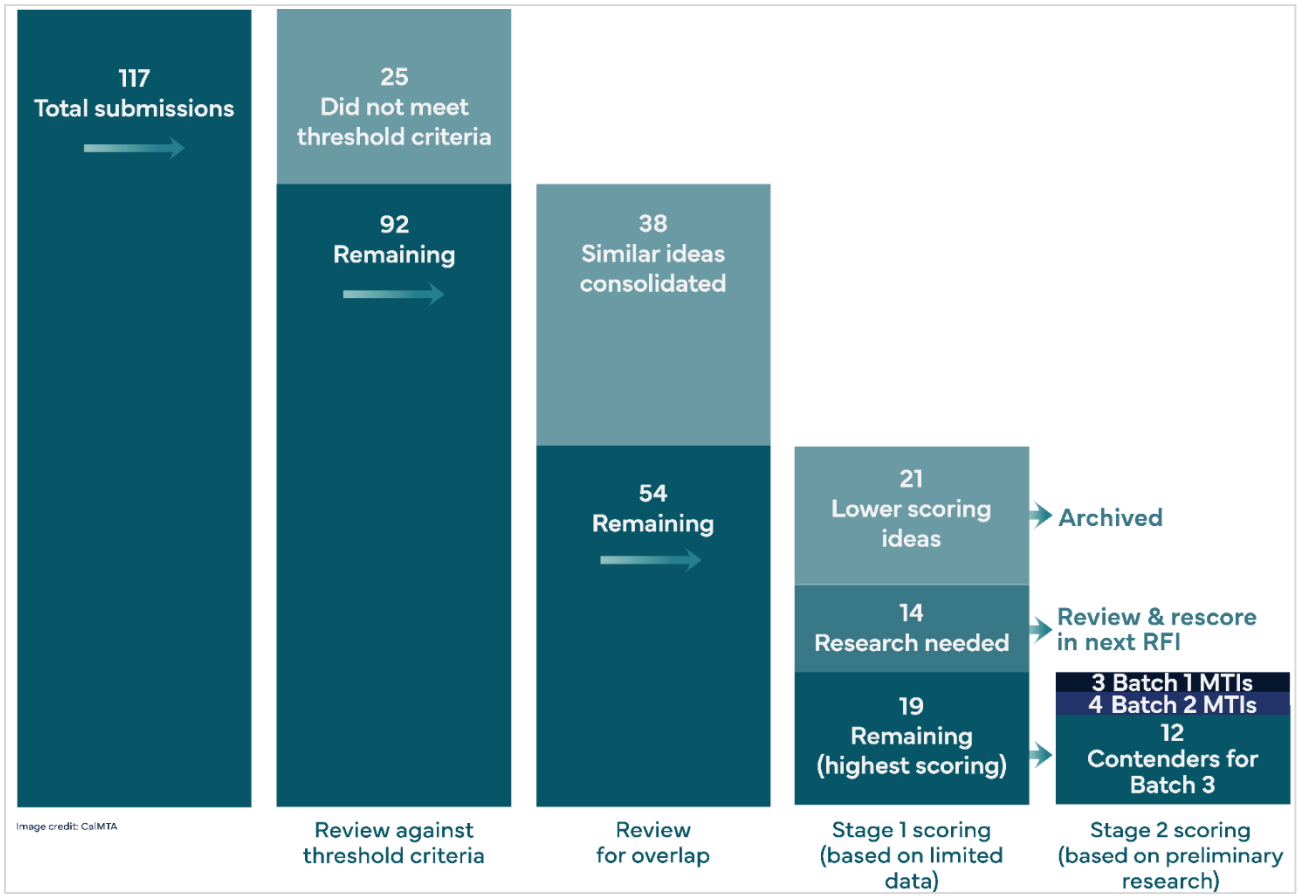
The team reviewing RFI submissions and setting Stage 1 scores consisted of staff from Resource Innovations (which is administering CalMTA) and subcontractors with each contributing a specific area of expertise to the process.



During Stage 1 scoring, the team found some overlap between the ideas submitted or found that combining several similar ideas resulted in a stronger, more comprehensive MT concept. In these cases, the team combined the ideas and scored the complete concept. For instance, one submittal advocated for CalMTA to support micro heat pumps generally while an idea focused on providing micro heat pumps with air filtration to low-income residents. The team felt that the two ideas were a stronger and more comprehensive MT effort when considered together. In another example, an idea that generally advocated for foodservice decarbonization was considered in relation to an idea to provide training and education for the adoption of commercial induction cooking. Ultimately, 38 of the ideas were combined with other ideas so that 54 ideas were scored in Stage 1 (see groupings in Table 7 below).

A list of all ideas scored in Stage 1, ranked in order of their score, is provided in Appendix A. Of those, 21 lower-scoring ideas did not advance to Stage 2 and were archived including nine of the internally developed submissions. An additional 14 were held to conduct additional scanning of new research and changing market conditions, which may strengthen the idea and make it viable for Stage 2 scoring (see "Stage 1 Research/ Refinement" status in Appendix A). The team will work to resolve any outstanding questions and rescore these ideas along with any new submissions received in the next RFI. The following sections describe the Stage 2 scoring and the processes for selecting the first two batches of MT ideas to recommend for further development. Figure 10 below shows the breakdown of how ideas were ultimately disposed through the scoring process.

Figure 10. Disposition of ideas received



Ideas advancing to Stage 2 scoring

Based on the Stage 1 scores, the team determined that the top 19 ideas should advance to Stage 2. These ideas are shown in the shaded rows of Table 7 together with the numbered RFI ideas that were combined into them.

Table 7. Grouping of Ideas Advanced to Stage 2 Scoring

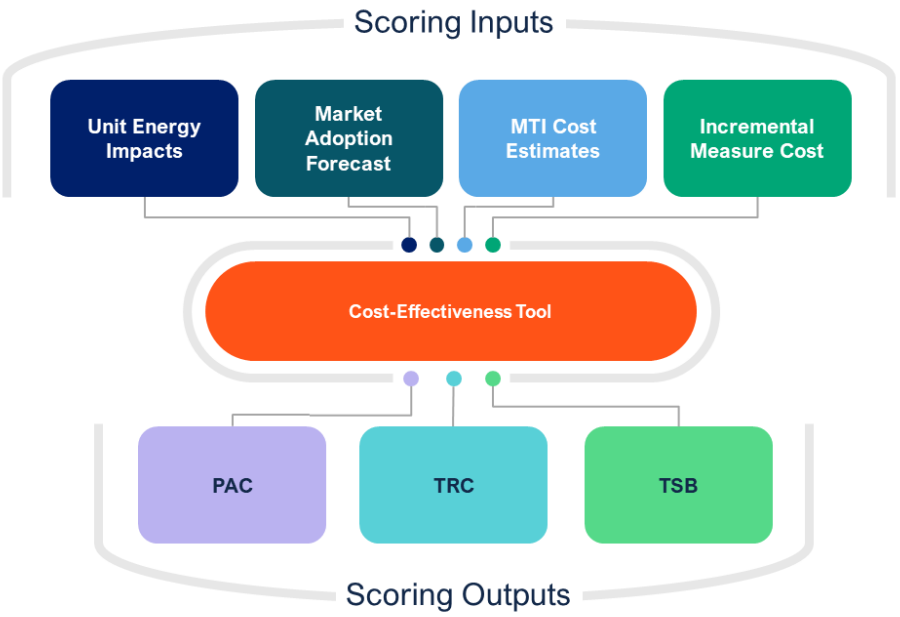
Idea Group	MTI Name	Idea #
Envelope	Commercial Windows	
	Single Pane Retrofit	0157
	Vacuum Insulated Glass (VIG)	0079
	Residential Windows	
	High Performance Windows	0010/0109
HVAC	Portable / Window Heat Pumps	
	Portable / Window Heat Pumps	0097
	Micro Heat Pumps	0086
	Cold Climate Window and Portable Heat Pumps	0125
	Combination HVAC and Water Heating	
	Multi-function Heat Pump	0085
	Combination Heating, Cooling, Water Heat	0126
	Residential HVAC	
	Residential Variable Speed Heat Pump	0171
	Cold Climate Heat Pumps	0037
	HVAC Integrated Ventilation	
	Heat Pump Integrated Continuous Mechanical Ventilation	0081
	HVAC Policy	
	Policy Requiring all AC be sold as HP	0068
	Efficient Rooftop Units	
	Efficient Rooftop Units (ERTUs)	0116
	Enable HVAC Quality Indicator/Quality Measure by Introducing a Universal HVAC Interface	0163
	Unitary Packaged Heat Pump Systems for Light Commercial	0166
	Advanced Rooftop Controls	0124
	Advancing Smarter HVAC Controls in Small to Medium Commercial	0184
	Medium to Large Commercial Control Systems	
	Modernizing building automation system hardware	0149
Lighting	Streetlighting	
	Efficient Streetlighting	0105

Idea Group	MTI Name	Idea #
	Regional Lighting Assessment Tool	0158
	Networked Lighting Controls	
	Luminaire Level Lighting Controls	0120
	Procure Networked Lighting Controls for Multivendor Teams	0128
Plug Load/ Appliances	Smart Home	
	Smart Electric Panel	0080
	Residential EV Charging	
	Bi-directional EV Charging - Residential	0021
	Electric Vehicle Supply Equipment Standards Roadmap	0175
	Commercial EV Charging	
	Bi-directional EV Charging - Fleet	0077
	Residential Appliances	
	Induction Cooktops & Ranges	0107
	Leveraging ENERGY STAR® Retail Products Platform (ESRPP) for Equity	0115
Practices	Building Performance Standards	
	Building Performance Standards Accelerator MTI	0193
Process	Foodservice	
	Foodservice Decarbonization	0165
	Induction Cooking Training Partnership	0174
	Elevating Foodservice Tech Transformation	0183
Water Heating	Residential Water Heating	
	Residential Heat Pump Water Heaters (HPWH)	0194
	HPWH Exterior Enclosure	0145
	HPWH Installer Certification	0136
	HPWH Rapid Installer Expansion	0177
	Deployment of 120V HPWHs	0180
	Market Connections for Plug-in HPWH	0148
	Gas WH Buyback Program + Solar	0132
	Eco-Tech Apprenticeship Program	0153
	Commercial Water Heating	
	HPWH for Multifamily	0078
	Central HPWH for MF-Complete Kit Solutions	0113
	Load flexibility controls for HPWH Systems	0179
	Ultra-low global warming potential (GWP) Packaged Systems with thermal energy storage	0108

5.3 Stage 2 scoring process

As described above in Section 2, Stage 2 scoring applies a level of rigor above what was applied in Stage 1 scoring. Specifically, in Stage 2 the scoring team conducted analysis to determine a preliminary value for the cost-effectiveness criteria, PAC and TRC, and TSB. Figure 1 illustrates the inputs and outputs of the Stage 2 scoring for cost-effectiveness and TSB.

Figure 11. Stage 2 Scoring Inputs and Outputs



Stage 2 scoring inputs

Currently, CEDARS' Cost-Effectiveness Tool (CET) is the official publicly available program to evaluate energy efficiency programs in California.[4] The CET allows for evaluation of programs from all utilities and climate zones and contains approved 8,760 load shapes and defined avoided costs. However, since the MT ideas focus on relatively new technologies and some MT ideas involving new technologies require custom 8,760 load shapes not currently supported by CET,

[4] CEDARS is the California Energy Data and Reporting System managed by the CPUC. It is the secure repository of California's energy efficiency program data reported to the CPUC by the investor-owned utilities, Regional Energy Networks, and certain Community Choice Aggregators. Data available on CEDARS are submitted in annual budget filings, quarterly savings claims, and monthly report summaries.

the team developed an in-house, Excel-based cost-effectiveness tool that is consistent with the CET methodology and versatile enough to handle all the MT ideas. CalMTA used this tool to calculate TSB and cost-effectiveness (TRC and PAC) with the following inputs:

- Unit energy impacts
- Market adoption forecasts
- MTI cost estimates
- Incremental measure costs

The development of each input is described in the sections below.

Unit Energy Impacts

CalMTA used a combination of existing, secondary data sources, engineering calculations, and building energy models to develop the unit energy impact estimates. The method(s) and source(s) used to develop each estimate is described in Table 8 below.

Table 8. Source of Unit Energy Impacts

Idea #	Idea Name	UEI methods and sources
0010	High Performance Windows	The team used the 2022 compliance version of California's Building Energy Code Compliance Software (CBECC-Res and CBECC) to model single family and multifamily prototypes, respectively. High performance windows were modeled with a low U-factor consistent with triple pane glazing and compared to a code baseline U-factor for new construction as well as replacement windows typically installed in existing buildings.
0021	Bi-directional EV Charging - Residential	The team developed hourly load (charge/discharge) models in Excel using data-supported assumptions about typical driving and charging patterns for California EV drivers. The models accounted for minor improvements in efficiency (reduced losses) while charging, as compared to single-direction AC chargers commonly installed today. The team then modeled discharge/export events during periods of high wholesale electricity cost throughout the year, representing the demand-response value of bi-directional chargers.
0068	AC must be HP	The team used CBECC-Res to model baseline and proposed cases in an existing single-family homes protype. Baseline models assumed HVAC change out with code-compliant, mixed fuel systems (AC with gas furnace). Proposed models assumed the existing gas furnace was retained or replaced and configured to provide only backup/supplemental heat during the coldest hours of the year, using the heat pump to meet most of the annual heating load.

Idea #	Idea Name	UEI methods and sources
0077	Bi-directional EV Charging - Fleet	The team developed hourly load (charge/discharge) models in Excel using data-supported assumptions about managed fleets of medium and heavy duty EVs such as school buses and garbage trucks. The team then modeled discharge/export events during periods of high wholesale electricity cost throughout the year, representing the demand-response value of bi-directional chargers.
0078	Efficient Heat Pump Water Heaters for Multifamily	The team used CBECC 2022 Title 24 software and a CBECC multifamily prototype building to estimate hourly and annual energy consumption for baseline and proposed water heating systems. Two baseline models were developed -- one representing a central gas boiler and another representing a minimally compliant central HPWH system with conventional refrigerant, both configured with a recirculation loop. Proposed designs included a high efficiency, low-GWP (CO2) central heat pump water heater with a recirculation loop, as well as several 80-gallon unitary HPWHs configured in a clustered design (each serving 3 apartments) without the need for recirculation. In addition to modeling the energy savings from efficiency and emissions reductions from efficiency/fuel switching, the team used the Avoided Cost Calculator Refrigerant Calculator to estimate the avoided cost impact of transitioning from conventional to low-GWP refrigerant in the central heat pump water heater.
0080	Smart Electric Panels	The team used NREL residential load shapes to develop an hourly model in Excel reflecting typical annual electricity use for existing single-family homes in California. This baseline model was then updated to include minor whole-home energy savings from increased awareness and control enabled by smart panels. The team then modeled several demand reduction events throughout the year, reflecting the ability for users to program a smart panel to shed non-critical loads during peak events.
0081	Heat Pump Integrated Continuous Mechanical Ventilation	The team developed a baseline model using a modified multifamily new construction CBECC prototype in CBECC 2022 compliance software. The baseline model included a standalone balanced ventilation system (per code updates proposed for Title 24 2025) and separate PTHP with supplemental resistance heat. The proposed design model included an All-in-One (AIO) heat pump heating and cooling system with balanced ventilation and integrated ERV.

Idea #	Idea Name	UEI methods and sources
0085	Combined Heat Pump Cooling-Heating-Water Heating	The team used CBECC-RES 2022 Title 24 software along with post-processing of the hourly energy uses based on heating, cooling, and domestic hot water needs each hour. Baseline models included separate mixed-fuel and/or heat-pump water heating and HVAC systems typical of code-compliant new construction and equipment change out in California single family homes. Data was post-processed to reflect efficiencies achieved by combi units during periods of simultaneous water heating and space cooling demand. The percentage reduction applied was based on a review of existing studies for currently available combined heat pump products.
0097	Portable/Window Heat Pumps	The team used CBECC-Res and CBECC 2022 single-family and multi-family prototypes to build baseline models, which were modified to represent existing single family and multifamily building envelope features. Baseline conditioning systems included window ACs with electric resistance space heaters, window ACs with wall furnace (gas) heating, and portable ACs combined with the same two baseline heating sources. The proposed design models included window heat pumps and portable heat pumps to provide both heating and cooling. Both baseline and proposed conditions were modeled using federal minimum CEER values for window ACs, window HPs, portable ACs, and portable HPs.
0105	Efficient Streetlights	The methodology to determine unit energy impacts is the difference in lighting wattages multiplied for each hour of operation. Specifically, typical baseline (high-intensity discharge or older light emitting diode – LED) with high efficacy LED replacements total fixture wattages from the CPUC approved Modified Lighting Calculator were used with sunrise and sunset times from the National Ocean & Atmospheric Administration. Streetlighting controls were conservatively estimated to dim between 20-40% during the 2-5AM time.
0107	Induction Cooktops	The team used annual gas and electricity consumption estimates for natural gas cooktops, electric resistance cooktops, and electric resistance cooktops from a recently published study comparing energy consumption for these three cooking technologies.[5] The team then used ERPI Residential Building Stock

[5] *Residential Cooktop Performance and Energy Comparison Study*. Prepared by Frontier Energy for Sacramento Municipal Utility District. Frontier Energy Report #501318071-R0. July 2019.

Idea #	Idea Name	UEI methods and sources
		Assessment Load Shapes to develop an hourly Excel model for electric resistance cooktops and induction cooktops, while natural gas consumption was modeled on a monthly basis. The team did not attempt to account for reductions in cooling load or increased heating load from replacing a gas cooktop with induction.
0116	Efficient Rooftop Units	The team used EnergyPlus engine building simulations built with CBECC 2022 Title 24 software to evaluate a retail building with single zone packaged units. The efficiency of the unit was modified in CBECC, accounting for heat recovery ventilation, increased fan speed controls, higher rated efficiencies for heating and cooling, and improved economizer control and performance. Both mixed-fuel and heat pump RTUs were included in the baseline and proposed design models.
0120	Luminaire Level Lighting Controls	DOE2.2 engine building simulation models with eQUEST was the basis for the analysis. 2016 and 2022 Title 24 lighting power densities depending on an accelerated retrofit or normal/new construction application were used to determine the hourly lighting profiles. Hourly lighting and HVAC end use simulation results with a Pacific Northwest National Lab report was used to establish the unit energy savings based on building square foot.
0149	Modernizing Building Automation Systems	The team estimated the average savings from full retrofit of controls hardware and implementation of the ASHRAE Guideline 36 controls on variable air volume (VAV) air-handlers. The team started with a literature review of estimated savings and then developed CBECC models of an existing medium sized office building and a new one to which the percent savings were applied to the heating, ventilation fans, and cooling energy hourly output from the models to estimate savings potential in climate zones CZ07, CZ10, and CZ12.
0157	Single Pane Retrofit	The team used EnergyPlus engine building simulations built with CBECC 2022 Title 24 software to evaluate a set of building thermal performance assumptions for existing buildings with single pane windows to new replacement options, including: a. new windows meeting minimum Title 24 requirements, and b. Vacuum Insulated Glass (VIG) windows exceeding minimum U-factor requirements. Annual simulations were run using the CBECC medium office prototype, which was modified to represent the thermal and solar performance of tinted single-pane windows commonly found in existing California office buildings.

Idea #	Idea Name	UEI methods and sources
0165	Foodservice Decarbonization	To estimate the savings from foodservice water heating, the team used CBECC-2022 for modeling the annual energy savings resulting from switching from a natural gas water heater to a HPWH for commercial kitchens. The small restaurant prototype model was run in with standard default Title 24 compliant natural gas water heater as the baseline and a standard efficiency HPWH was modeled as the proposed replacement. For gas cooking equipment, the team investigated fuel switching using the nameplate ratings for both natural gas and electric commercial combi oven, fryer, griddle, charbroiler, and a burner range top using CBECC-2022 and the small restaurant prototype model. The electric case assumed less heat gain into the space compared to the baseline with natural gas cooking equipment.
0171	Residential Variable Speed Heat Pump	The team used a CBECC-Res 2022 single family prototype to develop a baseline new construction model, and a modified version of the prototype to represent existing single-family homes. The baseline models included a mixed-fuel central HVAC, and a standard central HP HVAC, both meeting minimum Title 24 efficiency requirements. The proposed system for both new construction and replacement was a high-efficiency heat pump with variable speed fan and variable capacity compressor.
0193	Building Performance Standards Accelerator	The team used load shape ratios from NREL's ComStock database for medium office prototype, and applied EIA commercial building monthly energy consumption estimates to develop an 8760 hourly model in Excel. The team then referenced existing BPS policies and reports to estimate annual savings and assigned a conservative 20% reduction in whole building energy consumption to quantify hourly impacts for successful implementation of BPS policies in California commercial buildings.
0194	Residential Heat Pump Water Heater	The team used the CBECC-Res single family prototype to develop the baseline model, which was modeled in CBECC-Res 2022 with an instantaneous gas water heater typical of new construction and replacement products used over the last decade. The team then updated the model to use an 80-gallon HPWH with Title 24 Joint Appendix (JA) 13 enabled load shift capabilities, representing the proposed design.

Market adoption model

CalMTA developed preliminary baseline and total market adoption estimates based on readily available secondary research and a combination of three analysis approaches: Bass modeling; extrapolation of historic trends; and stock turnover modeling. Incremental market adoption for the MT ideas was calculated as the difference between total and baseline market adoption estimates.

The team used the following methods to develop market adoption estimates:

- Market saturation estimation: market saturation estimates for the existing building/technology stock were developed based on literature review, analysis of public databases, and forecasts developed by participants in mini-Delphi panels, as described below.
    - Literature review: the team developed qualitative insights regarding technology trends and market characteristics using sources such as manufacturer specifications, evaluation reports, academic papers, and past market studies.
    - Analysis of public databases: the team developed quantitative inputs such as population, housing stock, saturation, and cost data using public data bases such as census data, U.S. Energy Information Agency's Commercial Buildings Energy Consumption Survey, Residential Appliance Saturation Survey, U.S. Energy Information Administration (2023). Residential energy consumption survey 2020 (RECS 2020), CEC IEPR forecasts.
    - Mini-Delphi panel: for the Phase I forecasting model, CalMTA used a preliminary, abbreviated approach to estimate baseline market adoption and convened a mini-Delphi panel consisting of two rounds of surveys in which three panel members with general energy efficiency and market expertise provided their forecasts along with key rationale for their estimates. After the first round, panelists were shown all forecasts with an anonymized account of panelists' rationales and were given the opportunity to update their forecasts. CalMTA averaged respondents' second-round forecasts to determine the preliminary baseline market adoption estimates by market segment.
- Market share estimation: the team estimated annual market shares of efficient equipment for the new construction segment, using the same approaches described in the bullet above.
- Bass diffusion model: the Bass Model was used to generate market adoption curves that represent the cumulative adoption of a product over time.[6] The Bass model is based on three

[6] The Bass Model offers a mathematical framework to predict how new technologies spread within a market over time. It considers two key adoption drivers: innovators swayed by external influences, such as marketing, and imitators influenced by positive word-of-mouth from existing adopters. This widely used model in diffusion

model parameters - maximum potential market saturation (m), coefficient of innovation (p) and coefficient of imitation (q).

CalMTA will refine the estimated baseline and total market adoption curves using modeling best practices, and based on additional research, during Phase II: Program Development.

The preliminary baseline (BMA) and total (TMA) market adoption estimates for each MT idea scored in Stage 2 are presented in Table 9 below. Baseline market adoption (BMA) is the counterfactual market adoption likely to occur absent the MTI and related utility-funded interventions.[7] Total market adoption (TMA) is the actual market uptake that occurs over time. The table includes the assumed lifetime of the proposed MTI in Stage 2. In all cases, this is assumed to be 20 years.

Table 9. Estimates of baseline and total market adoption to inform Stage 2 scoring[8]

Idea #	Idea Name	Assumed Lifetime	BMA	TMA	Unit Definition
0010	High Performance Windows	2025-2045	0.7M	2.6M	Housing units
0021	Bi-Directional EV Charging Residential	2025-2045	6.1M	6.8M	# of charger units
0068	AC must be HP	2025-2045	2.4M	4.3M	Heat pump units
0077	Bi-Directional EV Charging - Fleet	2025-2045	1.5K	3.7K	# of charger units - school bus
		2025-2045	2.5K	6.4K	# of charger units - garbage trucks
0080	Smart Electric Panels	2025-2045	316K	1,032K	# of single-family homes
0081	Heat Pump Integrated Continuous Mechanical Ventilation	2025-2045	334	2377	# of multi-family buildings

research helps forecast market penetration for various innovations, including the adoption of energy-efficient technologies.

[7] CalMTA will include previously established savings in the BMA forecast because they would have occurred absent the MTI. Savings associated with collaborative efforts under the umbrella of the MTI, however, will be excluded from the BMA forecast.

[8] The BMA and TMA estimates for #0193 are disaggregated for three sub-periods of the forecast period to highlight the fact that TMA primarily differs from BMA in terms of rate of adoption instead of extent of total adoption.

Idea #	Idea Name	Assumed Lifetime	BMA	TMA	Unit Definition
0085	Combined Heat Pump Cooling-Heating-Water Heating	2025-2045	0.03M	1.22M	Heat pump units
0157	Single Pane Retrofit	2025-2045	108M	257M	Square feet of floorspace
0097	Portable/Window Heat Pumps	2025-2045	3.7M	8.7M	Heat pump units
0105	Efficient Streetlights	2025-2045	0.25M	2.11M	Efficient streetlight fixtures with dimmable controls
0107	Induction Cooktops	2025-2045	3.8M	7.6M	# of cooktops, stoves, and ranges
0116	Efficient Rooftop Units	2025-2045	16.0K	73.1K	# of commercial buildings
0120	Luminaire Level Lighting Controls	2025-2045	91M	348M	Square feet of floorspace, LLLCs with integrated HVAC
0149	Modernizing Building Automation Systems	2025-2045	348M	799M	Square feet of floorspace
0165	Foodservice Decarbonization	2025-2045	61.5K	208.8K	# of electric appliances
			25.4K	55.6K	# of electric water heating units
0171	Residential Variable Speed Heat Pump	2025-2045	2.3M	4.1M	Variable speed heat pump units
0078	Efficient Heat Pump Water Heaters for Multifamily	2025-2045	187	2,369	Heat pump water heater units
0193	Building Performance Standards Accelerator	2025-2030	1,567M	2,608M	Commercial Floor Space (Square feet)
		2031-2035	1,853M	1,444M	
		2036-2045	456M	57M	
0194	Residential Heat Pump Water Heaters	2025-2045	2.9M	5.1M	Heat pump water heater units

MTI cost estimates

To develop the MTI cost estimates, the team first assessed the initiative's market characteristics in terms of sector, viable market segments, and adoption decision types. To develop the MTI cost estimates, the team first assessed the initiative's market characteristics in terms of sector, viable market segments, and adoption decision types. The team next considered the current rate of market adoption and the reasonable adoption rate over the MTI's timeframe based on the known market barriers and opportunities. Then, based on the team's experience designing and implementing MT initiatives in other markets and considering California's market size and policy

drivers, the team estimated the funding that would be needed across multiple possible intervention strategies. For example, if awareness of the product or practice is low, we assessed the types of marketing interventions and dollars that would be needed to build awareness with leverageable partners. Lastly, if first cost is expected to be a significant barrier, the team estimated the incentives that might be needed for supply chain market actors and, separately, for end-use customers.

The total cost estimates were developed from the following components:

- **Consumer incentive costs:** These are the estimated costs of incentives required to influence the market. These cost estimates include incentive dollars that could be upstream facing, consumer facing, or any other mechanism that might be required to motivate market response. These may be incentives provided through the CalMTA or by other entities.
- **Non-consumer-facing incentive costs:** These are incentives directed to supply chain market actors to influence the product, feature set, or regional adoption.
- **Administration/program management costs:** These are CalMTA or program implementer costs, including labor and other direct expenses.
- **Research and evaluation costs:** Costs for the tracking and evaluation of MTI market progress over the life of the MTI, which may include lab testing and test procedure development.
- **Awareness building costs:** Costs related to awareness building or other marketing activities.
- **Other:** This category includes expenses not captured in the above categories like WE&T needs, stakeholder engagement, supply chain engagement, specification development, and advocacy.

The breakdown of estimated costs for each MT idea is provided in Table 10 below. These cost estimates will continue to be refined for ideas advancing to Phase II.

Table 10. Estimate of MTI cost (in millions of dollars)

Idea #	MTI	Customer Incentive Costs	Non Consumer-Facing Incentive Costs	Administration /Program Management	Research & Evaluation	Awareness Building	Other	Total without Customer Incentives	Total including Customer Incentives
0010	High Performance Windows	2.954	3.40	5.415	4.594	7.820	8.309[9]	34.412	37.366
0021	Bi-directional EV Charging - Residential	8.203	2.550	3.426	1.002	4.888	.489	15.438	23.640
0068	AC must be HP	0.0	0.0	.831	.587	0.0	3.421[10]	5.564	5.564
0077	Bi-directional EV Charging - Fleet	10.0	n/a	5.420	6.60	1.50	9.0	27.398	37.398
0078	Efficient Heat Pump Water Heaters for Multifamily	3.0	3.0	2.180	.40	.750	3.750[11]	12.042	15.042
0080	Smart Electric Panels	15.0	n/a	8.190	4.450	2.0	19.50[12]	41.511	56.511
0081	Heat Pump Integrated	3.0	3.0	3.50	5.50	1.0	8.0[13]	24.60	27.60

[9] The "other" costs for Idea 0010 include stakeholder and supply chain engagement.
[10] The "other" costs for Idea 0068 include stakeholder engagement.
[11] The "other" costs for Idea 0078 include stakeholder engagement and WE&T.
[12] The "other" costs for Idea 0080 include product support/assessment, stakeholder and supply chain engagement, and WE&T.
[13] The "other" costs for Idea 0081 include product support, stakeholder and supply chain engagement, and WE&T.

Idea #	MTI	Customer Incentive Costs	Non Consumer-Facing Incentive Costs	Administration /Program Management	Research & Evaluation	Awareness Building	Other	Total without Customer Incentives	Total including Customer Incentives
	Continuous Mechanical Ventilation								
0085	Combined Heat Pump Cooling-Heating-Water Heating	7.50	7.50	8.365	12.625	6.70	7.50	50.219	57.719
0097	Portable/Window Heat Pumps	20.0	18.0	9.643	2.365	3.0	4.849	46.535	66.535
0105	Efficient Streetlights	n/a	n/a	1.330	2.40	1.0	3.250[14]	9.177	9.177
0107	Induction Cooktops	n/a	7.50	3.840	1.40	5.0	5.30	26.496	26.496
0116	Efficient Rooftop Units	15.0	n/a	6.820	5.10	8.50	5.50	32.058	47.058
0120	Luminaire Level Lighting Controls	10.165	5.0	7.993	5.10	4.0	15.70[15]	44.987	55.152
0149	Modernizing Building	5.0	n/a	4.490	6.950	3.0	7.50[16]	25.981	30.981

[14] The "other" costs for Idea 0105 include advocacy efforts and WE&T.
[15] The "other" costs for Idea 0120 include advocacy efforts, stakeholder and supply chain engagement, and WE&T.
[16] The "other" costs for Idea 0149 include stakeholder and supply chain engagement, and WE&T.

Idea #	MTI	Customer Incentive Costs	Non Consumer-Facing Incentive Costs	Administration /Program Management	Research & Evaluation	Awareness Building	Other	Total without Customer Incentives	Total including Customer Incentives
	Automation Systems								
0157	Single Pane Retrofit	20.0	n/a	6.315	2.175	1.0	8.40	23.574	43.574
0165	Foodservice Decarbonization	50.0	10.0	17.119	6.90	2.50	16.50	68.472	118.472
0171	Residential Variable Speed Heat Pump	24.0	20.0	10.980	2.60	2.50	5.80	51.76	75.762
0193	Building Performance Standards Accelerator	n/a	n/a	7.854	10.520	3.50	25.250 [17]	54.193	54.193
0194	Residential Heat Pump Water Heater	n/a	n/a	6.680	1.60	16.0	15.80	46.092	46.092
Total								**640.510**	**834.331**

[17] The "other" cost for Idea 0193 include technical support/tool development, stakeholder engagement, and WE&T.

Incremental measure costs

The team conducted secondary research to develop estimates of incremental costs for each baseline installation condition. We reviewed California eTRM measure packages and other TRMs for information to support cost estimates.[18] In most cases, incremental measure costs were not available for all the combinations of proposed and baseline technology for each installation condition of an MTI in the TRM measure packages. We therefore conducted research into currently available products for the baseline and proposed technologies through a review of retail pricing. We extrapolated the incremental costs in future years by assuming a percentage price decrease for each subsequent year in the life of the MTI, using secondary research findings whenever possible.

Stage 2 scoring outputs

The scoring inputs described above were used to develop the TSB and cost-effectiveness values used as the basis for the Stage 2 scores. These are described below.

PAC & TRC

TRC and PAC are calculated in line with the IOU energy efficiency requirements. Costs and benefits were modified to accommodate a statewide value, with utility-/climate-zone-avoided costs averaged by the share of customers from each of the three largest state IOUs and with average values applied to the remaining portion of California served by other utilities. The TRC test compares the life-cycle benefits that the MTI will deliver to the costs associated with achieving those benefits from the perspective of both the MTI administrator and participant. The PAC test compares the life-cycle benefits that the MTI will deliver to the costs associated with achieving those benefits from the perspective of the MTI administrator. The TRC and PAC values that informed the cost-effectiveness scoring are presented in Table 11.

TSB

TSB is calculated using the savings and load shape of an energy efficiency resource by applying the hourly values for energy, capacity, and GHG compliance costs over the life of the resource, to enable development of the total net system benefits from an MTI. The team disaggregated the total TSB value into its component parts of energy, grid impacts, and GHG impacts. The team also calculated the GHG impacts related to refrigerants for Residential Heat Pump Water Heaters, Combined Heat Pump Cooling-Heating-Water Heating, and Efficient Heat Pump Water Heaters

[18] The California eTRM (www.caetrm.com) is a statewide repository of California's deemed measures, supporting values, and documentation.

for Multifamily.[19] These results were combined with the GHG impacts. Showing the breakdown of TSB into its component parts gave the team insight into the drivers of the TSB value and where the potential benefits are. The TSB values, both the total TSB and the component parts, are provided in Table 11 below.

[19] GHG impact from refrigerants only occurs when refrigerants are added when fuel switching from a natural gas technology to electric. For instance, the baseline for Portable/Window Heat Pumps (Idea 0097) is a portable air conditioning unit. Since both technologies already use low-GWP refrigerants, there is no change in the amount or type of refrigerant from this conversion.

Table 11. TSB and Cost-effectiveness inputs to Stage 2 scoring

Idea #	Idea Name	Total System Benefit ($M)					Cost-Effectiveness	
		Total TSB	Energy	Grid	GHG w/o Refrigerants	GHG Refrigerants	TRC	PAC
0097	Portable/Window Heat Pumps	4,027.9	475.9	1,183.4	2,368.6	n/a	14.11	310.76
0068	AC must be HP	3,716.1	88.1	76.2	3,551.8	n/a	9.35	794.79
0021	Bi-directional EV Charging - Residential	3,368.7	52.9	3,295.6	1,366.7	n/a	2.89	119.13
0194	Residential Heat Pump Water Heater	3,099.3	272.1	-45.4	2,748.1	124.4	2.19	81.48
0085	Combined Heat Pump Cooling-Heating-Water Heating	2,354.1	350.8	618.0	1,199.7	185.6	1.25	60.98
0171	Residential Variable Speed Heat Pump	2,025.3	155.0	458.3	1,412.0	n/a	1.19	32.21
0116	Efficient Rooftop Units	1,715.2	355.1	719.6	640.4	n/a	4.12	61.24
0165	Foodservice Decarbonization	1,492.2	47.5	-547.4	1,992.0	n/a	1.82	15.49
0080	Smart Electric Panels	721.3	39.5	653.7	28.2	n/a	1.07	19.71
0107	Induction Cooktops	690.3	8.4	-382.0	1,063.8	n/a	0.76	35.11
0193	Building Performance Standards Accelerator	566.4	148.1	223.0	195.3	n/a	1.35	12.67
0010	High Performance Windows	442.7	71.2	160.5	211.1	n/a	0.07	27.99
0149	Modernizing Building Automation Systems	384.2	69.4	195.8	119.0	n/a	0.19	13.12
0105	Efficient Streetlights	256.8	114.2	45.8	96.8	n/a	0.80	20.93
0157	Single Pane Retrofit	144.8	23.5	50.6	70.7	n/a	0.46	5.10

Idea #	Idea Name	Total System Benefit ($M)					Cost-Effectiveness	
		Total TSB	Energy	Grid	GHG w/o Refrigerants	GHG Refrigerants	TRC	PAC
0077	Bi-directional EV Charging - Fleet	43.5	0.3	43.3	-0.1	n/a	0.58	1.41
0120	Luminaire Level Lighting Controls	26.4	8.5	12.1	5.8	n/a	0.71	0.71
0078	Efficient Heat Pump Water Heaters for Multifamily	1.1	0.2	0.2	0.5	0.2	0.10	0.09
0081	Heat Pump Integrated Continuous Mechanical Ventilation	25.6	8.8	9.5	7.3	n/a	0.11	1.12

Stage 2 scores

To develop the Stage 2 scores for TSB and Cost-effectiveness, the team converted the values in Table 11 using the scoring rubric in Table 3. The TRC and PAC values were assigned a "yes" if they were 1.0 or greater and a "no" if they were below 1.0. To determine whether the TSB values were high, medium, or low, the team ranked the TSB values within each TSB criterion then assigned a high to values in the top third percentile, a medium to values in the middle, and low to the values in the lowest third percentile.

The scoring rubric for Product Readiness, Non-energy Impacts, ESJ Impacts, and MT Alignment is consistent between Stage 1 and Stage 2. To develop the Stage 2 scores for these criteria, the scoring team reviewed the Stage 1 scores and adjusted them based on additional information or insights that developed during the Stage 2 process, where necessary. However, the majority of scores did not change between Stages 1 and 2. Table 12 describes the three scores that were revised for Stage 2. The explanation for these changes shown in Table 12 is provided below.

Table 12. Score Revisions Between Stage 1 and Stage 2

Idea #	Idea Name	Scoring Category	Scoring Criteria	Stage 1 score	Stage 2 score
0010	High Performance Windows	MT Alignment/Opportunity	Leverage Points	5	3
0105	Streetlight	Equity	Beneficial Impacts to ESJ Communities	4	3
			Partnership Opportunities with ESJ Communities	4	3

High Performance Windows: In Stage 1, the scoring team awarded a high score of "5" for leverage because there were a number of existing activities that CalMTA could align with to support an MTI. These included new construction programs, the ENERGY STAR label, supporting regional programs by Northwest Energy Efficiency Alliance (NEEA), Market Transformation Savings Working Group in Illinois, and Minnesota Efficient Technology Accelerator. There is also an opportunity to leverage retail platforms, as well as product testing already completed by the national labs. However, the team subsequently found out that NEEA was sunsetting their high performance windows efforts. This was an important factor in Stage 1 so the team dropped the Stage 2 score by two points.

Streetlights: The scoring team originally scored both the equity criteria as a "4" because the submitter positioned the initiative to focus on legislation to support the purchase of the streetlight assets by the municipality (or municipalization). Owning the streetlights reduces the cost to municipalities relative to utility ownership. In addition, there is a revenue opportunity when the

municipality leases space on the pole to other utilities (such as cable providers). This cost savings and revenue generation can be leveraged by the municipality to support programs that support disadvantaged communities (DACs). However, during the development of the Stage 2 scores, the team determined that the best approach is to focus the MT idea on streetlight efficiency rather than municipalization in order to broaden the potential tactics employed by an initiative. This change reduced the equity scores to "3."

The Stage 2 scores for the 19 ideas that advanced to Stage 2 scoring are presented in Table 13 below.

Table 13. Stage 2 scores

Idea #	Idea Name	Stage 2 Score	Total System Benefit			Commercial Readiness	MTI Cost & Cost-effectiveness		Equity (HTR/DAC Impacts)		Non-energy Benefits	MT Alignment/ Opportunity		
			Energy Savings	Grid Benefits	GHG Impacts	Readiness	TRC	PAC	Beneficial Impacts to ESJ Communities	Partnership Opportunities with ESJ Communities	Non-energy Benefits	Innovation Characteristics	Leverage Points	Sustained Benefits
0010	High Performance Windows	7.02	Med.	Med.	Med.	High	No	Yes	3	3	5	4	3	5
0021	Bi-Directional EV Charging - Residential	7.21	Med.	High	Low	High	Yes	Yes	2	2	5	4	4	4
0068	AC must be HP	7.00	Med.	Med.	High	High	Yes	Yes	2	2	4	4	3	4
0077	Bi-Directional EV Charging - Fleet	4.83	Low	Low	Low	Med.	No	Yes	2	2	4	4	3	4
0078	Efficient Heat Pump Water Heaters for Multifamily	4.63	Low	Low	Low	High	No	No	3	3	2	2	3	5
0080	Smart Electric Panels	6.11	Low	High	Low	High	Yes	Yes	2	2	4	4	3	3
0081	Heat Pump Integrated Continuous Mechanical Ventilation	5.23	Low	Low	Low	Med.	No	Yes	4	3	4	4	3	3

Idea #	Idea Name	Stage 2 Score	Total System Benefit			Commercial Readiness	MTI Cost & Cost-effectiveness		Equity (HTR/DAC Impacts)		Non-energy Benefits	MT Alignment/ Opportunity		
			Energy Savings	Grid Benefits	GHG Impacts	Readiness	TRC	PAC	Beneficial Impacts to ESJ Communities	Partnership Opportunities with ESJ Communities	Non-energy Benefits	Innovation Characteristics	Leverage Points	Sustained Benefits
0085	Combined Heat Pump Cooling-Heating-Water Heating	8.11	High	High	High	High	Yes	Yes	2	3	5	3	4	4
0097	Portable/ Window Heat Pumps	9.28	High	High	High	High	Yes	Yes	4	5	4	5	5	4
0105	Efficient Streetlights	6.92	Med.	Med.	Med.	High	No	Yes	3	3	4	4	4	4
0107	Induction Cooktops	6.79	Low	Low	Med.	High	No	Yes	3	3	4	4	5	4
0116	Efficient Rooftop Units	7.39	High	High	Med.	Med.	Yes	Yes	3	3	3	4	4	5
0120	Luminaire Level Lighting Controls	5.49	Low	Low	Low	High	No	No	2	3	4	5	4	4
0149	Modernizing Building Automation Systems	6.02	Med.	Med.	Med.	High	No	Yes	1	1	4	4	3	5
0157	Single Pane Retrofit	6.96	Low	Med.	Low	High	No	Yes	3	3	5	5	4	5

Idea #	Idea Name	Stage 2 Score	Total System Benefit			Commercial Readiness	MTI Cost & Cost-effectiveness		Equity (HTR/DAC Impacts)		Non-energy Benefits	MT Alignment/ Opportunity		
			Energy Savings	Grid Benefits	GHG Impacts	Readiness	TRC	PAC	Beneficial Impacts to ESJ Communities	Partnership Opportunities with ESJ Communities	Non-energy Benefits	Innovation Characteristics	Leverage Points	Sustained Benefits
0165	Foodservice Decarbonization	7.50	Med.	Low	High	High	Yes	Yes	3	3	4	4	4	4
0171	Residential Variable Speed Heat Pump	8.25	High	High	High	High	Yes	Yes	2	2	4	5	4	5
0193	Building Performance Standards Accelerator	7.22	High	Med.	Med.	High	Yes	Yes	2	2	4	2	4	5
0194	Residential Heat Pump Water Heaters	7.36	High	Low	High	High	Yes	Yes	3	4	4	3	3	4

The CalMTA team used the same Excel-based scoring tool used for Stage 1 scoring to calculate weighted scores for each idea and rank them based on the criteria and weightings. The scoring tool ensured that the ideas were scored consistently using the defined criteria. The tool applied weights to the individual criterion score and aggregated them across scoring categories to develop a total weighted score for each idea.

6. Batch 1 & 2 MT ideas

This section describes the selection process for the first batch of MT ideas and provides a description of each idea.

6.1 Batch 1 selection process

The initial batch of MTIs must be approved by the CPUC through a formal Application process before Phase III: Market Deployment can begin.[20] The Application, anticipated to be filed in December 2024, will contain an MTI Plan for each proposed initiative. This MTI Plan is a comprehensive document covering items such as market characteristics, MT theory, implementation plan, metrics, anticipated savings, initiative costs, and MTI evaluation plan. To ensure that CalMTA is able to produce an MTI Plan in the required timeframe, the team identified three ideas that scored highly in Stage 1 and met the following criteria, which will support expedited MTI Plan development:

- Well-defined product, preliminary MT theory, and program logic
- Clear leverage points that are likely to be effective at producing market change
- A clear role for CalMTA
- Any needed research or pilot projects are clear and well understood

To identify these "front runner" MTIs, the team conducted a review of all ideas that were advanced to Stage 2 against the criteria bulleted above and recommended three MTIs for inclusion in Batch 1. Table 14 below describes how these ideas align with the criteria above. As illustrated, one of the three MTIs proposed for inclusion in the first batch did not address all front runner criteria. However, all three ideas possessed strong MT theories, would provide long-term value to California, have a high likelihood of moving to Phase III: Market Development, and offered a compelling rationale for starting Phase II: Program Development activities sooner than other ideas. These three are summarized below and further described in their respective Advancement Plans[21] linked in Appendix E.

[20] Ordering Paragraph 9 of CPUC Decision 19-12-021 calls for an Application to be filed and MTI Plans approved before implementation funding can be released and MTI implementation can begin.

[21] An Advancement Plan outlines the strategies, research, and activities that need to be conducted to determine the viability of a potential MTI. The activities indicated in the Advancement Plans are those that are needed to inform the development of the MTI Plans.

Table 14. Batch 1 "front runner" MTIs

Idea #	MTI Name	Well Defined Product Definition & Target Market	MT Theory	Program Logic	Leverage Points	CalMTA Role	Clear Research Needs
0097	Portable/ Window Heat Pumps	X	X	X	X	X	X
0107	Induction Cooktops & Ranges	X	X	X	X	X	X
0116	Efficient Rooftop Units (ERTUs)		X	X	X	X	X*

**Initial assessment did not identify clear research needs, but subsequent development of the Advancement Plan provided insight into critical path research needed.*

Portable/Window Heat Pumps

Sector(s): Existing single-family and multifamily residential

Portfolio Priorities	
☒	Equity
☐	WE&T
☒	Energy Savings
☐	Grid Benefits
☒	GHG Reductions

Product definition: Portable and window heat pumps (aka micro heat pumps) are affordable, self-contained consumer products that provide efficient heating and cooling for small spaces ranging from a single room to a whole apartment. They are similar in shape and size to typical window and portable air conditioning (AC) products – but use inverter technology that allows for variable-speed operations providing more efficient cooling in the summer and heating in the winter.

They can be self-installed, plugged into a 110v outlet, and have a cooling capacity of up to 18,000 BTUs. CalMTA will promote units that can still provide heat when the outdoor air temperature is below 41˚F, include air filtration, use low GWP refrigerants, and incorporate controls to allow the units to be grid-responsive in the future.

Induction Cooktops & Ranges

Sector(s): New & replacement in single-family & multifamily residential

Product definition: Induction cooktops and ranges use electromagnetic induction to heat cookware directly. Unlike traditional gas or electric stoves, which heat the burner, and the burner in turn heats the cookware, induction stoves work by directly heating the cooking vessel. They save energy through instant, direct, and efficient heat transfer, and provide precise temperature control. They do not emit noxious gases that contribute to reduced indoor air quality. Induction cooktops are available on combined stove/oven units, as a cooktop installed in a countertop, or as portable plug-in countertop units.

Portfolio Priorities	
☒	Equity
☐	WE&T
☒	Energy Savings
☐	Grid Benefits
☒	GHG Reductions

Efficient Rooftop Units (ERTUs)

Sector(s): Small & medium existing & new commercial buildings

Product definition: Rooftop units (RTUs) are forced-air systems that package the evaporator, condenser coils, fans, and heating components into a single unit to serve a building's heating, cooling, and ventilation needs. Efficient Rooftop Units (ERTUs) have three main design improvements addressing supply efficiency, heat recovery, and an improved shell, which can deliver 10–40% energy savings beyond today's minimum efficiency RTUs. Greater savings and grid benefits can be achieved through the addition of advanced controls. The energy savings components that enable this system to save energy may include:

Portfolio Priorities	
☒	Equity
☒	WE&T
☒	Energy Savings
☒	Grid Benefits
☒	GHG Reductions

A. Insulated RTU box (to R-12)
B. Low leakage dampers
C. Increased heat pump efficiency
D. Use of energy or heat recovery (E/HRV)

When combined, items A and B deliver a 2-10% energy use reduction compared with the current federal standard. Further efficiency can be achieved if A and B are combined with either C or D, resulting in a 12-40% energy reduction.

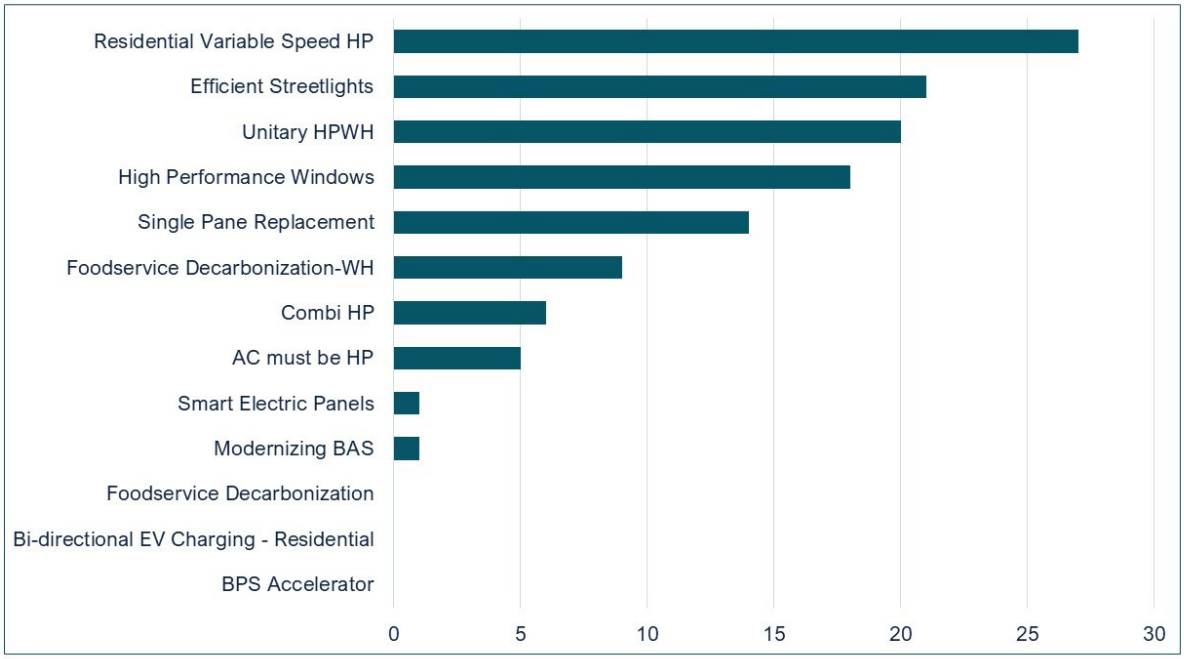
6.2 Batch 2 MT ideas

This section describes the selection process for the second batch of MT ideas and provides a description of each idea.

Batch 2 selection process

CalMTA staff presented the 19 ideas scored in Stage 2 to the MTAB, during a meeting held November 30 to December 1, 2023, to gather input and recommendations for which ideas to prioritize for further development. After each idea was presented and discussed, the MTAB members participated in an exercise to prioritize and rank them.[22] The total score for each idea was calculated by adding the votes for each, where an MTAB member's first ranked idea received five points, the second ranked idea received four points, etc. The final MTAB ranking of ideas is presented below.

Figure 12. MTAB prioritization of MT ideas for further development



[22] The three ideas already identified as Batch 1, induction cooking, portable/window heat pumps, and efficient rooftop units, were not included in this ranking exercise. In addition, the four ideas with the lowest TSB value estimated as part of the Stage 2 scoring were not included in the ranking exercise. These were bidirectional EV charging for fleet, LLLC + HVAC, heat pump integrated mechanical ventilation, and heat pump water heaters for multifamily.

During the discussion of the ideas, the MTAB members recommended that foodservice decarbonization (encompassing both foodservice equipment and water heating) be considered as two separate ideas: one as initially proposed by CalMTA and a second idea that included only foodservice water heating. The MTAB members believed that transforming the market for foodservice water heating had a higher likelihood for success than transforming the market for other foodservice equipment and wanted the option to consider these separately.

Proposed MTI advancement

As a result of the discussion with the MTAB, CalMTA proposed developing four of the top six ideas recommended by the MTAB as Batch 2. Each of these four MT ideas scored well in our Stage 2 scoring process and would broaden the reach of the MT ideas already advanced to Phase II. Although two of these proposed MT ideas had a TRC below 1.0, we believe that it is reasonable to conduct research to further our understanding of potential costs and benefits. In addition, the scopes of two of the MT ideas – Foodservice Water Heating and Single Pane Replacement – had been modified since their TSB and TRC values were initially calculated.[23] The four ideas recommended for Advancement Plan development include:

- Efficient Streetlights
- Residential Heat Pump Water Heating (HPWH)
- Single Pane Replacement (commercial buildings)[24]
- Foodservice Water Heating

CalMTA did not recommend advancing two of the top six MTAB ideas to allow time to understand certain aspects of the ideas. These ideas will remain in contention for future portfolio considerations as the following aspects are investigated:

- **High Performance Windows:** CalMTA wants to better understand the energy savings potential of high-performance windows in the California climate. Specifically, the impact of triple glazing, possible future ENERGY STAR specifications, and the interplay with solar heat gain requirements. In addition, initial TRC calculations were very low for windows. CalMTA recommends more research into current and potential future incremental costs for this measure prior to any significant program development activities.
- **Residential Variable Speed Heat Pump (HP):** The CEC recently proposed updates to 2025 Title 24 that would require heat pumps as the primary heating source for newly constructed single-family homes. CalMTA wants to monitor the progress of this CEC proposal to assess the

[23] The scope modifications were a result of the MTAB recommendation to pursue only the water heating aspect of foodservice decarbonization and the CalMTA staff suggestion to include commercial secondary windows in the single pane replacement MT idea.

[24] The Single Pane Retrofit MT idea was subsequently renamed to Commercial Replacement and Attachment Windows Solutions. It includes both vacuum insulated glass and commercial secondary windows as solutions for single pane windows in commercial buildings.

likelihood of its adoption and how that would change the CalMTA approach to this market or any needs for additional interventions.

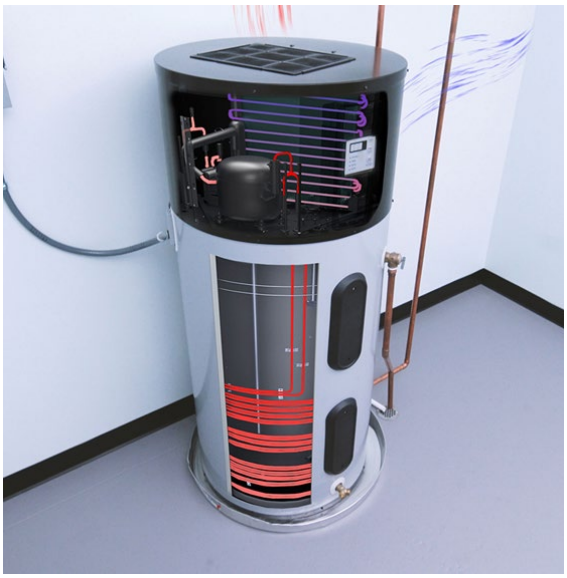
The four Batch 2 MT ideas are described in the sections below and Advancement Plans for those that move to Phase II: Program Development are linked in Appendix E.

Residential Heat Pump Water Heating

Sector(s): Residential single-family, existing, and new construction

Portfolio Priorities	
☒	Equity
☒	WE&T
☒	Energy Savings
☒	Grid Benefits
☒	GHG Reductions

Product definition: Residential Heat Pump Water Heaters (HPWHs) use a compressor-based heating system to extract heat from the air and use it to heat water, making them far more efficient than conventional electric water heaters, gas storage water heaters, and gas tankless water heaters. Since they are all-electric, they also generate significant emissions reductions when replacing gas water heaters.



Nearly all residential HPWH products are "hybrid heat pump" models that also include electric resistance heating elements for backup heating. These heating elements improve recovery times in periods of high demand for hot water, but they draw about 10x the power of the heat pump, so it is important for HPWHs to be sized, installed, and controlled to minimize the use of resistance backup during periods of high demand on the electricity grid.

This MTI will focus on increasing adoption of efficient, demand-flexible HPWHs in the residential replacement market. Products include both 120-volt and 240-volt options, in sizes ranging from 40 to 80 gallons, and must be ENERGY STAR qualified with a Uniform Energy Factor (UEF) of 3.3 and a sound rating below 50db. The MTI will also support products with connectivity and controls that can manage and optimize electricity demand, minimizing the use of backup electric resistance heating during periods of peak demand for electricity. Lastly, the MTI will support sizing and design strategies (such as integrated thermostatic mixing valves) that ensure the water heater can support energy storage and load shifting without posing a risk to consumers.

Foodservice Water Heating

Sector(s): Commercial Foodservice

Product definition: Medium-duty electric commercial water heaters with the ability to meet the unique hot water demand, delivery/recovery rate, and water temperature requirements of the foodservice industry offer significant emissions reductions and energy savings relative to the incumbent gas water heating technology used in most commercial kitchens. This MTI will support adoption of ENERGY STAR-certified, medium-duty commercial electric water heaters that are designed, configured, and controlled to optimize electricity use and allow demand flexibility. Additional opportunities to improve efficiency of electric water heating systems include: 1) integrated multi-function heat pump systems that provide simultaneous space cooling and water heating; and 2) heat recovery systems that capture waste heat from kitchens and dishwashing machines to pre-heat water or reduce overall hot water demand. The final specification may include requirements around sound level, footprint, and the use of low or ultra-low GWP refrigerants.

Portfolio Priorities	
☒	Equity
☒	WE&T
☒	Energy Savings
☐	Grid Benefits
☒	GHG Reductions

Efficient Streetlighting

Sector(s): Municipal

Portfolio Priorities	
☒	Equity
☐	WE&T
☒	Energy Savings
☒	Grid Benefits
☒	GHG Reductions

Product definition: The several ways to reduce streetlight energy consumption include more efficient luminaires and ballasts, design strategies that reduce the lighting intensity (while still ensuring driver and pedestrian safety), and advanced control strategies that allow lights to be dimmed or turned off in response to various inputs. This MTI will focus on LED streetlights with high (90+) Color Rendering Index (CRI) with dimming controls and automatic and/or controllable, regulation of light based on time, schedules, human presence, traffic, and/or weather. It will also support design and management practices that are tailored to the needs of local communities, enabling further energy and cost savings.

Single-Pane Retrofit

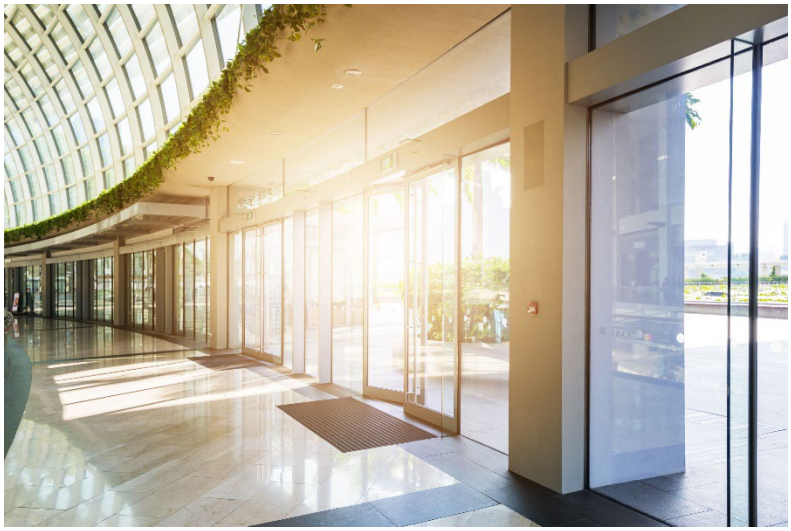
Sector(s): Commercial

Product definition: Single-Pane Replacement (SPR) utilizes the unique properties of vacuum-insulated glass (VIG) to increase uptake and investment in commercial retrofits, especially for buildings with single-pane glass. SPR involves the use of ultra-high-performance VIG with a nominal thickness of ¼" to ½" and an insulating R-Value of R-10 to R-15. VIG replaces a ¼" single pane glass (typical R-1) in existing commercial frames and improves thermal performance of the glass by a factor of 5-10x.

Portfolio Priorities	
☒	Equity
☒	WE&T
☒	Energy Savings
☒	Grid Benefits
☒	GHG Reductions

To reach these efficiency levels, VIG manufacturing replaces the gas layer in a typical dual pane insulated glass unit with a thin vacuum layer. It replaces traditional rubber spacers and seals around the edges of the glass with miniature, 250-micron tall pillars distributed across the center of the glass to maintain the glass spacing, and a glass hermetic seal around the edges to maintain the vacuum. VIG creates a thermal barrier between the outside and inside air of a building and there is no convection between the glass panes as the vacuum displaces the air/gas which is required for convection to occur. Conduction exists at each pillar and the perimeter seal; however, performance is enhanced by as much as 500% over double pane insulating glass with one-third the thickness.

SPR with the VIG solution provides fuel neutral savings and reduces HVAC load by as much as 40% in heating driven climates and 20% in cooling driven climates. The reduced load then provides an easier pathway for commercial building owners to convert from conventional HVAC systems to heat pump systems at reduced electrical load.



Alternatives to replacing existing glass with VIG include Commercial Secondary Windows (CSW). CSWs attach to the interior or exterior of the existing window, creating an additional insulating layer and offering options for solar control via low-E films. CSWs are available as single pane and double pane attachments. CSWs provide a lower level of thermal improvement compared to VIG replacements, but still significantly reduce HVAC load, are a more mature technology, less expensive and, like VIG replacements, can be installed without opening the façade or disrupting occupants.

7. MTAB & stakeholder feedback

A primary responsibility of MTAB is to "provide feedback and recommendations to pursue, modify, or reject each potential MTI brought forward by the MTA."[25] In this case, MTAB members provided verbal feedback during regular meetings and presentations on the Stage 1 Disposition Report material as well as written feedback on the final draft of the report. The MTAB members also provided written feedback on the final draft of this Phase I Disposition Report. These comments and the CalMTA team's response on how the comments were addressed is presented in Appendix F.

MTAB members and stakeholders also provided comments on the Advancement Plans for the initial three Batch 1 ideas identified for expedited MTI Plan development. The three Batch 1 ideas were presented to the MTAB in a meeting held on October 13, 2023, and then Advancement Plans were posted for public comment on the CPUC public document area (PDA) website from December 6-20, 2023. The comment response memo and comment summary with CalMTA responses to the feedback received are summarized in the January 25, 2024 MTAB packet and available on the PDA site. Advancement Plans for the Batch 2 ideas will be released for comment by MTAB and stakeholders in June and July of 2024. The final Phase I Disposition report will be updated to include those links and information about the comments received from MTAB members and CalMTA's response.

About CalMTA

CalMTA is a program of the California Public Utilities Commission and is administered by Resource Innovations. We work to deliver cost-effective energy efficiency and decarbonization benefits to Californians through a unique approach called market transformation. Market transformation is the strategic process of intervening in a market to create lasting change by removing market barriers or exploiting opportunities, accelerating the adoption of identified technologies or practices. CalMTA-developed market transformation initiatives (MTIs) also aim to advance state goals on demand flexibility, workforce development and equity. Learn more at www.calmta.org.

[25] CPUC D. 19-12-021, pp. 119

Appendix A: Ranked List of Ideas Scored in Stage 1

This appendix contains a rank-ordered list of all the ideas submitted and scored in Stage 1. Ideas that did not meet the threshold requirements to advance to Stage 1 scoring are included in Appendix C.

The rank-order list includes a description of the submitted idea as well as the status of the idea in the scoring process and clarifying notes. They are grouped in bins by score and ideas that were submitted by CalMTA are indicated by an asterisk in the Idea Name. Ideas with the status "Stage 2 Scoring Review" are those ideas that CalMTA advanced to Stage 2 scoring.

Ideas that CalMTA does not recommend advancing to Stage 2 scoring at this time are in the status "Archive/Stage 1." The "Status Notes" field includes a short explanation/rationale for which categories were the primary reason for the idea not scoring high enough in Stage 1 scoring to moving forward at this time. For more details on the scoring rubric and guidance, see Appendix B. CalMTA will monitor the market and other conditions and may advance archived MTI ideas in the future.

As described in the body of this report, when ideas were duplicative or complementary in nature, they were combined and scored together. In these cases, the status indicates "Combined" and the notes indicate which ideas were combined. Lastly, ideas with the status "Stage 1 Research/Refinement" are submissions that CalMTA was able to score in Stage 1 but did not contain enough information to fully understand the market or market transformation theory to move to Stage 2. CalMTA will conduct light research in the first half of 2024 to resolve any outstanding areas of uncertainty and will rescore these ideas along with the new submissions received in the next RFI.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
Ideas with Stage 1 scores between 8.0 & 8.9					
1	0157	Singe Pane Retrofit	Single Pane Retrofit replaces inefficient glass with an ultra-high-performance vacuum insulating glass (VIG) which virtually eliminates both conductive and convective heat transform as well as reduced radiant heat transfer when combined with low-e coatings.	Stage 2 Scoring Review	Advanced to Stage 2
1	0079	Vacuum Insulated Glass (VIG)*	Vacuum insulated glass uses a vacuum layer between two panes of glass which virtually eliminates both conductive and convective heat transfer as well as reduces radiant heat transfer when combined with low-e coatings resulting in energy savings.	Combined	Linked with IDEA-0157 in Stage 2 Scoring Review
2	0097	Portable Heat Pumps for heating and cooling for tenants	Portable Heat Pumps offer the convenience and low cost of portable air conditioners while offering the dual function of space heating and cooling. They are more efficient than space heaters and cost less to install and operate than a ducted HVAC system.	Stage 2 Scoring Review	Advanced to Stage 2

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
2	0125	Cold climate window and portable heat pumps with condensate evaporation	Cold climate window and portable heat pumps with condensate evaporation proposes portable and window heat pumps with variable-speed compressors which are inherently more efficient than single- or two-speed compressors and provide the capability to maintain heating capacity to 5˚F.	Combined	Linked with IDEA-0097 in Stage 2 Scoring Review
2	0086	Micro Heat Pumps*	Micro heat pumps are small, portable heat pumps that offer heating and cooling. They are more efficient than space heaters and cost less to install and operate than a ducted HVAC system.	Combined	Linked with IDEA-0097 in Stage 2 Scoring Review
3	0021	Bi-Directional EV Charging Residential*	Bi-directional electric vehicle level 2 or 3 EVSE (chargers) allow power to flow from the EV battery to the home or grid in response to a grid demand or price signal resulting in reduced peak demand.	Stage 2 Scoring Review	Advanced to Stage 2

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
3	0175	EVSE Standards Roadmap	EVSE Standards Roadmap would develop plan for EVSE adoption by performing a market characterization study to establish current practices and better understand barriers to establishing California state energy efficiency and flexible demand appliance standards and identify which technologies should be adopted to ease the transition from traditional fossil fuel vehicles to battery electric vehicles and the corresponding impact to the electric grid.	Combined	Linked with IDEA-0021 in Stage 2 Scoring Review
4	0085	Combined Heat Pump Cooling-Heating-Water Heating-Thermal Storage*	A Combined Heat Pump is a product that integrates water heating, space heating, and space cooling into one combined, three-function heat pump system. These systems can also store some amount of thermal energy for use at a later time.	Stage 2 Scoring Review	Advanced to Stage 2
4	0126	Combi Heat Pump	Combi Heat Pump is an integrated Heat Pump system designed to provide space cooling, space heating, and water heating.	Combined	Linked with IDEA-0085 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
5	0010	High Performance Windows*	High performance windows are windows that outperform code efficient windows by ~20% or more through the use of two or more panes of glass and /or the use of gases such as krypton or argon.	Stage 2 Scoring Review	Advanced to Stage 2
5	0109	High Performance Windows	High performance windows are defined as a product that achieves a .22 U-factor or less. The primary product currently meeting this efficiency level is a thin triple-pane window.	Combined	Linked with IDEA-0010 in Stage 2 Scoring Review
6	0171	Residential Variable Speed Heat Pump	Variable-speed heat pumps precisely control the compressor and fan motor in an HVAC system which results in energy savings by controlling the output directly by changing the speed or torque of the motor as needed.	Stage 2 Scoring Review	Advanced to Stage 2
6	0037	Cold Climate Heat Pumps*	Cold climate heat pumps are heat pumps with variable-speed compressors which are inherently more efficient than single- or two-speed compressors and provide the capability to maintain heating capacity to 5˚F.	Combined	Linked with IDEA-0171 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
Ideas with Stage 1 scores between 7.0 & 7.9					
7	0107	Induction Cooktops*	Induction cooktops work by generating a magnetic field at the surface of the cooktop increasing the efficiency and speed of cooking while reducing heat lost to space conditioning. Over 85% of the energy consumed by an induction hob is transferred to the cooking vessel while an electric resistance hob is roughly 70% efficient and a gas hob is 30% efficient.	Stage 2 Scoring Review	Advanced to Stage 2
7	0115	Leveraging ESRPP for Equity in Consumer Products in Retail	The ENERGY STAR Retail Products Platform (ESRPP) partners with the Environmental Protection Agency (EPA) ENERGY STAR program, utility organizations and large retailers utilizing mid-stream incentives to influence retail buyer's purchase decisions while collecting full category sales data with a focus on disadvantaged communities.	Combined	Linked with IDEA-0107 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
8	0194	Heat Pump Water Heater Parent Idea	Parent idea for multiple HPWH submissions. HPWHs have a uniform energy factor (UEF), the measure of its energy efficiency, of 3.0 while gas water heaters have a UEF between 0.50-0.98.	Stage 2 Scoring Review	Advanced to Stage 2
8	0180	Deployment of Retrofit-Ready 120V Heat Pump Water Heaters	Deployment of Retrofit-Ready 120V HPWHs would incentivize contractors to keep 120V HPWHs on their truck and educate contractors on the strengths and weaknesses of the technology.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review
8	0177	HPWH Rapid Installer Expansion TFP	HPWH Rapid Installer Expansion TFP would train installers to make them more familiar with the product by offering a focused certification program that will use ESMAC+ (Energy Star Manufacturer Action Council) training, virtual gathering meetings, manufacturer virtual universities, and in-person learning about HPWH benefits and installation how-tos.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
8	0148	Market connections for the new plug-in HPWH	Market connections for the new plug-in HPWH proposes accelerating the adoption of 120-volt plug in HPWH which circumvent costly electrical panel and infrastructure upgrades generally required when installing a standard 240-volt HPWH.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review
8	0153	Eco-Tech Apprenticeship: HPWH Experts for CA's Sustainable Future	Eco-Tech Apprenticeship: HPWH Experts for CA's Sustainable Future would standardize training for heat pump water heating technology across the trades and to integrate this technology and skill set into colleges, trade schools, union training halls, and contractor organizations across California for both residential and commercial applications.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review
8	0145	HPWH Exterior Enclosure	HPWH Exterior Enclosure reduces the sound from HPWH and ensures proper airflow around a HPWH that has been installed in an external location due to space limitations within the residence.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
8	0132	Gas Water Heater Buyback Program + Solar Water Heater 2.0	Gas Water Heater Buyback Program + Solar Water Heater 2.0 would buy back gas water heaters and replace the gas water heaters with heat pump water heaters or passive solar water heaters resulting in energy savings and emission reductions.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review
8	0136	HPWH Installation Certification	HPWH Installation Certification would certify contractors to install HPWHs while providing incentives and financing to customers and develop workforce training.	Combined	Linked with IDEA-0194 in Stage 2 Scoring Review
9	0154	Hydronic Heating Supply	Hydronic Heating Supply is a self-contained unit that converts a building's hydronic heating supply by using a proportional control valve and double-wall heat exchanger to provide on-demand domestic hot water for the ultimate in water and energy savings in multifamily, hospitality, assisted-living centers, and healthcare patient towers.	Stage 1 Research/Refinement	Hold for Further Development

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
10	0193	Building Performance Standards Accelerator MTI	Building Performance Standards (BPS) Accelerator MTI would encourage cities to adopt BPS policies which target existing building stock and improve efficiencies either through a prescriptive design or an energy use intensity benchmark.	Stage 2 Scoring Review	Advanced to Stage 2
11	0068	AC must be HP*	AC Must Be HP is a future-state in which consumers can no longer purchase a product that is only air conditioning.	Stage 2 Scoring Review	Advanced to Stage 2
12	0105	Streetlight Municipalization Legislation	Streetlight Municipalization Legislation proposes municipalities acquire ownership of the streetlights in California from the IOUs and upgrade them to efficient LED technology as well as install dimming and occupancy capabilities.	Stage 2 Scoring Review	Advanced to Stage 2
12	0158	Regional Lighting Assessment Tool	The Regional Lighting Assessment Tool is designed to improve outdated and inefficient CAD-based municipal roadway lighting design processes by using a combination of field measurements and lighting product information.	Combined	Linked with IDEA-0105 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
13	0111	Efficient Fans Leveraging FEI	Efficient Fans Leveraging FEI would require adopting the fan energy index (FEI) rating as the key energy metric for fans in state codes.	Stage 1 Research/Refinement	Hold for Further Development
14	0165	Foodservice Decarbonization	Foodservice decarbonization focuses on electrifying the most common pieces of cooking equipment that have historically been fueled by natural gas including combination ovens, friers, griddles, charbroilers, and 6-burner ranges as well as water heating. Electric cooking equipment offers direct energy savings due to more energy going into the cooking and less energy lost to space conditioning as well as greatly increases indoor air quality.	Stage 2 Scoring Review	Advanced to Stage 2
14	0174	Induction Cooktop Training Partnership	Induction Cooktop Training Partnership would increase exposure to the many benefits of induction cooktops in order to increase their acceptance and uptake in commercial kitchens. The purpose is to overcome bias through education.	Combined	Linked with IDEA-0165 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
14	0183	Elevating Underserved Foodservice: Community-Centered Tech Transformation	Elevating Underserved Foodservice: Community-Centered Tech Transformation would focus on tailoring technology to energy requirements, operational demands, and cultural nuances of ethnically specific independently owned small restaurants in disadvantaged communities.	Combined	Linked with IDEA-0165 in Stage 2 Scoring Review
15	0022	Smart Home*	Smart home technology enables automation of certain appliances for increased capabilities, security, comfort, and convenience including products such as thermostats, lighting, refrigerators, and cooking appliances. In addition, these appliances can be connected to an overarching smart home energy management system which allows the customer to monitor their energy usage and make changes based on usage patterns.	Stage 1 Research/Refinement	Hold for Further Development

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
16	0188	Reflective Insulation for Windows	Reflective Insulation for Windows is designed to keep building interiors cool without interfering with the occupants' views by blocking infrared light reducing solar heat gain by 50% in turn reducing summer cooling load.	Stage 1 Research/Refinement	Hold for Further Development
17	0106	High-Efficiency Factory-Built Homes	High-efficiency factory-built homes are homes that exceed ENERGY STAR certification criteria and are fully electric with low impact on the grid.	Stage 1 Research/Refinement	Hold for Further Development
17	0182	High Efficiency Electric Manufactured Housing Specifications and Factory Design	High Efficiency Electric Manufactured Housing Specifications and Factory Design is high efficiency, solar enabled, all electric manufactured housing which can be used to build new decarbonized affordable housing in California and replace existing mobile and manufactured homes that cannot cost effectively or feasibly be retrofitted.	Combined	Linked with IDEA-0106 in Stage 1.5 Research/Refinement

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
18	0078	Efficient HPWHs for Multifamily*	Efficient HPWHs focus on increased performance and emission reductions from central water heating systems. HPWHs have a uniform energy factor (UEF), the measure of its energy efficiency, of 3.0 while gas water heaters have a UEF between 0.50-0.98.	Stage 2 Scoring Review	Advanced to Stage 2
18	0179	Load flexibility controls of HPWH systems	Load flexibility controls of HPWH systems uses advanced controllers to control the flow router and manage water flow between water heaters and storage equipment. The technology also schedules and controls HPWH system operation according to grid control signals, such as time-varying electricity price, carbon intensity, and demand response signals to minimize energy costs, greenhouse gas emission, and peak electricity consumption.	Combined	Linked with IDEA-0078 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
18	0113	Central HPWH for MF - Skid Mount or complete Kit solutions	Central HPWH for MF - Skid Mount or complete Kit solutions heat and store water in a central location using a recirculation loop to distribute hot water using a packaged system approach also known as a plug and play solution that can be shipped and installed as a complete solution.	Combined	Linked with IDEA-0078 in Stage 2 Scoring Review
18	0108	Ultra-Low GWP Central Heat Pump Water Heaters (CHPWH) Skid Packaged Systems with TES	Ultra-Low GWP CHPWH Skid Packaged Systems with TES is a skid packaged CHPWH system that utilizes CO2 refrigerants, unpressurized storage, and phase change materials (PCMs) to enhance energy density and deliver superior performance compared to conventional CHPWH systems.	Combined	Linked with IDEA-0078 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
19	0149	Modernizing building automation system hardware to use standardized controls	Modernizing building automation system (BAS) hardware to use standardized controls proposes upgrading BAS systems in large commercial buildings (>50,000 SF) while adhering to ASHRAE Guideline 36-2021 (G36) which explicitly describes best practice controls sequences in a standardized way and has demonstrated very substantial energy savings and other benefits compared to typical existing controls in buildings.	Stage 2 Scoring Review	Advanced to Stage 2
Ideas with Stage 1 scores between 6.0 & 6.9					
20	0110	Smart Pumps	Smart pumps and circulators are a packaged pumping solution that combines a pump, motor, drive, and integrated controls into one product and is an example of highly efficient pumps and circulators.	Stage 1 Research/Refinement	Hold for Further Development

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
20	0147	IE5 Motor with Integrated Variable Speed Drive for Water Pumping	IE5 Motor with Integrated Variable Speed Drive for Water Pumping is a permanent magnet motor with an efficiency rating of Ultra-Premium Efficiency (IE5) combined with an integrated variable speed drive (VFD) for industrial water pumping applications, including pressure boosting, raw water feed, boiler feed, and cooling tower water circulation. A motor and VFD combination allow for customization of operating speeds to account for fluctuation in demand.	Combined	Linked with IDEA-0110 in Stage 1.5 Research/Refinement
20	0034	XMP PUMPS*	XMP Pumps refers to the development of a commercial and industrial program targeted at improving regional practices in mechanical systems for commercial and industrial sectors including municipalities and agriculture. XMP provides a method to provide incentives, market awareness, stability signals, end user facing materials, program development facing materials, and assist in building a regional knowledgebase.	Combined	Linked with IDEA-0110 in Stage 1.5 Research/Refinement

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
21	0116	ERTUs	Roof Top Units (RTU) are forced-air systems that package the evaporator, condenser coils, fans, and heating components into a single unit to serve a building's heating, cooling, and ventilation needs. Design improvements addressing supply efficiency, heat recovery, and an improved shell can deliver 10-40% above today's minimum efficiency RTUs while even greater savings and grid benefits can be achieved through the addition of advanced control strategies.	Stage 2 Scoring Review	Advanced to Stage 2
21	0184	Advancing Smarter HVAC Controls in Small-to-Medium Commercial Buildings	Advancing Smarter HVAC Controls in Small-to-Medium Commercial Buildings is a group of more than 20 product offerings including networked thermostatic control, advanced RTU control, and light commercial building automation systems (BAS) which provide customers with the ability to control their HVAC as well as participate in demand response.	Combined	Linked with IDEA-0116 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
21	0166	Unitary Packaged Heat Pump Systems for Light Commercial Applications TFP	Unitary Packaged Heat Pump Systems for Light Commercial Applications TFP proposes a study to determine the reason behind low market adoption rates of Packaged Unitary Air Source Heat Pump (ASHP) systems in the state of California.	Combined	Linked with IDEA-0116 in Stage 2 Scoring Review
21	0163	Enable HVAC QI/QM by Introducing a Universal HVAC Interface	Enable HVAC QI/QM by Introducing a Universal HVAC Interface would establish a standardized universal physical and software interface that would be mandated for all new HVAC equipment manufactured after a specified date. The interface would report various faults, including but not limited to airflows, refrigerant charge, refrigerant contaminants, CO2 emissions, and other performance indicators such as output, efficiency, and energy consumption.	Combined	Linked with IDEA-0116 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
21	0124	ARC Advanced Rooftop Controls for HVAC	Advanced Rooftop Controls for HVAC is a proposed technology that would install variable frequency drives (VFDs) with proprietary logic controllers on existing HVAC systems. Variable frequency drives control the output directly by changing the speed of the fan motor as needed.	Combined	Linked with IDEA-0116 in Stage 2 Scoring Review
22	0173	Scaling Passive House	Scaling Passive House is performance standard for residential and nonresidential construction and alterations that leans on continuous insulation, high-efficiency fenestration, and dedicated ventilation, among other principles, resulting in ultra energy efficient buildings with capacity to retain heating or cooling and release it steadily and slowly.	Stage 1 Research/Refinement	Hold for Further Development

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
23	0120	Luminaire Level Lighting Controls (LLLC)	Luminaire Level Lighting Controls (LLLC) are lighting control systems that have fixture-level integrated sensors (either at the factory or on-site) and controllers that are wirelessly networked, enabling lighting products within the system to communicate with each other and transmit data. Key features include occupancy sensing, continuous dimming, daylighting, high end trim, and controls persistence.	Stage 2 Scoring Review	Advanced to Stage 2
23	0128	Procure Networked Lighting Controls from Multi-Vendor Teams	Procure Networked Lighting Controls from Multi-Vendor Teams are digitally standardized interchangeable components for network lighting controls. The proposed practice will develop model procurement language with the goal of making digitally standardized multi-vendor NLC systems broadly available in California	Combined	Linked with IDEA-0120 in Stage 2 Scoring Review

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
23	0020	LLLC*	Luminaire level lighting controls are lighting control systems that have sensors and controllers installed that are directly integrated or embedded into the light during the manufacturing process. By adding advanced controls into lighting systems, customers can have greater control over their lighting usage and increase occupant comfort, space utilization, and improve energy use.	Combined	Linked with IDEA-0120 in Stage 2 Scoring Review
24	0112	Adjustable Speed Drives leveraging the Power Index	Adjustable Speed Drives leveraging the Power Index uses the ratio of rated power over baseline power to calculate savings as a result of adding an adjustable speed drive to a motor-driven system.	Stage 1 Research/Refinement	Hold for Further Development
25	0081	Heat Pump Integrated Continuous Mechanical Ventilation*	Heat Pump Integrated Continuous Mechanical Ventilation combines HVAC and ventilation resulting in energy savings by reducing or eliminating the need for an added fan and separate space conditioning unit while also improving IAQ.	Stage 2 Scoring Review	Advanced to Stage 2

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
26	0127	Energy Conditioning Technology	Energy Conditioning Technology is a custom technology solution that optimizes voltage by adding capacitance via a series of capacitors that enables the unit to capture reactive power (KVAR) which is commonly lost and adds it back to the system. It also stabilizes the voltage of the entire system, reduces voltage drop when demand increases, and reduces tripped breakers as a result of low voltage or power spikes.	Archive/Stage 1	The idea scored low on equity relative to other submitted ideas as no ESJ partnerships have been identified and low on MT alignment relative to other submitted ideas due to a lack of leverage points and unclear strategy for sustained benefits.
27	0121	Remote Pump Monitor	Remote Pump Monitor uses various sensors to measure a pump's operational data such as suction pressure, discharge pressure, flow rate and power consumption to provide real-time information to end users. It helps customers monitor their pumping systems and make timely decisions regarding optimizing pumping operations.	Stage 1 Research/Refinement	Hold for Further Development

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
28	0133	Thermal Energy Storage as a Distributed Energy Resource	Thermal Energy Storage as a Distributed Energy Resource proposes using thermal energy storage as a distributed energy resource at commercial sites that traditionally have the highest energy intensities like hospitals, grocery stores, and refrigerated warehouses.	Stage 1 Research/Refinement	Hold for Further Development
29	0118	Very High Efficiency Dedicated Outdoor Air Systems (DOAS)	Very High Efficiency Dedicated Outdoor Air Systems (DOAS) use high efficiency heat recovery combined with a high-performance heat pump as an HVAC system approach which result in significant commercial sector energy savings potential.	Stage 1 Research/Refinement	Hold for Further Development
30	0077	Bi-Directional Level 2 EV Charging - Fleet*	Bi-directional electric vehicle DC EVSE (fast chargers) allow power to flow from the EV battery to the business or grid in response to a grid demand or price signal.	Stage 2 Scoring Review	Advanced to Stage 2

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
31	0080	Smart Electric Panels*	A smart panel is an electric panel with integrated or add-on software controls, generally in the form of relays, that provide a user with additional information and capabilities beyond a traditional panel. Smart panels are capable of shutting down all non-critical loads, communicating circuit-level consumption, facilitating strategic participation in DR programs, limiting whole-home demand by preventing coincident demand from appliances, managing appliances, and enables electrification by allowing addition of loads in excess of rated panel capacity.	Stage 2 Scoring Review	Advanced to Stage 2
32	0100	Hydronic Additive	Hydronic Additive is designed to improve the system efficiency of closed loop water-based HVAC systems including boiler systems, heat pumps, district loops and chilled water systems resulting in water that heats and cools faster and energy savings.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to lack of grid benefits and low in equity relative to other submitted ideas due to the primary target being commercial.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
33	0146	Work-based Learning to Achieve Equitable Climate Cool Schools	Work-based Learning to Achieve Equitable Climate Cool Schools prepares and supports cohorts of Local Education Agencies (LEAs) to design, build, operate, and repair their facilities to meet state energy, decarbonization, and air quality requirements by providing cohort support, internship pilot programs, roadmaps and implementation activities.	Stage 1 Research/Refinement	Hold for Further Development
35	0169	Foodservice Refrigeration: High Efficiency Condenser and Evaporator Units TFP	Foodservice Refrigeration: High Efficiency Condenser and Evaporator Units TFP would target high efficiency condensing units (HECUs) and high-efficiency evaporator units (HEEUs) to replace standard efficiency condensing units and standard efficiency evaporators. HECUs and HEEUs have variable speed motors which control the output directly by changing the speed or torque of the motor as needed.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to low grid impacts and low in equity relative to other submitted ideas as there are no ESJ partnerships identified.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
36	0122	Commercial Secondary Windows	Commercial secondary windows adds on a single pane window to the existing frame in commercial buildings with single pane windows which creates an insulating air gap resulting in energy savings without replacing the full window.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to low grid flexibility and low in Equity relative to other submitted ideas due to the lack of partnership opportunities and overall impact to ESJ communities.
36	0187	High-Performance Secondary Window Panels	High-Performance Secondary Window Panels consist of a single pane of glass or plastic in an aluminum or wood frame installed on the inside or outside of the primary window. This would increase the overall U-factor at a lower cost than replacing the entire window.	Combined	Linked with IDEA-0122 in Archive/Stage 1
36	0161	Commercial Secondary Windows	Commercial secondary windows adds on a single pane window to the existing frame in commercial buildings with single pane windows which creates an insulating air gap resulting in energy savings without replacing the full window.	Combined	Linked with IDEA-0122 in Archive/Stage 1

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
37	0131	Time of Sale Energy Disclosure	Energy disclosure is a practice to leverage market forces to increase investment in energy efficient home upgrades by including energy efficiency upgrades in the appraisal process thus making them visible to the market.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to low grid impacts and low in equity relative to other submitted ideas as there are no ESJ targets identified.
37	0189	Transforming the Market for High Performing Homes in California	Transforming the Market for High Performing Homes in California is a 3rd party certification program which will leverage public funds to market demand for energy efficiency upgrades that will endure after incentive dollars are exhausted.	Combined	Linked with IDEA-0131 in Archive/Stage 1
38	0185	Combining Monitoring-Based Commissioning with DR to Maximize Grid Benefits	Combining Monitoring-Based Commissioning (MBCx) with DR to Maximize Grid Benefits is a pathway/practice to deploy MBCx in combination with DR in commercial buildings to maximize energy and demand benefits in a single package.	Archive/Stage 1	The idea scored low in equity relative to other submitted ideas due to lack of partnership strategy and low in MT alignment relative to other submitted ideas due lack of sustained benefits strategy and few leverage points.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
39	0176	Title 24 Enforcement Assistance: AHJ Automation and Acceptance Testing	Title 24 Enforcement Assistance: AHJ Automation and Acceptance Testing is an integrated set of tools to help the construction market with the energy code review process by automating and simplifying it. This would provide transparent data to the Authorities Having Jurisdiction (AHJs) which will in turn help enforce Title 24 Acceptance Testing which is currently only performed less than 20% of the time required by law.	Archive/Stage 1	The idea scored low in equity relative to other submitted ideas due to lack of partnership strategy and low in MT alignment relative to other submitted ideas due to unclear sustained benefits.
Ideas with Stage 1 scores between 5.0 & 5.9					
40	0093	Shade cloth over the outside of windows	Shade cloth over the outside of windows proposes that new buildings should be built with outside roller blinds (as is done in Europe even on newer public housing) which keeps direct sunlight from coming in the house (in summer) or can be used at night against cold. Existing buildings can be retrofitted cheaply using shade	Archive/Stage 1	The idea scored low in equity relative to other submitted ideas as there are no ESJ partnerships defined and low in MT alignment relative to other submitted ideas due to low factors of diffusion and unclear sustained benefits.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
			cloth over frames, seasonally, or on motorized rollers.		
40	0186	Exterior Shading for solar control	Exterior Shading for solar control is the use of various shading devices or structures installed on the outer side of residential windows to control and manage sunlight, heat, glare, and privacy reducing heat gain which reduces the summer cooling load.	Combined	Linked with IDEA-0093 in Archive/Stage 1

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
41	0160	Low Carbon Calcined Clay Concrete in California	Low Carbon Calcined Clay Concrete in California is a supplementary cementitious material that can reduce CO2 emissions through material & energy efficiency to meet state net zero goals for the sector. Clay is naturally zero carbon raw material and can be calcined at lower temperatures using less energy.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to lack of grid benefits and low in equity relative to other submitted ideas due to lack of ESJ strategy for partnerships.
42	0155	Residential Efficient Gas Absorption Heat Pump	Residential Efficient Gas Absorption Heat Pump is a technology that offers significant improvements to existing furnaces and electric heat pumps by using natural gas to pump heat from the outdoors to an indoor conditioned environment via a group of heat exchangers, vessels, and a pump that comprise the thermal compressor.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas as there are low energy savings compared to HP baseline and low equity relative to other submitted ideas scores due to only some of the benefits impacting ESJ communities.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
43	0143	Rare trees for shade and income grown with greywater	Rare trees for shade and income grown with greywater proposes growing rare or fruit trees to shade homes using greywater from a residence's laundry machine.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas as the energy savings and grid benefits are low and low in MT alignment relative to other submitted ideas due to lack of sustained benefits.
44	0137	Sustainable Refrigeration Transition	Sustainable Refrigeration Transition combines practice and technology to demonstrate the value of investing in and managing refrigeration systems more sustainably for smaller independent grocers. The practice involves comprehensive refrigerant leak detection and remediation, and the technology component aims to facilitate the transition to low GWP and natural refrigerant technologies.	Stage 1 Research/Refinement	Hold for Further Development

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
45	0025	Industrial Process Heat Pump*	Industrial Process Heat Pumps are a class of active heat-recovery equipment that allows temperature of a waste-heat stream to be increased to a higher, more useful temperature resulting in energy use being cut by up to one third.	Archive/Stage 1	The idea scored low in MT alignment relative to other submitted ideas due to low diffusion and unclear sustained benefits.
45	0164	Decarbonization for Industrial and Agricultural Sectors, and Hospitals	Decarbonization for Industrial and Agricultural Sectors, and Hospitals would place an emphasis on exploring alternative heating technologies and implementing heat recovery solutions to increase overall energy efficiency in the industrial and agricultural sectors.	Combined	Linked with IDEA-0025 in Archive/Stage 1
45	0159	Industrial Heat Pump Market Transformation	Industrial Heat Pump Market Transformation would accelerate the adoption of industrial heat pumps which are a class of active heat-recovery equipment that allows temperature of a waste-heat stream to be increased to a higher, more useful temperature resulting in energy use being cut by up to one third.	Combined	Linked with IDEA-0025 in Archive/Stage 1

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
45	0129	Industrial Heat Pumps in California	Industrial Heat Pumps in California are a class of active heat-recovery equipment that allows temperature of a waste-heat stream to be increased to a higher, more useful temperature resulting in energy use being cut by up to one third.	Combined	Linked with IDEA-0025 in Archive/Stage 1
46	0139	Commercial Wok Range Market Transformation	Commercial Wok Range Market Transformation studies the energy efficient and cost benefits of induction wok ranges compared to a gas wok range baseline.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas as the overall market is small and low in readiness as the product is pre-commercial.
47	0130	Continuous Process Management for Wastewater Treatment	Continuous Process Management System for Wastewater Treatment Plans is an integrated demand side management solution that helps reduce energy consumption and provides flexibility in demand response through controls and pump system optimization during periods of electric utility overgeneration and peak load shedding.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to low GHG impacts and low equity relative to other submitted ideas as there is no identified partnership role.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
48	0178	Second Skin Walls	Second Skin Walls are vines that act as a second thermal shield on the southern and western facing walls in addition to the standard home walls. The vines protect the exterior walls from absorbing the thermal heat from the sun, thus reducing the need for air condition.	Archive/Stage 1	The idea scored low in TSB relative to other submitted ideas due to low energy savings and low grid benefits. It also scored low in MT alignment relative to other submitted ideas due to lack of leverage points.
49	0035	Refrigerant Recycling*	Refrigerant Recycling provides an economical refrigerant supply chain that encourages the collection of refrigerants by trained technicians which is then reused.	Archive/Stage 1	The idea scored low in non-energy impacts relative to other submitted ideas as most of the benefits are captured under GHG benefits and low in MT alignment relative to other submitted ideas due to low diffusion and few leverage points.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
50	0101	Condenser Coil Cleaning of Commercial Refrigeration Units	Patented dust hood which can be used to clean the condenser coils of stand-alone ("self-contained") commercial refrigeration units which reside in large numbers in foodservice, healthcare and laboratory locations. Cleaning the condenser coils that are generally dirty and clogged result in 15-25% energy savings.	Stage 1 Research/Refinement	Hold for Further Development
51	0123	Automate Energy Optimization for Production Companies	Automate Energy Optimization for Production Companies is an energy management system for distribution network operators (DSO) and transmission system operators (TSO) level integration that provides energy optimization by allowing customers to capitalize on keeping the balance between energy production and consumption.	Archive/Stage 1	The idea scored low on equity relative to other submitted ideas as there were no clear ESJ benefits and low on MT alignment relative to other submitted ideas due to low factors of diffusion and no strategy for sustained benefits.
Ideas with Stage 1 scores between 4.0 & 4.9					

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
52	0023	Switched Reluctance Motors (SWRM)*	Switched reluctance (SWRM) is a unique software-controlled motor which can stand in for a conventional 3-phase motor with Variable Frequency Drive. The design is easy to manufacture and SWRMs are generally more efficient than induction motors on a VFD, especially at lower speeds.	Archive/Stage 1	The idea scored low in MT alignment relative to other submitted ideas due lack of leverage points and sustained benefits.
53	0069	Solar Assisted Heat Pumps*	Solar-assisted heat pumps are a type of HVAC system that combines the technology of solar thermal collectors with a heat pump. The solar energy powers the heat pump reducing the amount of energy needed from other sources.	Archive/Stage 1	The idea scored low in equity relative to other submitted ideas as the primary customer target is commercial and low in non-energy impacts due to the baseline equipment being heat pumps.
54	0012	Dynamic Window Glazing*	Dynamic window glazing uses electrochromic technology to darken the interior of glass by applying a small DC voltage via a thin coating on the window. The window can be tinted during the summer months reducing solar heat gain resulting in a reduction in cooling load while allowing heat	Archive/Stage 1	The idea scored low on TSB relative to other submitted ideas due to the baseline and low on equity relative to other submitted ideas.

Stage 1 Score Rank	Idea #	Idea Name	Description	Status	Status Notes
			gain in the winter to offset heating needs.		
Ideas with Stage 1 scores between 3.0 & 3.9					
55	0011	Solar Windows*	Solar windows technology allows windows to capture light and convert it into electricity similar to a solar panel but without blocking visible light.	Archive/Stage 1	The idea scored low on TSB relative to other submitted ideas due to the nature of solar windows producing energy during peak times of solar energy production. It also scored low on equity relative to other submitted ideas as no equity play or role for ESJ partnership was identified.

*Ideas were internally generated by CalMTA.

Appendix B: Scoring Rubric & Guidance

This appendix presents the scoring guidance provided to the scoring team to ensure that the scores are assigned consistently across all ideas.

Stage 1			Stage 2	
Overarching Scoring Guidance				
Scores should be based on the submitters response but can be modified if the reviewer sees potential for enhancement, such as ESJ partnership opportunities, or changes to assumptions, such as targeting a narrower segment of the market. The reviewer must document the reasons for their score and any changes made in the notes.			Scores for Total System Benefit and Participant Cost/Cost-Effectiveness are estimated by the CalMTA team. Scores for the other categories use the same scoring rubric as Stage 1 but are updated based on new information, if applicable.	
Total System Benefit				
Energy Savings	The energy savings potential of the technology or practice over the life of the MTI.	In Stage 1, the energy savings score is the reviewer's informed opinion of the achievable energy savings potential within the market sector and end use, as follows: • Low levels of energy savings • Medium levels of energy savings • High levels of energy savings	Energy component of total system benefit - Dollars ($)	Bin values into scores of low, medium, high
Grid Benefits	The potential level of grid flexibility or the contributions to reliability the initiative will provide.	In Stage 1 scoring, load flexibility is a proxy for grid benefits and reliability. The reviewer should use their informed opinion to assess the level of load flexibility within the market sector and end use, as follows: • Low levels of grid flexibility	Grid benefits (Generation Capacity, Transmission, Distribution, Avoided AS Procurement, and Losses) components	Bin values into scores of low, medium, high

Stage 1			Stage 2	
		• Medium levels of grid flexibility • High levels of grid flexibility	of total system benefit - Dollars ($)	
GHG Impacts	The GHG reductions potential of the technology or practice over the life of the MTI.	In Stage 1, the likely levels of GHG emissions reductions (including the net emissions reductions from fuel switching) and/or peak demand reductions. The reviewer should use their informed opinion to score based on likely levels of GHG emissions reductions (including the net emissions reductions from fuel switching) and/or peak demand reductions within the market sector and end use, as follows: • Low levels of peak demand reductions and/or change in GHG emissions from refrigerants • Medium levels of peak demand reduction and/or change in GHG emissions from refrigerants • High levels of peak demand reductions and/or change in GHG emissions from refrigerants	GHG impacts (GHG Cap and Trade, GHG Adder, GHG Portfolio Rebalancing, and Methane Leakage) components of total system benefit - Dollars ($)	Bin values into scores of low, medium, high
Readiness				

Stage 1			Stage 2	
Readiness	Readiness is an indicator of the supply chain maturity/product availability. Scores are assigned based on the level of availability of the technology or practice in the United States.	Low - not commercially available or limited, pre-commercial availability (anywhere) Medium - commercially available outside of United States; requires special order in United States High - commercially available in the United States	Same as Stage 1	Same as Stage 1
Participant Cost/Cost-effectiveness				
Participant Cost/Cost-effectiveness	In Stage 1, Participant Cost/Cost-effectiveness is the reviewer's assessment of the reasonableness of participant costs	Yes, the cost estimates are reasonable No, the cost estimates are not reasonable	In Stage 2, Participant Cost/Cost-effectiveness score is determined by the estimates of Program Administrator Cost Test (PAC) and Total Resource Cost Test (TRC)	PAC score: <1.0 (no) ≥1.0 (yes) TRC score: <1.0 (no) ≥1.0 (yes)
ESJ Impacts (Equity)				
Beneficial Impacts to ESJ Communities	Beneficial impacts result from projects which include activities to reduce energy burden, create jobs in disadvantaged communities and high road pathway	Will the initiative provide beneficial impacts to ESJ communities as submitted or envisioned by the MTA team? 1 - none of the benefits generated by the initiative idea will accrue to ESJ communities	Same as Stage 1	Same as Stage 1

Stage 1			Stage 2	
	opportunities, reduce GHG emissions, and demonstrate transformative climate change actions which contribute to the ESJ community's health, safety, and improved environment. The MTI should specifically address the delivery of benefits to ESJ communities as part of the MTI idea. MTI ideas that focus on the general market but generate benefits to ESJ communities incidentally (as in the case of mass market products that both general market and low-income customers purchase) can receive points in this category if the reviewer determines that there is a plausible strategy.	2 - some of the benefits generated by the initiative accrue to ESJ communities 3 - about half of the benefits generated by the initiative will accrue to ESJ communities 4 - most of the benefits generated by the initiative accrue to ESJ communities 5 - all of the impacts generated by the initiative will accrue to ESJ communities (exclusively)		

Stage 1			Stage 2	
	Technologies or practices that improve air quality in DAC or DAC adjacent communities should receive credit in this category. Initiatives that provide workforce development in ESJ communities should receive credit in this category.			
Partnership Opportunities with ESJ Communities	The partnership opportunities with ESJ communities reflects whether the initiative will leverage existing community resources, partner with other ESJ entities, or use available resource(s) in its execution. The points earned in this category depend on whether the described initiative specifically identifies an ESJ agency or other	Does the initiative leverage existing community resources, partner with other ESJ entities, or use available resource(s) as submitted or envisioned by the MTA team? 1 - no role has been identified/anticipated for an ESJ agency or other CBO in a stakeholder or advisory role for the initiative 2 - there is a strategy for involving public participation from the ESJ communities, however, potential partnerships or the targeted geographic locations have not been identified	Same as Stage 1	Same as Stage 1

Stage 1			Stage 2	
	CBO for delivery, or whether they identify the role for an agency but indicates that it will be filled later. Ideas can receive points in this category if the reviewer determines that there are additional partnership opportunities.	3 - there is an identified role for a CBO partner and/or ESJ agency, however, a specific partner has not been identified 4 - one CBO organization who will work on the implementation of the initiative has been identified 5 - two or more CBO organizations OR a single statewide/regional CBO have been identified to work on the initiative		
Non-energy Impacts				
Non-energy Impacts (NEIs)	The non-energy impacts capture the impacts generated by the initiative other than the direct energy (kWh and therms) and demand savings. For the purposes of this scoring, GHG emissions reductions do not count as a non-energy impact since they are captured under the TSB score.	What non-energy impacts does the initiative address that would increase the success of the initiative (as identified by the submitter or CalMTA)? 1 - no identified NEIs 2 - NEIs are identified in the initiative, but are not measurable and are not of strategic value to the success of the initiative 3 - NEIs are identified in the initiative and are measurable, but do not have strategic value to the success of the initiative	Same as Stage 1	Same as Stage 1

Stage 1			Stage 2	
	The non-energy impact score is determined by whether the non-energy impacts are incidental (achievable and measurable) or a fundamental element of the initiative's value proposition. WE&T should be captured as an NEI when a WE&T effort (existing or new) can be leveraged to support the initiative.	4 - NEIs are identified in the initiative, are measurable and likely have some strategic value to the success of the initiative 5 - NEIs are identified in the initiative, are measurable, and substantial, and have significant strategic value to the success of the initiative		
MT Alignment/Opportunity				
Innovation Characteristics	The innovation characteristics capture the technology or service's alignment with the factors of diffusion, which have influence on the innovation's likelihood of success or failure.	Does the product or service align with the 5 factors of diffusion: relative advantage, compatibility, (low) complexity, trialability, and observability? 1 - product or service aligns with 0 factors of diffusion 2 - product or service aligns with 1 factor of diffusion 3 - product or service aligns with 2 factors of diffusion	Same as Stage 1	Same as Stage 1

Stage 1			Stage 2	
		4 - product or service aligns with 3 factors of diffusion 5 - product or service aligns with 4+ factors of diffusion		
Leverage Points	The leverage point criteria captures whether there is a known aggregation node in the technology or services market structure that can be utilized to gain market leverage causing amplified MTI influence.	Is there an intervention point, aggregation node, trend, or policy impacting the target market that will generate broad change? 1 - there are no known or identified market leverage points or proven intervention strategies 2- one identified market leverage point/intervention strategy, without evidence of likely success 3- one identified market leverage point/intervention strategy with some evidence of likely success (i.e., previously interventions or relevant conversations have already taken place) 4 - one market leverage point with proven intervention strategies and MT success 5 - two or more market leverage points with proven intervention strategies and MT success	Same as Stage 1	Same as Stage 1
Sustained Benefits	Sustained benefits are the structural changes that will occur to lock in the desired market	Are there potential structural market changes that may occur that are difficult to reverse to support lastingness or a plausible argument that market changes	Same as Stage 1	Same as Stage 1

Stage 1			Stage 2	
	behavior. The reviewer should have a theory for where or how those changes might occur and have a plausible strategy to create that change. Examples of sustained benefits include adopted code or standard, permanent changes to manufacturing operations, market practice, or permanent infrastructure that does not require CalMTA support.	could occur? Such as: adopted code or standard, permanent changes to manufacturing operations, market practice, or permanent infrastructure that does not require CalMTA support. 1 - no changes in market structure/infrastructure/regulations envisioned that could result in sustained market adoption 2 - changes in market structure/infrastructure/regulations that could result in sustained market adoption are envisioned, but no strategy is identified 3 - the MTI envisions a change in market conditions/infrastructure/regulations that could result in sustained market adoption, and infrastructure mechanisms exist to support change, but the strategy is not clear 4 - the MTI includes a plausible strategy that can lead to changes in market conditions/infrastructure/regulations that could result in sustained market adoption, and infrastructure mechanisms exist to support change 5 - the MTI includes a proven strategy that can lead to changes in market		

Stage 1			Stage 2	
		conditions/infrastructure/regulations that would result in sustained market adoption		

Appendix C: Ideas Archived at Threshold Review

This appendix presents the ideas that did not pass the threshold review. The status notes provide information about why they did not pass the review.

Idea #	Idea Name	Description	Status Notes
0024	VFDs on all pumps and fans > 10 HP	VFDs on all pumps and fans > 10 HP suggest adding variable frequency drives on all pumps and fan systems. Variable frequency drives control output directly by changing the speed or torque of the motor as needed.	Insufficient Information
0070	Economizer Inspection and Upgrade	Economizer Inspection and Upgrade would pay HVAC companies to inspect economizers, a part of the building's cooling system that uses outdoor air to cool the building instead of the air conditioning compressor and repair them as needed resulting in energy savings.	Idea is a tactic and may be combined with other, similar ideas in the future
0114	ESRPP	The ENERGY STAR Retail Products Platform (ESRPP) partners with the Environmental Protection Agency (EPA) ENERGY STAR program, utility organizations and large retailers utilizing mid-stream incentives to influence retail buyer's purchase decisions while collecting full category sales data.	Idea is a tactic and may be combined with other, similar ideas in the future
0098	Thermal and Infiltration Management System	Thermal and Infiltration Management System are radiant barrier window insulators that make any existing window more energy efficient and cool roof coatings that reduce heat loss and gain.	Insufficient Information
0138	Heat Pumps	Heat Pumps proposes adopting electrification starting with heat pumps which pull heat from the outdoor air in the cooler months and transfers it indoors. In warmer months, it pulls heat out of indoor air to cool the home.	Insufficient Information

Idea #	Idea Name	Description	Status Notes
0036	Low GWP Refrigerant - Grocery	Low GWP Refrigerant proposes replacing high GWP refrigerants at existing grocery locations throughout California with lower GWP refrigerants such as CO2. High GWP is between 1,000-3,000 while CO2 has a GWP of 1.	No Energy savings
0095	One-stop Hazard Reporting Phone Number	One-stop Hazard Reporting Phone Number proposes a one-stop shop phone number for reporting power outages or downed power lines that would make it easier for the customers to report hazards and reduce response times by the utilities.	No Energy savings
0103	Climate-health warning labels on gas pumps	Climate-health warning labels on gas pumps requires climate health warning stickers on all gas pumps in the state of California which outline the environmental and health impacts of gasoline combustion.	No Energy savings
0119	Residential and Mid-Size Wind Turbines for sites that have wind	Residential and Mid-Size Wind Turbines for sites that have wind would encourage the adoption of wind turbines that are 30-80 feet tall and provide 3kW to 30kW of energy to residential and commercial sectors.	No Energy savings
0140	Residential Electrification Concierge Service	Residential Electrification Concierge Service is a software-enabled managed marketplace that connects homeowners seeking home electrification services with local contractors.	No Energy savings
0150	Pay-for-Performance Market Platform	Pay-for-Performance Market Platform ensures alignment between participant incentives and desired programmatic impacts by enabling a pay-for-performance (P4P) market platform with open qualified aggregator participation.	No Energy savings
0151	Aggregator of Aggregators (AoA)	AoA proposes one centralized aggregator that groups multiple individual Virtual Power Plant projects into large deal packages for finance purposes due to the Department of Energy's Load Programs Office only looking at deal sizes of $100 million or larger.	No Energy savings

Idea #	Idea Name	Description	Status Notes
0152	DER Procurement Hub	DER Procurement Hub proposes the continuation of a project that provides rigorous and unbiased evaluations of distributed energy resource (DER) products that reduce and/or manage demand for energy consumption in commercial buildings and agriculture by providing application guidance, side-by-side product comparisons, and feedback from actual users for a variety of DER technologies.	No Energy savings
0156	A solution reducing heat stress and improving air quality for low-income people	A solution reducing heat stress and improving air quality for low-income people combines a local fan, a local evaporative cooler, and a Corsi box into one system that can provide efficient cooling and improve air quality in summer as well as reduce heat stress and improve air quality in heat waves and wildfires, for low-income communities.	No Energy savings
0162	Updating Warren-Alquist Act by Adding Greenhouse Gas Reduction to Statute	Updating Warren-Alquist Act by Adding Greenhouse Gas Reduction to Statute would allow the CEC to more easily and swiftly establish regulatory frameworks for codifying embedded carbon, as well as implementing GHG-based building energy performance standards.	No Energy savings
0167	Introduce Lower GWP Refrigerants in California Market, including Heat Pump	Introduce Lower GWP Refrigerants in California Market, including Heat Pump proposes forging collaborations with manufacturers and their industry associations, such as AHRI and ASHRAE, to facilitate the introduction of refrigerants with GWP significantly lower than the mandated limit of 700 into the market.	No Energy savings
0168	Enhance the Resilience of ESJ areas by Enabling Community Solar and other DERs	Enhance the Resilience of ESJ areas by Enabling Community Solar and other DERs would focus on community solar and energy storage in disadvantaged communities that would essentially create microgrids that could respond to grid events and provide resiliency for the surrounding neighborhoods.	No Energy savings

Idea #	Idea Name	Description	Status Notes
0170	Making Homes Electric-Ready by Upgrading Electric Panels in ESJ Communities	Making Homes Electric-Ready by Upgrading Electric Panels in ESJ Communities would upgrade electric panels in underserved communities to prepare the homes for electrification.	No Energy savings
0172	Advanced Electric Motors Market Awareness and Demand TFP	Advanced Electric Motors Market Awareness and Demand Total Factor Productivity (TFP) would increase awareness of and demand for advanced electric motors in California by adopting an advanced motor measure program that generates savings and accelerates market adoption.	No Energy savings
0181	Hemp Transformation	Hemp Transformation converts hemp into biofuels to provide energy that was previously provided by combusting trees, cotton, plastics, and gasoline. Hemp does not require fertilizers and uses less water than other potential biofuels.	No Energy savings
0191	Portable Energy Storage Systems Utilizing Second-Life EV Batteries.	Portable Energy Storage Systems Utilizing Second-Life EV Batteries is a portable 2 kWh Energy Storage System (ESS) utilizing second-life EV batteries for residential and commercial applications which can reduce utility bills and GHG emissions by load-shifting electricity to reduce peak demand and also provides backup power during grid outages, at a 30-50% cost advantage compared to new batteries.	No Energy savings
0192	Statewide marketplace with integrated rebates & consumer loans to drive market	Statewide marketplace with integrated rebates & consumer loans to drive market is a consumer marketplace that would drive the uptake of MTI-targeted residential technologies/practices through the online retail purchase channel by eliminating barriers.	Idea is a tactic and may be combined with other, similar ideas in the future

Idea #	Idea Name	Description	Status Notes
0142	Agricultural Irrigation as a flexible demand load	Agricultural Irrigation as a flexible demand load proposes a proprietary agricultural irrigation technology that cuts irrigation water consumption by 80% as well as an equal amount of power consumption from well pumping, booster pumps and canal transportation pumps.	Not commercially available
0144	Integrated Windows & Building Envelope Make Net Zero Energy AFFORDABLE NOW	Integrated Windows & Building Envelope Make Net Zero Energy AFFORDABLE NOW proposes a pipeline for R7 and R9 windows which are a multi-pane fixed acrylic window that fit 24" wood frames in residential and light commercial buildings.	Not commercially available
0190	Using infrared sensor reducing overcooling, save energy, by Closed-loop Control	Using infrared sensor reducing overcooling, save energy, by Closed-loop Control is a closed-loop HVAC sensor-controller that predicts occupant thermal sensation from the thermographic measurement of skin temperature distribution, then uses this information to reduce overcooling by regulating HVAC output.	Not commercially available

Appendix D: Outreach Briefings for RFI

Date	Subject
8/14/2023	Redwood Energy Briefing
8/11/2023	LBNL Briefing
8/11/2023	The Energy Coalition Briefing
8/10/2023	Building Resilient Communities Briefing (ESJ)
8/8/2023	Presentation at Local Energy Resources Network Meeting (ESJ)
8/8/2023	Presentation to ACESS members (ESJ)
8/4/2023	California Advanced Lighting Controls Training Program (CALCTP) Briefing
8/1/2023	The Two Hundred for Homeownership Briefing (ESJ)
8/1/2023	200 Leadership (ESJ)
8/1/2023	Physicians, Scientists, and Engineers for Healthy Energy Briefing
8/1/2023	Rising Sun Briefing (ESJ)
7/28/2023	The Climate Center Briefing
7/28/2023	Suscol Intertribal Council Briefing (ESJ)
7/27/2023	RFI Self-Help Enterprises Briefing (ESJ)
7/27/2023	Climate Resilient Communities Briefing (ESJ)
7/24/2023	VEIC Briefing
7/24/2023	New Buildings Institute Briefing
7/21/2023	SW Gas ET Team Briefing
7/21/2023	Energy Efficiency Council (EEC) Briefing
7/21/2023	Redwood Community Action Agency Briefing
7/20/2023	EPRI Briefing
7/20/2023	CalNEXT Briefing & Coordination Call
7/19/2023	Presentation to California Energy Alliance Member Meeting
7/17/2023	ACCES Briefing (ESJ)
7/13/2023	NREL Briefing
6/27/2023	San Diego Building Electrification Coalition Equity Working Group Meeting Briefing (ESJ)
6/21/2023	Quarterly CAEEC Meeting Briefing
6/8/2023	Building Decarbonization Coalition Briefing
6/5/2023	Energy Efficiency Portfolio Directors Briefing
6/2/2023	SW Codes & Standards Team Briefing
5/7/2023	California Energy Commission Briefing

Appendix E: Advancement Plans for Batch 1 and Batch 2

Advancement Plans for the seven Batch 1 and 2 ideas to move to Phase II: Program Development can be found at CalMTA's website at the following links:

Efficient Rooftop Units (ERTUs)

Induction Cooktops & Ranges

Portable/Window Heat Pumps

Commercial Replacement & Attachment Window Solutions

Residential Heat Pump Water Heating

Additional Advancement Plan links to be added when approved.

Appendix F: MTAB Comments on Draft Stage 1 & Phase I Disposition Reports

This appendix captures the MTAB feedback and the CalMTA response on the final draft versions of both the Stage 1 Disposition Report (Table F1) and Phase I Disposition Report (Table F2).

Table F1. MTAB Comments on Stage 1 Disposition Report and CalMTA Response

MTAB Comment	CalMTA Response
The Draft Stage 1 Disposition Report showcases the tremendous progress achieved to date. Following establishment of the organization earlier this year, CalMTA has conducted a successful solicitation which elicited a large and diverse number of ideas, thoroughly reviewed and ranked these ideas, and developed a plan to move forward in the coming year toward a focused goal of at least one full MT plan by the end of 2024. The MTAB input was already solicited on the draft Scoring Framework and outreach plan and I have no comments on these sections. Similarly, the Scoring Results are generally reasonable and while one could take issue with particular scores, it is unlikely that the final results would be significantly different. As a result, I have no comments on this section either. The Batch 1 MTIs focus on three important technologies with broad potential application across the state, and in particular in EJ communities. Given the early stage of development, the descriptions of the Batch 1 MTIs only provide a broad overview of the technology and market context. Much work is needed to take these ideas from a	CalMTA agrees that it will take significant work to develop the candidate ideas into fully formed and well-developed MTIs. Another consideration is the need to continue discussions with the MTAB and stakeholders about how to balance the number of MTIs, impact, and budget.

MTAB Comment	CalMTA Response
broad concept to a fully-formed, well-defined MTI plan. The Draft Report also proposes advancing an additional 16 contenders for Stage 2 and 3 scoring. The time and effort to more fully evaluate these ideas is significant, making completion of the Phase I Disposition report in six months a challenging goal. A key issue going forward will be around focus versus breadth, both across and within MTIs. A tight focus with a more limited set of initiatives will allow for concentration of resources (both financial and staff) and facilitate near-term, measurable impacts. In contrast, a broad portfolio of a larger set of initiatives will allow support for broad market impacts across a range of sectors and reduce risk. The MTA team will need to work with the stakeholders, market participants, and the MTAB to develop a proposed portfolio that addresses these sometimes competing objectives.	
CalMTA should make further refinements to their scoring categories and criteria, especially when evaluating cost-effectiveness. Even if an MTI presents a good case for market transformation, it is unacceptable that non-cost-effective MTIs have passed the Stage 2 Scoring process with extremely low TRCs. For example, CalMTA has allowed MTI#10 (High Performance Windows) to pass to Stage 2 of its scoring process despite its TRC of 0.07. Such a low TRC should be used to screen out potential MTIs, yet CalMTA is unreasonably continuing to consider MTI#10. CalMTA needs to appropriately prioritize how it evaluates programs, including cost-effectiveness as a requirement, and remove MTIs with extremely low TRCs from as options for advancement. As CalMTA depicted in the 12/1 MTAB Meeting PowerPoint slides, the forecasted portfolio budget, when also considering CalMTA's operational costs, will likely result in CalMTA exceeding the $50 million	Although High Performance Windows were ranked highly by the MTAB in the meeting on Nov. 30, 2023, CalMTA is not recommending advancing them to Batch 2 for the reasons detailed in the Batch 2 memo. Although we're not moving forward with High Performance Windows at this point, we'd like to clarify that the CalMTA scoring process does not estimate TRC until Stage 2 scoring, so we could not know about its low TRC until after Stage 2. The proxy used for cost-effectiveness in Stage 1, participant costs, appeared reasonable by the scoring team. Furthermore, in D.19-12-021 the Commission specifically declined to set specific cost-effectiveness thresholds for MTIs or the portfolio, but rather set an expectation for "the MTA to manage its portfolio of MTIs, for the initial five-year

MTAB Comment	CalMTA Response
annual budget ordered in D.19-12-021 (cumulatively $250 million over five years). CalMTA should use its MTI cost-effectiveness evaluations to prioritize spending and ensure it does not exceed its authorized budget. The weighted category for cost-effectiveness is unable to filter out egregiously non-cost-effective ideas. Instead, CalMTA should adopt a cost-effectiveness threshold until it has demonstrated its ability to maintain a balanced and cost-effective portfolio. Consequently, the weight given to the cost-effectiveness criteria can then be redistributed to other requirements. Specifically, for the first five years after Batch 1's approval by the Commission, CalMTA should hold the Market Transformation portfolio to a TRC threshold of 1.0. Furthermore, any non-Equity focused MTI should also have a minimum TRC of 1.0 as well. This is similar to the Energy Efficiency Portfolio's TRC requirements (see D.21-05-031 at 22) except that this will be on both an MTI level for non-Equity focused MTIs and on a portfolio level. This stringency is necessary because CalMTA's ability to measure and administrate cost-effective programs remains unproven. Thus, extra caution should be exercised to ensure that CalMTA can meet its claims. CalMTA can still advance ideas with strong market transformation potential and impact, but this would foremost promote developing these ideas into cost-effective initiatives. If CalMTA is not able to develop a cost-effective plan to pursue a market transformation opportunity, then CalMTA should not pursue it.	implementation period, with an eye toward cost-effectiveness." (Section 3.4.2, page 69) Similar to the long-time rules for the energy efficiency portfolios, we anticipate cost-effectiveness to be measured at the portfolio level and not as a threshold for each MTI, so there may be cases where the benefits of a specific non-cost-effective MTI would make sense to keep in the portfolio. Transitioning a potential MT idea from Phase I: Concept Development to Phase II: Program Development does not mean those ideas have entered the CalMTA portfolio, nor does it mean CalMTA will begin investing the resources on the order of the budget estimates provided at the MTAB meetings on Nov. 30 and Dec.1, 2023. Transitioning an MT idea to Phase II allows CalMTA to further refine the MT theory and proposed strategy, and to reduce the levels of uncertainty. As we develop ideas in Phase II and consider recommending transitioning them to Phase III, CalMTA will revisit program budget estimates, portfolio balance and budget, revised C/E calculations, and other CalMTA portfolio metrics with the MTAB.
It is inappropriate for CalMTA to move forward with ERTUs as a Batch 1 MTI given that CalMTA may face future budgetary overruns (see	At the time of identifying ideas that presented strong MT opportunities and could be advanced quickly, ERTUs didn't

MTAB Comment	CalMTA Response
comment above) and since only one MTI is needed for CalMTA to advance to the next funding stage. According to the CalMTA's evaluation, ERTUs do not meet the "Well defined Product Definition & Target Market" and "Clear Research Needs" criteria. It is concerning that this MTI does not include a defined target market nor include what research needs to be done. Please see the comments on the ERTU Draft Advancement Plan for a more in-depth discussion of these issues. Additionally, while the discussion regarding Induction Cooktops & Ranges during the 11/30 & 12/1 MTAB meeting indicated some promising opportunities, the current TRC for this MTI is 0.76. CalMTA should refocus this MTI to develop a more cost-effective method for market transformation or develops an equity-targeted proposal, which does not need to meet a 1.0 TRC (see discussion above). Further discussion on these issues is included below in our comments on the ERTU Draft Advancement Plan.	score highly on "product/market definition" or "clear research needs". (Please refer to the memo titled "MT Ideas Moved to Stage 2 Scoring and Proposed First Batch MTIs" located here: https://calmta.org/wp-content/uploads/sites/263/RFI-Summary-Memo-_.pdf) While ERTUs did not score highly on "product/market definition" or "clear research needs," the ERTU Advancement Plan identifies target markets and clarifies the research needed to further refine market strategies – typical program development (Phase II) activities. Based on research to date, CalMTA continues to believe ERTUs represent a strong opportunity for MT in California. The preliminary MTI strategy for induction cooking aims for significant cost reductions, with an explicit equity focus. During Phase II, CalMTA will refine preliminary strategies and reassess cost-effectiveness metrics before determining if this MTI should be considered for Phase III: Market Deployment. Because cost reduction -- as described in the Advancement Plan -- is central to the opportunity, we expect the preliminary TRC estimate to improve. We agree it will be important to identify opportunities to achieve cost-effective MT programs and are committed to doing so. Please also note that D.19.12.021 established cost-effectiveness guidelines for the nascent CalMTA portfolio that are different from those applied to the EE Rolling Portfolio.

MTAB Comment	CalMTA Response
CalMTA should adopt the cost-effectiveness thresholds described above in the Scoring Framework comments for Stage 2. The Stage 1 scoring category for cost-effectiveness does not measure cost-effectiveness and should not be labeled as such. The description mentions no consideration of cost-effectiveness. The listed assessment focuses on whether participant cost is reasonable, not the cost-effectiveness of the program. As such, CalMTA is improperly suggesting that cost-effectiveness is being evaluated in Stage 1 and should instead recategorize this assessment.	CalMTA has changed the description of this criteria so it's clear that the Stage 1 score is based on the reasonableness of the participant's cost.
For more critical evaluation of these potential MTIs, please list the scoring results for each grading criterion as well as how each idea would evaluate on the criteria identified in Table 8 (Disposition Report at 20).	The MTIs proposed as front runners were selected from a review of MTIs that scored well in Stage 1 and the team determined would have a high likelihood of transitioning to Phase II and potentially Phase III. A more detailed accounting of this process and the other MTIs that were evaluated against the front runner criteria can be found in the memo titled "Request for Ideas Summary Memo" located here: https://calmta.org/wp-content/uploads/sites/263/RFI-Summary-Memo-_.pdf. CalMTA has been discussing and refining the Batch 1 MTI ideas with the MTAB since the MTAB meeting on Oct. 13, 2023, we have drafted the Advancement Plans, and they remain high-scoring ideas that merit further study in Phase II. We understand the desire to review the detailed Stage 1 scores, however, out of consideration to the submitters, we have decided to not share those publicly but instead

MTAB Comment	CalMTA Response
	provide both the ideas in rank order by their overall scores as well as indicate the range of each idea's score. These are provided in Appendix A.
CalMTA should report any and all resources spent on developing these threshold ideas in their budget.	We do not plan to spend any resources to develop the ideas that did not pass the threshold criteria.
How many ideas were submitted from each stakeholder segment? Were there any that were particularly fruitful? Are there any segments that ideally should have submitted an idea, who didn't, and would warrant more outreach in the future?	Figure 4 in report lists the number of submitters by industry roles as they self-selected. While we had submissions from research labs, academia, we had expected more and have plans to conduct directed outreach in future RFIs. We also noted a lack of industrial and agricultural submissions and will seek higher levels of engagement with these sectors in the future.
Are these ideas presented in Appendix C in rank order?	The ideas in Appendix C are those ideas that did not pass the threshold criteria and, therefore, were not scored. So there is not a score or other metric upon which to rank them.
I made comments on prior sections at my last meeting, and thought that discussion, with everyone on the MTAB's input, was sufficient. I am here noting items where the brief description of the decision basis left me with questions. I don't necessarily disagree with the decision or the ranking, but thought that more could be said or explained. #32-Hydronic additive. Also important to know that it's very difficult to assess savings across system types and ages, building types and sizes, etc. without an extremely large field test. Validation is either limited to a narrow scope of buildings or is quite expensive. #39 Title 24 enforcement. If the idea is to create a repeatable simplified process for code compliance tracking and documentation, I'm not sure why it has	Thank you for the additional input. Some of your observations were raised by the scoring team during the scoring discussions. In any case, where appropriate we will capture your additional feedback in the scoring notes for these ideas so they can be considered if the ideas are advanced in the future.

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"unclear sustained benefits." #42 Rare trees. Validation is problematic due to the dependence on tree location, variations in buildings, building systems, and trees, and the long time until full benefits. Issues like interaction between tree location, tree health, building disruption (e.g., roots in cellar) and efficiency are complex. Vulnerability to tree removal or failure to care during property ownership or occupancy transitions are also difficult to assess. Are rare trees local or invasive? If invasive, are they problematic? I'll stop there. #45. I'm not sure why diffusion is problematic for industrial heat pumps. It's possible that there's a limited number of high-yield applications. I wonder if this is a case where a limited field demonstration effort and efforts to prime the supply chain might be effective without many of the elements of a sustained campaign.	
Only two scorers scored an entire submission on every criteria. Due to the late spike in submissions, there were no scorers who scored the entire portfolio of submissions on every criteria. In the future, a minimum of 3 scorers on every criteria will likely result in greater sharing at the Alignment meeting where scores may be adjusted. The Report should address whether the assigned resources were adequate to support these scoring needs. It is unclear in the Advancement plans how CalMTA is calculating TSB and TRC. It is important to understand the full details of how the CalMTA has been estimating TRC and TSB, because TSB is weighted so heavily in the scoring and MTI advancement process and to ensure consistency with how the broader EE portfolio calculates TSB and TRC. The revised Disposition report should explain how TRC and TSB were calculated, and a clear statement of whether or not this differs from the	It is correct that only two scorers scored every criteria for each idea and no scorer scored all 117 ideas. We will work to modify the scoring process in the future so that at least three scorers score each criteria and at least one scores every idea submitted. We will, however, need to maintain some flexibility in this process to respond to unanticipated activity levels. TSB and TRC are developed as part of the Stage 2 scoring, but this Stage 1 Disposition Report only includes the process through Stage 1 scoring. We will ensure that the Stage 2 Disposition Report includes clear explanations of these calculations. We agree that it is important that the MTAB understand how CalMTA calculated the TSB and

MTAB Comment	CalMTA Response
TSB inputs and calculations that are required from the IOU EE programs.	TRC. Each advancement plan contains an appendix describing this.
a) Please include details on the process and results for Step 4 "Top ideas checked against CA activities" (see CalMTA's funnel graphic). Please include a listing in the disposition report of the submitted ideas that were duplicative of CA activities, and thus screened out. Please also include these in Figure 8 "Disposition of ideas received." b) In the future Step 4 should occur through meetings and discussions rather than through a two-week asynchronous public comment process. This would help improve the MTI advancement plan by identifying areas of unnecessary duplication, so that the proposed budgets more realistically reflect the amount of work that is needed. c) For Section 2.3 – please describe how the CalMTA develops a single overall score. d) Please explain the disposition of ideas by fuel type? e) Some of the MTIs put forth in the advancement plans are technologies that the CalMTA acknowledges are not commercially available. Please clarify the criteria for determining "commercially available" f) Why do the ideas number more than 117?	a) and b) Step 4 in the "funnel graphic" (which is not included in the Stage 1 Disposition Report) is a review of programmatic and other activities related to the idea being conducted in California. This information helped the CalMTA team to understand possible leverage points and what CalMTA's potential MT theory and strategy may be, which helped the CalMTA team to begin to understand the MTI budget requirements. None of the ideas were screened out as a result of these reviews. These reviews were conducted by the CalMTA team and involved both independent research as well as meetings and discussions with the IOUs and other program administrators. c) To address this comment, we have included additional information about how the individual criteria scores were rolled up into a single, overall score in Section 2.2 Category and Criteria Weighting. d) We have added a graphic reporting the disposition of ideas by fuel type in Figure 8 on page 15. e) All of the ideas that CalMTA is proposing to transition to Phase II: Program Development are commercially available. We acknowledge that some of the technologies would benefit from advanced features that aren't broadly accepted, but the technologies themselves are

MTAB Comment	CalMTA Response
	commercially available. The criteria for determining this status is whether the product can be ordered and received by a customer in the United States. f) The idea numbers exceed 117, the number of ideas submitted, because the numbering includes ideas that were submitted by the CalMTA team as part of system testing but later deleted.
Thorough, well written.	Thank you for the feedback.
a) For the next round of MTA Advancement Plans, the MTAB should have a role in reviewing "the MTA recommendations and supporting data gathered in the Concept Development Phase and provide feedback to the MTA on which MTIs should proceed into Phase II: Program Development." (D.19-12-021) b) The Disposition report should include more than just an overall ranking of the submitted ideas and should include the CalMTA's scores on the six scoring categories. For each idea, the report should include the score on the scale described in Table 3 "scoring rubric." This type of visibility assures the MTAB of the CalMTA's transparency and provides necessary feedback to the submitters that will help them improve future submissions. c) The Disposition report and individual MTI Advancement plans contain details about the Batch 1 MTIs that are duplicative. The Disposition report should primarily be used to describe the Batch 1 MTIs compared against the other submissions, in order to justify the	A) CalMTA agrees that the MTAB has a role to provide feedback on which ideas advance to Phase II. Development of Advancement Plans is the final Phase I deliverable for CalMTA. While the MT Framework appended to D.19-12-021 prescribes on page 107 that the MTAB "Review 1" would occur after CalMTA has ranked the MTI ideas and developed "preliminary development plans for data/research needed" (i.e., Advancement Plans), based on the MTAB input, we elected to seek MTAB feedback sooner to advise CalMTA on which MTI ideas should be prioritized for Advancement Plan development. In the MTAB meeting on Nov. 30 -Dec. 1, CalMTA presented the Stage 2 scoring to the MTAB and solicited their feedback on the subset of high-scoring ideas to prioritize for Advancement Plan development. In addition, ideas anticipated to move to Phase II were discussed at the October MTAB meeting. CalMTA is preparing a memo to the MTAB summarizing the outcome of its input and our recommendations. CalMTA

MTAB Comment	CalMTA Response
selection of the Batch 1 MTIs. Details such as Product Definition and Preliminary Market Theory should be left to the individual Advancement Plans. d) The MTAB Feedback section should contain the MTAB feedback on the entire list of MTI submissions and the MTAB feedback on the individual Batch 1 MTIs should be duplicated in the respective advancement plan. This way all MTI-relevant information is available in the Advancement Plans, and stakeholders do not have to remember to check multiple sources in order to get a full picture of the MTI.	intends to seek MTAB guidance on prioritizing future Advancement Plans as well. b) We understand the desire to review the Stage 1 scores for each criteria, however, out of consideration to the submitters, we made the decision to not share those publicly but instead provide both the ideas in rank order by their overall scores as well as indicate the range of each idea's score. These are provided in Appendix A. c) CalMTA believes it is helpful to describe the appended Batch 1 MTI ideas in the Disposition Report for readers that may not take the time to dive into the details of the Advancement Plans. d) The MTAB feedback and the CalMTA response is provided in the disposition report. Stakeholder and MTAB feedback on the individual advancement plans is captured in Advancement Plan feedback memos developed for this purpose.
a) The IOUs appreciate the thoughts details of this section. It gives the stakeholders a good idea of how the CalMTA differentiated between different score values. A couple of areas for further clarification and future consideration: 1. The Report should clarify whether energy savings potential is evaluated as technical potential or market potential.	1. The energy savings score in Stage 1 is based on the scoring team's informed opinion of achievable potential (low, medium, or high). The scoring rubric has been updated accordingly. 2. The Stage 1 score for grid benefits is based on the scoring team's informed opinion of load flexibility potential (low, medium, high), including load shifting and load

MTAB Comment	CalMTA Response
2. The scoring should include an estimate of the potential for permanent load reduction, load shifting, load shaping, and other relevant factors. 3. The Report should provide more information on how the evaluators were instructed to assess the MTI costs and its cost-effectiveness showing. A review of costs should include the direct cost to the consumer to adopt the MT technology or service. This cost assessment should consider the installation and maintenance costs relative to existing technologies. 4. The report should provide more detail on assessing GHG impacts relative to the estimated GWP of refrigerants when evaluating fuel substitution or switching-related proposals.	shaping. Stage 2 scoring (to be included in the Phase I disposition report) is based on a quantitative estimate of TSB, including the breakdown of TSB into its underlying drivers: energy savings, GHG impacts, and grid benefits. CalMTA will refine TSB and cost-effectiveness estimates and include estimates of additional benefits such as permanent load reduction during Phase II. CalMTA will include those estimates along with documentation of the sources and methods in the MTI Plans required for advancement from Phase II (Program Development) to Phase III (Market Deployment). 3. Stage 1 scoring for cost-effectiveness was based solely on participant costs, rather than on cost-effectiveness. Cost-effectiveness is estimated in Stage 2 (which will be addressed in the Phase I Disposition Report). We have clarified this in the text of the Stage 1 Disposition Report. CalMTA will refine cost-effectiveness estimates during Phase II and include installation and maintenance costs relative to existing technologies. CalMTA will include those estimates along with documentation of the sources and methods in the MTI Plans required for advancement to Phase III (Market Deployment). 4. The GHG impacts for Stage 1 scoring are based on the scoring team's estimation of peak demand reduction or GHG emission reductions due to refrigerant impacts. TSB is estimated during Stage 2 scoring, including the breakdown

MTAB Comment	CalMTA Response
	of TSB into its underlying drivers of energy savings, GHG impacts, and grid benefits. Additional details on the GHG impacts associated with reduced gas consumption vs. increased GWP from refrigerants will be included in the MTI Plans required for advancement to Phase III (Market Deployment).
a) For the ideas marked "Hold for Further Development", please provide details on why these ideas may continue to hold promise. Seeing the Idea's scores along the six categories would be useful for this.	The ideas that were held for further development are those that had a strong Stage 1 score but the scoring team wanted to better understand the market or market transformation theory before attempting to conduct the Stage 2 scoring. CalMTA will conduct light research in 2024 and, where warranted, will move these into Stage 2 scoring.
a) Are there any lessons-learned from this first RFI that can improve the quality of future RFIs? For example, there are a surprisingly large number of ideas that did not pass Threshold Review due to "No Energy Savings". CalMTA should consider a short survey of submitters asking for feedback including: a) do they intend to participate in future RFIs, and b) what was your motivation for submitting an idea (i.e., "What's in it for you?"), and c) are they satisfied with the level of communication and feedback they received about their submission? b) For Appendix D: To assist with the assessment of the CalMTA's effectiveness in Year 5, CalMTA should retain a list of contacts and contact information for each organization for which CalMTA presented RFI outreach, to facilitate future evaluations of the CalMTA. CalMTA should also consider conducting a small satisfaction survey both now and after each future outreach briefing and share with the MTAB results on issues like: a) did the audience feel like they understood the	a) We had a number of lessons learned from this first RFI effort that included improvements to the directions and messaging on submission content. However, it was clear that energy savings was a requirement of acceptance. We conducted a survey, but received limited responses so most of the input was anecdotal from conversations with submitters. Most felt that they had been sufficiently communicated with and opportunities for engagement were good. The main issues centered on the Idea Portal and improvements that could be made on password setting and access. Mainly, we knew that submitters were not likely to have complete information that would suffice for full MTI development. As such, we combined tactics and information from related submissions to create a more

MTAB Comment	CalMTA Response
RFI's objectives and requirements, b) were there any areas of confusion or areas where they needed more information c) did they feel like they knew where to get clarifications or additional information d) did they actually get the clarification? These immediate feedback surveys would help improve processes and would assure stakeholders that a future non-profit incarnation of the CalMTA would be well-suited for self-administration. Lastly, it would be helpful for the evaluation to track how many people attended each briefing and how many of these organizations submitted ideas.	complete picture of the idea. The question of "what's in it for you?" is a difficult one since we had no promise of funding for submissions, but emphasized the opportunity to support energy efficiency and decarbonization efforts in California. b) We do track all of our outreach via a Salesforce database and report on our outreach monthly to the CPUC. This information will be provided to the independent evaluators in the future. We are also planning a stakeholder survey in mid-2024 to assess how well our outreach efforts are doing with audiences interested in CalMTA. We will look to incorporate these suggestions for feedback in terms of did the information we provided provide clarity and how we can improve.

Table F2. MTAB Comments on Phase I Disposition Report and CalMTA Response

MTAB Comment	CalMTA Response
Please define BMA (baseline market adoption) and TMA (total market adoption) more clearly.	Additional defining information added to the subsection on market adoption models in Section 5.3 Stage 2 scoring process.
Clarify whether total market adoption takes into account all other interventions in the market left out of baseline market adoption or if it's already included in the baseline estimate.	Added short section to clarify that previously established savings are in the baseline market adoption forecast because they would have occurred absent an MTI but that savings associated with collaborative efforts under the

MTAB Comment	CalMTA Response
	umbrella of the MTI would be excluded from the baseline market adoption forecast.
In the section on MTI costs, why are there no incentives listed for induction cooktops?	For Induction cooktops, the budget assumed only upstream incentives, using the ENERGY STAR Retail Products Platform (ESRPP) model. This may change as we move our plans forward and refine our logic model.
Regarding MTI costs for Residential Heat Pump Water Heater (Idea # 0194), does it target multi-family and single-family or just single-family? There is also a multi-family initiative (Efficiency Heat Pump Water Heaters for Multifamily, Idea # 0078) that includes incentives for consumer and non-consumers.	This initiative is for single- and multifamily homes that can be addressed with an integrated or split system. For multifamily, we did assume that there could be market facing incentives as the market is less mature and there is less market activity.
In the section on MTI costs, why no incentives for residential Heat Pump Water Heaters (Idea # 0194)?	With all the market activity and incentives currently happening, we assumed the MTI would focus on other market barriers. This Stage 2 estimate included significant funding for workforce education and training and awareness building.
Table 12, Score Revisions Between Stage 1 and Stage 2, lists two scores but the text above says that three scores were revised for Stage 2.	There were three scores listed in Table 12 but the two scores in the equity scoring category were put on the same line because the changes to the scores were the same. We have split out the two equity scores onto two lines in the table so it's clear.
"The 2050 Partners and CalMTA scorers split into two teams so that each firm had two members." (Page 23)	We've updated the report to make it clear that each firm had one team member on each scoring team.

MTAB Comment	CalMTA Response
MTAB comment: This statement is unclear. Did each firm have two members on each scoring team? Or did each team have one member on each team?	
"38 ideas were combined" (Page 23) MTAB comment: combined into how many proposals? Sentence seems to lead there.	We've edited the report so that it is clearer that 38 ideas were combined with other ideas and that 54 ideas were ultimately scored in Stage 1.
"Efficient Rooftop Units" (Page 25) MTAB Comment: This is more of a general topic area than a proposed initiative. It seems like the initiative will be delineated, and some of these proposals eliminated in later steps. This is okay; just doesn't seem like what you're saying.	Thank you for your comment.
"Residential Water Heating" (Page 26) MTAB comment: This is an example where you have selected a large area in which you might run an initiative, but have not yet selected the focus for the initiative. It seems unlikely that any initiative would combine all these foci. So you will really select the initiative scope, even in fairly broad terms, in later steps. I'm okay with this, have to start somewhere and there's a lot to sort out, but it seems like your process description would imply more decision making at this stage.	Thank you for your comment.
"Smart Electric Panels" (Page 29) MTAB Comment: I thought that one of the primary benefits of smart panels is the ability to coordinate equipment on times so that more electric equipment can be installed without upsizing the panel and	We agree that smart panels will support the adoption of greater levels of electrification. However, we opted for a simplified approach for the Stage 2 scoring that captured customer behavior and demand response potential.

MTAB Comment	CalMTA Response
sometimes the line to the house, possibly even the line to the neighborhood? If that's relevant it would show as "more electrification" where the baseline is fossil fuel.	
"CalMTA developed preliminary baseline and total market adoption estimates" (Page 33) MTAB Comment: Please clarify the time period	The assumed lifetime of each MTI is shown in Table 9.
Regarding consumer incentive costs. (Page 36) MTAB Comment: Is this net of incentives from other entities?	These may be incentives provided through the CalMTA or by other entities. We have clarified this in the description.
Regarding Research and evaluation costs (Page 36) MTAB Comments: As written, this does not appear to include technology testing and refinement. Does MTAB assume that other California agencies will cover all this and no technology validation is required? That doesn't seem consistent with early experience. Other groups will carry a lot of that load, but not all of it.	The research and evaluation costs category does anticipate funding for things like lab testing and procedure development. The description has been updated to indicate this.
"WE&T" (Page 36) MTAB comment: please spell out WE&T	WE&T has been defined previously in the document.
Estimate of MTI cost: High Performance Windows and other MTIs (Pages 37-38) MTAB Comment: Whenever "other" is the highest cost category, it rates a footnote to the table. Should another cost category be broken out?	When the "other" cost category is the highest, we've added footnotes describing these costs.

MTAB Comment	CalMTA Response
Residential Heat Pump Water Heating Sector(s): Residential multi-family, existing, and new construction (Page 54) MTAB comment: and single family?	This was updated to indicate single-family rather than multi-family.