



February 13, 2025

MEMORANDUM

TO: Market Transformation Advisory Board (MTAB)

FROM: Jeff Mitchell, CalMTA
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SUBJECT: 2024 Request for Ideas: Phase I Update

This memo summarizes CalMTA's recommendations regarding the Market Transformation (MT) ideas that advanced to Stage 2 scoring in 2024, including one MT idea that merits further consideration through the development of an Advancement Plan. This memo describes the Phase I: Concept Development activities conducted to date, the feedback provided by the Market Transformation Advisory Board (MTAB), and CalMTA's response to this feedback. CalMTA appreciates the MTAB's input and expertise, which has been instrumental in shaping our evaluation of MT ideas currently in Phase I.

Phase I: Concept Development

Phase I: Concept Development includes two stages of scoring and evaluating MT ideas and concludes with the development of Advancement Plans for promising MT ideas that merit further development. The final deliverable of Phase I, an Advancement Plan, identifies knowledge gaps and the research needed to fill those gaps in order to later determine if the MTI should advance to Phase II: Program Development. Approval of the Advancement Plan by the CPUC, following review and comment by MTAB and the public, is the stage gate that allows CalMTA to advance an idea from Phase I to Phase II.

2024 RFI and Stage 1 Scoring

CalMTA's second request for ideas (RFI) process, conducted from May 29-July 3, 2024, resulted in the submission of 13 newly submitted ideas via the web-based process. In addition to these ideas, CalMTA pulled forward 20 ideas submitted in the 2023 RFI. After conducting a threshold review and combining similar ideas together, 26 ideas were advanced to Stage 1 scoring. After completing the Stage 1 scoring, the highest-scoring ideas were prepared for MTAB review. Figure 1 below illustrates the disposition of the ideas over this process.

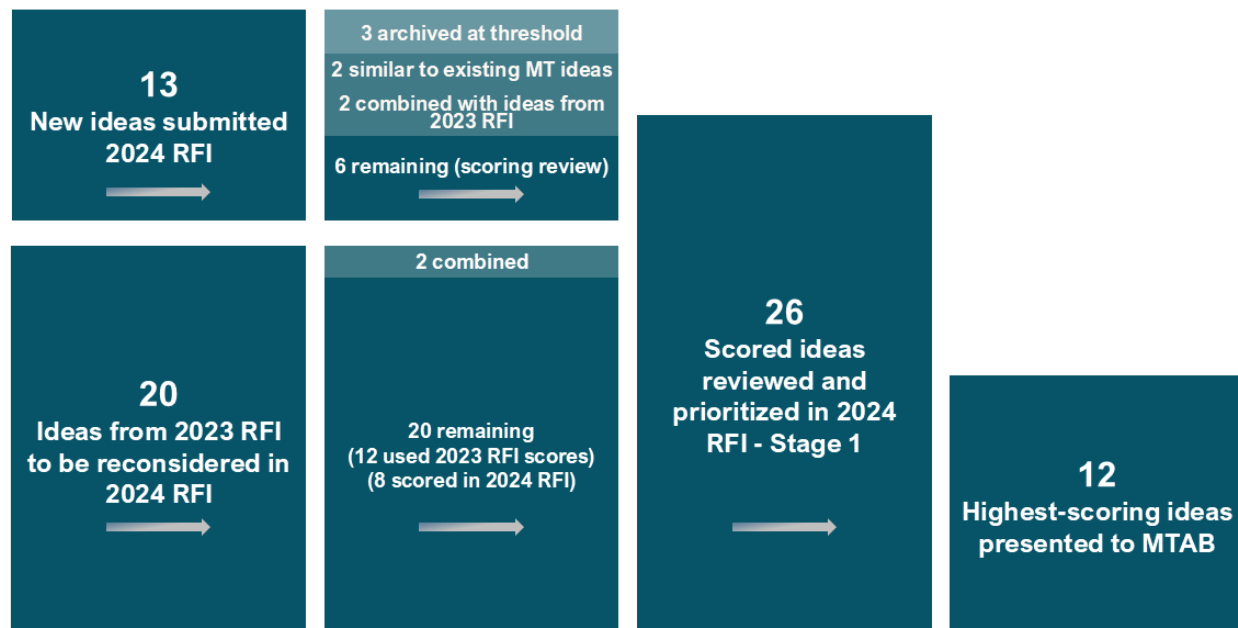
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Figure 1. Disposition of ideas in the second RFI



During an MTAB meeting on September 23, 2024, the CalMTA team presented the Stage 1 results for the 12 highest scoring ideas, along with their recommendations for the five ideas to advance to Stage 2 scoring. These included:

- Multifunction Heat Pumps
- Thermal Energy Storage as a Distributed Energy Resource
- Variable Frequency Drives (VFD) on All Pumps and Fans > 10 horsepower
- Building Performance Standard (BPS) Acceleration
- Smart Electric Panels

Stage 2 Scoring

Based on discussions with the MTAB, CalMTA advanced four of these ideas to Stage 2 scoring, deciding not to include Smart Electric Panels. The MTAB's feedback was that smart electric panels were not an electrification solution on their own but rather need to work with smart devices to best control end-use loads.

In addition to the four ideas advancing from Stage 1, the Efficient Streetlighting idea was assessed in Stage 2. Efficient Streetlighting was an earlier idea that was being researched under an approved Advancement Plan, but our study raised a number of questions about the size of

market opportunity for Efficient Streetlighting, whether an MTI could deliver substantial total system benefits, and the likely ramp rate. Because of these questions, the team decided to reevaluate Efficient Streetlighting as part of the second RFI disposition to see how it compared to the other ideas under consideration.

The CalMTA team presented the Stage 2 scoring results to the MTAB in the meeting on November 20, 2024, where the following four ideas scored in Stage 2 were presented:

- Multifunction Heat Pumps
- BPS Acceleration
- Efficient Streetlighting
- VFDs on All Pumps and Fans > 10 Horsepower

Thermal Energy Storage as a Distributed Energy Resource was not presented as it had a Total Resource Cost (TRC) test score of 0.26 and, therefore, was not considered to be a viable MTI.

Advancement Plan development

As a result of Stage 2 scoring and subsequent discussion with the MTAB, CalMTA recommends developing an Advancement Plan for BPS Acceleration. As further detailed in the following section, this MTI aims to accelerate performance improvement of the existing commercial building stock by preparing and equipping the market with the value proposition and capabilities to respond early and constructively to California's forthcoming policies on energy use and emissions reductions.

BPS Acceleration merits development of an Advancement Plan based on high Total System Benefit (TSB) and beneficial ramp rate and cost-effectiveness; the idea also scored well in energy savings and greenhouse gas (GHG) emissions. Due to the complementary elements with other measures, it also would strengthen the MTIs being developed as part of the first and second batches, such as Commercial Rooftop Units (CRTUs), Foodservice Water Heating (FSWH), Commercial Replacement and Attachment Windows (CRAWS), and Induction Cooking and Room Heat Pumps (RHPs) for multifamily markets. This MT idea would also broaden the portfolio's reach into commercial markets.

Advancement Plan development is a precursor to CalMTA committing resources to complete the second Phase I deliverable: development of an Advancement Plan that describes proposed next steps to develop the BPS Acceleration idea.

CalMTA does not recommend further investment in three of the ideas scored in Stage 2 for the reasons described below. In order to reconsider Multifunction Heat Pump and VFDs on All Pumps

and Fans > 10 Horsepower for future advancement, we see benefit in monitoring current research and technology development that will address the knowledge gaps described below. CalMTA recommends that Efficient Streetlighting not be considered for future advancement.

- **Multifunction Heat Pumps:** CalMTA has identified three knowledge and technology gaps for multifunction heat pumps. The first is the ability of the product to deliver all three critical functions: space cooling, space heating, and water heating. According to CalMTA's research as part of Stage 2, many, if not most, current products only perform space and water heating. With many California climates needing space cooling, including significant areas that cover equity populations, the need for technology advancement is important to fully impact the broad California market. Second, testing research on performance in the different operation modes will allow for a more defined product definition and increased savings estimate accuracy. The UC Davis Western Cooling Efficiency Center is currently conducting performance testing through the CalNEXT program, scheduled to be completed in late 2025. Finally, a complete understanding of the potential incremental GHG impacts from refrigerant leaks with additional piping connecting the heat pump to the air handling unit and/or storage water tank is important to refine the technology's TSB. In addition to technology gaps, this idea would present significant savings overlap with the existing Room Heat Pumps (RHP) and Residential Heat Pump Water Heater (HPWH) MTIs.
- **VFDs on All Pumps and Fans >10 HP:** VFDs were the lowest scoring Stage 2 idea and also saw the largest reduction from the Stage 1 score. Title 24 includes VFD requirements for many motor applications in new construction and permitted retrofit. VFDs are also a deemed commercial measure in California. During the Stage 2 scoring activity, CalMTA evaluated information relating to a VFD MT program in the northwest. A Market Progress Evaluation Report noted numerous MT challenges including lack of a compelling value proposition to drive diffusion in a market that does not value efficiency. MT alignment is challenged by a lack of well-defined focal point for market interventions given a fragmented market consisting of many decision-makers, varied influencers, and many different paths to purchase. CalMTA will closely observe industry activities that may lead to an enhancement of the MT product definition beyond the originally submitted >10 HP MT idea and signs of increased market diffusion in other MT programs.
- **Efficient Streetlighting:** Many of the California streetlights have been upgraded to LED technology. While there have been improvements in LED efficacy over the past decade, this limits the energy savings opportunities of the MT idea. The ability of controls to enhance the business case is critical to the success of this MT idea. Phase I work revealed that the interplay between controls and safety standards limit the savings that controls can deliver and provided greater insight into the complicated ownership models that contribute to complex financial barriers. The combination of these factors leads CalMTA to

recommend suspending this MTI and assigning resources to higher priority ideas in the portfolio.

BPS Acceleration MT idea

The following sections describe potential elements of the BPS Acceleration MT idea that will be further scoped in the Advancement Plan.

Name	Building Performance Standard (BPS) Acceleration
Sectors	Commercial Buildings, existing
Portfolio Priorities	
<input type="checkbox"/> Equity <input type="checkbox"/> WE&T <input checked="" type="checkbox"/> Energy Savings <input type="checkbox"/> Grid Benefits <input checked="" type="checkbox"/> GHG Reductions	
Product Definition	
<p>The BPS Acceleration MTI will develop strategies and tools to prepare the market for a constructive and accelerated response to policies and laws aimed at reducing energy use intensity (EUI) and GHG emissions of the built environment in support of California Senate Bill 48, the Building Energy Savings Act (SB 48).</p> <p>BPS are policies that require commercial and multifamily buildings to meet certain performance levels, typically for energy use or GHG. BPS are typically phased in by building size with larger buildings (>50,000 sq ft) being regulated first, followed later by smaller buildings (>20,000 sq ft). BPS are often preceded by energy benchmarking requirements. Each local or state government that implements a BPS customizes the requirements to fit its needs, but in general, a BPS contains:</p> <ol style="list-style-type: none"> 1) A performance target. For example, a jurisdiction may require buildings to meet a specific level of energy use per square foot and/or other level of performance. 2) A timeframe by which all buildings must meet this target. For example, a jurisdiction may require that all buildings meet this target by December 2050, with interim goals in 2030 and 2040. Many laws include alternative paths to compliance, and there are penalties for buildings that fail to reach the target.”¹ <p>SB 48 was approved in 2023 requiring the California Energy Commission (CEC), in consultation with the State Air Resources Board, Public Utilities Commission, and Department of Housing and Community Development, on or before July 1, 2026, to develop a strategy for using building energy benchmarking data to track and manage the energy usage and emissions of greenhouse gases of covered buildings in order to achieve the State’s goals, targets, and standards related to energy usage and emissions of GHG.</p> <p>SB 48 does not require the CEC to develop a BPS, nor does it limit the CEC to utilizing only BPS to achieve the State’s goals. However, in the 2021 Integrated Energy Policy Report, the CEC noted, “California is in a prime position to implement and enforce a building performance standard using the numerous local, state, and national examples. The CEC will aim to create a building performance standard with metrics for existing buildings that align with new building metrics.”</p>	

¹ What are Building Performance Standards? ENERGY STAR. Undated. Accessed January 21, 2025. <https://www.energystar.gov/buildings/resources-topic/what-are-building-performance-standards>

Development of a statewide BPS is not a prerequisite for MTI success. Whatever recommendations are made by the CEC to achieve the State's goals, this MTI will focus on collaboration within the state to develop the most effective policy for achieving California's energy efficiency and emissions goals, and developing complementary strategies and tools to simplify, accelerate, and maximize building owners' compliance with EUI and GHG reduction targets.

Rather than focusing on a specific technology, this MTI will create a strategic pathway for building owners to reduce EUI and comply with BPS or California's broader decarbonization goals. The initiative will address systemic barriers such as benchmarking, energy audits, financing, and market capacity, which have hindered compliance in other jurisdictions. By removing these obstacles, the MTI will also pave the way for greater adoption of technology-specific initiatives within CalMTA's portfolio – such as CRTUs, CRAWs, and FSWH – as well as increased participation in other statewide programs aimed at EUI and GHG reductions across the built environment.

Preliminary Market Transformation Theory

Successful implementation of a statewide BPS is critical for California to meet its energy and climate goals. However, lessons learned from other jurisdictions that currently have BPS reveal several market barriers that can prevent or delay the anticipated benefits. There are currently four statewide BPS and 12 regional BPS that have been implemented in the US, which have provided some insights into the problem of compliance. While no initial compliance deadlines have yet occurred, research has been conducted to gauge compliance progress in those cities furthest along. In general, compliance rates remain low, and data suggest that buildings that have come into compliance are most likely those for which compliance was not a significant burden.² This highlights a significant risk that buildings with poorer performance – those facing higher barriers to compliance – will continue to lag as standards tighten over time, potentially resulting in a widening compliance gap.

In many places where BPS have been implemented, hubs and accelerators have been established to provide technical support to building owners and facilitate compliance with the BPS. In some locations, incentives have been offered to drive early compliance. Yet substantial barriers to compliance remain, and are likely to grow, as targets become more stringent. Through research into the hubs' approaches and insights gained from market actor interviews in Washington state, several key gaps have been identified that remain unaddressed by the various hubs and accelerator programs, and that can form the central premise of CalMTA's MT theory.

Additionally, the interventions employed in these jurisdictions have addressed market barriers only. Lessons learned suggest that some barriers were created during policy development, prior to the implementation phase of BPS.

We envision that CalMTA will participate in addressing barriers in both policy and in the market, with the bulk of our efforts focusing on addressing market barriers prior to BPS launch and during its implementation.

With regard to policy interventions, the BPS Acceleration MTI would not aim to accelerate development of a BPS policy, but rather inform policy in order to create accommodating market conditions for building-owner compliance and accelerate the market's constructive response to

² Lessons from the Ground: Implementing Building Performance Standards. Institute for Market Transformation. Undated. Accessed January 27, 2024. <https://imt.org/resources/lessons-from-the-ground-implementing-building-performance-standards/>.

such a policy. Policy that doesn't understand the market won't work. We envision CalMTA's participation as a stakeholder in informing BPS policy via CEC workshops scheduled for 2025 and sharing lessons learned from other jurisdictions that can help eliminate or reduce barriers that have been created at this phase in other jurisdictions.

One such policy gap is ineffective consequences for noncompliance. In jurisdictions with BPS, much of the effort to date has focused on creating awareness of technology solutions and creating access to short-term financing mechanisms, relying on the enforcement of penalties to drive participation and compliance. These strategies have had limited success since many building owners find it easier to pay modest fines than to commit to expensive or complex upgrades. The fundamental goal of a BPS is to motivate action that would not otherwise happen, not simply drive adoption of more efficient technologies by willing market participants. Policy development with an MT lens can help address this critical policy barrier.

The thrust of CalMTA's involvement, however, would be in the market where we will research barriers to compliance and develop more holistic intervention strategies and pathways that have been missing from other jurisdictions' efforts. The MTI would develop compliance strategies that present a value proposition for building-owner participation. Examples include pathways that stage building owners' large-scale capital investments only after more accessible, lower-cost and faster-to-deploy interventions - such as strategic energy management (SEM), tuning existing building management systems and retro-commissioning - have reduced the gap between current and target EUI and GHG emissions performance. These strategies will align necessary capital improvements with existing building lifecycle planning to the extent possible, while still meeting compliance deadlines, thus reducing the incremental capital required to achieve BPS compliance on time and increasing the viability of financing mechanisms such as Energy as a Service (EaaS) and Energy Service Companies (ESCOs).

By establishing early, attainable milestones, the MTI aims to engage building owners who may have hesitated due to uncertainty or difficulty aligning performance standards with their business goals. Early building-owner engagement in attainable milestones will increase the likelihood of building owners remaining engaged when larger, capital-intensive investments are needed, and can reduce the financial burden of those investments by upgrading equipment later in its serviceable life when it is closer to planned replacement.

The MTI will develop strategies specific to environmental and social justice (ESJ) communities where buildings are more likely to be farther from performance targets necessitating more significant and costly upgrades. The initiative will leverage lessons learned from other jurisdictions' efforts to develop low-cost compliance pathways including funding and financing options such as green banks and revolving funds, and will also address split incentives in leased properties, where financial responsibilities between owners and tenants often conflict. It will prioritize minimizing tenant disruption and insulating renters from additional costs, ensuring that compliance benefits are distributed fairly across all communities.

When successful, this MTI will simplify, accelerate, and equitably amplify building owners' early response to BPS (or surrogate standards). By working with CEC to align state and regional BPS, it will reduce confusion stemming from multiple standards applying to a single entity, catalyze greater involvement from building owners and reduce compliance costs. This MTI will help prepare the market for a constructive and accelerated response to the CEC's pending BPS Strategy Report and

potential BPS, thus maximizing the impact of California’s investment in decarbonizing its built environment.

Possible Leverage Points

The following list describes aggregation nodes in the market that CalMTA can leverage to accelerate market adoption and/or amplify MTI influence.

- SB-48 requires the California Energy Commission (CEC), on or before July 1, 2026 to develop a strategy using the existing energy usage data found in the benchmarking program requirement to track and manage the energy and GHG emissions of covered buildings in order to achieve the state’s energy and climate goals for buildings. CalMTA will partner with CEC and partner organizations to ensure that the state designs and adopts the most effective form of Building Performance Standard and prepares the market for early and accelerated response to forthcoming policy on building energy performance.
- Organizations such as DOE, CEC, CARB, American Council for an Energy-Efficient Economy (ACEEE), along with numerous BPS hubs in jurisdictions that have already launched BPS, have developed significant resources for supporting BPS implementation. These organizations have developed tools for utilizing benchmarking data, researched and developed compliance pathways, and have identified best practices and lessons learned. This MTI can leverage those existing resources and more quickly develop California-specific resources to better prepare the market for BPS and drive earlier response to BPS.
- The California statewide benchmarking program can be used to identify priority buildings, group buildings by types of upgrades needed in order to achieve energy and decarbonization targets and develop well-defined but flexible compliance pathways that correspond to large cohorts of buildings.
- This MTI can leverage existing MTI activities such as energy modeling, savings analyses and supply chain relationships associated with CRTU, FSWH, CRAWNS, and other MTIs. Outputs from these activities can be applied to the BPS MTI to confidently estimate energy savings and emissions reductions earlier than would otherwise be possible, thus amplifying the impact of existing MTIs and simultaneously accelerating market response to BPS. Bulk ordering agreements established by other CalMTA MTIs can be extended to this MTI, reducing the cost of BPS-related equipment purchases and accelerating adoption sooner than would be expected without this leverage and aggregated demand.
- The Building Owners and Managers Association (BOMA) is a trade organization that can be a vector for driving awareness, delivering education materials, and engaging with decision-makers responsible for managing commercial buildings. BOMA’s members represent those who will be responsible for compliance with California efficiency and decarbonization targets.

CalMTA’s Role

The following are potential roles for CalMTA throughout the various Phases of the MTI. Roles and associated activities would be researched and refined during Phase I: Concept Development and Phase II: Program Development. CalMTA envisions having roles in the following areas:

Policy

- Work with CEC to shape BPS policy with an MT perspective in order to reduce or eliminate barriers associated with policy design and ensure that California designs and adopts a BPS that most effectively drives achievement of the State’s energy efficiency and emissions goals.

Government Support

- Within CA, one city has currently passed a BPS: Chula Vista. Seven other jurisdictions are considering adoption of a BPS. This leaves much of California with no activity relative to BPS, risking delayed response to any statewide BPS. This MTI will help to drive increased local government engagement on a schedule that may be several years earlier than what will otherwise happen.
- Prepare jurisdictions for adoption and effective deployment of BPS earlier than might otherwise happen.
 - The combination of technical, economic, market data, and organizational expertise to develop and support ongoing implementation of a BPS program is rarely found at a single local government as it is an unconventional program concept. Elements of BPS implementation are often resource intensive and not efficiently conducted at the single jurisdiction level. Directly and/or through collaboration with BPS hubs, CalMTA will provide technical, organizational, financial, and programmatic expertise to jurisdictions administering BPS.

Market Preparedness and Facilitation

- Educate and prepare the market for early response to BPS. Develop a building-owner value proposition that will accelerate progress towards meeting BPS targets, increasing the likelihood that building owners will respond constructively to BPS rather than choosing to pay fines.
- Convene, coordinate, and facilitate statewide collaborative of building owner associations (e.g., BOMA), architects, engineers and other relevant market actors to permanently embed BPS-related practices into building life-cycle planning and budgeting.
- Convene and collaborate with market stakeholders and other BPS jurisdictions to develop and/or adapt holistic upgrade strategies that reflect optimal loading order of measures for California building stock to reduce long-term costs, maximize TSB and enhance ROIs.
- Directly and/or through collaboration with BPS hubs, CalMTA will provide technical, organizational, financial, and programmatic expertise to building owner associations in order to assist them in understanding and complying with local BPS.
- For specific market segments such as DACs and low-income multifamily communities where buildings are likely to be further from compliance, coordinate among stakeholders to develop custom compliance pathways that ensure BPS compliance does not financially burden these communities or result in increased rents.

2025 Priorities for Phase II

- Continue coordination with the CEC and participate in scheduled technical workshops (Q1 2025), individual input meetings (Q1 - Q3, 2025) and technical advisory workgroup meetings (Q1 - Q3, 2025) to advise and assist in development of the Building Energy Performance Strategy Report.
- Analyze benchmarking data and conduct market characterization research to develop preliminary baseline and market adoption curves.
- Research mechanisms for determining savings that will span multiple programs within and beyond CalMTA's portfolio.

- Research and define strategic interventions, clear market outcomes and mechanisms for determining market impact as part of Advancement Plan development.
- Coordinate outreach and engagement with existing BPS Hubs to document lessons learned and best practices and identify gaps/interventions that CalMTA could help to fill.
- Research funding and financing models including Energy as a Service (EaaS) and Energy Service Companies (ESCOs).
- Coordinate outreach and engagement with efficiency organizations such as ACEEE, Rocky Mountain Institute (RMI), New Building Institute (NBI) and others to consolidate and adapt strategic recommendations relevant to California building stock.
- Research and understand barriers specific to ESJ communities.
- Establish objectives and measurement approach for coordinated statewide intervention.

Portfolio Characteristics

Expanding a robust portfolio of ideas remains an important consideration as CalMTA conducts MTI activities in 2025. In addition to selecting individual MTIs, CalMTA needs to consider how the entire portfolio of selected ideas will perform compared to strategic goals. This is not unlike a financial portfolio where investments with higher risks and rewards are mixed with lower risk and reward investments to manage risk. After discussions with the MTAB during Batch 2 development, CalMTA identified characteristics of the MTI portfolio that will be important to monitor - even though not every MTI will address or perform well against every characteristic. As part of Batch 3 development MTAB identified TSB and ramp rate as priority characteristics. Ideas advancing to Stage 2 scored well in these two areas. At the completion of Stage 2 scoring, the BPS Acceleration idea had scores of “low” for ESJ and workforce, education, and training (WE&T). Subsequent feedback from strategic advisors and other stakeholders identified additional opportunities in these areas that had not been previously considered, resulting in a final score of “medium” for ESJ and WE&T.

Key portfolio characteristics for all idea batches are shown in Table 1 below.

Table 1. Characteristics of MTIs in Batch 1 & 2 and proposed Batch 3 MTI

Idea name	Batch	Sector	Ramp rate/ Timing	ESJ	WE&T
Building Performance Standard Acceleration	3	Comm	Med	Med	Med
Foodservice Water Heating	2	Comm	Long	Med	Med
Commercial Replacement and Attachment Window Solutions	2	Comm	Long	Med	High

Idea name	Batch	Sector	Ramp rate/ Timing	ESJ	WE&T
Residential Heat Pump Water Heating	2	Res	Short	Low	High
Room Heat Pumps	1	Res	Short	High	Low
Induction Cooking	1	Res	Short	High	Low
Commercial Rooftop Units	1	Comm	Med	Med	High

While a BPS Acceleration MTI would not seek to advance any specific technology, it would complement CalMTA’s portfolio of MTIs by developing strategies and tools to facilitate building-owner compliance with policies and laws aimed at achieving energy use and emissions reductions in the built environment. It would increase market leverage for other technology-specific MTIs in CalMTA’s portfolio, such as CRTUs, FSWH, CRAWs, Induction Cooking and RHPs, and is also expected to increase leverage for other statewide programs driving EUI and emissions reductions.

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 also aim to advance state goals on demand flexibility, workforce development and equity. Learn more at www.calmta.org.