



Induction Cooktops & Ranges

Market Transformation Advancement Plan

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

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This Advancement Plan describes CalMTA's recommendations for information to be developed and research conducted during Phase II: Program Development for the Induction Cooktops and Ranges Market Transformation Initiative (MTI). CalMTA will finalize the Advancement Plan after reviewing comments received from the Market Transformation Advisory Board (MTAB) and the public via the California Public Utilities Commission (CPUC) Energy Division's Public Documents Area website.

CalMTA will use data and research collected in Phase II to further inform and refine the proposed Market Transformation (MT) theory, intervention strategies, and metrics and data that will be used to assess incremental impact for this MTI to determine if it should advance to Phase III: Market Deployment. CalMTA will prepare a full MTI Plan for approval by the CPUC if it recommends advancing this MTI to Phase III. This MTI Advancement Plan contains:

- 1) Key characteristics of the proposed MTI (e.g., description, target market, barriers, opportunities, MT theory, and possible interventions)
- 2) Identified gaps in knowledge that need to be filled before CalMTA can determine whether to recommend advancing the MTI Phase III: Market Deployment
- 3) Initial cost estimate and work plan for activities in Phase II that will fill the knowledge gaps.

1 Executive Summary

As California continues its goal of decarbonization, induction cooktops and ranges represent one of the largest kitchen appliance opportunities. This technology offers several benefits over standard gas and electric cooktops:

- 1) According to the EPA, induction cooktops and ranges are highly efficient, delivering ~85% of the energy they consume to heat the food compared to ~75-80% for electric stoves and ~32% for gas stoves.¹
- 2) Induction offers more precise control of cooking temperatures, eliminates harmful gases that can negatively impact human health, offers improved safety, and reduces greenhouse gas (GHG) emissions.

¹https://www.energystar.gov/partner_resources/brand_owner_resources/spec_dev_effort/2021_residential_induction_cooking_tops

While potential barriers to adoption exist surrounding financial, educational, and cultural concerns, CalMTA believes these can be overcome to achieve widespread acceptance and adoption of the technology. Potential strategies to mitigate these barriers include:

- Partnering with distributors and manufacturers to convey the business case for developing and selling more affordable and improved products
- Influencing adoption of the new ENERGY STAR® specifications and future updates to the specification
- Coordinating with California’s Codes and Standards Advocacy program team and subject matter experts to build upon their foundational specifications and induction product research
- Coordinating with other program administrators to leverage local multifamily and weatherization programs and Inflation Reduction Act (IRA) funding.

As the kitchen is often the heart of a home and where initial upgrades or remodels are done, induction cooking can serve as a readily visible lynchpin technology to increase consumer comfort with whole-home electrification. If consumers do not embrace electric cooking, then we run the risk of maintaining gas infrastructure to homes for one, last remaining appliance. The MTI will support California’s transition to 100% Renewable Portfolio Standard (RPS)-certified, zero-carbon emissions by 2045. CalMTA’s preliminary analysis finds that this MTI has an estimated Total System Benefit (TSB)² of \$690M over the 20-year lifecycle of the initiative.

Achieving the goal of widespread adoption requires a special focus on lower-income consumers in environmental and social justice (ESJ) communities. Currently, induction cooktops and ranges are seen as premium products that often require additional electrical upgrades for installation and usage. The initiative must address the need for 24” models which are a common size in rental units. Through the approaches mentioned above, we can ensure suitable (120-volt or higher and 24”), affordable products are available to everyone to support complete market transformation.

As envisioned by CalMTA, by 2035 all new homes in California will be built with electric induction ranges and 50% of all cooktops and ranges sold in the state will include induction technology. The technology will gain widespread acceptance and awareness as prices fall and become competitive with current electric resistance and gas models, and as the myth of gas range superiority is debunked. While cooktops are often the most challenging hurdle to overcome in full home decarbonization, induction cooktops have the potential to serve as a foundational all-electric electric home appliance - inspiring more consumers to pursue electrification.

2 Product, Service, or Practice Definition

Induction cooktops and ranges use electromagnetic induction in the cooktop portions of the technology to heat cookware directly. Unlike traditional electric, gas, or propane cooking

² For further details and explanation on TSB inputs and assumptions see Appendix 1.

technologies, induction ranges use alternating electric current passed through copper heating coils underneath a flat glass or ceramic surface to heat the cooking vessel. When a metal pot containing enough iron is placed on the surface of the range, it activates a magnetic charge that heats the food while the cookware and stovetop remain relatively cool to the touch.

Induction cooking saves energy through instant, direct, and efficient heat transfer, and provides precise temperature control. Like all electric ranges, induction technology does not directly emit the harmful byproducts generated through combustion of natural gas or propane, which contribute to reduced indoor air quality.³ Although gas cooking does not generate as much CO₂ as other residential end-uses (such as space heating and water heating), replacing gas stoves with electric resistance is often the critical last step in fully electrifying residential buildings, which in turn can support strategic decommissioning⁴ of portions of California's natural gas distribution infrastructure. Since methane leakage from gas infrastructure is a significant contributor to California's overall GHG emissions, market adoption of induction cooking can have an impact that far exceeds the site-level reduction in CO₂ emissions from cooking.

Unlike electric resistance cooking, induction does not require the consumer to sacrifice temperature control and performance to reduce emissions and save energy. In fact, relative to both gas and electric resistance, this technology offers better temperature control, safer cool-to-the-touch cooking surfaces, and other advanced features like setting exact times and temperatures on each burner. By emitting far less heat in the kitchen than gas ranges, induction can also improve comfort and reduce air-conditioning load during peak cooling times.

Induction cooktops are widely available from major manufacturers as either a combined range, a cooktop installed in a countertop, or a portable plug-in countertop unit. Current product gaps include affordable 24" ranges, which primarily service the rental market, ranges that run on 120V to mitigate the need for electrical panel upgrades, and models with backup batteries that enable a consumer to continue to cook during power outages. Expanding product options will allow consumers to choose between fully replacing, supplementing, or complementing existing kitchen equipment with this feature-rich, efficient, safe, and healthy electric technology.

³ Environ. Sci. Technol. 2022, 56, 4, 2529-2539

⁴ https://buildingdecarb.org/wp-content/uploads/the_flipside_report_-_targeted_electrification_for_gas_transition.pdf



3 Market Transformation Theory and Opportunity

3.1 Market Opportunity

With more than a 70% market share, gas ranges are the most prevalent cooking method in California single-family and multi-family units. Gas ranges have been promoted in California for years, despite their inefficiency and the increased awareness of gas cooking's negative impact on a home's indoor air quality (IAQ). While cooking technology represents a key opportunity in supporting home electrification, consumers need affordable and efficient electric options. The market is fairly mature, with most manufacturers offering induction models, yet adoption has been slow. The technology has improved significantly from early induction cooking and traditional resistance cooktops, creating additional market opportunity. Although the potential GHG and energy use reduction impacts of induction cooking are less significant than those associated with replacing gas furnaces and water heaters with heat pumps, this technology represents the most high-profile and visible end-use in an all-electric home. Overcoming consumers' attachment to their gas stoves will help prevent a scenario in which the gas infrastructure is utilized for one last appliance in the home.

3.2 Target Market

The Induction Ranges and Cooktop MTI primarily targets existing and new construction multi-family and single-family homes with a focus on induction products that are well-suited to serving ESJ customers.

3.3 Key Market Barriers

Induction stoves and cooktops face the following barriers:

- **Higher cost at entry level:** Induction cooking has been available for several years, with most major manufacturers offering models, but the product has not been widely adopted

and continues to be positioned as a premium product beyond the reach of many ESJ households. Induction cooktops and ranges can cost between \$200 and \$1,000 more than comparable gas and radiant-electric models and often require the purchase of new cookware. Ensuring that induction stoves are affordable and available to consumers will be critical to increased acceptance of efficient electrification, reducing the risk that consumers perceive electric technologies (such as electric resistance stoves) as inferior.

- **Lack of awareness of benefits and resistance to change/attachment to existing technology:** For many years, gas cooking has been marketed as a superior cooking method so consumer awareness on the benefits of induction cooking is low. In addition, a new ENERGY STAR label covers cooking appliances and pushes consumers towards induction cooking, but awareness of this product category is also low.
- **Technical improvements needed:** Product availability of 24" ranges and those that can use 120Vs used in smaller homes and multifamily units needs to be addressed. In addition, consumers cannot continue to cook with induction during power outages. Adding battery backups to induction is being done in a few models and needs to become more prevalent over time.
- **Cultural barriers:** Some communities face cultural barriers associated with the move away from gas to electric cooking, with the perception that an open flame is required to properly prepare traditional dishes.
- **Limited electric panel capacity:** In many cases, induction and other electrification measures may require an outlet and/or panel upgrade.

3.4 Points of Leverage and Strategic Interventions

Multiple points of leverage in this market exist, which can be addressed through the following strategic interventions:

- CalMTA will engage manufacturers to improve products, include more 24" models, and develop lower-priced models that include induction but without premium add-on features.
- CalMTA will coordinate and build upon the product research work that the CalNEXT program has already completed.
- This MTI will leverage existing financial assistance programs, incentives, and rebates to offset the cost of ownership and possible electrical upgrades needed. CalMTA will also encourage inclusion of induction products in direct installation programs targeting limited-income households (e.g., the Energy Savings Assistance [ESA] programs in California) and programs focused on improving IAQ and promoting electrification.
- This MTI will build stocking and sales practices targeting ESJ communities by engaging with retailers, online retail platforms and their manufacturer suppliers on co-marketing partnerships, layered with IRA funding.

- To build awareness about the benefits of induction, this MTI will build and deploy consumer education campaigns, which will include demonstrations, in partnerships with current programs, community-based organizations (CBOs), and local governments.
- This MTI will support the development of residential and multifamily all-electric new construction codes and state and federal standards through interventions that increase availability of more affordable products, build awareness of induction's benefits, and increase overall market share.
- CalMTA will engage with ENERGY STAR to support the new Residential Cooking Products V1.0 specification, which serves as key energy efficiency product differentiator. Over time, CalMTA will work with ENERGY STAR on V2.0 which will continue to improve efficiency of induction cooking.
- CalMTA will coordinate with the California Codes and Standards Advocacy Program team to learn from and build upon the valuable work this team has already completed on induction cooktops and ranges.

3.5 Market Vision/End-State

A transformed market will be driven by changed perceptions and understanding of the benefits of induction cooktops, including the health benefits for household members, improved IAQ, reduced GHG emissions, increased safety, and a superior cooking performance. As California moves towards further decarbonization, affordable and appropriately sized ENERGY STAR-labeled induction options will become the first choice for cooking in most single- and multi-family homes.

This MTI will also support the California Air Resource Board's (CARB) efforts to require the sale of only zero-emission appliances, along with possible federal standards that improve the efficiency of electric cooktops and ranges, effectively ensuring induction cooking as the standard cooking appliance in homes.

By 2035, all new homes in California will be built with electric induction ranges and 50% of all cooktops and ranges sold in the state will include induction technology. By this date induction ranges will become the standard in both new construction and existing single- and multi-family homes, contributing to increased public acceptance of and interest in all-electric homes.

3.6 Key Market Assumptions

The following market assumptions inform this MTI and Advancement Plan:

- California continues to invest in electrification programs that target ESJ multi-family and single-family homes. CalMTA can leverage these programs to reach target audiences.
- IRA funding continues to target induction cooking, especially for customers in ESJ communities.
- California electric and gas utilities continue to invest in online marketplaces and midstream channel retail programs, which create an accessible distribution channel.

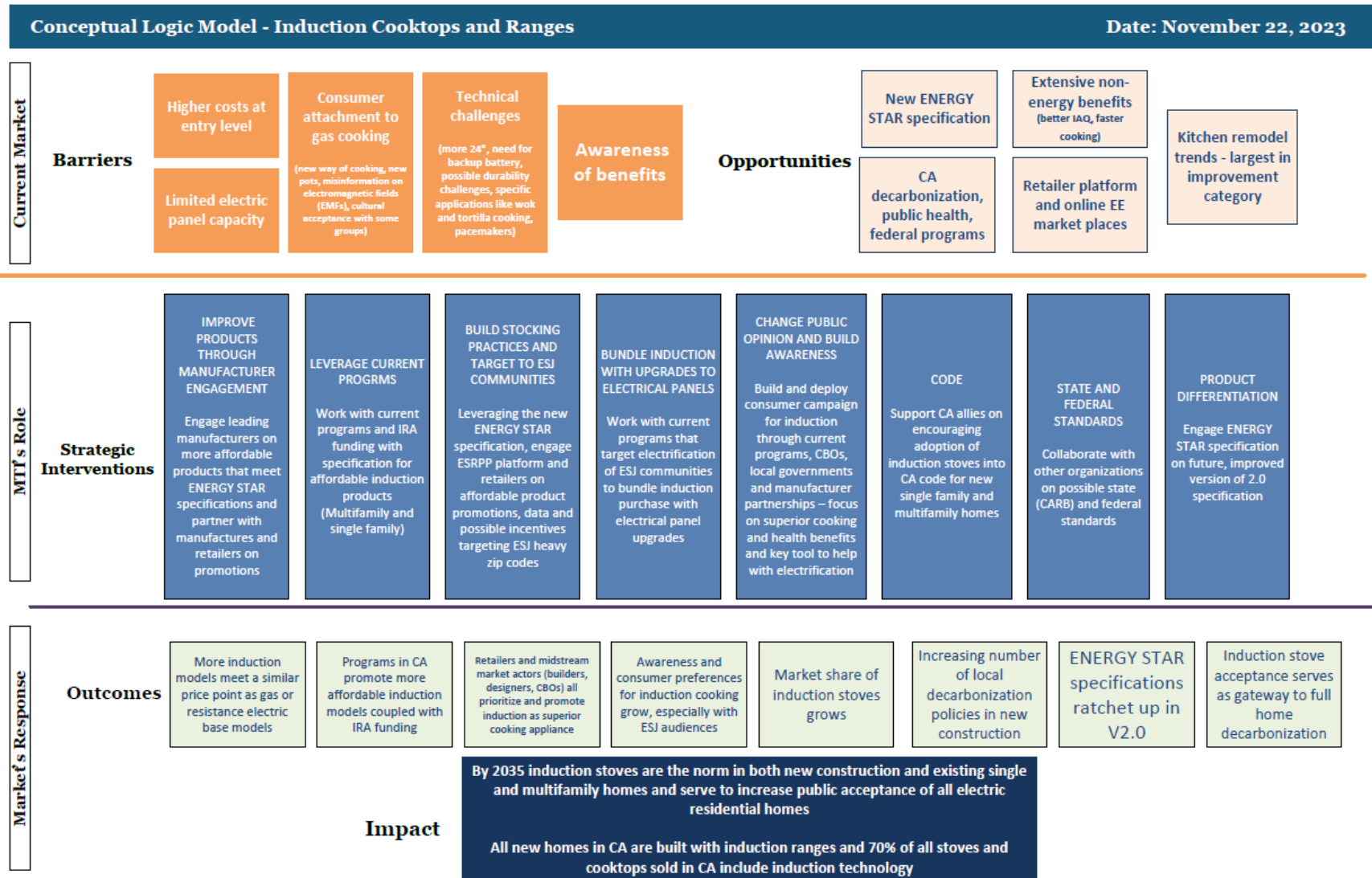
3.7 Diffusion and “Lastingness” Mechanism

Long-term diffusion will occur as more affordable, ENERGY STAR-labeled products become commercially available and as market understanding and awareness of the benefits of induction cooking grows. As California moves toward decarbonization, affordable induction options will be the first choice for cooking in most homes. In the long term, a potential federal standard could “raise the floor” on efficiency levels to position induction cooking as the means for meeting this standard.

3.8 Conceptual Logic Model

Figure 1 features the logic model developed to provide a preliminary visualization of the Induction Cooktop and Ranges MTI program theory. It includes high-level market barriers and opportunities that inform the draft interventions, as well as expected outcomes and long-term impacts. This model represents the entire “market,” with many parties contributing to the advancement of induction cooking. CalMTA’s role in each of these potential interventions will become clearer after the research phase is complete. The proposed market characterization, product assessment, and pilots conducted in Phase II will verify logic model assumptions and draft interventions. Once this work is completed in Phase II, CalMTA will develop a more refined and formal logic model for Phase III: Market Deployment.

Figure 1. Induction Cooktops & Ranges Conceptual Logic Model



3.9 Measuring Market Outcomes

The conceptual logic model depicted in Figure 1 shows CalMTA’s current thinking on envisioned MTI outcomes. We expect to refine the logic model during Phase II based on the research we conduct to address current knowledge and data gaps as described in [Section 5: Research and Program Development Plan](#). This Phase II research will inform the development of an evaluation plan that includes clearly defined market progress indicators, the data sources for tracking those, and the expected timeframe for realizing market transformation progress.

While Phase II research is needed to fill information gaps before we can establish clearly defined MTIs and measurement plans, Table 1 shows our current thinking on likely market progress indicators, some of the possible associated data sources, and the Phase II research that will further inform our evaluation plan.

Table 1. Possible MTI Market Progress Indicators and Data Sources

Likely Market Progress Indicator	Possible Data Sources	Phase II Research that will Inform the MTI
Market share of qualified induction cooktops and ranges grow	Retailers Manufacturers	Secondary research Market actor (manufacturer, retailer, multifamily building owner) interviews Sales data obtained through ESRPP pilot
More induction models meet a similar price point as gas or electric resistance base models	Retailer data Store visits/shopping Web scraping	Market actor interviews Store visits/shopping Web scraping
More stringent ENERGY STAR specification	ENERGY STAR	Subject matter expert (SME) interviews with ENERGY STAR staff
Local programs promote more affordable induction models coupled with IRA funding	Program documentation	Program administrator/SME interviews
Awareness of benefits and preferences for induction cooking grow	Consumer survey CBO partner survey	Consumer survey

In addition to the preliminary market progress indicators shown in Table 1, CalMTA is working to develop metrics specifically focused on equity. During Phase I we kicked off a long-term engagement plan with CBOs and other organizations that serve ESJ communities. Although additional, ongoing engagement will be required to establish the most appropriate equity metrics, Table 2 shows our preliminary thinking on possible equity metrics.

Table 2. Possible Equity Metrics and Data Sources

Possible Equity Metric	Possible Data Sources	Notes
ESJ partner engagement: Number of CBOs/other ESJ market partners engaged in MTI design Number of CBOs/other ESJ market partners engaged in MTI implementation	CalMTA Stakeholder Engagement Database (Salesforce data)	
Awareness of product and benefits among ESJ communities	Consumer survey Landlord survey CBO/partner survey	
CBO/ESJ partner satisfaction	CBO/partner survey	Could also include qualitative feedback, such as success stories and lessons learned
Market adoption among ESJ communities	Program data (coordinated/partner programs)	This may be difficult/costly to measure quantitatively
Non-energy impacts among adopters in ESJ communities (e.g., health, safety or user experience)	Local/partner program participant evaluation	Would likely be conducted by or in collaboration with the local/partner program evaluation

4 Gap Analysis

In contrast to many other emerging technologies, induction cooktops are a lifestyle product and interplay with sociocultural and socio-economic dynamics. Their everyday use, high visibility, and cultural importance to cooking in the home creates unique barriers and opportunities for market engagement. Research that explores cultural acceptance of induction cooktops will be critical to ensuring that program logic and interventions are relevant and adequately reflect the challenges of mass-market adoption, with specific insights for ESJ communities. Additionally, the cost barriers surrounding electrical upgrades that enable gas-to-induction installations must be better understood and quantified. In the next phase of MTI development, the following research will be needed:

- **A full market characterization** will describe the supply and demand-side market actors, dynamics as well as barriers and solutions. Of particular interest is the new ENERGY STAR specification for cooktops and ranges, as CalMTA will need to better understand how manufacturers are reacting to this specification when developing new models. Awareness of induction, preferences, and standard practices among trades such as builders and kitchen remodelers also need to be better understood, as do various policy levers.

- **Product-specific research** is also needed, particularly on affordability, sizing, and drop-in 120V replacement. CalMTA also sees the need for research to determine “cost of efficiency,” or strategies for improving affordability without compromising efficiency, and will coordinate with manufacturers to achieve this.
- **One strategy pilot has been identified.** CalMTA will gather data and test an intervention using the current ENERGY STAR Retail Product Platform (ESRPP) as a channel for targeting ESJ communities.

The research will inform a full MTI Plan and allow CalMTA to refine savings and cost-effectiveness model assumptions as well as the baseline market adoption forecast. It will also inform the development of an evaluation plan that includes clearly defined market progress indicators, the data sources for tracking those, and the expected timeframe for realizing market transformation progress. A description of proposed research objectives and activities can be found in Sections 5.1 and 5.2.

5 Research and Program Development Plan

5.1 Market and Technology Research

The CalMTA team will first coordinate with relevant partners to ensure the development of this MTI leverages existing and planned induction cooking research in California or through national partners like the United States Department of Energy (DOE) and Environmental Protection Agency (EPA). Data and information needed to develop the full MTI Plan are shown in Tables 3, 4, 5, 6, and 7.

Table 3. Research Objectives, Tasks, and Final Deliverables

Research Objective	Phase II Research Task						Deliverable informed by Research
	Secondary Research/Sales Data Analysis	Builder and Remodeler Interviews	Manufacturer and SME Interviews	Focus Groups	Customer and Building Owner Surveys	Delphi Panel	
<p>Characterize the Induction Cooktop Market (supply side) Estimate market penetration of induction technology by housing sector (single-family, multifamily, existing homes, new construction)</p> <p>Map the supply chain detailing key manufacturers</p> <p>Calculate the market share of induction; characterize sales by product type, size, amperage requirements, and retailer types</p> <p>Gauge level of awareness and rate of installation or specification by home remodelers, designers, contractors, builders, and identify barriers and opportunities</p>	✓	✓	✓				1. MTI Plan 2. Evaluation and Data Collection Plans 3. Market Characterization 4. Baseline Market Forecast 5. Impact and Cost-Effectiveness Forecast

Research Objective	Phase II Research Task						Deliverable informed by Research
	Secondary Research/ Sales Data Analysis	Builder and Remodeler Interviews	Manufacturer and SME Interviews	Focus Groups	Customer and Building Owner Surveys	Delphi Panel	
<p>Characterize the Induction Cooktop Market (demand side)</p> <p>Assess awareness of and value hierarchy of induction (i.e., health, environmental impacts, improved cooking experiences) and cost-value proposition</p> <p>Explore distinctions between induction technology and electric resistance</p> <p>Explore distinctions between multifamily and SF barriers and opportunities, identify key influencers in purchaser decision-making</p> <p>Explore the need for affordable financing for some customer segments.</p> <p>Understand the assessment approaches and cost of electrical upgrades needed for induction products in home retrofits</p> <p>Understand the benefits of induction products that include battery backup</p>		✓		✓	✓		<ol style="list-style-type: none"> 1. MTI Plan 2. Evaluation and Data Collection Plans 3. Market Characterization 4. Baseline Market Forecast 5. Impact and Cost-Effectiveness Forecast

Research Objective	Phase II Research Task						Deliverable informed by Research
	Secondary Research/Sales Data Analysis	Builder and Remodeler Interviews	Manufacturer and SME Interviews	Focus Groups	Customer and Building Owner Surveys	Delphi Panel	
<p>Identify Sociocultural Connections and Interventions Assess barriers to induction technology uptake from a cultural perspective</p> <p>Explore leading social influencers, audiences, or groups for which induction is already gaining acceptance and traction</p> <p>Identify organizations with alignment on IAQ, with a specific focus on ESJ and explore partnerships</p>		✓	✓	✓	✓		<p>1. MTI Plan</p> <p>2. Market Characterization</p>
<p>Assess Opportunities for Technology Advancement/Improvement Understand the current landscape and outlook for ENERGY STAR qualifying products</p> <p>Understand the incremental cost of improved efficiency versus other features and explore opportunities for improving product affordability with manufacturers</p> <p>Explore health concerns for certain groups (possible pacemaker interference) and whether mitigation is possible</p>	✓		✓				<p>1. MTI Plan</p> <p>2. Evaluation and Data Collection Plans</p> <p>3. Impact and Cost-Effectiveness Forecast</p>
<p>Evaluate Policy Tools, Utility and Regulatory Landscape Explore options for working with CA utility programs to promote induction products and understand feasibility of various policy/regulatory paths to eliminate gas stoves</p>	✓		✓				<p>1. MTI Plan</p>

Research Objective	Phase II Research Task						Deliverable informed by Research
	Secondary Research/ Sales Data Analysis	Builder and Remodeler Interviews	Manufacturer and SME Interviews	Focus Groups	Customer and Building Owner Surveys	Delphi Panel	
Characterize the Baseline Market Conditions and Develop Market Baseline Forecast Segment the residential market by building type, range type, and size to understand market adoption potential	✓	✓	✓	✓	✓	✓	1. Baseline Market Adoption Forecast

Table 4. Research, Initial Cost Estimate, and Estimated Timeline

Research Task	Schedule (Estimated Weeks from Launch)	Initial Cost Estimate	Deliverables Informed by this Task
(1) Secondary Research ⁵ /Sales Data Analysis	Weeks 1-4	\$85,000	Market Characterization, Baseline Market Adoption Forecast, Impact and Cost-Effectiveness Forecast, MTI Plan
(2) Builder and Remodeler Interviews	Weeks 3-12	\$42,000	Market Characterization, Baseline Market Adoption Forecast, Impact and Cost-Effectiveness Forecast, MTI Plan
(3) Manufacturer and SME Interviews ⁶	Weeks 9-18	\$75,000	Market Characterization, Baseline Market Adoption Forecast, MTI Plan
(4) Focus Groups	Weeks 10-22	\$120,000	Market Characterization
(5) Customer and Building Owner Surveys	Weeks 18-32	\$130,000	Market Characterization
(6) Delphi Panel	Weeks 30-36	\$36,000	Baseline Market Adoption Forecast
(7) Sales Data Purchase		\$5,000	
Total Estimate		\$493,000	

5.2 Strategy Development and Testing

5.2.1 Technology

After addressing information gaps, CalMTA will conduct technical assessments of electric cooktop products currently on the market, including those in final stages of development but not yet available to the public. The team will also conduct the related technical research needed to inform MTI strategy and validate assumptions.

These assessments will allow CalMTA to validate and refine assumptions about how the technology will be adopted and used, and whether any technical barriers will prevent development of lower cost products, erode customer confidence, or otherwise limit adoption and use of induction cooking.

The table below outlines Technical Assessment Objectives (column 1) and describes Technology Assessment Methods (column 3). Purpose/Relevance (column 2) ensures that each research objective is necessary and directly relevant to the MTI. Most studies or lab testing described in the Methods column will address multiple objectives and research questions.

⁵ Interviews and literature reviews will be conducted in conjunction with the Market and Technology Research described in Table 3, Budgets are not included in Table 6 below.

⁶ Tasks also support research needs outlined in Table 5, Summary of Technology Assessment Activities.

Table 5. Summary of Technology Assessment Activities

Technical Assessment Objectives	Purpose / Relevance	Methods
Drop-in Replacement /120V Induction Products		
<p>Determine technical feasibility of 120V products to replace gas stoves without circuit or panel upgrades</p> <p>Assess limitations and cost tradeoffs (e.g., using only two burners simultaneously)</p> <p>Assess potential for 120V 24" ranges for small homes and apartments</p> <p>Assess potential for small electric ovens to operate on 120V</p> <p>Evaluate material and manufacturing costs of 120V models with battery backup</p> <p>Investigate potential to produce lower cost products without battery</p>	<p>Inform potential interventions to reduce product cost and improve access to induction</p> <p>Inform final product specification</p>	<p>Expert interviews, web scraping and data analysis</p> <p>Possibly product tear-down studies and testing</p>
Performance Ratings and Standards		
<p>Quantify maximum technical efficiency potential for induction cooktop and electric resistance cooktops</p> <p>Identify threshold for annual kWh consumption that can only be met with induction</p>	<p>Inform strategy to leverage ENERGY STAR and federal standards</p>	<p>Literature review, subject matter expert (SME) interviews (see footnote 2), product tear down and testing</p>
<p>Review test procedure to determine how/if reflects performance advantages of induction cooktops</p>	<p>Inform strategy to leverage ENERGY STAR and federal standards</p>	<p>Expert review, SME interviews (see footnote 2)</p>
Product Durability and Quality		
<p>Assess durability and expected useful life of induction as compared to gas and resistance stoves</p>	<p>Inform potential interventions to improve consumer confidence in induction</p> <p>Inform final product specification</p>	<p>Data analysis and modeling, SME interviews (see footnote 2)</p>
Indoor Air Quality (IAQ) and Ventilation Efficiency (potential research)		
<p>Assess concentrations of indoor contaminants (e.g., PM2.5, CO2, CO) from gas vs. induction cooktops under existing conditions in California homes (poorly functioning, low CFM range hoods, no range hood, etc.)</p> <p>Quantify public health benefits of switching to induction</p>	<p>Inform non-energy benefits of induction and potential partnership strategies</p>	<p>Literature review, SME interviews (see footnote 2) and possible IAQ data analysis and modeling</p>

Technical Assessment Objectives	Purpose / Relevance	Methods
Investigate potential energy savings from lower fan power and reduced space conditioning from switching from gas to induction	Inform baseline and target for energy savings	Range hood technical product review and energy use analysis
Gas / Electric Infrastructure		
Quantify overall impacts on grid and peak demand (for homes switching from gas to induction) due to additional electric cooking load and from reduced summer peak cooling load vs. cooking with gas indoors	Validate/revise cost and avoided cost impacts	Data analysis and modeling, field tests
Assess the current and projected rate of electrification of gas furnaces and water heaters	Validate and revise TSB estimates for business case, viability Inform MT strategy in relation to other decarbonization strategies and programs, in alignment with gas infrastructure retirement schedule	Review of existing studies on infrastructure
Estimate the number of homes and buildings that will retain connection to the natural gas distribution infrastructure solely for cooking		Heat pump heating, ventilation, and air conditioning (HVAC) and heat pump water heater (HPWH) adoption models from other MTIs
Evaluate the number of new homes/production builders that are connecting to the gas grid primarily for gas cooking		Interviews with builders and homeowners
Quantify methane leakage reductions and CO2 impacts from converting these existing and new homes to induction cooking and removing gas infrastructure.		

Table 6. Summary of Technology Assessment Needs, Initial Cost Estimate, and Estimated Timeline

Assessment Task	Schedule (Estimated Weeks from Launch)	Initial Cost Estimate	Deliverables Informed by this Task
(1) Product Evaluation and Component Analysis Study	Weeks 1 - 32	\$110,000	Updated Induction Cooking Product Plan
(2) Data Analysis and Modeling	Weeks 16 - 40	\$85,000	Updated Induction Cooking Product Plan
(3) Field Tests and Energy Use Analyses	Weeks 20 - 40	\$107,000	Updated Induction Cooking Product Plan
Total Estimate:	40	\$302,000	

5.2.2 Strategy Pilot

Non-labor costs associated with program strategy testing/pilots shall be authorized by written approval from the CalMTA CPUC Energy Division after:

- MTAB review of the pilot cost estimate and workplan
- Posting of pilot cost estimate and workplan to the CPUC Energy Division’s Public Document Area (PDA) for 15 calendar days to solicit public comment

- CalMTA response to public comments and public webinar to share the final cost estimate and workplan and discuss comments and resulting changes.

The following description is provided to illustrate a possible initial pilot concept and is not meant to represent the pilot cost estimate or workplan. Proposed pilot cost estimates and workplans will be posted for review by MTAB and the public following the initial MTAB review of MTI Advancement Plans. Additional pilots may be identified and proposed based on research findings or other relevant inputs.

Strategy Pilot 1: Retail Pilot Using Current ESRPP

As called out in the logic model, national retailers represent one key potential channel for influencing adoption of affordable induction cooktops and ranges. CalMTA has an opportunity to utilize the ESRPP platform as a tool to gather data and target ESJ communities. This pilot will help us understand if this is a viable intervention in the market development phase. In addition, this pilot can be implemented in tandem with a pilot for portable/window heat pumps, leveraging the implementation and data-gathering budget. The primary purpose of this pilot is to gather retail sales data and test manufacturer, retailer, and customer engagement on portable/window HPs in retail stores targeted by zip code in ESJ communities. It will test how easily the ESRPP platform can be adapted to target identified zip codes of ESJ communities and provide insight into this target audience's interest in induction technology. Through this pilot, CalMTA will gain insight into current sales and an understanding of both manufacturer and retailer systems to better engage ESJ communities.

Pilot objectives include:

- **Objective 1: Learn how ESRPP can be adapted to target identified zip codes that primarily serve ESJ communities.** Typically, national retailers have very limited variation of products across territories: store inventory in one neighborhood will typically be very similar to inventory in any other. This premise informs the standard ESRPP incentive approach, with the same incentive level offered to retail partners regardless of store location. CalMTA's proposed Strategy Pilot features the following possible modifications to ESRPP interventions:
 1. **Retail stocking and promotion targeting ESJ communities:** The study will yield insight into retailers' willingness and ability to adapt ESRPP to target more affordable products in specific zip codes. CalMTA will gain an understanding of both manufacturer and retailer systems to target these audiences, understand stocking practices and messaging/marketing tactics in retail stores, and gain insight into possible layering of local and IRA incentives.
 2. **Awareness- and acceptance-building:** Pilot activities will identify standard instore promotions and messaging that can be leveraged or enhanced to build consumer awareness in targeted ESJ communities during the MTI market deployment phase.

3. **Product improvements through manufacturer engagement:** CalMTA will share lessons learned with manufacturers to inform product development strategies for improvements or new features that may increase adoption in ESJ communities.

- **Objective 2: Gather full product category sales data.** ESRPP’s ability to provide full category sales data on all portable/window heat pumps, air conditioning (AC)-only units, and induction cooking products sold at participating retail locations will assist CalMTA in developing baseline estimates for the two target MT ideas. This data will also provide valuable insight into consumer purchasing decisions in areas where traditional sales data can be harder to obtain, such as the rural communities served by many ESRPP retail partners.

Success will be measured by uptake of induction purchases in targeted zip codes, the degree to which retailers are able to adapt ESRPP to targeted zip codes, retailers’ agreement on future engagement targeting induction stoves, and the interest of other regions in adapting the ESRPP platform as an ESJ-targeting approach.

Steps to develop this pilot will include:

- 1) Engaging California stakeholders, the ESRPP national collaborative, and ESRPP participating retailers to acquire data on induction product sales and program-specific adaptation needed to target specific ESJ zip codes
- 2) Using existing data sets and engaging local partners to determine which zip codes to target during pilot
- 3) Engaging leading manufacturers for possible co-marketing support
- 4) Implementing testing in partnership with ESRPP
- 5) Analyzing and assessing results to inform future MTI intervention strategies.

Table 7. Summary of Pilot Activities, Initial Cost Estimate, and Estimated Timeline

Pilot Activity	Schedule (Estimated Weeks)	Initial Cost Estimate	Intervention Strategies Informed by this Task
Leverage ESRPP and one online energy efficiency platform for targeted induction promotion in ESJ communities. Will involve engagement with current ESRPP implementation team, manufacturers and current rebate programs that could overlap in targeted areas.	40 weeks (10 months)	~\$600,000	Inform data strategy on induction cooking through ESRPP platform Strategies to leverage current programs Strategies to build sales and stocking practices that target ESJ communities ESJ consumer interest in induction cooking

Pilot Activity	Schedule (Estimated Weeks)	Initial Cost Estimate	Intervention Strategies Informed by this Task
			Inform messaging and awareness building strategies Inform ENERGY STAR specification process
Total Estimate:		\$600,000	

5.3 Environmental & Social Justice, Workforce Development, Education and Training Approach

Affordability is a key barrier to the adoption of induction stoves, along with the possible need to upgrade electrical panels. The benefits of induction are often beyond the reach of many ESJ communities. By driving costs down while increasing awareness of the IAQ and cooking benefits induction provides, this MTI directly delivers value to ESJ communities.

CalMTA will center equity and ESJ in multiple aspects of this MTI design and implementation, including:

- Manufacturer engagement to ensure more 120V products are available, including backup batteries for power outages
- Manufacturer engagement to increase availability of affordable induction products
- Workforce development to address the need for electric panel upgrades, as well as potential education and training to address the need for more electricians
- Leverage of existing ESJ community partners and programs
- Messaging and outreach tailored to ESJ community needs to build awareness and demand
- Targeted retailer promotions coupled with local utility incentives and IRA funding to drive adoption
- Leverage of existing ESJ electrification and new construction programs to ensure more affordable products are available.

6 External Program Review and Stakeholder Engagement

For each MTI, CalMTA conducted an initial analysis to identify areas of potential overlap and opportunities for collaboration between MTIs and existing programs focused on the market segment in question. Our external program review for the Induction Cooktop and Ranges MTI revealed numerous local, state, and national programs that target this technology. However,

CalMTA still sees ample opportunity to help accelerate adoption of induction cooktops, primarily through manufacturers/upstream engagement and coordination with existing programs.

Potential areas of coordination include:

- **Research and development projects/programs** that are already active may provide leverage for CalMTA
- **Statewide all-electric new construction programs** that include induction cooking as part of measure packages are important demand channels that CalMTA will coordinate with on affordable product specifications and awareness-building
- **Programs targeting affordable housing and income-qualified residents** could be leveraged to include induction cooking once CalMTA begins work with manufacturers and retailers to produce more affordable products
- **Local energy efficiency programs** that offer rebates and/or induction stove loaner programs can be leveraged for education and cost reductions
- **Online energy efficiency marketplaces** create an additional product distribution channel
- **Codes and Standards Advocacy** efforts advancing California standards for induction cooktops and ranges.

Additionally, national programs and regions outside California provide a significant leverage opportunity. ENERGY STAR recently announced the release of its Final Version 1.0 ENERGY STAR Residential Electric Cooking Products specification, providing consumers with a key mechanism for product differentiation. The New York State Energy Research and Development Authority (NYSERDA) recently launched an Induction Stove Challenge calling on appliance manufacturers to design and produce energy-efficient, induction stoves to replace existing gas stoves while avoiding costly electrical upgrades. IRA tax credits will also help reduce the upfront cost of induction cooking for low- to moderate-income consumers.

Key stakeholders identified through this process are summarized in Table 8.

Table 8. Summary of California Program Stakeholders

Program - Organization/ Stakeholder Segment	Coordination Approach
"Plug Load Appliances - Decarbonizing Household Appliances" technology research (CalNEXT)	Review CalNEXT research findings to identify areas of leverage and refine technology specifications where appropriate Meet with CalNEXT SMEs on as-needed basis to help influence and leverage any additional research on induction as part of CalNEXT technology-focused areas

Program - Organization/ Stakeholder Segment	Coordination Approach
California Energy-Smart Homes Program (Administrator: Pacific Gas and Electric Company [PG&E], implementer: TRC) California Electric Homes Program (Administrator: CEC, implementer: TRC) Building Initiative for Low-Emissions Development (BUILD) Program (Administrator: CEC, implementer: Association for Energy Affordability)	Coordinate on experience targeting induction as part of these programs and any possible data During MTI market development phase, coordinate on product specification, marketing, and awareness- building activities, in addition to lessons learned
Energy Savings Assistance (ESA) programs (Administrator: each investor-owned utility [IOU], implementer: multiple) Equitable Building Decarbonization Direct Install Program (Administrator: CEC, implementer TBD) San Joaquin Valley electrification pilots	Coordinate on product specification, product availability and any lessons learned on targeting ESJ communities with induction cooking
Induction Cooktop Check Out (Sonoma Clean Power)	Coordinate and gather lessons learned from implementors of two-week induction cooktop loaner program
ENERGY STAR Retail Product Platform (ESRPP)	Participate in introductory and regular meetings with implementors and other national ESRPP members, including SMUD and PG&E, on data acquisition. Coordinate on a pilot effort that engages induction cooktop retailers in specific ESJ community zip codes
Online energy efficiency marketplaces (Administrators: PG&E, Southern California Edison [SCE], the Los Angeles Department of Water and Power [LADWP])	Coordinate introductory and regular meetings on possible inclusion of more induction stove models on online marketplaces
Statewide Codes and Standards Advocacy Program	Coordinate with ongoing related work

We will develop a regular cadence for communication and coordination with key programs to avoid duplication of efforts, facilitate mutually beneficial information/data-sharing, and identify key leverage opportunities to enhance each other's program efforts.

7 Risks and Possible Mitigation Approach

Table 9 identifies potential risks that need to be tracked and mitigated to make the initiative successful.

Table 9. MTI Risk Review

Initiative Risk	Severity	Mitigation Approach
Magnitude of household cooking loads, especially in ESJ communities, is too low to justify investment in this MTI	High	Research current loads of cooking equipment
Continued gas range protection legislation	Medium	Monitor ongoing additional legislation
Copper and computer chip supply competes with other major technologies	Low	Monitor copper and chip prices to determine impact level
Manufacturer inability to produce induction stoves at lower price points	Low	Need to engage manufactures with other national partners on clear specifications
An increased energy burden on ESJ households due to electric cooking	Medium	Explore partnership with IOU financial assistance programs Modeling to determine maximum impact on house load; utility coordination can help prepare for this shift
Need to upgrade electrical panels, especially in low-income housing stock (MF and SF), proves to be too expensive a barrier for those switching to induction	High	Research other programs facing with similar barriers and develop an assessment tool for determining necessity Leverage other programs that are working towards full electrification and their incentives targeting electrical panel upgrades Leverage possible smart panel program
IRA incentives for induction expire	Medium	Monitor progress of induction adoption because of IRA incentives in the short-term Over the course of the MTI, prices should decline, eliminating this issue

8 Initial Cost Estimate, Timing, and Expected Results

Table 10 summarizes all budget items from Tables 4, 6 and 7 in Section 5.

Table 10. MTI Advancement Plan Initial Cost Estimate Summary

Section	Cost Estimate
Market and Technology Research	\$493,000
(1) Secondary Research (Weeks 1-4)	\$85,000
(2) Builder and Remodeler Interviews (Weeks 3-12)	\$42,000
(3) Manufacturer or SME Interviews (Weeks 9-18)	\$75,000
(4) Focus Groups (Weeks 10-22)	\$120,000
(5) Customer and Building Owner Surveys (Weeks 18-32)	\$130,000
(6) Delphi Panel (Weeks 30-36)	\$36,000
(7) Data Purchase	\$5,000
Technology Assessment	\$302,000
(1) Product Evaluation and Component Analysis Study (Weeks 1-32)	\$110,000
(2) Data Analysis and Modeling (Weeks 16-40)	\$85,000
(3) Field Tests and Energy Use Analyses (Weeks 20-40)	\$107,000
Strategy Pilots	\$1,040,000
Strategy Pilot 1) ESRPP Retail Pilot (Weeks 1-40)	\$600,000
Total	\$1,295,000

Figure 2 provides a preliminary Gantt chart for activities beginning in Q1 of 2024.

Figure 2. Overall Timeline/Schedule of Activities

Activity	Duration (Weeks)	Timeline (Months)											
		1	2	3	4	5	6	7	8	9	10	11	12
Market Research													
(1) Secondary Research/ Sales Data Purchase	Weeks 1-4	█	█	█	█								
(2) Builder and Remodeler Interviews	Weeks 3-12	█	█	█	█	█	█	█	█	█			
(3) Manufacturer or SME Interviews	Weeks 9-18			█	█	█	█	█	█	█	█		
(4) Focus Groups	Weeks 10-22			█	█	█	█	█	█	█	█	█	
(5) Customer and Building Owner Surveys	Weeks 18-32					█	█	█	█	█	█	█	█
(6) Delphi Panel	Weeks 30-36								█	█	█	█	█
Technology Assessment													
(1) Product Evaluation and Component Analysis Study	Weeks 1-32	█	█	█	█	█	█	█	█	█	█	█	█
(2) Data Analysis and Modeling	Weeks 16-40					█	█	█	█	█	█	█	█
(3) Field Tests and Energy Use Analysis	Weeks 20-40					█	█	█	█	█	█	█	█
Strategy Pilot Activities*													
(1) Geographic Targeting Using ESRPP for Portable/Window Heat Pump and Induction Cooking	Weeks 1-40	█	█	█	█	█	█	█	█	█	█	█	█

*Pilot activities and associated cost estimates will be authorized by written approval from the CPUC contract manager after public review of pilot workplans.

Table 11 summarizes the MTI’s estimated lifetime deployment costs, initiative timeline and expected results.

Table 11. Initiative Market Deployment Initial Cost Estimate and Expected Results

Initiative Cost Estimate (\$)	>\$25 million	Induction cooktops and ranges are not a new technology, but widespread adoption has been slow. A significant amount will be needed, especially to increase adoption among the ESJ consumers.
Initiative Timeline (Years)	5-10 years	With the appropriate market levers and interventions, we believe fast and lasting change can be enacted.
Estimated Expected Results	TSB - \$690M TSB Energy - \$8M TSB Grid - (\$382M) TSB GHG - \$1.064B	Preliminary analysis shows induction will result in kWh savings, improved IAQ, and GHG reduction from reduced natural gas and increased infrastructure requirements.

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.

Appendix 1: TSB Estimation Approach

As adopted by the California Public Utilities Commission, Total System Benefit (TSB) is defined as “the sum of the benefit that a measure provides to the electric and natural gas systems.”

According to D.21-09-037

1, TSB accounts for increased supply costs as a reduction in benefits and expresses, in dollars, the lifecycle energy, ancillary services, generation capacity, transmission and distribution capacity, and greenhouse gas (GHG) benefits of energy efficiency activities on an annual basis. The 2021 Energy Efficiency Potential and Goals study states that TSB represents the total benefits, or “avoided costs,” that a measure provides to the electric and natural gas systems.

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 initiative.

TSB Estimation by MTI Lifecycle Phase

CalMTA developed a preliminary 20-year estimate of TSB and cost-effectiveness for each market transformation initiative (MTI) submitted through the Request for Ideas (RFI) process that advanced to Stage 2 scoring. The estimates were based on readily available secondary research combined with a Bass modeling approach to estimate baseline and total market adoption curves. The CalMTA team will refine these estimates based on additional research and best practices during Phase II of the MTI Lifecycle, as shown in Figure 1.

Figure 1. TSB Estimation by MTI Lifecycle Phase



Phase I – Preliminary TSB Estimation Approach

During Stage 2 scoring, the CalMTA team developed a preliminary estimate of TSB associated with Induction Cooktops. For this and all MTIs that advanced to Stage 2 scoring, the team used a systematic approach that included developing preliminary estimates of the following inputs needed for TSB calculations:

- **Preliminary baseline market adoption (BMA) forecast:** The team developed a preliminary 20-year BMA forecast gathered from a small panel of experts who relied on readily available secondary research and their industry knowledge. Adoption for

¹ Adopted from Decision 21-05-031

single-family and multi-family households were forecasted by existing and new construction home types.

- **Preliminary total market adoption (TMA) forecast:** This forecast estimated preliminary market adoption based on the size of the market (households) in each addressable market segment, and Bass model parameters (maximum market saturation, coefficients of innovation and imitation) based on a database of adoption curve parameters gathered from international experience with market diffusion of a variety of new technologies.
- **Preliminary per-unit energy, grid, and GHG impacts:** The team developed unit impact estimates using hourly simulation models.
- **Preliminary estimates of avoided costs:** The team estimated avoided costs for the 20-year period using the Avoided Cost Calculator.

MTI-Specific Analysis and Assumptions

BMA Assumptions

For existing households (both single- and multi-family), the team used a Bass model framework to forecast baseline market adoption through 2045. We convened a mini-Delphi panel of experts to forecast market adoption using the three Bass Model parameters: maximum potential market saturation (m), coefficient of innovation (p), and coefficient of imitation (q), which capture the rate of adoption by early and late adopters, respectively. Panel members estimated the maximum baseline market saturation at 25% of households by 2045 – assuming no MTI market intervention. The rationale provided by panel members included the impact of existing and planned incentives (“...IRA rebates will certainly spur adoption over the next several years...”), and growing awareness of health implications with switching from gas to electric cooktops/range. Two key market adoption barriers identified by panel members were “...the belief that cooking with gas is more effective...” and cost considerations.

For new construction (both single- and multi-family residences), panel members estimated the market share of induction cooktops in two-year intervals until 2035 and five-year intervals after that. Panel members forecasted the annual market share of induction cooktops in new construction to grow from approximately 10% in 2025 to 43.5% in 2045. Panelist estimates were driven by regulatory developments such as California’s new requirement for homes to be built electric-ready and a growing trend toward local restrictions on gas hookups for new homes.

TMA Assumptions

For existing households (both single- and multi-family), the team estimated the maximum market saturation (m), coefficients of innovation (p) and coefficient of imitation (q) in the presence of CalMTA market interventions. Based on current saturation and annual market share of induction cooktops in Europe as estimated by a study commissioned by the European Commission

(Quintero et al. 2021), the maximum potential market saturation is assumed to be 50% of households.²

The team estimated behavior of early and late adopters (“p” and “q,” respectively) based on a database of adoption curve parameters gathered from international experience with market diffusion for a variety of new technologies using 29 observations of adoption of electrical appliances.³

For new construction (both single- and multi-family), the team considered trends in the annual market share of induction cooktops in Europe as estimated by a study commissioned by the European Commission (Quintero et al. 2021). The team assumed that the market share will grow linearly from 10% in 2023 (per BMA) to 75% by 2045 in the presence of CalMTA interventions.

Additional Assumptions

The team used the following assumptions regarding timing of MTI initiation and initial impacts:

- Start year for initiation of CalMTA MTI: 2025
- Number of years until initial MTI incremental impacts begin: Two

Incremental Market Adoption

Based on the assumptions described above, the team’s preliminary estimate of cumulative 20-year TMA was just under eight million units. Our initial estimate for cumulative baseline market adoption is approximately four million units.

Incremental Adoption by Installation Condition

We identified two representative installation conditions (baseline technology and fuel type), electric resistance and gas cooktops, and estimated the proportion of incremental adoption (estimated at just under four million units) in each of these segments (Table 1). The team allocated incremental market adoption based on readily available secondary research on the share of electric versus gas cooktops in California.

² Rodríguez Quintero, R., Bernad Beltran, D., Ranea Palma, A., Donatello, S., Villanueva, A., Paraskevas, D., & Stamminger, R. (2022). Preparatory study of Ecodesign and Energy Labelling measures for domestic cooking appliances (No. JRC130716). Joint Research Centre (Seville site).

³ Multiple references were used to develop a dataset of ‘p’ and ‘q’ values. The three which provided most of the estimates for consumer electronics and electrical appliances are the following:
Lilien, G. L., Rangaswamy, A., & Van den Bulte, C. (2000). Diffusion Models: Managerial Applications and Software. Vijay Mahajan, Eitan Muller, Jerry Wind, eds. *New-Product Diffusion Models*. Chicago, Lavoie, J., Barham, H., Gupta, A., Lilja, T., Nguyen, T., Kim, J., & Daim, T. U. (2018). Forecasting Super-Efficient Dryers Adoption in the Pacific Northwest. *Energy Management–Collective and Computational Intelligence with Theory and Applications*, 41-64.
Gupta, R., & Jain, K. (2012). Diffusion of Mobile Telephony in India: An Empirical Study. *Technological Forecasting and Social Change*, 79(4), 709-715.

Table 1. Stage 2 Induction Cooktops - Installation Conditions

Segment	Adopted Technology	Baseline Technology/ Fuel	Distribution of Market Adoption
Single- and Multi-family	Electric Induction	Electric Resistance	30%
Single- and Multi-family	Electric Induction	Gas Burner	70%

Unit Energy Impacts

Impacts were calculated for adoption for each installation condition. Average annual electric savings for these two installation conditions were 20.02 kWh per unit for the electric resistance baseline and -258.21 kWh per unit for gas burner users. Average annual gas savings were zero therms for the electric resistance baseline and 21.21 therms for a gas burner baseline, resulting in an average of \$21.20 in total avoided cost across all cases.

Incremental Costs

The team conducted secondary research to develop estimates of incremental costs for each of the installation conditions and developed preliminary program cost estimates to inform Total Resource Cost (TRC) and Program Administrator Cost (PAC) calculations.

Preliminary Estimate

TRC and TSB 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. TRC includes all avoided costs categories, including electric/gas/greenhouse gas and refrigerant benefits, program costs, incremental measure costs, etc. The Avoided Cost Calculator and projected lifetime savings were also used to generate TSB. The preliminary TSB estimates are reported in Table 2, disaggregated for energy, grid, and GHG impacts.

Table 2. Stage 2 Preliminary Lifetime TSB Estimate - Induction Cooktops

Idea Name	TSB (\$M)	Energy (\$M)	Grid (\$M)	GHG (\$M)
Induction Cooktops	690	8	-382	1,063

As shown in the table, the total initiative generates approximately 690 million dollars in lifetime TSB. The largest share of these benefits can be attributed to mitigated GHG emissions, with around 1.063 billion in TSB. The smallest share of TSB is driven by negative grid benefits (an estimated -382 million in TSB). Finally, energy benefits driven by savings related to electricity and natural gas reductions generate nearly eight million in lifetime TSB.

The team developed preliminary TRC and PAC ratios of 0.76 and 35.11 respectively for the initiative.

Phase II – Refined TSB and Cost-Effectiveness Estimates

The CalMTA team will conduct additional market and technology research on Induction Cooktops during Phase II of the MTI as described in the Advancement Plan. Based on that research, the team will refine TSB and cost-effectiveness estimates for the MTI. These refined estimates and their detailed methodology and assumptions will be included as part of the MTI Plan required for MTI advancement to Phase III. The MTI Plan will also include an evaluation plan and a data collection plan to support ongoing evaluation.

Phase III – Ongoing Updates to TSB and Cost-Effectiveness Estimates

The team will update TSB and cost-effectiveness estimates based on newly available data collected as part of the ongoing data collection plan. An independent third-party evaluator will periodically review CalMTA's TSB and cost-effectiveness models and supporting data and assumptions and make suggestions for improvement, as needed.