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A Comprehensive Strategic Market Transformation (SMT) Plan for a Home Upgrade Program SMT Initiative

Report on Working Group Activities from April 2014 through March 2015

Prepared for:
San Diego Gas & Electric and the Home Upgrade Program Working Group

Navigant Consulting, Inc.
1375 Walnut Street
Suite 200
Boulder, CO 80302

+1.303.728.2500
www.navigant.com

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THE CORE BUSINESS PROCESS TEAM
Steve Culbertson (BKI)—Co-lead
Giovanna Casillas (SDG&E)—Co-lead
Chris Cone (Efficiency First–invited)
Leif Magnusson (PG&E)
Jenny Berg (BayREN)
Cyd Swaim (SCG)
Denise Parker (SCE)
Nathan Bruner (SDG&E)
Spencer Rosen (Energy Integrity)
Tiger Adolph (BPI)
*Caroline Chen (Consultant)—Facilitator

FINANCING AND REAL ESTATE & APPRAISAL TEAM
Nancy Baba (BKI)—Co-lead
Drew Marie Bauer (BKI)—Co-lead
David Cohen (CSE)
James Ward (SCG)
Lisa Parker (SCE)
Steve Culbertson (BKI)
Joanne O'Neil (PG&E)

PRODUCT DEFINITION AND MARKET DEFINITION TEAMS
Joanne O'Neil (PG&E)—Product definition lead
Lisa Parker (SCE)
Denise Parker (SCE)
Jenny Berg (BayREN)
Lindsey Hawes (CSE)—Market definition lead
Mindy Craig (BluePoint Planning)
Nathan J Bruner (SDG&E)
Caroline Chen (Consultant)

CPUC STAFF AND CONSULTANTS
Hazlyn Fortune (CPUC)
Cathy Fogel (CPUC)
Syreeta Gibbs (CPUC)
Pete Scala (CPUC)
Joanna Gubman (CPUC)
Ken Keating (Consultant)
Ralph Prahl (Consultant)

WORKING GROUP INTERVIEWEES AND WORKSHOP ATTENDEES
Lara Ettenson (NRDC)
Jack Clark (CSE)
Carlos Ruiz (SCG)
Siobhan Foley (CSE)
Bruce Mast (Build It Green)
Christine Collopy (CEC)
Bill Pennington (CEC)
James Tuleya (PG&E)
Darren Hanway (SCG)
Sheila Lee (SCE)
Nicole Amweg (Los Angeles County)
Eugene Ayuyao (SCE)
Daniel Blustein (LADWP)
Berenice Barajas (LADWP)
Scott Broten (ICFI)
Hugo Gonzalez (SCE)
Lindsey Hawes (CSE)
Charlie Buck (CSE)
Susan Davison (CSE)
Other participants not listed

NAVIGANT PROJECT TEAM
Jay Luboff (Lead); Laura Tabor (Co-lead); Kevin Cooney; Rob Russell; Brad Rogers (Tritone); Nehemiah Stone (Benningfield Group); Danielle Vitoff; Jes Rivas; Lee Wood; Vijeta Jangra

*Special thanks to Caroline Chen for her great work in facilitating the core business process team.

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List of Acronyms

ACEEE	American Council for an Energy Efficient Economy
AESP	Association of Energy Service Professionals
AHU	Advanced Home Upgrade Program
ARRA	American Recovery and Reinvestment Act
CAEESP	California Energy Efficiency Strategic Plan
CEC	California Energy Commission
CEE	Consortium for Energy Efficiency
CPA	Contractor Participation Agreement
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
DAWG	Demand Analysis Working Group
DOE	U.S. Department of Energy
EAP	Energy Action Plan
ED	Energy Division
EIA	U.S. Energy Information Administration
EM&V	Evaluation, Measurement, and Verification
EUC	Energy Upgrade California
EVT	Efficiency Vermont
HEER	Home Energy Efficiency Rebate
HPRC	Home Performance Resource Center
HU	Home Upgrade
HUAG	Home Upgrade Advisory Group
IDSM	Integrated Demand-Side Management
IEPEC	International Energy Program Evaluation Conference
IIP	Initiative Implementation Plan
IOU	Investor-Owned Utilities
ME&O	Marketing, Education and Outreach
MT	Market Transformation
MTI	Market Transformation Indicators
NEEA	Northwest Energy Efficiency Alliance
NEEP	Northeast Energy Efficiency Partnership
NEI	Non-Energy Impacts
NOB	Naturally Occurring Baseline
NOMAD	Naturally Occurring Market Adoption
NREL	National Renewable Energy Laboratory

NTG	Net-to-Gross
NYSERDA	New York State Energy Research and Development Authority
PA	Program Administrator
PCG	Program Coordination Groups
PG&E	Pacific Gas and Electric Company
PIP	Program Implementation Plan
POU	Publicly Owned Utility
QC	Quality Control
RA	Resource Acquisition
REN	Regional Energy Network
RFP	Request for Proposal
SCE	Southern California Edison
SCG	Southern California Gas Company
SDG&E	San Diego Gas & Electric
SEEA	Southeast Energy Efficiency Alliance
SMT	Strategic Market Transformation
SMTI	Strategic Market Transformation Initiative
SWEEP	Southwest Energy Efficiency Project
TMG	Total-Market-Gross
TRC	Total Resource Cost
UES	Unit Energy Savings
USGBC	U.S. Green Building Council
WG	Working Group
ZNE	Zero Net Energy

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Executive Summary

Background

This report presents the first-year efforts of the Home Upgrade Program[1] Working Group (working group or WG) to develop the components to begin a potential transition of the program from a resource acquisition (RA)-oriented energy efficiency program to a strategic market transformation (SMT)[2] program. RA programs typically focus on generating as much energy efficiency as possible in a short period of time to provide measurable energy services, usually as a means to displace or supplement electric or natural gas supplies. SMT is the long-term strategic targeting of a market to create lasting change in market structures and market actor behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of all cost-effective energy efficiency as a matter of standard practice. The distinctions between these two approaches to saving energy are significant, requiring different planning horizons, approaches, and programmatic structures.

The Home Upgrade Program is a market transformation-oriented program that offers whole house residential energy efficiency upgrades in a variety of measure packages across the state. The program's focused on promoting energy savings through deep energy retrofits in the energy-impactful residential existing home market, which is responsible for consuming over one-third of the state's energy demand.[3] The program is offered statewide by the Regional Energy Networks (RENs) and the investor-owned utilities (IOUs) in a coordinated statewide program approach.

California Public Utilities Commission (CPUC) Decision 12-11-015 provides the impetus for this project. The decision authorized the state's IOUs to engage a market transformation (MT) consultant to work with the utilities, RENs, and other Home Upgrade stakeholders to develop an SMT plan for Home Upgrade and a related SMT framework (framework). The challenges and needs of the existing residential retrofit market provide the backdrop for the Commission's authorization of and support for a review of the Home Upgrade Program market transformation approach. The primary goals for this effort are to first provide a plan for transitioning the Home Upgrade Program to a formal SMT initiative, and second, to provide a draft framework approach that might be useful for future SMT initiatives in California.[4]

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[1] Formerly known as Energy Upgrade California

[2] In this report the term strategic market transformation (SMT) and market transformation (MT) are used interchangeably.

[3] California Energy Commission, *California Energy Demand 2014–2024 Revised Forecast, Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency*, September 2013. Navigant calculates residential electric demand at 37 percent of 2014 CEC forecasted statewide demand and 39 percent of statewide natural gas demand.

[4] Throughout this report, the term initiative is used to identify a targeted strategic MT effort. In the context of the Home Upgrade Program, the term relates to a single programmatic set of statewide activities. However, in the broadest context, the term may also relate to a group of program activities that, when combined together, create a multi-program targeted strategic MT initiative.

This report presents accomplishments of the Home Upgrade Program WG and its MT consultant, Navigant Consulting, Inc. (Navigant or the project team) during the period April 2014 through March 2015 to develop major components of an SMT framework and plan for the Home Upgrade Program.

Structure of the Report

The report is organized into three chapters that provide a comprehensive view of generic SMT theory and the application of these SMT concepts to the Home Upgrade Program. Table 1 provides an overview of the report structure.

Table 1. Report Structure Overview

Chapter	Description
Chapter 1: Introduction	1. Background and context for the project 2. The collaborative approach taken by the Home Upgrade Program WG and the project team to develop a workable plan for the Home Upgrade Program 3. An introduction to SMT basic theory and operational needs for developing both a generic SMT framework, including an introduction to SMT life cycle stages and the related SMT initiative components — both foundational elements for a SMT framework and Plan for the Home Upgrade Program
Chapter 2: Home Upgrade Working Group SMT Initiative Development Activities	1. Overview of the current status, needs, priorities, and timelines of the Home Upgrade SMT initiative development efforts 2. Detailed description of the SMT initiative pre-launch components 3. Current status of the Home Upgrade SMT initiative in relation to developing SMT initiative pre-launch components 4. Next steps for the Home Upgrade SMT activities 5. Findings from Navigant's *National Best Practice Market Transformation Programs* report
Chapter 3: Conclusions and Recommendations	1. General conclusions on the state of Home Upgrade Program's potential transition to an SMT initiative 2. General recommendations for Phase 2 WG activities 3. Specific recommendations on next-step activities to complete development of the remaining SMT initiative pre-launch components and vet development of a WG agreed to SMT Framework

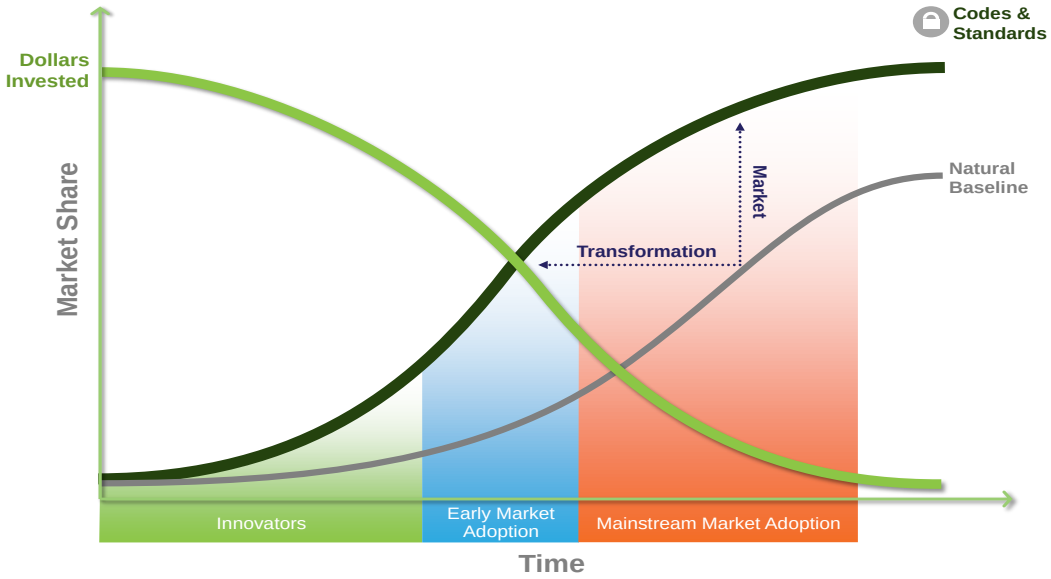
SMT Initiative Stages, Component Elements, and Application

Chapters 1 and 2 (outlined below) provide basic information for understanding SMT issues, concepts, needs, and applications, as well as developing a plan for launching a Home Upgrade SMT initiative.

Chapter 1: Introduction

SMT theory is based on the concept that it is possible to initiate an energy efficiency market intervention over a long-term timeframe that results in movement from a public sector-driven initiative to, eventually, a private sector, market-driven activity. Figure 1 provides an overview of this process.

Figure 1. Overview of Strategic Market Transformation Goal and Process

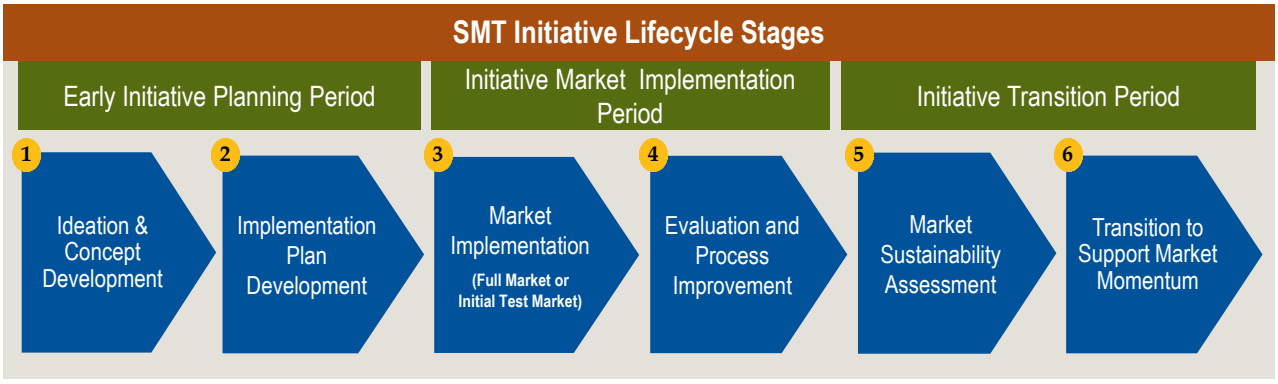


Source: Northwest Energy Efficiency Alliance

As seen in Figure 1, the initial driver for an SMT effort is represented by the public funds being spent at the initiation of the SMT initiative (i.e., the green downward curving line) with a goal of market adoption of the technology increasing (i.e., the upward curving black line) as public funds decrease. This is the fundamental concept behind the development of SMT initiatives: transforming the market toward higher states of adoption of the efficiency product, service, or practice.

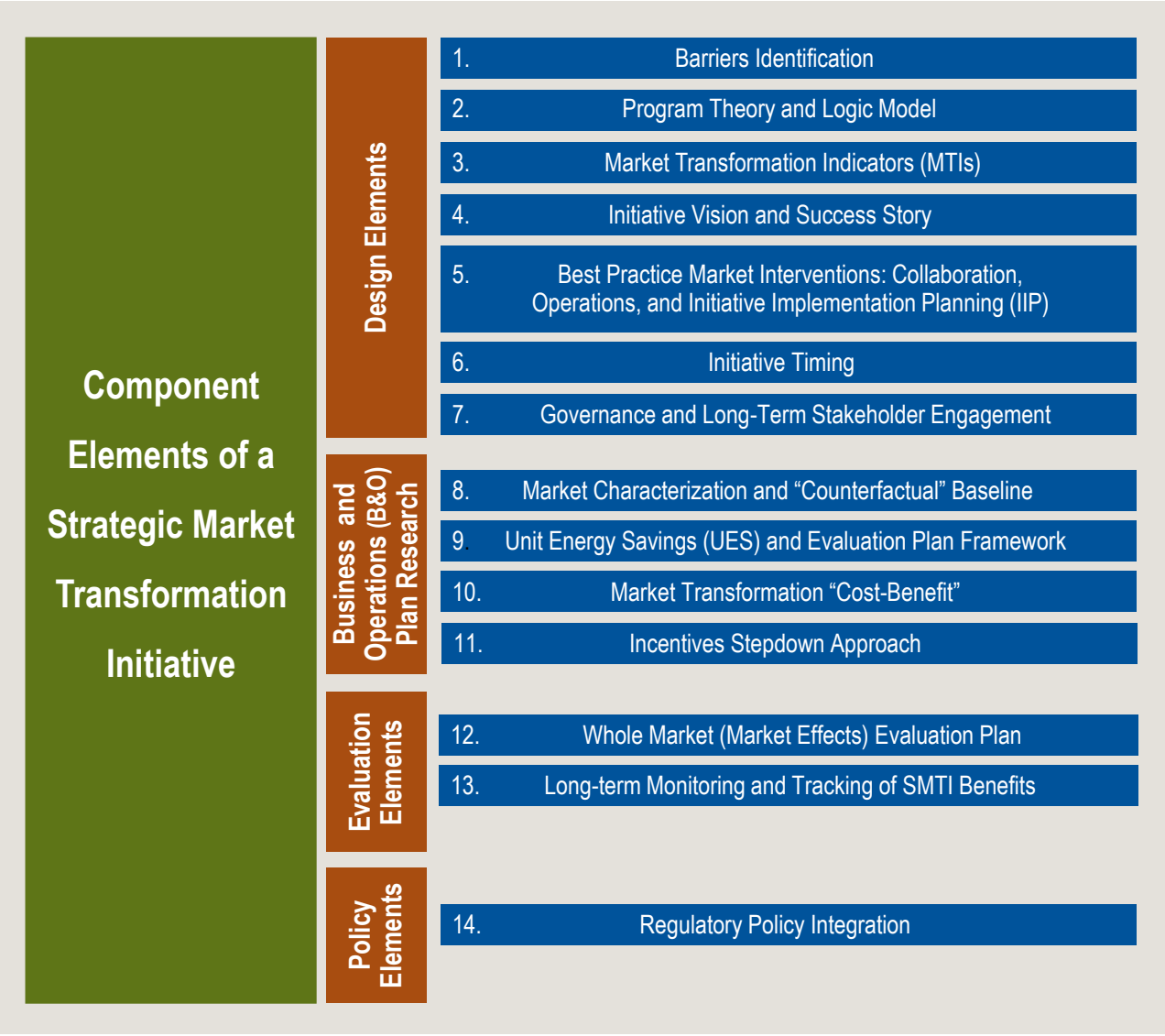
SMT initiatives tend to have a six-stage life cycle over which time initiative ideas are introduced, developed, implemented, evaluated, and then transitioned to support of market momentum once adoption goals reach desired levels. This life cycle is depicted in Figure 2

Figure 2. Six Stages of the SMT Initiative Life Cycle



Proponents, or initiative champions, interested in developing and implementing an SMT initiative, will find that preparation for such an effort is quite complex and requires a focus on developing 14 key pre-launch components. Navigant lists these in Figure 3.

Figure 3. SMT Initiative Pre-Launch Components

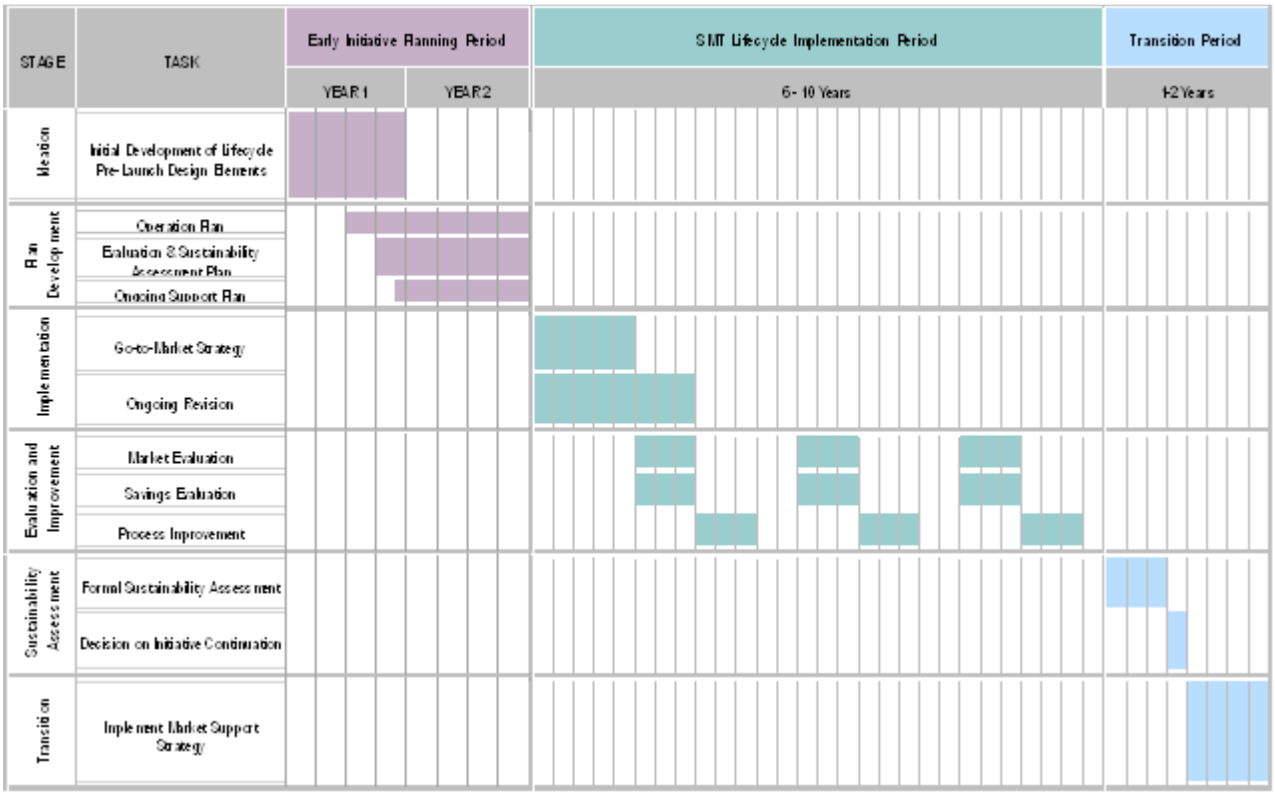


Source: Navigant

The development of the pre-launch components identified in Figure 3 represents a comprehensive roadmap for launching a SMT initiative within the six stages of the life cycle. Note that: a) Component 14, Regulatory Policy Integration, is generally a onetime set of activities that, once completed, will not need to be conducted again; and b) The WG has not yet reviewed and vetted the shape and form of a formal SMT framework approach.

Chapter 1 also presents a generic development and implementation timeframe for the six typical SMT life cycle stages and further detail on the ideation and development Stages 1 and 2. Figure 4 presents an overview of the timeframe for implementing each of the SMT pre-launch components over the major initiative life cycle stages.

Figure 4. Illustrative Example of Timeline for SMT Life Cycle Development and Implementation



Source: Navigant

Chapter 2: Home Upgrade Working Group SMT Initiative Development Activities

This chapter presents an overview of the detailed pre-launch development needs for an SMT initiative and the current status of the Home Upgrade Program in meeting those requirements. Figure 5 provides background on the collaborative approach taken by the WG to develop the SMT framework and SMT initiative pre-launch components. Specifically, the graphic shows the WG work scope and team structure adopted to begin developing SMT initiative pre-launch components needs.

Figure 5. Home Upgrade Program Working Group Team SMT Focus

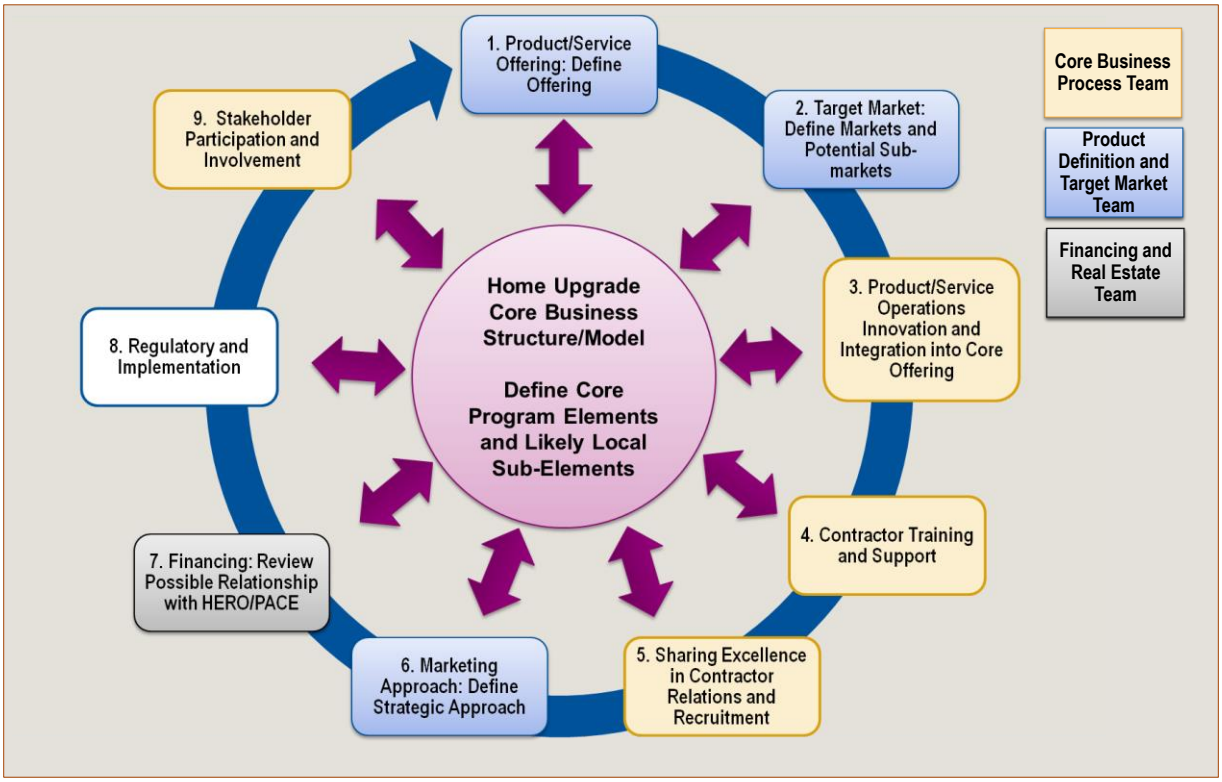
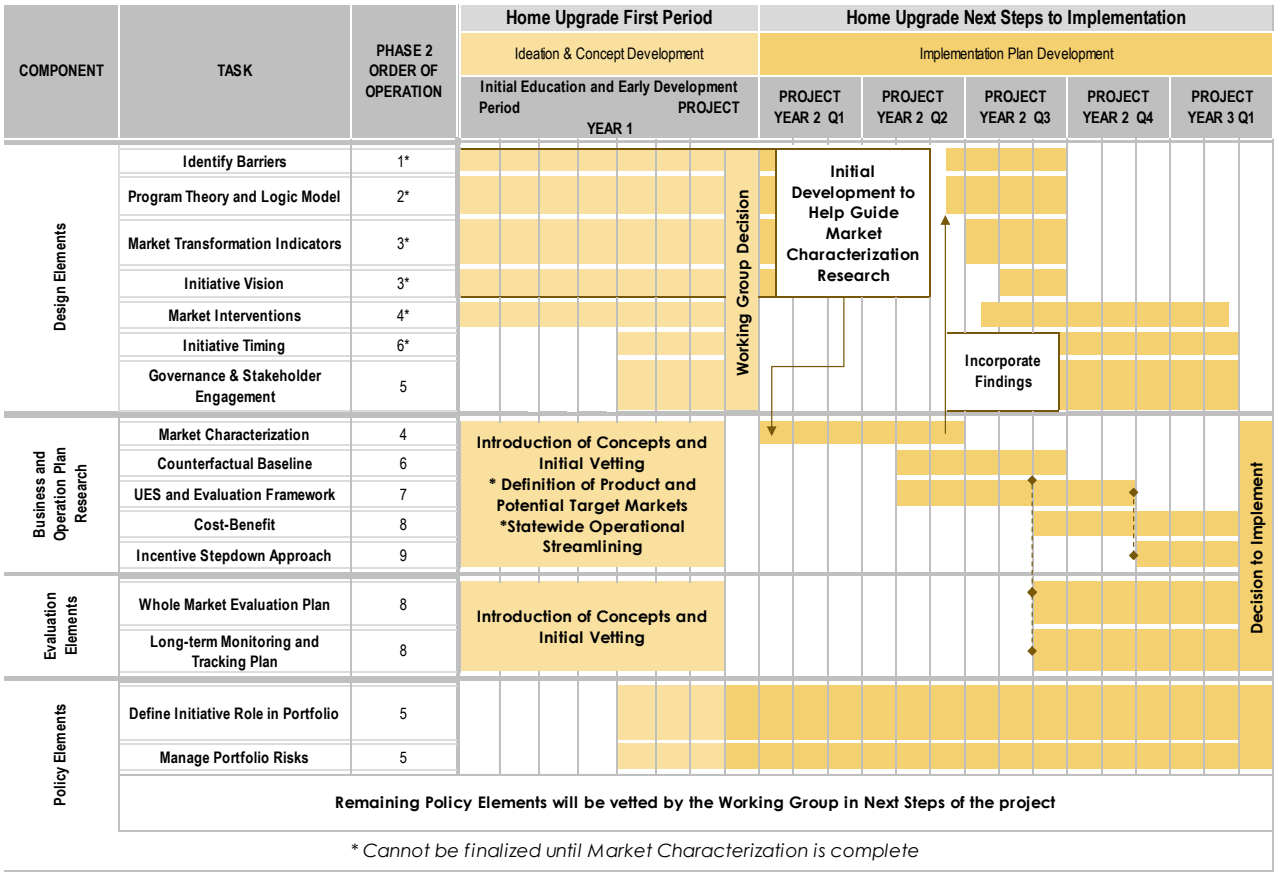


Figure 6 provides a timeline identifying the current status and needs for WG development of the remainder of the SMT initiative pre-launch components. The timeline notes the status of the project's initial period of development (year 1) and the recommended next step activities to complete development of design and business and operations components of a potential Home Upgrade SMT initiative.

Figure 6. Project First Period Status and Next Steps



Source: Navigant

Chapter 3: Conclusions and Recommendations

This chapter provides Navigant's general conclusions and recommendations on the project's first year activities and accomplishments as well as specific recommendations for next steps to complete the remaining SMT initiative pre-launch components.

Navigant's general conclusions and recommendations are provided in Table 2. Summaries of these general recommendations can be found in Chapter 3 along with specific Navigant next step recommendations related to SMT initiative pre-launch component development by the Home Upgrade WG.

Table 2. Navigant's General Conclusions and Recommendations

General Conclusion(s)	
Navigant makes the following broad conclusions about the feasibility of a potential SMT initiative for Home Upgrade: • In Navigant's view, the Home Upgrade Program meets many of the broad requirements for a potential SMT initiative and should be considered a viable candidate for potential continued development as an SMT initiative. These SMT areas include: a) appropriateness of the market; b) collaborative and coordinated statewide effort; and c) potential and actual market partnerships to transform the sector. • The Home Upgrade Program Working Group will need to develop an SMT initiative cost-effectiveness model and scenarios to prove the potential for the program as an SMT initiative. • The WG should begin drafting a transition plan to move from its current resource acquisition structure to the proposed Governance structure, including determining operational lead partners for specific areas of SMT initiative operation, as appropriate. • The program administrators and other stakeholders will need to continue to assume the need for staff and other stakeholder resources to complete development of the program into a formal SMT initiative. • To fulfill the needs of original project design, the WG should consider developing the components of the SMT life cycle stages and related pre-launch components into a formal SMT framework in its next step deliberations to facilitate possible incorporation into the state's long-term efficiency portfolio plans.	
General Recommendations	
Recommendations	**Comments**
• The WG should continue to develop the needed components of SMT initiative for the Home Upgrade Program.	The project team believes that the potential exists for the Home Upgrade SMT collaborative to successfully rethink the program from a longer-term statewide SMT perspective and incorporate that perspective into a potentially successful statewide initiative design and IIP.
• The WG should explore creative collaboration approaches that go beyond the traditional regulatory framework.	Collaboration in reaching whole market goals is a pre-requisite for initiative success. New models of collaboration are being developed in the Northwest related to energy industry social media exchanges and collaborative stakeholder partnerships to support initiatives. Beyond traditional stakeholder advisory roles, Navigant recommends exploration of these kinds of collaborative initiative support efforts.
• The WG should continue to deepen its current practice of building flexibility and innovation into its development and implementation processes for a potential Home Upgrade SMT initiative	Transforming the culture of the existing residential market in California will require significant flexibility and creativity. Such effort is the hallmark of current program administrator's approach to Home Upgrade as a resource acquisition program. Navigant recommends that this kind of innovative thinking be built into the IIP best practice initiative design and the implementation and related components of the SMT initiative

• The WG should deepen its focus on consumer messaging needs and drivers in order to increase the demand for a home upgrade.	Successful initiatives focus on influencing adoption on both the supply side and the demand sides of the market. During this first project period, the Working Group has rightfully focused on supply-side partnerships, issues, and concerns. Navigant recommends a continuation of this focus and an added focus and concern on developing strategies to educate California residential consumers about the benefits of deep energy and near zero net energy retrofits. The initiative's vision and story could provide the basis for initiative messages presented to California homeowners.
• The WG should pursue and develop statewide public/private handshake partnerships.	The core team of the WG was involved with the project team in interviewing national manufacturer representatives—all of whom were positive about a statewide public/private partnership. Navigant strongly recommends that the WG develop a formal strategy and approach for firming up these partnerships as part of development of its IIP.
• The WG should seek to expand the public partnership as part of developing the IIP (as possible and advisable).	SMT initiatives require broad input to support the market for success. In other words, the more voices in the market giving the same message, the more likely the success. Given this, Navigant recommends that the core Home Upgrade team consider reaching out to public entities (i.e., jurisdictions and POUs) in a formal way to seek development of as broad a public coalition as possible prior to initiative launch.
• The WG should purse continuation of this effort to establish the parameters and discussion points for future CPUC rulemaking R.13-11-005 Phase III deliberations.	Navigant believes that completion of this prototype SMT initiative effort for the Home Upgrade Program will help the state better understand the issues and needs of incorporating an SMT framework into the CPUC's efficiency portfolio during R.13-11-005 Phase III deliberations. Continuing to develop the Home Upgrade program as a pilot SMT initiative could provide a much needed real world example of a collaborative, statewide partnership to create a potentially workable SMT initiative and framework.

1. Introduction

Chapter 1 presents information on the following:

- **Background:** Contextual information on this Home Upgrade Program Working Group (WG) effort to develop a strategic market transformation[5] (SMT) framework (framework) and plan
- **Approach:** The collaborative approach taken by the Home Upgrade Program WG and the Navigant project team to develop a workable SMT framework and plan
- **SMT Basics:** The key theoretical and operational needs for developing both a SMT plan, SMT framework and related SMT initiative components needing to be developed by the Home Upgrade Program WG

1.1 Background

California's existing residential market is arguably the most difficult and challenging one to transform to increasingly higher states of energy efficiency. The diversity of this large market with its variations in climate, past construction practices, homeowner language and cultural differences, and varied socio-economic profiles provides both challenges and opportunities for attempts to transform this energy impactful market.[6] This report focuses on Home Upgrade WG efforts to develop methodologies and structures to assist in development and implementation of a long-term SMT initiative plan for the program. The report also sets the stage for WG review, vetting and agreement on a formal SMT framework designed to have potential applicability to other market transformation (MT) efforts as a next step activity for the WG.[7,8] The report also identifies the current status of WG efforts (from the project kickoff meeting in April 2014 through Phase 1 completion in March 2015) and the remaining work to be completed in a possible Phase 2, which would fully develop and align the Home Upgrade Program toward the needs of an SMT initiative for possible transition to becoming the state's first formal SMT initiative under the SMT framework.

1.1.1 Background of the Home Upgrade Program

The California Investor-Owned Utilities (IOUs) Program Implementation Plan (2013–2014) describes the Home Upgrade program as a market transformation-orientated program that began under California Public Utilities Commission (CPUC) auspices in the 2010–2012 residential energy efficiency portfolio of the four California IOUs: Pacific Gas & Electric Company (PG&E), Southern California Edison (SCE), San Diego

[5] Formerly known as Energy Upgrade California (EUC).
[6] Navigant calculates residential energy consumption as approximately 37 percent of state usage.
[7] The SMT life cycle stages and SMT initiative pre-launch components presented in this chapter (below) provide the basis for future development of a potentially workable SMT framework as part of WG next step deliberations.
[8] The Home Upgrade WG is made up of the state's IOUs, Regional Energy Networks (RENs), publicly owned utilities' (POUs') key trade allys, state energy agency (CPUC, CEC) staff, local government, advocacy organizations and staff, and other relevant stakeholders.

Gas & Electric Company (SDG&E), and Southern California Gas Company (SCG).[9] In 2009, the Home Upgrade Program was created as a program to incentivize comprehensive whole home upgrades, beginning as a collaborative activity between the State of California, the utilities, contractors, and local governments that was largely funded through the American Reinvestment and Recovery Act (ARRA).

The Home Upgrade Program is offered consistently across the IOU and REN service territories, with some variations. The program is designed to build customer and contractor awareness of the house-as-a-system approach to residential retrofits and the many corresponding benefits of improving the energy-savings potential and comfort of their dwelling. It promotes the idea that energy efficiency measures are most effective when taking into account interactive effects of measures, and it aims to move customers from a widget- or single-measure-based approach to energy efficiency to one of deeper, comprehensive energy retrofits that respect the energy efficiency loading order. The energy efficiency loading order takes the approach that a house is a series of interdependent systems that must be considered holistically.[10]

For single family residences, the whole house approach of the Home Upgrade Program promotes a Standardized Assessment, and two products aimed toward a whole house approach for a home energy retrofit: a streamlined hybrid deemed/performance based option (Home Upgrade) and a comprehensive, measured performance-based approach (Advanced Home Upgrade).

1.1.2 Impetus for Project Initiation

The impetus for undertaking this work stems from CPUC decision D12-11-015, which directs the California IOUs to engage a "market transformation consultant" to assist the IOUs, RENs, and other stakeholders in developing a long-term streamlined MT approach for the implementation of the residential sector Home Upgrade Program.

The consultant is to partner with IOUs, RENs, and the working group to conduct a comprehensive assessment and provide recommendations regarding, but not necessarily limited to, the following areas, in order to achieve a transformed, self-sustaining residential whole house efficiency market by 2025:

(a) Policy rules and guidance (e.g., cost-effectiveness methodology)
(b) Program design and delivery
(c) Identification of key market transformation indicators
(d) Program evaluation and monitoring
(e) Marketing, education, and outreach
(f) Ongoing and effective stakeholder engagement
(g) Other opportunities that can be leveraged

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[9] Pacific Gas and Electric Company 2013-2014 Energy Efficiency Portfolio Statewide Program Implementation Plan Residential Program, April 2013.

[10] The loading order specifies improvements in the following sequence: (1) air sealing to obtain a tight building envelope; (2) insulation to complete the thermal boundary; (3) proper sizing, design, installation, and commissioning of space heating and cooling systems; (4) proper sizing, design, installation, commissioning, and insulation of the hot water system, including distribution; (5) efficient lighting and appliances, and demand response measures; and (6) renewables.

(h) Development of a 10-year step-down incentive structure
(i) Contractor engagement model

Additionally, as a result of assessing market transformation in the context of the whole house efficiency market, the Market Transformation Consultant should also identify a best practices market transformation framework for California and recommend a path for achieving the enhanced framework (underline added). This path will include, but not limited to, high-level policy changes that could impact the residential sector served by the program.[11]

The project began with a WG kickoff meeting in April 2014. As background, the project team used prior information presented in the IOU-sponsored NMR Group best practice MT report[12] and the CPUC consultant white papers,[13] as well as information previously developed by Navigant for the CPUC as part of the 2011 Potentials, Goals, and Targets study.[14] Beyond this, Navigant acknowledges the significant expertise brought to this effort by Home Upgrade Program WG members and the willingness of Home Upgrade Program stakeholders to collectively and collaboratively craft the initial components needed for implementing a workable SMT framework and attendant SMT initiative component elements, and for implementing a formal SMT effort for the Home Upgrade Program.

Energy efficiency programs, at their core, exist to alter market behavior related to specific energy efficiency measures (products and/or services) by reducing market barriers and increasing the measures' attractiveness to the end-use customer. Market transformation occurs when that altered market behavior continues after the program's interventions have ceased or transitioned to supporting continued market moment. Some program interventions intend to induce market transformation; others are intended more for near-term resource acquisition (RA) that may also have some lasting effects on the market's behavior beyond the program's active period.

1.2 Approach

The project team in collaboration with the Home Upgrade Program WG approached this project from the point of view of first, identifying the generic stages of a SMT initiative life cycle and related SMT initiative (pre-initiative launch) components; second, considering how a SMT framework that would combine the life cycle stages and pre-launch components could be a starting point for WG next steps; and, third, initiating a

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[11] San Diego Gas & Electric PEPMA Announcement, "Market Transformation Consultant RFI Announcement," May 2013.
[12] [12] NMR Group, Inc., "A Review of Effective Practices for the Planning, Design, Implementation, and Evaluation of Market Transformation Efforts," November 25, 2013, http://calmac.org/publications/FINAL_NMR_MT_Practices_Report_20131125ES.pdf.
[13] K. Keating and R. Prahl, "Building a Policy Framework to Support Energy Efficiency Market Transformation in California," California Public Utilities Commission, December 9, 2014, http://www.energydataweb.com/cpuc/search.aspx?did=1207.
K. Keating, "Guidance on Designing and Implementing Energy Efficiency Market Transformation Initiatives," California Public Utilities Commission, December 9, 2014, http://www.energydataweb.com/cpuc/search.aspx?did=1188.
[14] Appendix B provides an overview of a draft MT planning framework for California developed by Navigant staff as part of the 2011 CPUC Potentials, Goals and Targets study. Additionally, project team staff has worked on other important SMTI efforts around the country over the past decade.

development process for completing the needed SMT components to transition the Home Upgrade Program to a SMT initiative

Key elements of this approach include:

- Engaging with the WG in multiple workshops, meetings, and webinars on background and theory related to the needs associated with developing an SMT initiative, and the differences between SMT initiative and RA programs
- Developing a generic SMT life-cycle stage view of an SMT initiative, including pre-launch component elements for initiative design, operations, implementation, evaluation, and eventual transition to supporting market momentum in the target market
- Applying SMT initiative pre-launch component elements to the Home Upgrade Program (by sub-working group topic teams) as part of Stage 1 and Stage 2 of the initiative life cycle to begin developing it into a potential candidate for an SMT initiative

The remainder of this chapter presents general MT theory as it relates to RA program approaches and high-level elements of the SMT initiative life cycle, including discussion of the key design, business and operational, evaluation and related policy component needs.

Chapter 2 presents a detailed discussion on: a) the important pre-launch SMT components that Home Upgrade stakeholders must address to complete development of the component activities, timelines, and sequential tasks, b) the current status of WG efforts, and c) remaining next step activities to fully complete the transition of the Home Upgrade Program into a potential SMT initiative.

1.3 Developing a Strategic Market Transformation Initiative

The theory and component elements of a potentially successful SMT approach are related to, but very different from, approaches to acquiring energy savings as a resource—i.e., RA energy-savings programs. The concept of MT is not a new one in California or around the country. State, regional, and national organizations have been focusing on how best to transform markets toward energy efficiency for decades.[15] What is new about this effort in California, as generated from CPUC decision D12-11-015, is a focus on creating a formal SMT framework component within the CPUC's current RA portfolio strategy. The Home Upgrade Program SMT project can be seen as a pilot effort to use the tool of integrating a formal MT framework effort into traditional regulatory energy-savings portfolio approaches and as a complement to RA efforts.[16]

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[15] Chief among leading organizations engaging in SMT efforts are the Northwest Energy Efficiency Alliance (NEEA), Northeast Energy Efficiency Partnerships (NEEP), Midwest Energy Efficiency Alliance (MEEA), U.S. Environmental Protection Agency/Department of Energy's ENERGY STAR Program, Consortium for Energy Efficiency (CEE), U.S. Green Building Council (USGBC), Alliance to Save Energy, New York State Energy Research and Development Authority (NYSERDA), and the Energy Trust of Oregon.

[16] Keating and Prahl (2014), *op. cit.,* p.7 notes that "…market transformation is best approached as an intervention strategy or policy tool rather than as an end point or policy objective in and of itself."

1.3.1 Definition and Role of Market Transformation

MT has been defined in many ways over the years. The California CPUC updated its definition in 2009 to include the following:

> *Market transformation is long-lasting, sustainable changes in the structure or functioning of a market achieved by reducing barriers to the adoption of energy efficiency measures to the point where continuation of the same publicly-funded intervention is no longer appropriate in that specific market. Market transformation includes promoting one set of efficient technologies, processes or building design approaches until they are adopted into codes and standards (or otherwise substantially adopted by the market), while also moving forward to bring the next generation of even more efficient technologies, processes or design solutions to the market.*[17]

Another definition by the Consortium for Energy Efficiency (CEE) points to the use of MT as a strategic intervention tool of portfolio policy (along with RA)—one that is focused on long-term changes to market structures and consumer behavior, all with the goal of increasing energy efficiency savings:

> *Strategic interventions that attempts to cause lasting changes in the structure or function of a market or the behavior of market participants, resulting in an increase in the adoption of energy efficient products, services, or practices.*[18]

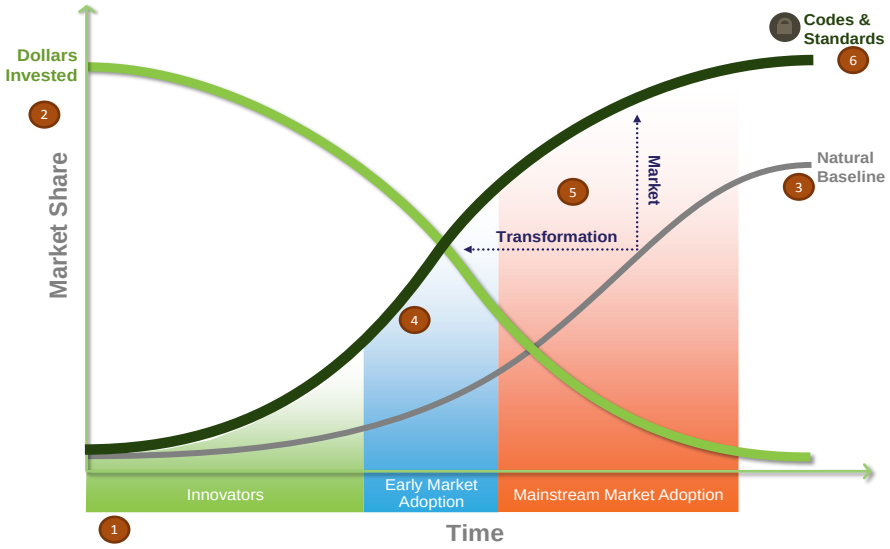
The notion that changing an entire market's way of seeing and doing business related to energy efficiency is quite different than, though related to, energy efficiency acquisition approaches that focus primarily on shorter-term savings with the goal of encouraging temporary shifts in market share for efficiency products and services.

1.3.2 Underlying Theory and Identifying Features of the Strategic Market Transformation Approach

Figure 1-1 provides a high-level overview of the underlying theory of MT as related to energy efficiency investment and activity.

[17] D.09-09-047, p. 89.
[18] Joanne Morin, "Market Transformation 101" (CEE paper presented at the 2014 National Symposium on Market Transformation, March 30, 2014).

Figure 1-1. Illustrative Example of Market Transformation Process over Time



Source: Adapted by Navigant from Northwest Energy Efficiency Alliance

The SMT theory expressed through this graphic relates to the basic economic notion that while energy efficiency products or services may have societal benefits—i.e., be less costly than other alternatives, often more readily available, and environmentally friendly— these products will not necessarily be adopted at the rate of uptake needed or desired without assistance. In most cases this assistance involves ratepayer or governmental funding to seed the market for the efficiency product with the hope of enhancing market adoption.

As
Figure 1-1 suggests, six key features not typically present in RA programs underlie the theory and flow of a successful SMT effort. Table 1-1 provides a brief overview and discussion of the interaction of each of these in the development of an SMT initiative.

Table 1-1. Market Transformation Theory Components

	Market Transformation Theory Components	Description
1.	Time element	Planning an SMT initiative requires awareness of the various stages of market adoption and the need to plan the initiative over a reasonable timeframe to support push-pull market force incorporation of sustainable savings as common practice.
2.	Cost of dollars invested	Ratepayer and/or governmental funding typically drive early implementation of energy efficiency programs. The goal of an SMT effort is to diminish ratepayer/governmental investment and costs over time, as energy-savings actions become incorporated into normal market structures and behaviors.
3.	Counterfactual market baseline[19]	This estimate of naturally occurring market activity that represents an estimate of what would have occurred in the market had no utility or other program administrator (PA) interventions been undertaken. The counterfactual baseline provides a basis from which the progress of an SMT effort may be measured.
4.	Expanding market uptake of the product or service	Markets tend to adopt new products or services in an "S" shaped fashion over time. This pattern of market adoption, known as the Rogers theory of market innovation/diffusion, provides a structure for designing and planning an SMT initiative, as efficiency measure adoption moves up the "S" through its various stages toward full market transformation.
5.	Whole market evaluation of estimated MT activity	SMT efforts aim to generate savings not only from programmatic efforts (i.e., PA interventions) but also from market adoption (i.e., market effects resulting from the SMT intervention) undertaken by non-participating consumers.[20]
6.	Codes and standards	As voluntary market adoption of the efficiency product moves up the "S" curve, codes and standards can play a role in ensuring that the market reaches its maximum potential for energy savings.

1.3.3 Formal Whole Market SMT Initiatives

SMT initiatives focus on garnering savings from the whole market. The term whole market initiative refers to the fact that SMT initiatives are focused on changing/transforming consumer behavior and related

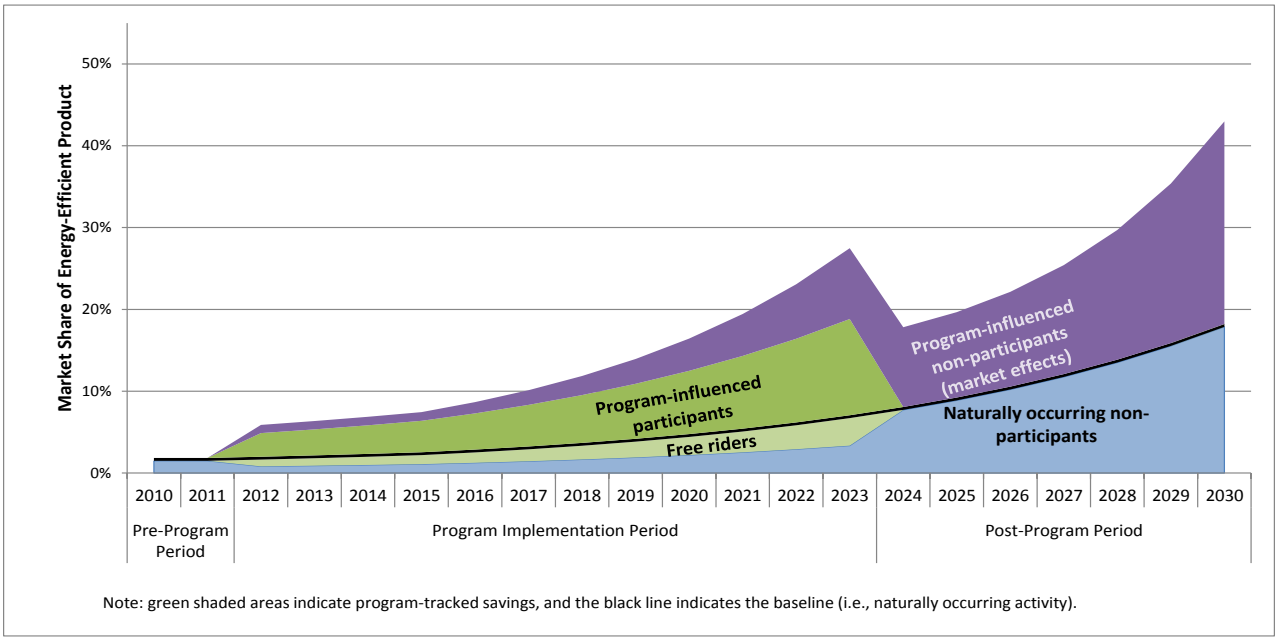
[19] This is often referred to alternatively as the naturally occurring market adoption (NOMAD), the naturally occurring baseline (NOB), or simply the market baseline.

[20] Eto, Joseph, Ralph Prahl and Jeff Schlegel, "A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs," Lawrence Berkeley National Laboratory, 1996 defines market effects as "a change in the structure of a market or the behavior of participants in a market that is reflective of an increase in adoption of products or services or practices and is causally related to market intervention(s) (e.g. programs)."

market structures toward higher states of adoption of efficiency products or services over a long-term timeframe—not only by influencing consumers participating in a program but also by influencing consumers not participating to undertake energy-savings actions substantially similar to those actions taken by program participants. These latter savings, known as market effects savings, when accounted for alongside program savings provide the potential for accounting for whole market savings as part of the benefit stream of an SMT initiative.

This notion of a whole market effort is embedded in the fundamental concepts presented in Figure 1-2, which shows the sources of MT savings as the combination of program and non-program influenced market effects savings.[21]

Figure 1-2. Illustrative Example of a Generic Strategic Market Transformation Initiative



Source: Navigant

1.3.4 Differences between SMT Initiatives and RA Programs

SMT initiatives differ in significant ways from traditional RA programs and hold out the potential for changing markets in permanent ways that will save energy for many years to come. RA programs focus on shorter-term savings as a means to defer or avoid costs for traditional, often more expensive energy resources and thus have a different but complementary focus to save energy through consumer energy efficiency actions.

[21] In this diagram, program savings above the black line represent savings that would not have occurred except for the utility or other PAs market intervention; below the black line are naturally occurring market baseline savings.

Table 1-2 summarizes the key differences between RA approaches and SMT efforts related to program design, market targets, and other important parameters.[22]

Table 1-2. Differences between Resource Acquisition and Market Transformation Efforts

	Resource Acquisition (RA)	Market Transformation (MT)
Scale	• Program	• Initiative
Target	• Program participants (i.e., utility customers who participate in an energy efficiency program, net of free riders)	• Key market actors in the defined market
Goal	• Near- and long-term energy savings	• Structural changes in the market leading to long-term energy savings
Scope of Effort	• Usually a single program but can involve multiple programs	• Multiple programs or interventions but may be a single program effort
Implications	• All savings based on verified results • Success of program judged on annual savings • Logic model not required	• Savings based on market projections using accepted and replicable techniques • Success based on long-term, sustainable outcomes • Evaluated per a theory of change with specific indicators of market transformation
Amount of PA's Control	• PAs can control the pace, scale, geographic location, and can, in general, identify participants	• Markets are dynamic, and the PAs are only one set of actors. If, how, where, and when the impacts occur are usually beyond the control of the PAs
What Is Tracked, Measured, and Evaluated Follows from the Distinctions	• Technology baselines (i.e., code, standards, or standard practice), energy use and savings per widget/service, participants, free ridership/spillover	• Dynamic market baselines, energy use, and cumulative energy savings for the entire defined market, attribution to the program, interim and long-term indicators of market penetration and structural changes

Source: Keating and Prahl, December 2014

Although RA and SMT efforts have the same fundamental goal of energy savings within a target market, approach to reaching this goal is quite different. In this way, incorporating an SMT framework within an existing portfolio of RA programs provides state policymakers a potential second tool to help meet the California Energy Efficiency Strategic Plan (CEESP) MT and energy savings goals.

[22] Keating and Prahl (2014), *op. cit.*, p. 12.

1.3.5 Differences in the Term "Net Savings" for an SMT Initiative and an RA Program

The term "net savings" in relation to energy efficiency has typically been associated with the RA energy efficiency evaluation concept of "net-to-gross" savings or NTG. The concept of net savings for an SMT initiative is quite different.

Table 1-3 describes the differences between the sources of savings—i.e., where and how energy savings are acquired and accounted for—between these two types of efforts.

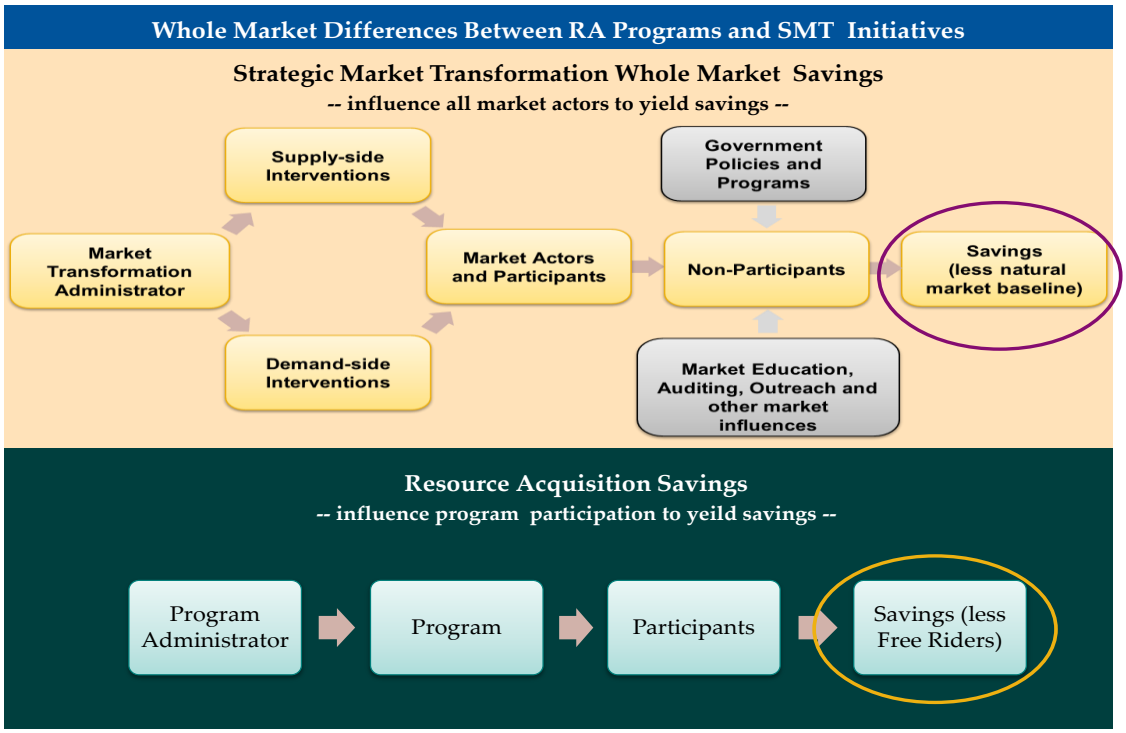
Table 1-3. Differences in Sources of Savings from RA and SMT Initiative Efforts

	Resource Acquisition (RA)	Market Transformation (MT)
Approach	• Save energy per participant or installation	• Save energy by mobilizing widespread market adoption
End-User Characteristics	• Participants/enrollees/purchases are generally known and recruited directly	• Adopters are not known (apart from early partners/demonstrators)
Savings Estimation	• Summation of site-by-site known participants	• Modeled savings based on deemed or average savings and extrapolated to the market at large (including nonparticipant adopters)
Implications	• All savings based on verified results • Success of program judged on annual savings • Logic model not necessarily required	• Savings based on market projections using accepted and replicable techniques • Success based on long-term sustainable outcomes • Evaluated per a theory of change with specific indicators of MT (logic model required)

As Table 1-3 indicates, the source of whole market savings are generated from as many market actors as possible rather than program participants, as is the case in an RA program effort. This distinction provides the basis for understanding and aligning not only proposed SMT initiative design and implementation activities, but also SMT initiative evaluation activities, including an assessment of net savings benefits.

Figure 1-3 provides a graphic description of the difference of how energy savings are generated in an SMT initiative environment and in a RA program environment.

Figure 1-3. Sources of Savings from RA and SMT Whole Market Programs



Source: Navigant

For an RA program, net savings ("net savings/RA") described in the lower green area of Figure 1-3 are:

1. Generated from the program's market activities to gain participation
2. Comprised of program participant savings (i.e., gross savings/RA)
3. Minus estimated free riders[23]

This approach provides a final estimate of net savings/RA, which restated is equal to:

Participant savings - free riders = net savings/RA

The upper part of the figure in light tan describes the sources of net savings from SMT efforts ("net savings/SMT"). Net savings/SMT is generated from whole market savings, including both program participant savings and savings from non-program participants within the target market. Because net savings/SMT is generated from nonparticipants who chose to undertake the savings actions but not through the program, the term free rider no longer applies. Savings from market adopters both in the program and out are part of the benefits associated with SMT initiative efforts.

[23] Free riders are those program participants who would have taken the energy-savings action without the program but chose instead to participate in the program.

Due to the fact that net savings/SMT is generated from the whole market, net savings/SMT can be described as:

1. Generated from both supply- and demand-side short-, intermediate, and long-term SMT initiative MT activities
2. Comprised of participant and nonparticipant savings (i.e., gross savings/SMT)
3. Minus the counterfactual baseline estimate of naturally occurring nonparticipant market savings

This approach provides a final estimate of net savings/SMT, which simply restated is equal to:

Participant savings + nonparticipant savings –
estimated naturally occurring nonparticipant baseline savings = net savings/RA

Figure 1-1 identifies the program savings sources for RA efforts—where net savings/RA are identified in the green area as program-influenced participants and free riders are identified as a part of the nonparticipant naturally occurring baseline shown (also in green) under the black line; and net savings from SMT efforts—where net savings/SMT are identified as program-influenced savings and program-influenced nonparticipants/market effects in the green and purple areas above the black naturally occurring baseline, and those below the baseline as naturally occurring nonparticipants.

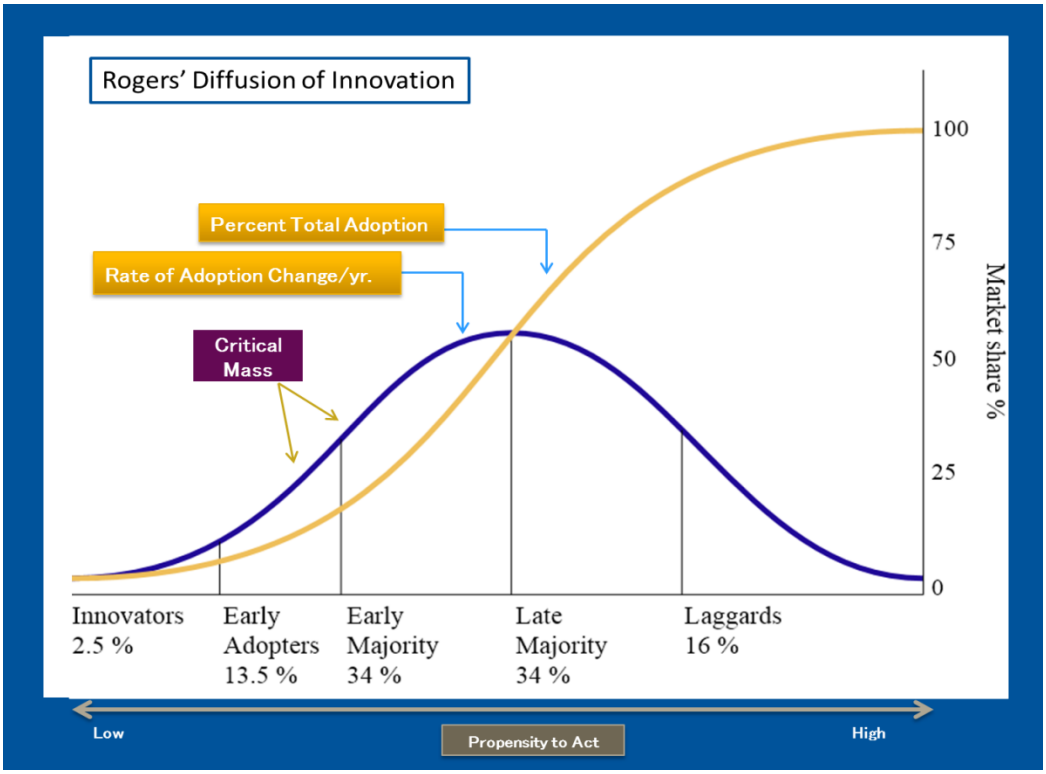
1.3.6 Applicability of Market Diffusion Theory

SMT efforts are designed around the well-tested notion that consumer uptake in targeted markets happens in predictable ways and with predictable patterns. Assuming the product or service is desirable, the price is acceptable to consumers, and the market providers are reliable and trusted, market diffusion theory asserts that market adoption will take place based on passage from innovators and early adopters to early majority to later majority and finally to market laggards.[24]

Figure 1-4 presents a graphic image of the market diffusion theory and its assumptions. From the SMT initiative point of view, the focus is on designing an initiative that will move market adoption up the "S" curve from innovator, to early adopter, and across what is known as the gap to the areas of early and late majority adoption.

[24] Rogers, Everett (2013), *op. cit.*

Figure 1-4. Diffusion Theory in Strategy Market Transformation



Source: Adapted by Navigant from Wikipedia

1.3.6.1 Uses of Diffusion Theory in SMT Initiative Design

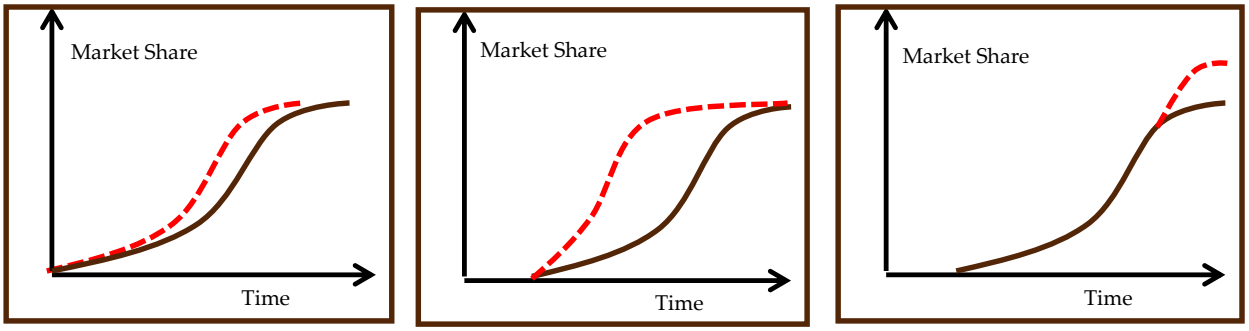
Successful MT initiatives pass through stages of adoption during which time specific SMT initiative implementation and evaluation activities occur in an attempt to enhance market adoption. Figure 1-5, Figure 1-6, and Figure 1-7 present three different SMT initiative market design strategies that have been used by MT initiative designers to identify the specific goals of an SMT initiative effort. It is often the case that one, two, or all three of these strategies may be employed in initiative design. MT strategies typically fall into three categories based on Rogers' Theory of Innovation Diffusion: early introduction, early acceleration, and increase in saturation.[25]

In Figure 1-5, the solid line represents the anticipated cumulative adoption of an innovation without program intervention. The dashed red line represents the early introduction of the innovation. The market effects benefits of the action represent the delta between the two lines—in this case, the introduction of an innovation earlier than existing trends, or naturally occurring baseline, would have allowed. Marketing efforts for this type of activity tend to focus on marketing communication to raise awareness and understanding. Examples of initiatives aimed at encouraging product adoption sooner than otherwise

[25] Northwest Energy Efficiency Alliance, "NEEA's Definition of Market Transformation," 2010, http://www.neea.org/participate/docs/NEEA_Definition_of_MarketTransformation.pdf.

would be the case include NEEA's industrial Strategic Energy Management (SEM), 80 Plus (desktop computer power supply)/Verdiem (controls), double pane windows, and MagnaDrive (motor drives).

Figure 1-5. Early Introduction. **Figure 1-6. Early Acceleration** **Figure 1-7. Increased Saturation**



Source: Navigant

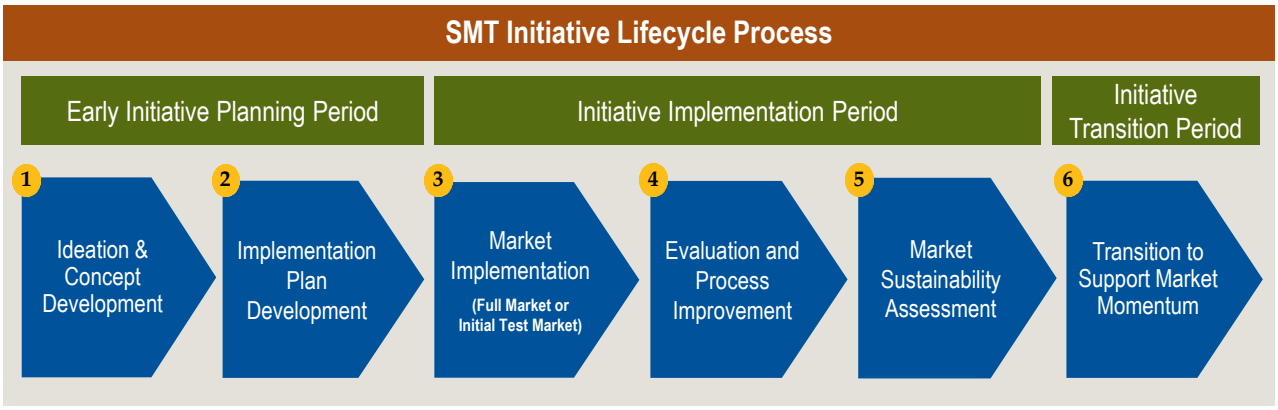
In Figure 1-6, the solid line again represents the anticipated cumulative adoption of an innovation without program intervention, but this time the dashed red line represents efforts to accelerate adoption of the innovation. To achieve lasting market effects, effective programming combines incentives with education and promotion activities. These latter activities focus on conveying the value of the efficient option to target audiences. The combination of incentives, value promotion, and education tends to build demand and increase supply. Over time, the incentives become less necessary as suppliers and consumers structure a market based on the value of efficient goods and services rather than the availability of subsidies. In this case, market effects are due to the program's demand creation and/or supply support activities. Examples of NEEA initiatives aimed at accelerating adoption include ductless heat pumps, commercial new construction, and evaporator fan variable speed drives.

Figure 1-7 illustrates the third strategy: increasing overall market saturation. Generally, this strategy focuses on codes, standards, and the development of a new market structure that increases the total saturation beyond the naturally occurring market share that would be expected without the program. The focus of this strategy tends to be on the establishment and acceptance of a new market structure that attracts additional adopters or requires compliance for market laggards. The market effects amount to the number of additional laggards that adopt due to program activities.

1.3.7 Life Cycle of an SMT Initiative

MT initiatives tend to have a life cycle that takes place over three broad periods and six related stages of activity. Figure 1-8 provides an overview of a typical initiative life cycle from ideation through a period of transition (following the initiative's success in transforming the market) to a time of support for continuing the market momentum that has been built by the SMT initiative.

Figure 1-8. Illustrative Example of the SMT Initiative Life Cycle



Source: Navigant

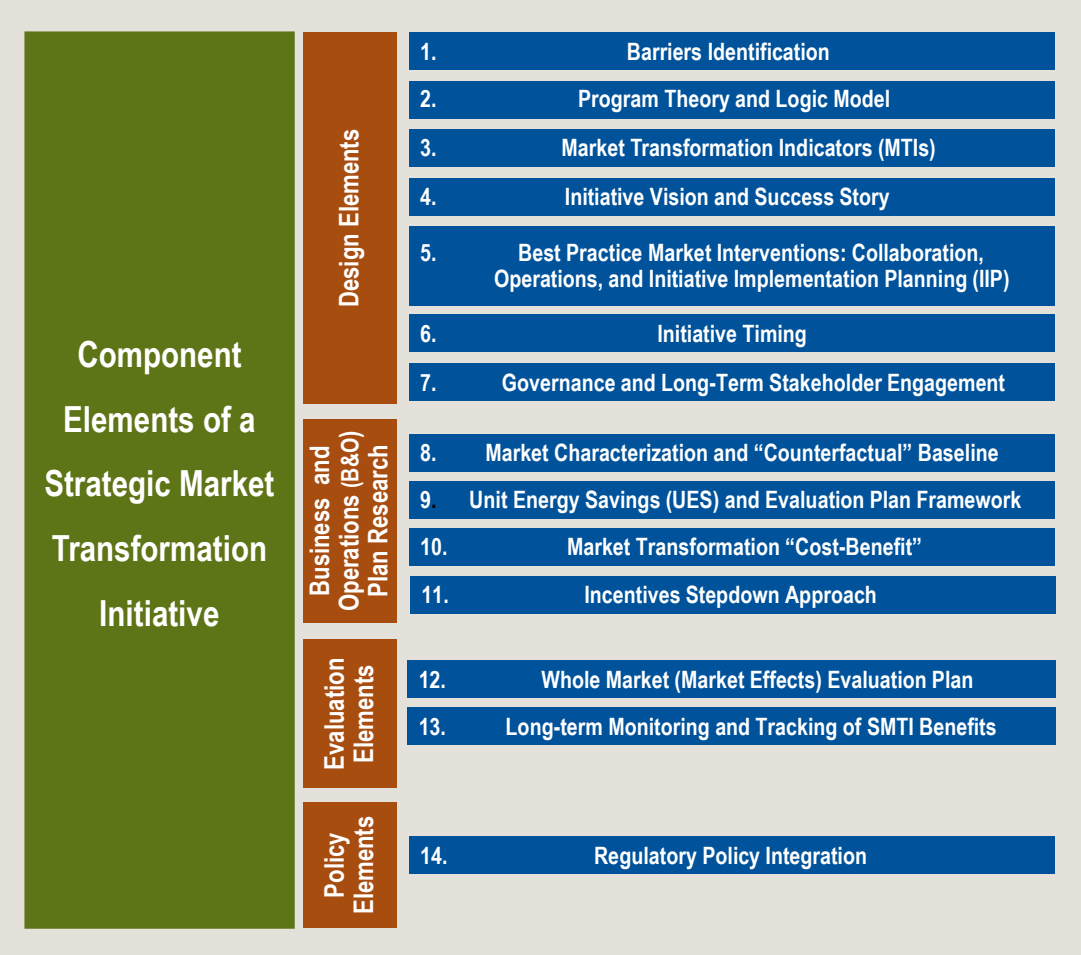
Successful design of an SMT initiative will require initiative champions to understand the basic flow of the SMT life cycle, which in turn guides the pre-launch initiative developmental and implementation needs.

1.3.8 Pre-Launch SMT Initiative Research and Operational Planning Components

While the figure above provides and illustrative example of the periods and stages of an SMT initiative, Figure 1-9 identifies the key pre-launch initiative design, business and operations plan research, evaluation, and policy components of an SMT initiative that Home Upgrade stakeholders and other SMT initiative proponents will need to develop (or address as needed in relation to regulatory policy integration) as part of a pre-launch initiative planning process, and finalize through the ideation and concept development first two life cycle stages.

Reviewing, vetting, and developing many of the key component elements identified in the figure below was the major focus of the Home Upgrade Program Working Group during the initial project period from April 2014 to March 2015.

Figure 1-9. SMT Initiative Pre-Launch Planning Components[26]



Source: Navigant

SMT initiatives require a good deal of pre-initiative focus on design issues related to the logic of the program effort and the MT indicators of success, best practice interventions, and evaluation issues. This is also the case with RA programs. However, due the need for detailed initiative planning over a long-term timeframe for an SMT initiative these elements and others listed above have a much different meaning for SMT initiative planners than for RA programs, which tend to be shorter-term. For instance, the logic model and related market transformation indicators (MTIs) play a major role in not only defining the barriers, activities, and expected outcomes built into the design of the effort, but also the measures of progress over the life of the initiative to determine initiative success and identify potential needs for program process improvements. With a long-term timeframe on transforming market structure and market actor behavior

[26] Component 14, Regulatory Policy Integration, exists only as an initiative component in the front-end of stakeholder deliberations and decision-making processes. The element is listed here as it is a foundational one, the issues of which need to be reviewed and vetted in a potential Phase 2 of this project.

toward higher states of efficiency, these pre-launch components become critical to keeping the SMT initiative on track to its short-, intermediate- and long-term goals—with the ultimate objective of reaching the SMT initiative's market sustainability goals.[27]

Chapter 2 provides an overview of the Home Upgrade Program Working Group's work undertaken during this first phase of the project, as well as the remaining tasks that need to be completed to develop the program into a potential SMT initiative. Navigant places the WG progress in the context of the initiative life cycle stages and pre-launch components.

1.3.9 Planning Timeframe for Integrating Pre-Launch Components within the SMT Initiative Life Cycle

Initiatives can be focused on short-term MT efforts or on longer-term efforts depending on the products or services offered, barriers to their adoption within the target market, and/or other relevant issues.[28] Regardless of the timeline for the initiative, the development and implementation needs of the pre-launch components identified in Figure 1-8 in relationship to the ideation, concept development, and implementation stages of the SMT initiative life cycle, will not vary.

Figure 1-10 shows a high-level overview of the relationship between the development and implementation of pre-launch components to the SMT initiative life cycle. SMT initiative pre-launch components are developed during life-cycle Stages 1 and 2, while Stages 2 through 6 focuses on implementing, evaluating, and transitioning the effort to market momentum support once successful.

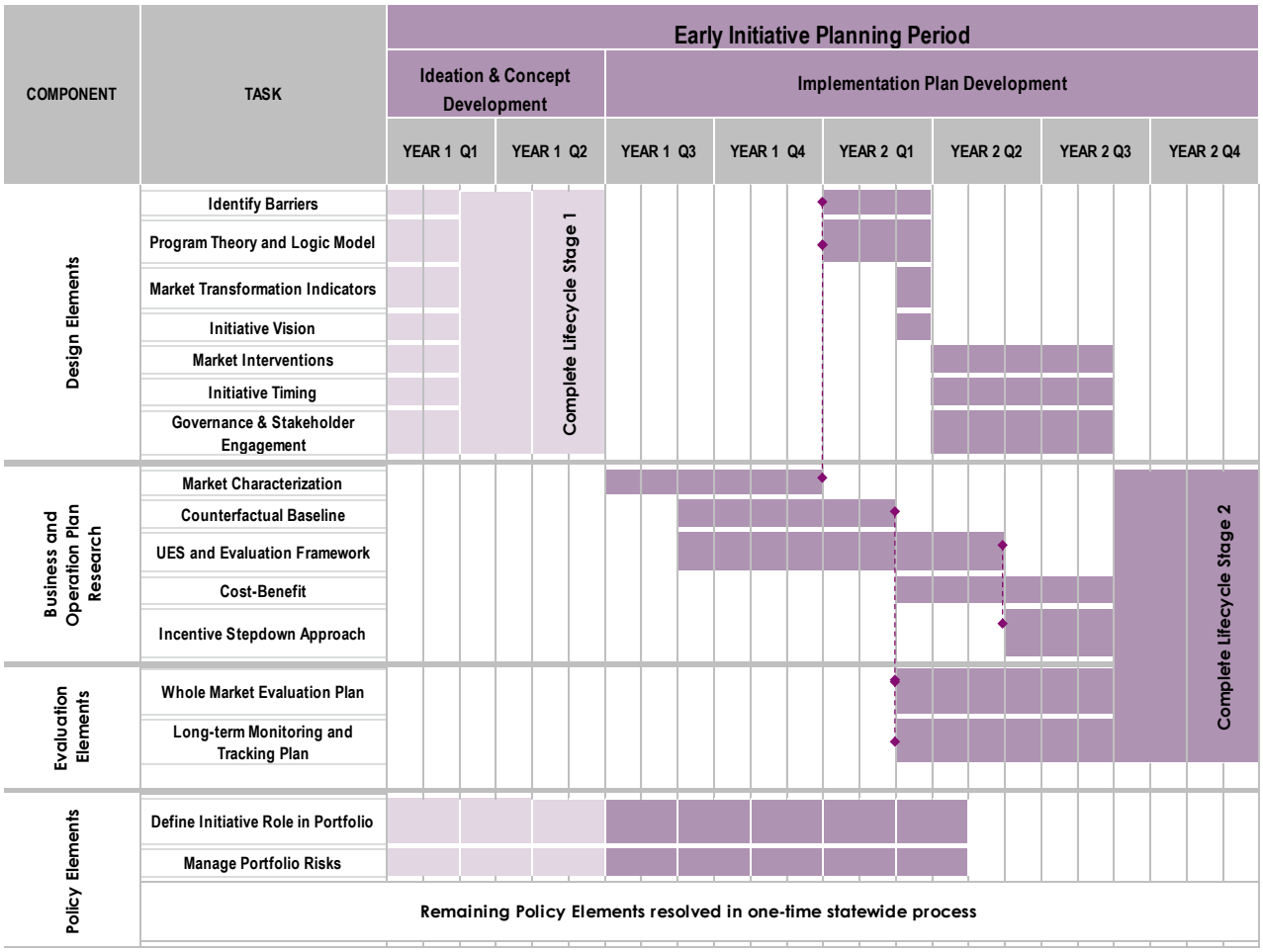
Figure 1-10. Relationship between Timing of Pre-Launch SMT Initiative Components and the SMT Life Cycle

In Figure 1-11, Navigant presents this relationship between the timing, development, and implementation needs of the SMT initiative pre-launch components and the SMT life cycle ideation and implementation plan Stages 1 and 2 in a generic timeline that shows the sequencing of these two SMT framework elements.

[27] Based on work currently being conducted in the Northwest for the Bonneville Power Administration (BPA) related to what has become known as "momentum savings," Navigant has incorporated a period called "Transition to Support Market Momentum" into Figure 1-8 showing the SMT initiative life cycle. This is done in recognition that even though an SMT initiative's efforts may be successful in reaching its market adoption goals given its initial understanding of the market, a sustained effort to incorporate new technologies and savings concepts, as well as to address any new barriers that may have arisen, will likely be needed to continue to deepen and grow market savings levels.

[28] Chapter 3, Section 2.4.10, presents a detailed discussion on the issue of SMT initiative timing, as well as the status of determining the timing for a potential Home Upgrade Program initiative.

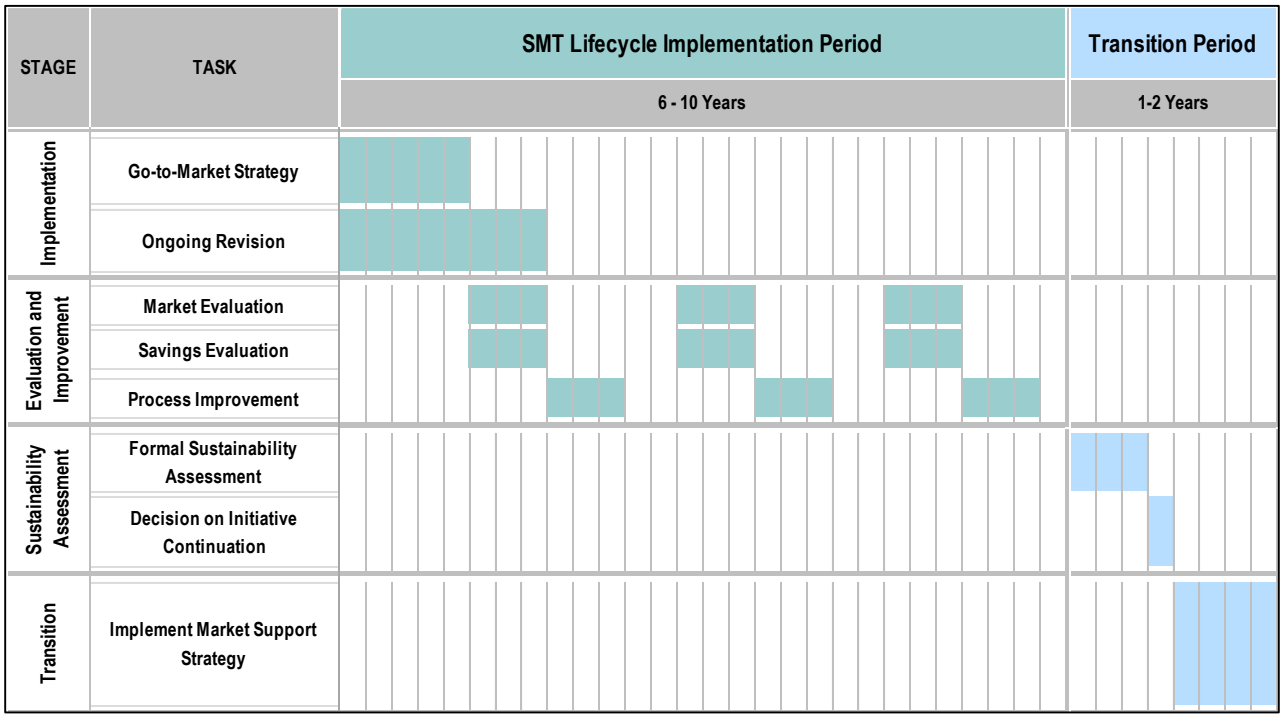
Figure 1-11. Generic SMT Initiative Timeline for the Early Planning Periods: Stages 1 and 2



Source: Navigant

Figure 1-12 provides a generic overview of the life-cycle implementation of Stages 3 through 6, the timelines during which SMT initiative timing will vary depending on the design of the initiative.

Figure 1-12. Generic SMT Initiative Timeline for Implementation Planning Periods: Stages 3 to 6



Source: Navigant

The SMT initiative pre-launch components identified in Figure 1-9 are completed in the first two stages of the SMT initiative life cycle as shown in Figure 1-11. During the implementation stages 3 through 6, presented in Figure 1-12, best practice interventions are initiated along with evaluation activities to determine an initiative's progress toward meeting its sustainability goals.

2. Home Upgrade Working Group SMT Initiative Development Activities

Chapter 2 presents information on the following:

- Overview of the current status, needs, priorities, and timelines of the Home Upgrade Working Group SMT initiative development efforts
- Detailed description of the SMT initiative pre-launch components
- Current status of the Home Upgrade Working Group SMT initiative in relation to developing SMT initiative pre-launch components
- Needed next steps for the Home Upgrade Working Group SMT initiative activities
- Findings from Navigant's *National Best Practice Market Transformation Programs* report

2.1 Developing the Home Upgrade Program into an SMT Initiative

As noted in Chapter 1, SMT initiatives require careful and detailed planning prior to launch of such an effort. They also require an agreed upon SMT framework and regulatory implementation process within which to implement the SMT initiative. In this chapter, Navigant provides detailed descriptions of the SMT initiative pre-launch components (presented in Chapter 1) that need to be in place prior to SMT initiative launch, the current status of the relationship of WG stakeholders' efforts to develop these needed components, and the next step activities needed for the WG to transition Home Upgrade from an RA effort to a potential SMT initiative. As note previously, the Navigant recommends development of a formal SMT framework —based on the SMT life cycle stage needs and pre-launch components —for potential development in any next step activities undertaken by the Home Upgrade Program WG.

Figure 2-1 restates the SMT initiative pre-launch components presented in Chapter 1. This is followed in Section 2.1.1 by a summary table that presents the current status of the Home Upgrade Working Group's efforts and remaining activities that need to be completed to launch an SMT initiative as well as an overall timeline/schedule for completing the development of these activities.

Figure 2-1. Pre-Launch SMT Initiative Planning Components

Source: Navigant

2.1.1 Overview of Current Status and Needs of a Home Upgrade SMT Initiative Effort

Navigant provides an overview the current status of activities to develop the needed components of a formal Home Upgrade initiative below. All of these components build toward the completion of a full initiative implementation and evaluation plan; in other words, reaching the end of the second stage of the planning period in the straw-person SMT framework. The timing and priority of these components are addressed in the next section.

Table 2-1 presents an overview of the current status and needs of the design elements addressed by the Home Upgrade Working Group.

Table 2-1. Status of Design Elements

	SMT Initiative Pre-Launch Components	Home Upgrade SMT Initiative Development Status	Responsible Party	Remaining Work	Order of Operation
1.	**Barriers Identification**	Initial drafts developed	Initiative administrators, with market research firm support and commission review	Hold logic model and MTI workshops to finalize and document for commission review	1*
2.	**Program Theory and Logic Model**				2*
3.	**MTIs**			Revisit once market characterization study complete, pending approval	3*
4.	**Initiative Vision and Success Story**			Finalize initiative vision and statement of objective	3*
5.	**Best Practice Market Interventions: Collaboration, Operations, and IIP**	Target market, product definition drafted		Finalize initiative operations structure Develop go-to-market strategy Develop gradual transition strategy	4*
6.	**Initiative Timing**	Introduced concepts		Determine time of initiative launch Forecast expected duration of initiative	6*
7.	**Governance and Long-Term Stakeholder Engagement**	Draft structure proposed		Refine governance structure Engage stakeholders and develop plan for long-term stakeholder involvement	5

**None of these elements can be finalized until the B&O research elements have been completed, in particular the market characterization research. Source: Navigant*

Table 2-2 provides an overview of the developmental status of the B&O research plan components.

Table 2-2. Status of B&O Plan Research Elements

	SMT Initiative Pre-Launch Components	Home Upgrade SMT Initiative Development Status	Responsible Party	Remaining Work	Order of Operations
8.	**Market Characterization and Counterfactual Baseline**		Market research firm	Conduct market characterization study Finalize target market and product definition Develop counterfactual baseline study	4 Market characterization launches first while planning for 6 Counterfactual baseline Delphi Panel begins (see timeline below)
9.	**UES & Evaluation Planning Framework***	Introduced concepts	Market research firm	Develop UES estimates for product and target market as defined above	7 (One time vetting of SMT evaluation protocols)
10.	**Market Transformation Cost-Benefit**		Commission Market research firm	Finalize approach to estimating cost-effectiveness Build cost-effectiveness model	8
11.	**Incentives Step-Down**		Market research firm	Use cost-effectiveness model to analyze incentives step-down scenarios	9

Source: Navigant

Table 2-3 and Table 2-4 provide overviews and next steps for the evaluation and regulatory policy elements.

Table 2-3. Status of SMT Initiative Evaluation Elements

	SMT Initiative Pre-Launch Components	Home Upgrade SMT Initiative Development Status	Responsible Party	Remaining Work	Order of Operation
12.	**Whole Market (Market Effects) Evaluation Plan**	Introduced concepts	Market research and/or evaluation firm(s), with commission review	Define whole market evaluation approach and develop detailed plan based on final program theory, logic model, MTIs, and UES evaluation needs	8
13.	**Long-Term Monitoring and Tracking of SMT Initiative Benefits**			Develop plan for long-term monitoring and tracking plan based on whole market evaluation approach	8

Source: Navigant

Table 2-4. Status of Policy Elements

	SMT Initiative Pre-Launch Components	Home Upgrade SMT Initiative Development Status	Responsible Party	Remaining Work	Order of Operation
14.1	**Define Role of Market Transformation within Portfolio**	CPUC MT Policy White Paper and Keating White Paper on MT introduced the concepts	WG position	WG to meet and develop formal position on these issues	4/5
14.2	**Select Market Transformation PA**		WG position		
14.3	**Manage Risk**		WG position		
14.4	**Carefully Identify and Thoroughly Vet Market Transformation Initiatives**		WG position		
14.5	**Assess/Ensure Cost-Effectiveness**		WG position		
14.6	**Measure Progress**		WG position		
14.7	**Reward Performance**		WG position	WG to meet and develop formal position on this issue	4/5

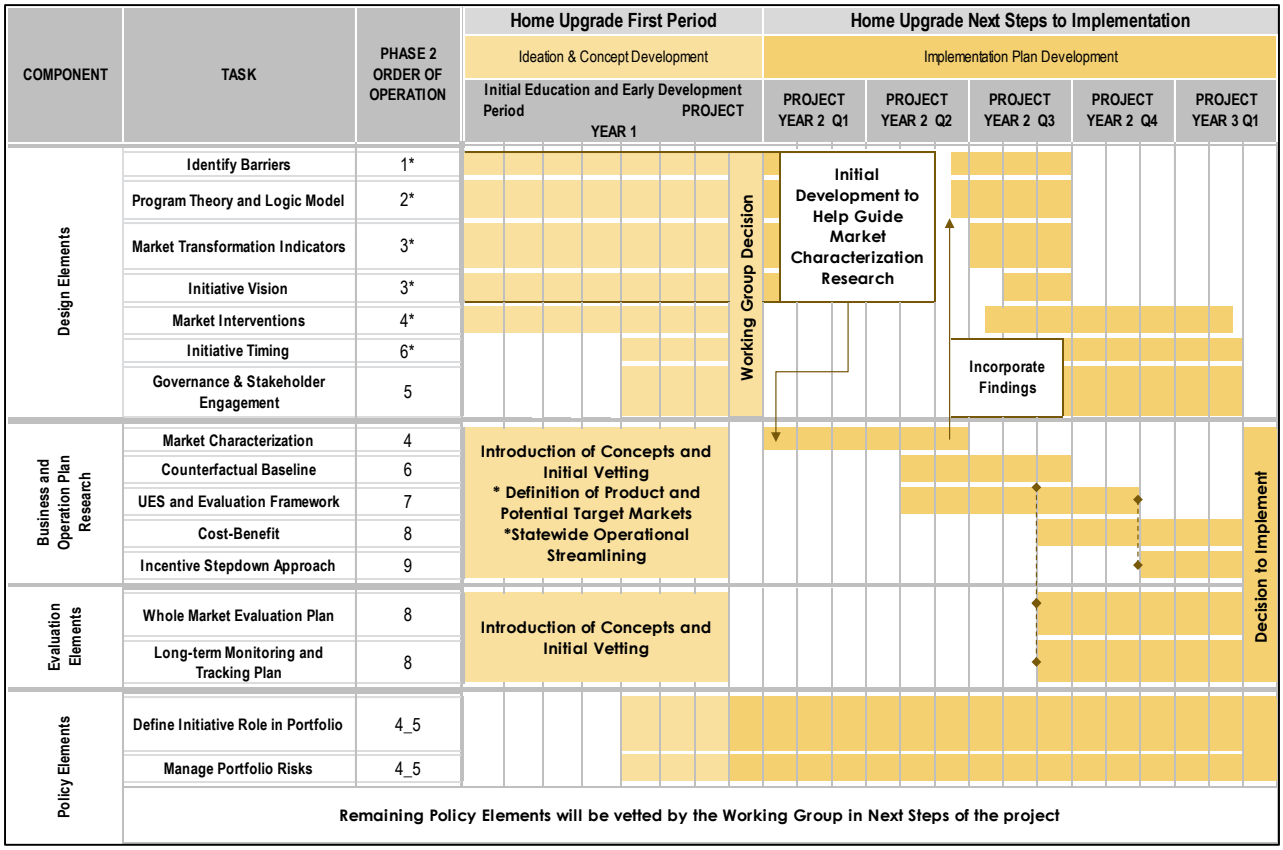
	SMT Initiative Pre-Launch Components	Home Upgrade SMT Initiative Development Status	Responsible Party	Remaining Work	Order of Operation
14.8	**Reflect Market Transformation Opportunities in Potentials Studies**		WG position	WG to meet and develop formal position on this issue	4/5

Source: Navigant

2.1.1.1 Schedule of Home Upgrade SMT Initiative Pre-Launch Activities

Figure 2-2 provides a status timeline of the Home Upgrade Working Group project efforts to develop the SMT initiative pre-launch components for the effort, with Phase 1 activities listed in year one of the effort and Phase 2 activities taking place during year 2.

Figure 2-2. Home Upgrade Timeline for Developing and Implementing the SMT Initiative Life-Cycle Components



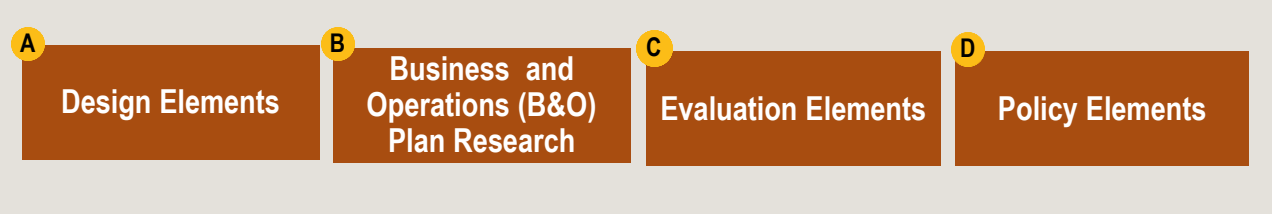
Source: Navigant

2.2 Component Elements of a Potentially Successful SMT Initiative Design

Moving from theory to practice presents a critical juncture in SMT initiative planning. Rogers or Bass curves may tell one the direction to take in developing an SMT initiative in terms of a vision of success (i.e., moving along the "S" curve to and through the critical mass phase to full saturation). Yet, per the previous discussion, fruitful SMT initiatives still require a comprehensive roadmap of activities that SMT PAs will need to undertake to guide the effort. Such guidance will move the initiative through its implementation stages from the early market period through the transforming market period to a transformed market.

There are four major periods of categories of focus for successful SMT efforts. These are listed below in Figure 2-3.

Figure 2-3. SMT Initiative Elements



Source: Navigant

2.3 Home Upgrade SMT Initiative Development Phase 1 and Phase 2

During this first year of the project, Home Upgrade Working Group stakeholders have focused on understanding the technical, design, economic, evaluation, and policy issues, concepts, and needs associated with developing a formal SMT framework. They have also focused on developing many of the needed early design and initiative planning elements of a successful initiative. For instance, many of the foundational design elements have been met by WG teams related to SMT initiative program and target market definitions, operational structure changes, governance perspectives, high-level go-to-market approaches, and other related issues. Others must still be vetted, analyzed, or developed (e.g., baseline, cost-effectiveness, policy integration, evaluation plan development, etc.).

Because further development of the pre-launch components is needed to complete the advanced pre-launch work of an SMT initiative, the Home Upgrade Working Group is considering a next step set of activities of this project. Such an effort would focus on refining existing year one agreements and on developing the remaining components needed to fully complete Home Upgrade Program development as a potential SMT initiative.

The remainder of this chapter focuses on presenting a detailed description of the pre-launch SMT design, B&O planning, evaluation, and policy components as well as the current status and next steps needing to be completed. Finally, the chapter incorporates a summary of the best practice market transformation program research undertaken as part of Navigant's year one support effort. The entirety of the best practices report is presented in Appendix C.

2.4 Design Elements

The first step in any SMT initiative consideration is focused on selecting an appropriate target market for the promoted product or service and reviewing the market profile for the targeted segment. Market profiles are compilations of market research and intelligence on specific market segments.

Design Elements

2.4.1 Barriers Identification, Logic Model, and MTI Development (Pre-Launch Components 1, 2, and 3)

2.4.1.1 Barriers Identification

Once a market focus and efficiency measures are defined, SMT initiative designers will need to identify the current and projected market barriers that stand in the way of the product or service being adopted. Sometimes this relates to awareness of the product, other times to attractiveness, and yet other times to the availability of the product or service. Identifying and understanding the key barriers to adoption provides the basis for the development of a solid SMT initiative program theory and logic model, which is needed to guide the SMT initiative activities, set goals, and establish a basis for measuring the progress and success of the effort. Table 2-5 presents a high-level typology of common barriers to market uptake.

Table 2-5. Illustrative Examples of Common Barriers to Product or Services Adoption

Indicators	Supply Chain	End User
Awareness/Understanding	Suppliers are unaware of the measure and will not distribute, stock, or sell	End users are unaware of measure
Availability	Suppliers do not know how to access measure (or support services) from upstream providers	End users do not know where to easily access the measure or its support services
Attractiveness	Suppliers do not see profit in distributing, stocking, or selling measure	End users do not see value of measure (e.g., too expensive)

Source: Navigant

Note that the three indicators described above serve both as feedback on identifying barriers related to market awareness and understanding, availability, and product attractiveness and as potential evaluation metrics for identifying the progress of the initiative during each of its stages of market adoption.

Table 2-6 provides further detail on the types of barriers that initiative proponents may need to address in designing their efforts. An SMT initiative's specific market profiling and characterization will be needed to identify the relevant barriers to success in the proposed initiative's target market and market segments.

Table 2-6. Types of Market Barriers

Market Barriers
Information search costs
Performance uncertainties; asymmetric information
Access to financing
Split incentives
Bounded rationality—frustrated by old rules of thumb; organizational practices or custom
Inability to separate product features—in particular for pricing; inability to reverse an EE decision
Hassle or transaction costs; hidden costs
Externalities not visible; mispricing due to regulation
Product or service unavailability

Source: Joseph Eto, et al. (1996), Electric Power Research Institute (2001)

2.4.1.2 Program Theory and Logic Model Theory

Barrier identification is a major first step in SMT initiative planning. Once completed, proponents will need to engage in a stepped process to develop a working program theory that identifies specific elements:

1. The barriers to initiative success.
2. Specific activities that program implementers will undertake to overcome those barriers.
3. The expected outcomes in terms of market adoption in successfully accomplishing the goals.
4. Indicators of progress/success in meeting the goals of the desired outcomes.
5. A definition of the sustainability goals and metrics for determining the level of market adoption; which in turn indicates the needs for continued market support for ongoing momentum in the transformed market.

Development of these five elements of a formal program theory of change into formal logic model forces initiative proponents to seriously think through the SMT initiative's proposed activities and process for moving a proposed effort through the adoption curve. The adoption "S" curve as note previously moves from early adopters to innovators to mainstream market adoption and beyond to full market saturation. Additionally, identifying these elements and developing the logic model as the initial SMT initiative program design element (based on the above) provides insights into the initial indicators of initiative progress (MTIs), sustainability metrics, and the potential needs for support to continue to deepen transformation momentum in the target market.

Table 2-7 provides an overview of the necessary steps and the typical questions that initiative designers should consider in developing the component elements of an SMT initiative's theory of change.

Table 2-7. Steps to an SMT Initiative Theory of Change and Logic Model Development

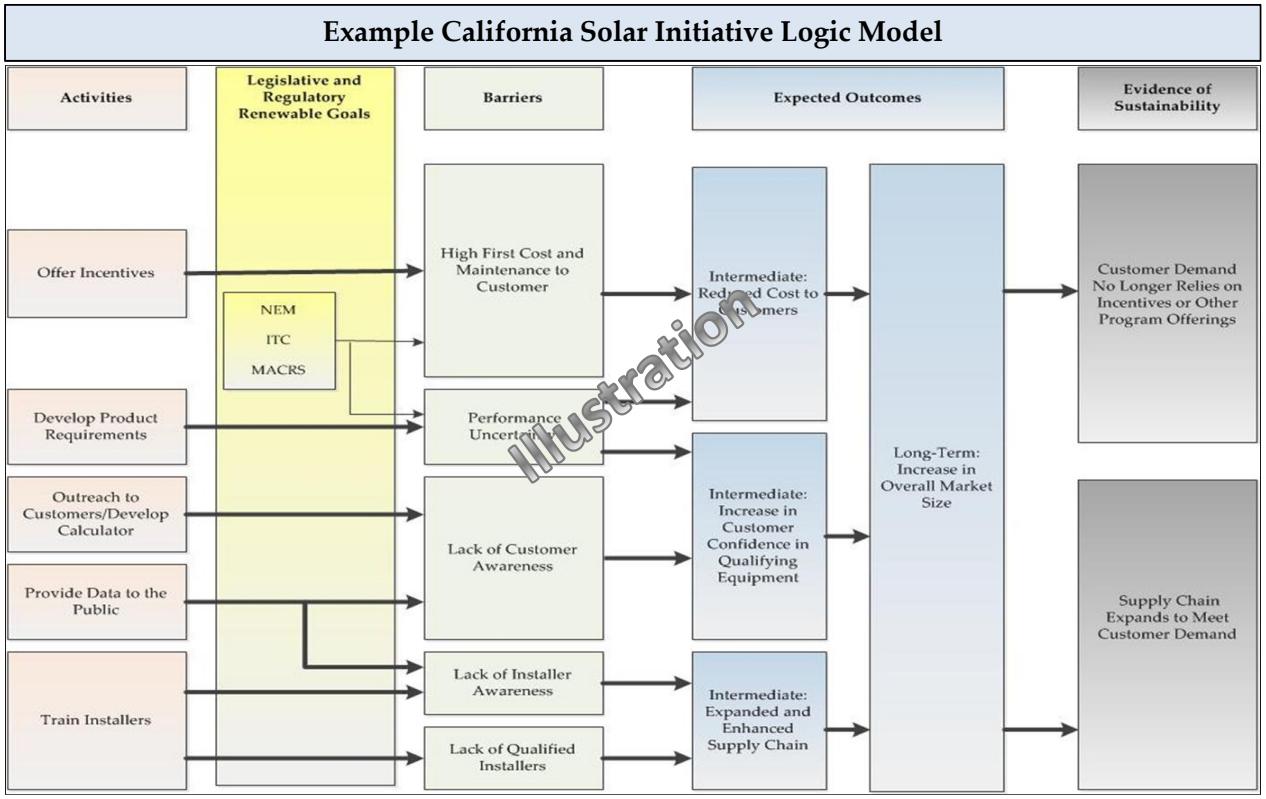
Creating a Theory of Change	
1. Identifying Barriers	What prevents adoption? • Be specific/clarify the barriers • Confirm the barriers are real and not just typical reasons/responses
2. Designating Interventions to Overcome Barriers	How do we overcome or reduce the barriers? • Understand the relationship the barrier has to the market • These can be leverage points
3. Prediction of Outcomes (Market Effects)	If the interventions work, how will the world be different? • Require a baseline • Track progress over time
4. Assignment of Indicators	How will we know if the expected outcomes have come to pass? • At least one indicator per outcome • Track changes over time • Indicators must be measurable
5. Evidence of Sustainability/ Support Needs to Maintain Market Momentum	How will we know that the SMT initiative has reached a sustainable market adoption? • Require cumulative market progress analysis • Require forecasts of sustainability based on market data • Require assessment of market maintenance needs to support market momentum to introduce new technologies and approaches or address new barriers

Source: Navigant

While the theory and logic elements identified above are key components of an initiative logic model (and related MTI development), these are not static elements to be developed and then only tangentially regarded. Rather, in an SMT effort, barriers may change and new indicators may begin to play an important role at different phases of the SMT effort. This points to the critical role the program logic and MTIs hold in the process and the need for continued flexibility in examining the program logic and market indicators on an ongoing basis.

Figure 2-4 provides an example of a logic model developed by Navigant to assess the market sustainability of the CSI.[29]

Figure 2-4. Illustrative Example of Logic Model Elements[30]



Source: Navigant

The CSI example provides an overview of the needs of a formal logic model. Note that in the logic model activities to overcome barriers are tracked through each of the stages.[31]

2.4.1.3 MTI Theory

MTIs, as noted previously, are not only important elements of the theory of change of an SMT initiative, but also dynamic markers to assess the ongoing progress of the effort on its path along the market adoption

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[29] In Chapter 3, the project team provides a draft Home Upgrade Program SMT logic model and related MTIs developed by the project team and based on the program administrators' (IOUs and RENs) most recently submitted CPUC program application.

[30] Navigant Consulting, Inc., *Task 2 Final Report: CSI Market Transformation Study*, California Public Utilities Commission, 2014, www.cpuc.ca.gov/NR/rdonlyres/C0AC3B34-2321-49FC-8351-963B290E943E/0/CSIMTStudyTask2ReportFinalFinalCLN20140425.pdf.

[31] The "legislative and regulatory renewable goals" component is unique to the CSI effort and generally does not play a role in logic model development for most programs.

curve. It is critical at the beginning of an SMT effort to select MTIs that best represent those changes to the structure of the target market and/or market actor behavior that tie directly to the activities and expected outcomes ascribed in the program theory and logic model.

MTIs may be developed in retrospect for an initiative that had not previously undertaken logic model and indictor development, such as the CSI initiative, or prospectively for a newly planned initiative. California efficiency programs have for some years been required to develop a logic model and MTIs for RA program efforts. These should be reviewed in the light of the needs of an SMT initiative for those existing programs proponents may wish to transition to market transformation efforts.

The NMR Study and other such efforts,[32] including the CPUC Keating white paper,[33] provide examples of key indicators of market effects for assessing an initiative's progress. While many examples of indicators exist, it is clear from the literature and program implementation experience that each proposed SMT initiative will need to assign its own unique indicators-based assessment of the initiative barriers identified in the theory and logic model, as well as specific target market characteristics. Table 2-8 provides suggested high-level rules of thumb for developing market indicators.

Table 2-8. Rules of Thumb for Market Indicator Selection

Rules of Thumb for Market Indicator Development	
√	Indicators must be consistently measurable
√	In general, indicators should be associated with the barrier that the program seeks to overcome
√	Over time, indicators may change to reflect the degree of market transformation (e.g., "awareness" is an early indicator and "understanding" is a later indicator)
√	Cost of measurement is a legitimate criteria for selecting or eliminating an indicator
√	Over time, it may be appropriate to modify or drop indicators if their usefulness declines
√	All outcomes and evidence of sustainability must have at least 1 indicator (preferably no more than 3)

Source: Navigant

[32] The NMR report (2013) provides a comprehensive compilation of market indicators for NYSERDA, Efficiency Vermont, Massachusetts, and NEEA market transformation efforts. Also, see M. Rosenberg and L. Hoefgen, "Market Effects and Market Transformation: Their Role in Energy Efficiency Program Design and Evaluation," March 2009, for a discussion of proximate (e.g., awareness/knowledge and availability) and ultimate (e.g., market share and other changes in patterns of adoption) indicators.

[33] Keating (2014), op. cit., p. 16.

Proponents of SMT initiatives will find voluminous information on designing MTIs of market effects. In Table 2-9, Navigant provides examples of typical MTIs.

Table 2-9. Example of Typical Market Indicators

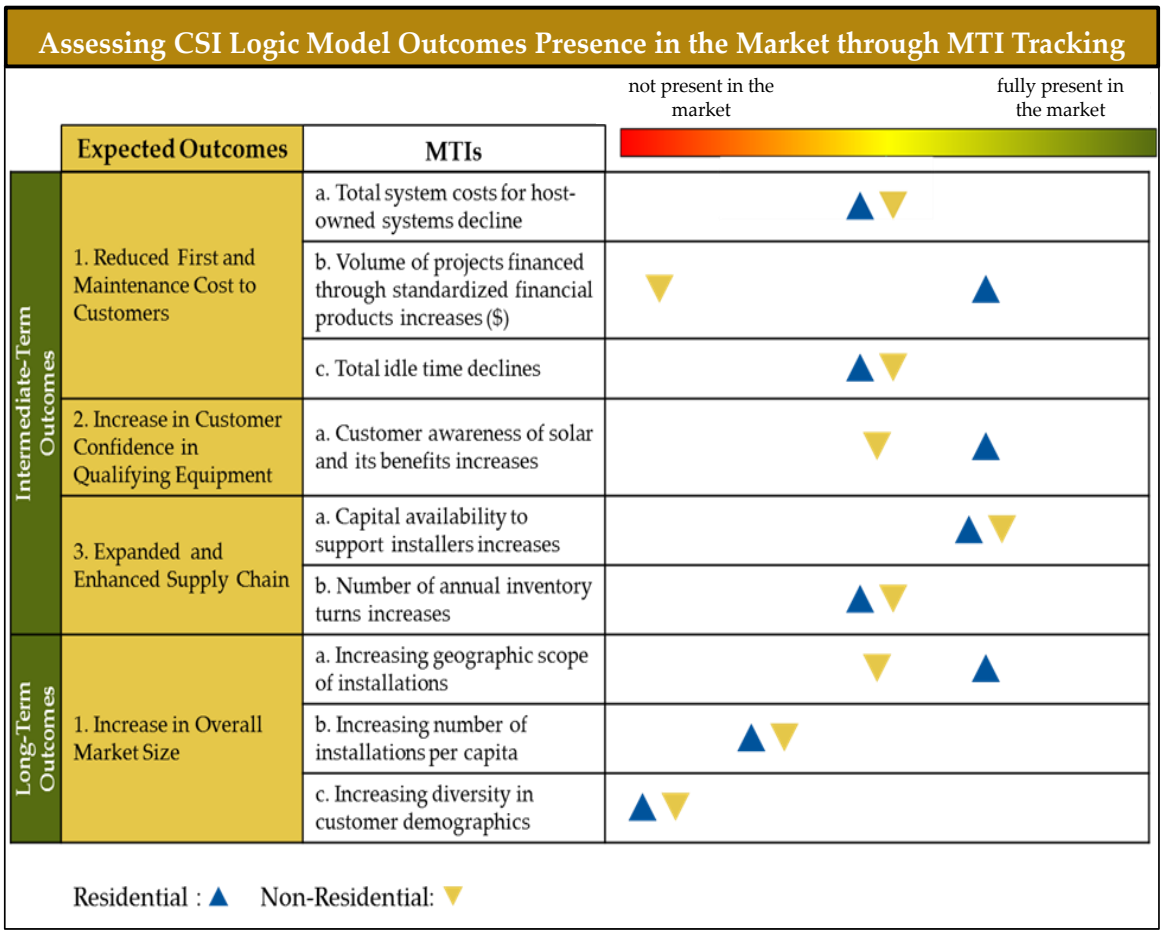
	Example Market Indicators
1.	Market audience is increasingly aware and more knowledgeable of products/services/practices and benefits/value to market audience
2.	Increasing number of new market actors begin to supply market
3.	Standards and codes become more stringent
4.	Increasing repeat purchases
5.	Product price declines without subsidy
6.	Products are increasingly available

Source: Navigant

The table above points to the important role that MTIs play as markers of initiative progress and hoped for success.in an SMT initiative. Rooted in program theory and logic model, these indicators provide the focus of evaluation efforts—not only throughout the initiative's three key phases (immediate and short-term market adoption, intermediate market adoption, and long-term market adoption) but also in assessing market sustainability at the transition period (exit phase) from full market implementation to program support for ongoing market momentum.

Figure 2-5 provides an example of the linkage between the CSI logic model's expected outcomes, MTIs, and post-evaluation presence of the indicators of market progress/success. Based on this example table and others, the CSI initiative was found to be sustainable.[34]

Figure 2-5. Application of Logic Model Outcomes to MTI Evaluation



Source: Navigant

As can be seen in this CSI example, for SMT initiatives logic models, MTIs, and evaluation components are intimately linked in determining the progress and effectiveness of the effort.

2.4.2 Current Status: Barriers Identification, Logic Model, and MTI Development (Pre-Launch Components 1, 2, and 3)

Navigant developed a draft logic model and example MTI options tables for the Home Upgrade Program. During Workshop #1, the WG provided initial feedback on these drafts and Navigant revised accordingly.

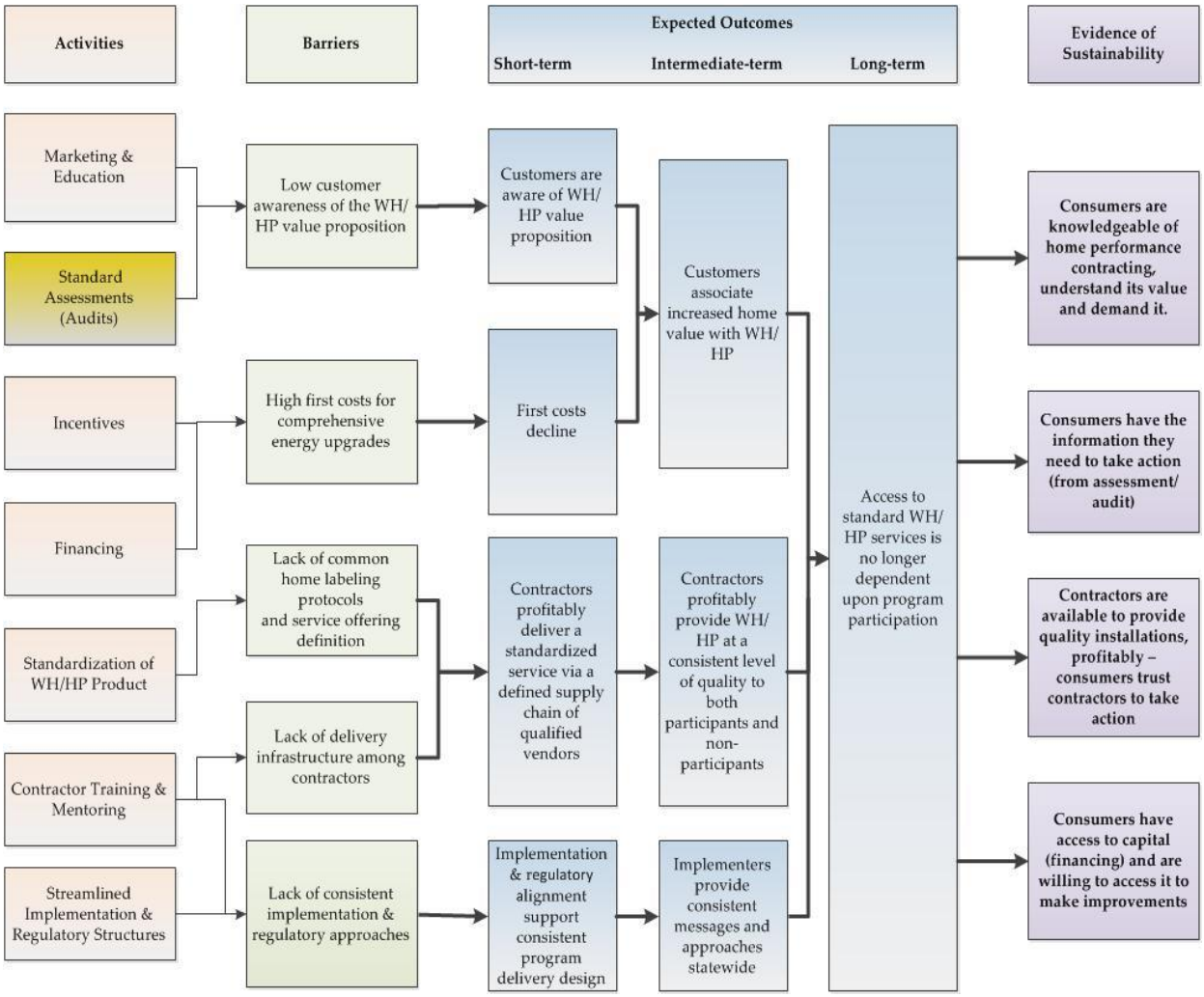
[34] See Chapter 3 for discussion of a Navigant created draft Home Upgrade Program logic model and potential indictors modified based on program's most recent PIP logic model submission.

Status: The barriers approach, logic model, and MTIs need to be refined and finalized prior to completing these pre-launch SMT initiative components.

Below, Navigant presents the draft Home Upgrade Program logic model and several example MTI options tables.

2.4.2.1 Home Upgrade Draft Logic Model

Figure 2-6. Draft Logic Model for Market Transformation Based on CSI Model



Source: Navigant

As can be seen, the draft logic model starts out on the right hand side with identification of the overall sustainability objectives of the effort. Once identified, these objectives help designers better refine and clarify the barriers that the initiative will need to overcome, the activities that need to be taken to reach the

sustainability goals, and the expected short-, intermediate- and long-term outcomes expected to occur over the course of the initiative.

2.4.2.2 Home Upgrade Program Draft Example MTI Options

As noted, Navigant also developed draft MTI option tables for WG consideration. These MTIs relate to the metrics that would be used to measure the progress of the initiative in meeting the logic model expected outcomes from activities.

Figure 2-7, Figure 2-8, and Figure 2-9 present examples of MTI options for several different logic model metrics at several different periods of the initiative: short-term awareness (

Figure 2-7); intermediate-term recognition of Home Upgrade value (Figure 2-8); and sustainability measure of consumer demand and desire to become Home Upgrade participants (Figure 2-9). These and other MTI options for measuring the progress of the Home Upgrade SMT initiative's ability to overcome the barriers identified in the logic model were also developed and presented at WG Workshop #1.

Figure 2-7. Example Short-Term MTI Options

Short-Term Outcome: ***Customers are aware of Home Upgrade Value Proposition***

Good	Better	Best	Data Sources
Increasing number of customers recognize program terminology	Increasing number of customers can identify benefits of WH/HP	Increasing number of customers plan to use WH/HP in their next home retrofit	telephone surveys of participating and non-participating customers (general population survey)

Source: Navigant

Figure 2-8. Example Intermediate-Term MTI Options

Intermediate-Term Outcome: ***Homeowners associate increased home value with Home Upgrade***

Good	Better	Best	Data Sources
Increasing number of homeowners state that WH/HP increases home value compared to a non-retrofitted home	Increasing number of homeowners state that WH/HP increases home value compared to a non-WH/HP retrofitted home	Homeowners can articulate the difference in value between a WH/HP home a non-WH/HP retrofitted home	Telephone survey of participating and non-participating homeowners (general population survey)

Source: Navigant

Figure 2-9. Example Sustainability Analysis MTI Options

Evidence of Sustainability: ***Consumers are knowledgeable of home performance contracting, understand its value and demand it***

Good	Better	Best	Data Sources
Increasing number of customers recognize program terminology	Increasing number of customers can identify benefits of WH/HP	Increasing number of customers plan to use WH/HP in their next home retrofit	Telephone surveys of participating and non-participating customers (general population survey)

Source: Navigant

2.4.3 Next Steps: Barriers Identification, Logic Model, and MTI Development (Pre-Launch Components 1, 2, and 3)

Building off of the draft Home Upgrade Program logic model and MTI options developed by Navigant in year one of this project, the next step is to work with the core team leaders and the state's evaluation, measurement, and verification (EM&V) and other stakeholders to agree on a well-documented logic model. This includes a set of MTIs that both captures the current design of the Home Upgrade Program and provides a conceptual context for understanding its intended market transformation achievements and effects. To do this, Navigant recommends holding a series of three in-person meetings with utility and stakeholder staff as part of an iterative process to build upon the well-laid foundation of the market transformation process. This iterative process will take three steps:

Step 1: Preparation

The WG will need to task a sub-committee with collecting a limited amount of relevant market information from published sources and through informal telephone interviews with utility and stakeholder staff as a backdrop for logic model and MTI development. This market information will include, but be limited to, specific topics:

- Perceptions of current market conditions
- Identification of market barriers and non-programmatic influences
- Logical linkages between program activities and expected outcomes
- Determination of programmatic and market transformation timelines

With this information, the sub-committee can develop an initial straw-person logic model for review as part of the in-person meetings.

Step 2: In-Person Meetings and Follow-Up

Navigant recommends convening three in-person meetings in California with utility and stakeholder staff. Based on the initial logic model, the logic model sub-committee or a consultant should revise and refine

each element of the logic model and develop MTIs. After each meeting, the sub-committee/consultant will follow up with attendees to address any unanswered questions and drive consensus regarding any outstanding issues. Navigant proposes the following structure for this step:

Meeting 1
Goal: Develop a good working relationship among participants and align understanding of logic modeling
Topics:

- *Review logic model principles (components, structure and use)*
- *Develop consensus of current market conditions*
- *Determine desired outcomes*
- *Identify barriers to desired outcomes*

Between the first and second meeting, the sub-committee/consultant will circulate an updated logic model based on stakeholder input. Based on stakeholder comments, the sub-committee/consultant will update the logic model in preparation for the next meeting. These revisions will drive consensus without taking up meeting time.

Meeting 2
Goal: Confirm consensus regarding logic model revisions and develop a shared understanding of potential program design
Topics:

- *Identify potential program activities*
- *Categorize non-programmatic sources of market influence*
- *Discuss the logical linkages among proposed activities, barriers, and desired outcomes*
- *Develop consensus regarding expected outcomes versus desired outcomes within the programmatic timeline*

Between the second and third meeting, the sub-committee/consultant will again follow up with stakeholders to further update the logic model and prepare to finalize the logic model in the final meeting. The sub-committee/consultant should also introduce ideas for MTIs and potential information sources to stakeholders.

Meeting 3
Goal: Complete logic model and designate MTIs
Topics:

- *Finalize logic model*
- *Confirm MTIs and information sources*

If any issues remain outstanding or questions unanswered, the sub-committee/consultant will need to follow up with stakeholders and provide resolution.

The interval between meetings will be approximately 15 working days.

Step 3: Reporting and Final Presentations

In order to fully memorialize the logic model and MTIs, Navigant and the sub-committee/consultant should develop a report for the WG that details all aspects of the logic model, MTIs, and the development process. If necessary, the sub-committee/consultant will provide a webinar for stakeholders and interested parties. The WG should document methods, best practices, and lessons learned from this experience for inclusion in a final report to describe a general process that may be applied to other market transformation initiatives.

2.4.4 Initiative Vision and Success Story (Pre-Launch Component 4)

Understanding the overall goals of the initiative and having a vision of what success looks like is an important element for the success of any initiative. Telling the SMT story prior to initiative launch provides a strong understanding of the desired outcomes, measurement metrics, and sustainability indicators for success. Such a story allows initiative public and private partners to work toward a common goal, track success, and make process improvements to keep the initiative on track relative to the storyline.[35]

2.4.5 Current Status: Initiative Vision and Success Story (Pre-Launch Component 4)

A key component of a successful market transformation initiative is having a clear market transformation story and vision for success.[36] As the group proceeds, it will be critical to document this vision as a clear narrative linked to the logic model, MTIs, and (in particular) the logic model's sustainability goals, which establish a vision and direction for the SMT initiative. The WG began this process by establishing objectives for the Home Upgrade Program market transformation initiative:

> *Collectively, we are engaged to create a new paradigm, building upon a public and private partnership, where comprehensive retrofits occur as the new standard for all existing home retrofit market segments. At the same time, we are creating awareness among all market players such that whole home energy retrofits are naturally and commonly integrated in all existing home renovation and retrofit markets. This transformation will produce deeper energy savings (than business as usual) and more aware, engaged, and satisfied California homeowners, with a multitude of additional environmental, social, and economic benefits. The focus of the Home Upgrade Program Initiative is to accelerate the adoption of a whole home energy efficiency approach to retrofits and remodels producing breakthrough results in the transformation of our existing housing stock.*

Additional input to development of the Home Upgrade Program SMT story will likely include reference to four (draft) key areas of market impact that could provide evidence of sustainability for the effort as a target goal:

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[35] See Keating (2014), op. cit., p. 13 for a further discussion of this issue.

[36] NMR Group, Inc. (2013), op. cit., p. 18.

- Consumers are knowledgeable of home performance contracting, understand its value, and demand it.
- Consumers have the information they need to take action (from an audit).
- Contractors are available to provide quality installations, profitably—consumers trust contractors to take action.
- Consumers have access to capital (financing) and are willing to access it to make improvements.

2.4.6 Next Steps: Initiative Vision and Success Story (Pre-Launch Component 4)

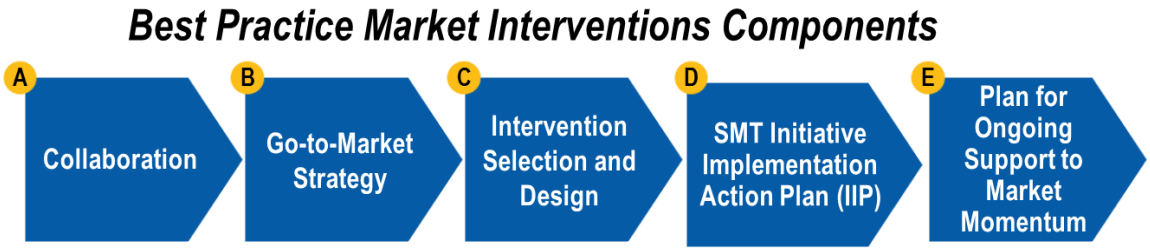
Navigant recommends that the WG should formally agree upon this objective. We recognize that at least some elements of the initiative success story will need to incorporate the findings from the logic model, MTI, and cost-effectiveness analyses. However, much of the story has already been vetted in terms of a clearly stated and agreed to initiative objective and the broad initial discussion at the project kickoff meeting and at Workshop #1 related to what success looks like and what a sustainable market transformation effort for the Home Upgrade Program would look like. Given this, Navigant recommends that the WG should hold one meeting to draft a Home Upgrade Program success story for the larger WG to vet and approve.

2.4.7 Best Practice Market Intervention(s) (Pre-Launch Component 5)

Below, Navigant presents the basic elements of what the project team has identified as five key market intervention process and design needs for SMT initiatives.

Figure 2-10 presents a graphic overview of the key elements and is followed by a brief discussion of each.

Figure 2-10. Components of Best Practice SMT Market Interventions



Source: Navigant

2.4.7.1 Collaboration

Successful SMT initiatives start out with important partnership strategies both among implementers—if multiple PAs exist, as is the case in California—and between PAs and market handshake partners. The notion that the whole market is now the target for PA efforts—including the notion that savings are accounted for not only from program participants, but also from non-program-related market actors—requires program offers to consider how best to work with each other in this win-win situation.

It is critical for SMT initiatives to develop public/private collaborative partnerships at the outset of an initiative to ensure SMT intervention success in moving the program from public/ratepayer funding and programmatic effort to market adoption and private sector success in a transformed market.

As noted previously, the transition from public/ratepayer programmatic efforts to market adoption requires handshake agreements at the beginning of an initiative between initiative champions (i.e., those authorized to implement an SMT initiative) and potential market partners, with the specific common goal of moving the market from ratepayer-funded efforts to market adoption.

However, beyond public/private sector collaboration in situations where multiple administrators exist—as is the case in California—collaboration on the part of PAs is vital. Creating a statewide program platform, private sector partnerships, marketing materials, and related business operations functions becomes critical for market actors to see the same face of the program in every area of the state.

2.4.7.2 Go-to-Market Strategy

A market transformation initiative will need to answer questions related to the best strategy for introducing and actively working the initiative. A go-to-market strategy will consider the best channels, market partner focus, and strategy for working upstream, mid-stream, and/or downstream. Whichever intervention strategy PAs choose, special attention will need to be given to questions directly related to the barriers identified in the logic model and the expected outcomes from the chosen activities.

2.4.7.3 Intervention Selection and Design

For voluntary consumer-driven program initiatives, interventions focus primarily on financial incentives, either at the end-use customer level or at the mid- or upstream level through manufacturing and distribution channels. Marketing and education programs and other non-resource efforts (e.g., audit programs, training, etc.) may also focus on end-use customers or be focused at the upstream level with program efforts that include technical assistance to professionals and others in the field. Beyond this, however, from a design point of view, program flexibility is critical to ongoing process improvements and to continued market adoption over the life of the SMT initiative.

Interventions should be selected based on a review of the market profile; analysis of current and forecasted external market realities related to, for instance, availability of key product material, expected price swings, or changing weather patterns; the ability to best impact the baseline indicators of availability, awareness, and attractiveness; and proven best practices in program design. Interventions need to be planned to support the product's or service's market adoption throughout the various implementation phases of the initiative. For example, in the immediate- and short-term initiative implementation period, increasing financial incentives and extensive consumer marketing (e.g., for the first three years of an initiative) may be incorporated into market transformation design. In contrast, during the intermediate period, initiative designers may choose to reduce or flatten incentives and move the market from general advertising to a neighborhood word-of-mouth behavioral strategy. Program interventions must continually confront and then overcome identified barriers at successive stages of the transformation process.

2.4.7.4 SMT Initiative IIP

Initiatives should have a clear implementation strategy related to the various phases of the SMT effort. An implementation action plan provides structure for initiative proponents to think through strategic activities and approaches to addressing market barriers that will be offered in the short-, intermediate- and long-term market transformation phases. Interventions need to be associated with reaching desired outcomes in each phase. Additionally, the plan should delineate market actor and PA partnership building and enhancing strategies throughout the timeframe of the efforts; channel marketing approaches; short- and long-term upstream, mid-stream, and downstream strategies; the inclusion of the integration of all party coordinated actions as part of the champion collaborative IIP effort; incentive structures and approaches; and other relevant planning issues based on an SMT initiative approach and timeframe.

For programs transitioning from RA to SMT initiatives, a major issue to address in the IIP is whether the program design and intervention approach needs to be streamlined and revised to meet the needs of long-term market adoption.

2.4.7.5 Gradual Transition and Ongoing Support to Market Momentum

The initiative implementation action plan should include a section on how the effort will gradually disengage from the market, once initiative goals are met or appear on the road to being met. Such a plan will focus on how the initiative proponent proposes to provide (or that others should provide) ongoing market support in the form of the integration of new technologies, new approaches, and/or support of codes and standards efforts.

2.4.7.6 Navigant Best Practice Program Design Study

Component elements of best practice program design and development of RA programs are well-researched.[37] Early in this project, Navigant undertook a comprehensive Best Practice and Whole House/Home Performance National Programs Review and Comparative Gap Analysis for the current Home Upgrade Program.

Table 2-10 presents a summary of findings from the Navigant best practice study.[38] Navigant notes that many of the issues identified as "gaps" in the study findings are currently in the process of being addressed by the Home Upgrade Working Group as part of the development of the SMT initiative pre-launch components.

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[37] See, for instance, The Home Performance Resource Center – www.hprcenter.org/best-practices; SWEEP Best Practices – http://swenergy.org/publications/documents/Review_of_Residential_Retrofit_Programs_in_SW.pdf; the EPA's Energy Efficiency best practices – www.epa.gov/cleanenergy/documents/suca/napee_chap6.pdf; and ITRON, "Best Practices Benchmarking for Energy Efficiency Programs: National Energy Efficiency Best Practices Study," www.eebestpractices.com/pdf/whatsnew.pdf.

[38] The full study is presented in Appendix C.

Table 2-10. Summary of Areas of Strength and Needed Improvement for Program

Maintain Areas of Strength	Grow in Areas for Improvement
Program Design and Delivery	
• SCE and SCG have made strong efforts to streamline application processes in response to contractor feedback. • CalTest is being developed to improve the accuracy of modeling tools, and CalTrack is being developed to assess ongoing performance. • The program is flexible enough to allow a variety of contractor models, ensuring that the market can grow and adapt unrestricted.	• Program must be designed to meet the specific needs of each program's product definition and target market, two elements that California is currently working to define. Incentive levels and specific requirements vary across best practice programs depending on each program's goals and regulatory environment. • California can improve future offerings by streamlining and standardizing the application process as well as contractor and homeowner participation requirements on a statewide basis.
Financing	
• There are many financing options available to homeowners looking to make energy efficiency improvements, including several offered through programs. • Many financing programs are easy to participate in even if on-site pre-approval is not possible.	• The program needs to continue to work on streamlining its integration with available financing options, especially those that are popular among nonparticipants.
Marketing and Outreach	

• At an individual level, most PAs are meeting if not exceeding many marketing and outreach best practices. All PAs are doing the following:
  ○ Using social media and community-based marketing (all)
  ○ Making efforts to engage stakeholders and market actors
  ○ Using the non-energy benefits of home performance upgrades to their advantage
• Some PAs are working to leverage local governments and local government programs as well as engaging the real estate community.
	• One of the biggest drawbacks to the California program is the lack of effective statewide coordination, which makes it difficult to enlist market actors able to support going to scale. Although various PAs represent many of the nation's best practices, there is not an organized way for PAs to share ideas and prioritize adopting effective strategies, including enlisting upstream and mid-stream trade ally partners.
	• Not all PAs are engaging local governments.
	• The Home Upgrade Program does not provide significant market intelligence to market actors, and most of these market actors are not yet true partners with the program.
	• Outreach to the real estate community has only been at the local level and not statewide.

Contractor Training and Alliances	
• Most PAs offer multiple training formats. • BPI certification requirements are in place for the AHU Program. • There is targeted outreach to specialty contractors involved in HVAC and insulation. • Several contractor engagement platforms have been established and the WG is aware of need to solicit input from the contractor community.	• The PAs need to transition to requiring BPI-certified staff not only on a project team (via direct employment of subcontracting), but also actually onsite supervising project installation. • Improving technical training offerings for other trades will also help ensure that the people actually carrying out upgrades understand the importance of their work to efficiency performance. • Engagement platforms need to become part of a clearly defined process for incorporating contractor feedback into program planning. Unless the WG demonstrates a formal process for addressing contractor input, contractors will lose faith in the effort.

Source: Navigant

2.4.8 Current Status: Best Practice Market Intervention(s) (Pre-Launch Component 5)

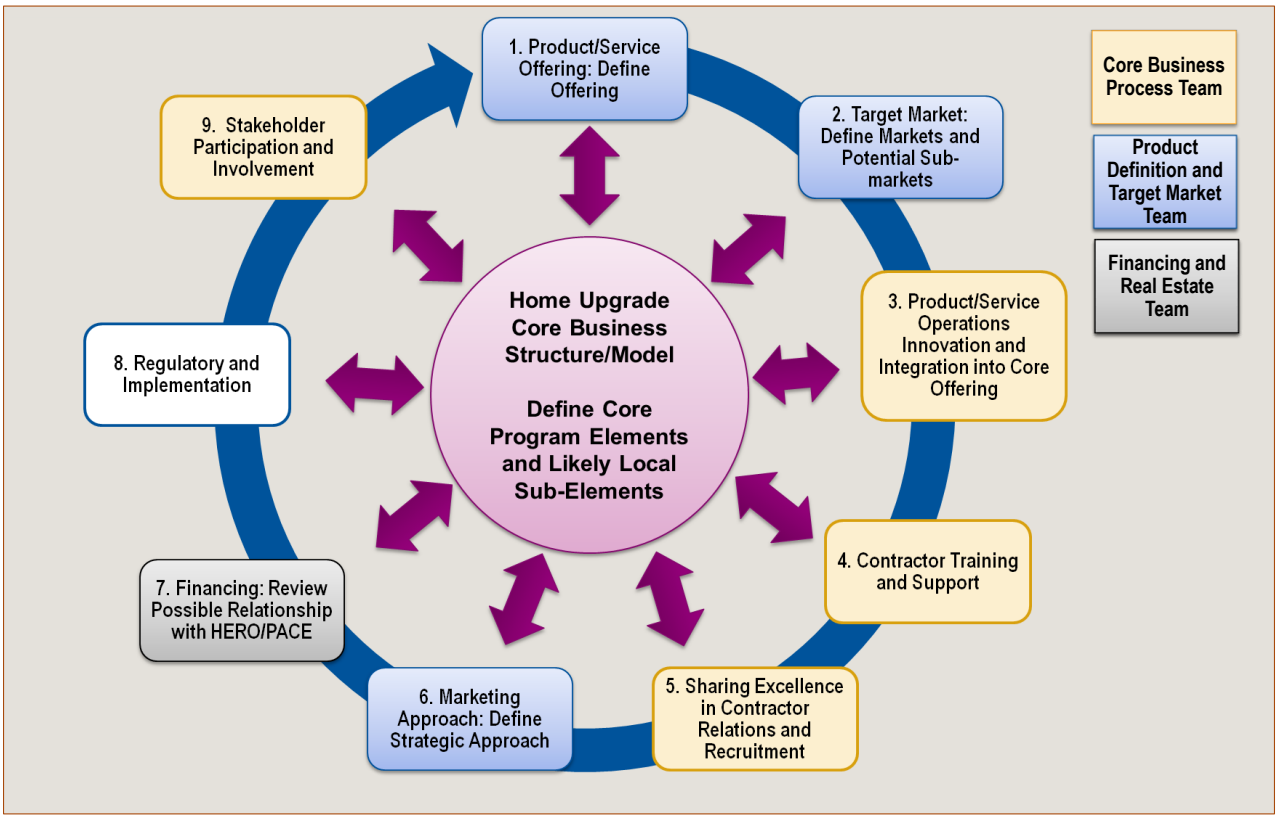
Over the spring and summer of 2014, Navigant conducted best practice research on market transformation and whole house retrofit programs and provided the WG with research findings (including a gap analysis)

in July 2014. Navigant's best practice review demonstrated that while individual program offerings across California individually meet or exceed many national best practices, the lack of statewide standardization and formal idea sharing may be the single largest limitation to market transformation. The gap analysis did reveal some specific areas for improvement, but no individual fix will enable the program to evolve into a true transformative force in the market. At the first workshop in July 2014, the WG formed several sub-committees to address components of the gap analysis:

- The **core business process team** began developing plans to move the program toward a statewide structure for outward-facing program components.
- The **product definition** and **target market teams** established definitions for the Home Upgrade Program product as well as potential target markets, respectively.
- The **financing team** analyzed existing finance options in California and what barriers exist to incorporating these options in the Home Upgrade Program.
- The **real estate team** summarized barriers to recognizing the value of Home Upgrade Programs, getting through to realtors, and broadening the green multiple listing service (MLS).

Figure 2-11 summarizes the tasks each sub-committee worked on between the first and second workshops.

Figure 2-11. Workshop #1 Sub-Committee Assignments



Source: Navigant

After each team's initial work was drafted, the core business process team and the product and market teams joined forces to begin outlining a go-to-market strategy that will capitalize on the statewide offerings under development.

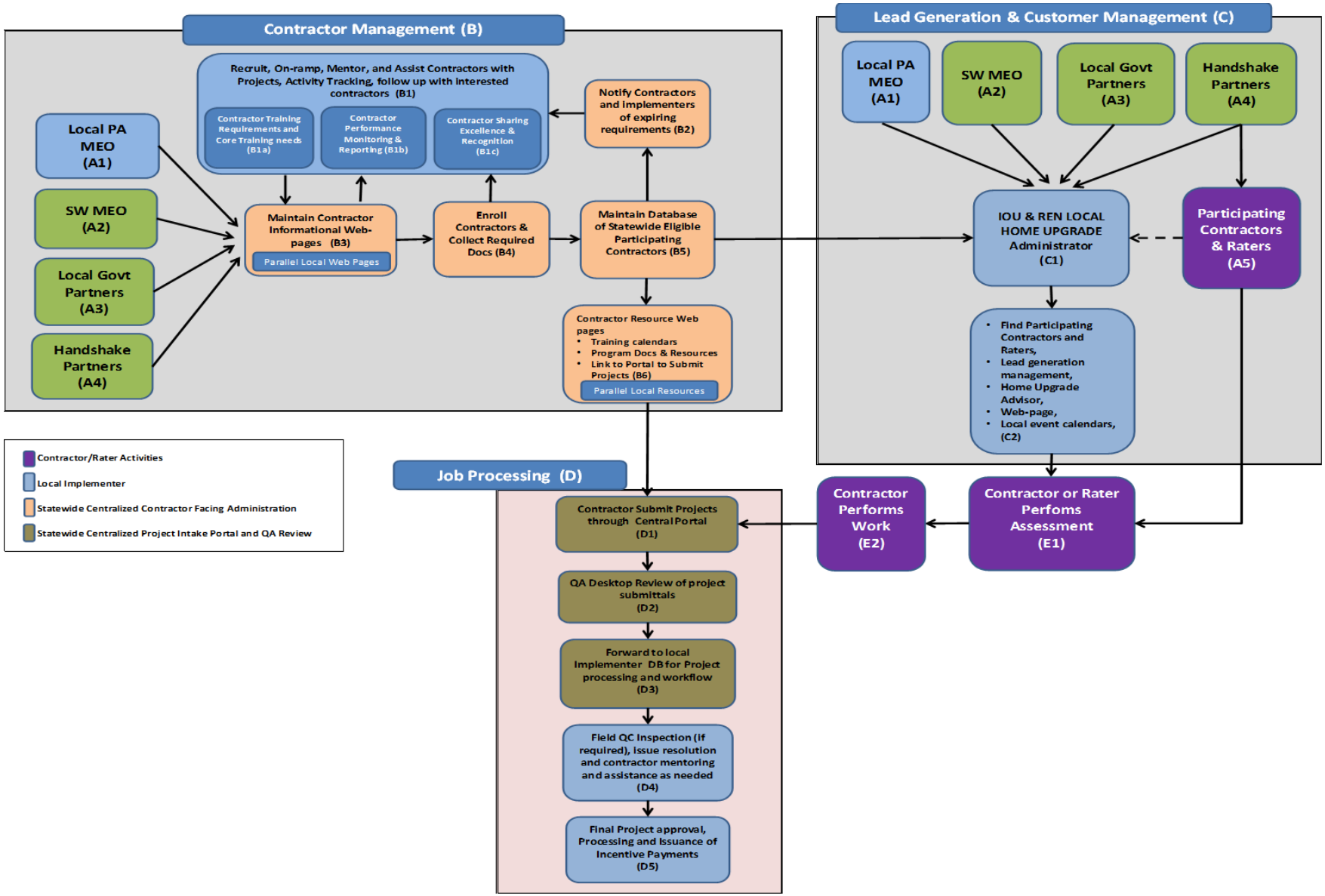
2.4.8.1 Core Business Structure

The primary goal of the core business process team was to determine which aspects of program implementation could be streamlined at the state level and which aspects were better maintained locally. The team used the following high-level strategy to make these determinations:

- Core centralized process selection criteria
    - Logical from an implementation point of view
    - Statewide market actors such as manufacturers, distributors, and large retailers easier allowed access to program partnerships
- Local implementer business process selection criteria
    - Local hands-on presence vital to quality control
    - Market engagement at the local level necessary (i.e., for local government and contractors)

As shown in Figure 2-12, the core team focused on three areas: contractor management (B), lead generation and customer management (C), and job processing (D). These are illustrated above with a special focus on the activities the team designated for statewide versus local operation. Within each of the three areas are also marketing, education, and outreach activities (A) and contractor activities (E). As the market matures and transforms, it is hoped that the contractor (private sector) activities will remain, while the public activities will transition into activities to support the momentum of the transformed market.

Figure 2-12. Overview of Core Business Structure



Source: Navigant

Below is a brief description of each of the three elements.

Contractor Management

The project team assessed all of the operations within contractor management and determined which functions required local presence and which functions would be more streamlined if conducted at a statewide level. The group agreed that many administrative processes, such as maintaining resource pages and an online contractor portal for processing applications, would be useful, but the local touch was needed to aid recruiting, training (onboarding and ongoing), and marketing, education, and outreach. Standardizing participation agreements and minimum training requirements will make it easier for contractors to participate across PA territories and enable the program to connect with larger contractors and other market actors. Table 2-11 summarizes these agreements and the next steps that the core business process team WG has developed.

Table 2-11. Contractor Management Local and Statewide Operations Plan

Need	Status	Next Steps
Maintain local contractor recruiting, on-ramping, mentoring, and assistance efforts Maintain local marketing, education and outreach		
Standardized contractor participation agreement (CPA)	Compiled table of requirements by PA	Determine elements needed to meet all PA needs in a statewide CPA
Standardized minimum training requirements	Compiled table of onboarding training formats and content	Determine which elements should be required statewide
Single statewide contractor portal	Agreed that this is possible and desirable	Develop and maintain portal with connections to each PA's system
Statewide contractor resource pages	Agreed that this is possible and desirable	Develop page and compile PA-specific training calendars, etc.
Maintain local contractor performance monitoring and reporting Maintain local contractor excellence, sharing, and recognition		
Provide feedback and recognition through statewide contractor portal, resource pages, and customer-facing pages	Agreed that this is possible and desirable	Develop and maintain portal with connections to each PA's system

Source: Navigant

Lead Generation and Customer Management

The team recognized that much of the local hands-on interaction with customers and contractors is vital to program success. Local government partnerships must also be maintained through local implementation. However, given the program's market transformation goals, the team also sought to plan for broader statewide partnerships that could also promote the initiative. Table 2-12 summarizes these two components.

Table 2-12. Lead Generation and Customer Management Local and Statewide Operations Plan

Need	Status	Next Steps
Maintain local marketing, education, and outreach Maintain local administrative activities that connect customers with contractors Continue local government partnerships		
Create partnerships with larger handshake partners at statewide level	Agreed that this is possible and desirable	Identify potential partners and coordinate statewide outreach

Source: Navigant

Job Processing

Much of the paperwork part of the initiative will be combined at the statewide level and connected to the contractor portal described in Table 2-13. However, the PAs will maintain local field quality control (QC) inspection practices, and incentives will be paid by each PA.

Table 2-13. Job Processing Local and Statewide Operations Plan

Need	Status	Next Steps
Maintain local field QC inspection practices, issue resolution, and contractor mentoring and assistance Continue processing payments at local level		
Single statewide contractor portal for project submittal and QA	Agreed that this is possible and desirable	Develop and maintain portal with connections to each PA's system
Statewide QA desktop review process	Agreed that this is possible and desirable	Compare QA processes and establish standardized review protocol

Source: Navigant

Go-to-Market Strategy: Short Term and Long Term

Once the product and market definition teams reached consensus on the product definition and possible target markets, the two teams joined with the core business team to discuss a broader go-to-market strategy. For this market transformation initiative, going to market will have two components: streamlined statewide outreach and outreach to local market actors. The local marketing piece will largely remain intact.

2.4.9 Next Steps: Best Practice Market Intervention(s) (Pre-Launch Component 5)

Navigant recommends that the next step should be to confirm the operational structure and deepen and refine WG positions on go-to-market strategy, initiative timing, governance, and stakeholder engagement. Next steps should also include development of the IIP, which should contain a sub-plan for the gradual

transition of the initiative and ongoing support to market momentum, following the SMT initiative life-cycle Stage 5 sustainability assessment.

The Initiative Implementation Action Plan needs a refined Home Upgrade Program implementation action plan strategy. The implementation strategy—in particular, the go-to-market approach and market metric targets—is closely linked to findings from developing a counterfactual baseline, logic model, and MTIs.

Navigant recommends holding an initial meeting to review the current status of the Home Upgrade Program implementation strategy and identify stages of strategy development tied to the completion of ongoing tasks, namely the market characterization study and logic model, MTIs, and counterfactual baseline development. As each subsequent stage arrives, Navigant recommends having up to five additional meetings (with three optional follow-on meetings, as needed) to refine the implementation strategy. This strategy will encompass a go-to-market handshake partner strategy and SMT program design and implementation action plan. It will also address recommendations on integrating financing options into the action plan. The implementation strategy planning should address any ad hoc issues not previously discussed, as well.

2.4.10 Initiative Timing (Pre-Launch Component 6)

Initiative timing depends on the type of efficient good or service offered to the market. A new technology with a well-defined supply chain that serves a market accepting of innovation might take as little as three years to go from introduction to near full saturation. A complex energy management approach offered to market segments with conservative corporate cultures might take a decade to reach all innovators, early adopters, and the bulk of the early majority. In either case, the market exit, including the start of post-intervention evaluation activities, would continue after programming concluded.

Notionally, initiative timing—exclusive of design and policy development—would fall into four phases that would last from 8 to 15 years:

- **Introduction (One to two years):** The initial years of an initiative tend to focus on building relationships with suppliers and market influencers, such as trade associations, to raise awareness and understanding. The initiative would also begin marketing communication activities for the same purpose. The initial participants would be innovators and early adopters that may take part in early demonstration projects.
- **Validation (Three to five years):** During these years, the initiative's goals would include solidifying suppliers and establishing a brand identity with consumers that including both the program and the efficient product or service. In this phase, the participants would be early adopters whose success could be parlayed into examples to the broader market.
- **Expansion (Three to five years):** Growth beyond innovators and early adopters is always a challenge for new products or services. If the initiative can cross the chasm to the early majority by showing both the value and broad availability of the new innovation, expansion of market share will be rapid. While incentives to suppliers or consumers may be part of the strategy for this phase, the initiative should not make the market dependent upon subsidies. Otherwise, any market effects

will be dependent upon continued programming, and this is not the desired outcome of a market transformation effort.

- **Exit (Two to three years):** Once the early majority begins to adopt the innovative energy efficiency product, the initiative should plan for market exit. In general, this will mean a cessation of subsidies and a weaning of promotional effort. During this phase, the initiative should take care to begin its post-intervention evaluation activities.

2.4.11 Current Status: Initiative Timing (Pre-Launch Component 6)

Developing initiative timing will depend on the outcomes of the B&O plan research as well as how quickly the regulatory policy integration can occur. Discussion of this may also depend on the integration of the Home Upgrade Program initiative into the 10-year rolling portfolio discussion.

The initiative administrators will need to assess the timing that they believe will be needed to achieve the sustainability goals of the SMT initiative. Factors to consider will relate to the current state of the market, degree of the challenges that may exist in overcoming barriers, and other relevant issues. The targeted length of each phase of the initiative will also depend to some extent on the target market or sub-markets selected. For instance, the WG may choose to first focus on a particular target sub-market that it believes could be transformed more quickly and then transition into more difficult sub-markets. This issue is identified as one of those that must be addressed in the development of an IIP.

2.4.12 Next Steps: Initiative Timing (Pre-Launch Component 6)

Navigant recommends that the Home Upgrade Working Group hold one initial meeting and one follow-up meeting (as necessary) to review and discuss timeline issues, with a goal of achieving a consensus WG approach. The Home Upgrade Working Group needs to determine the timeline of the initiative launch and forecast of expected SMT initiative duration. In reviewing this issue, WG stakeholders need to define recommendations for the timeframe for the initiative with a focus on when stakeholders believe the initiative can meet its desired market transformation adoption goals. Determining the best timeframe will also affect several aspects of future activity related to the Home Upgrade Program. In particular, the development of the counterfactual baseline and related Home Upgrade Program SMT cost-effectiveness analysis as part of the B&O plan will need this timeline as an input to those efforts. In this regard, the market characterization study recommended below in the B&O section will provide further insights to support or modify the champion collaborative's decision on SMT initiative timing. Additionally, the results of the cost-effectiveness analysis may help confirm or lead to a revision of the timeline projection.

2.4.13 SMT Initiative Governance[39] and Long-Term Stakeholder Engagement (Pre-Launch Components 7A and 7B)

It is the project team's view that this issue of governance and implementation of SMT initiatives relates to the functional structure of the initiative and how best to develop, implement, and govern an SMT initiative's IIP to meet market adoption and sustainability goals.

Several key characteristics of initiative design and administration will affect, in Navigant's view, the governance of an initiative. Navigant lists these below:

1. **Collaboration:** SMT initiatives will have a greater chance of success if offered by a collaborative partnership that has the potential to create a statewide public/private partnership approach.

2. **Statewide focus:** Initiatives may differ by target market but for success, Navigant believes that SMT initiatives should have a statewide to allow for the maximum handshake partner participation of private sector upstream, mid-stream, and downstream entities—all focused on a common vision and goal of market transformation success.

3. **Public/private partnership:** SMT initiatives, of necessity, should seek to develop partnership/coalitions of public and private market entities that band together to transform the market holding a common vision.

2.4.13.1 Collaboration

California is a large state and it is often the case that activities that are successful in one area of the state will find challenges in other areas due to climate, diversity of population, industry area focuses, etc. While the residential sector is consistent across the state (i.e., everyone lives in residences), these factors still present implementation issues. Collaboration among parties is a standard that is well-known among statewide utility and REN program providers. While differences have occurred in relationship, for instance, to the Home Upgrade Program implementation, these have been in relation to the delivery of RA programs that typically do not require the joint, statewide, collaborative effort that is inherent in a long-term SMT initiative.

Functionally, the requirements of an SMT initiative must include at a minimum a clear plan for decision-making and governance of the SMT initiative. Beyond this, the project team believes collaboration with local partners and statewide industry partners will be critical to implementing a success initiative.

These functional elements, in theory, can be adapted to several different types of SMT initiative governance and implementation structures, including proponent that may choose to: 1) implement an initiative among

[39] While not the focus of discussion in this section, we note the critical importance in implementing an SMT initiative that data tracking systems play for not only tracking program data, but also market partner and general market activity.

the collaborative members; 2) engage multiple implementation contractors; 3) engage a single statewide implementation contractor; or d) a mix of the above approaches. Additionally, SMT initiative proponents might choose implementation configurations requiring more centralized implementation approaches or a mix of centralized and decentralized approaches[40] —both of which would require potentially different governance models.

2.4.13.2 Governance Charter

Any long-term SMT initiative will need to be based on the key element of collaboration. It is the project team's view, however, that collaborative governance structures should not be left to chance, but rather, should be well thought out prior to initiative authorization. Below, the project team presents several illustrative components of a generic governance charter for such initiatives. While the project team has no recommendations on the format and/or content of such a charter, the team believes that a generic California SMT initiative collaboration charter may be possible to draft. This is an issue for future consideration as part of development of a finalized WG stakeholder approach to governance the Home Upgrade Program SMT initiative effort.

Charter issues relate to various factors:

- Overall roles and responsibilities
- Specific member responsibilities
- Meetings
- Reports and compliance
    - IIP goals development
    - IIP goals management

Initiatives are long-term efforts requiring well-developed collaborative organizational structures. Initiative plans should include well-designed management approaches that ensure as much as possible the long-term collaboration of the parties involved in implementing the effort.

2.4.13.3 Long-Term Stakeholder Engagement

As noted above, a fundamental precept to the success of any SMT initiative is collaboration. Long-term stakeholder engagement must include not only program staff and related market actors (e.g., contractors, manufacturers, retailers, etc.), but also interested policy, technical, and public interest stakeholders. In states throughout the nation, stakeholders generally provide advisory functions to energy efficiency programs. A recent memorandum on the subject related to the structuring and organizational role of the California Technical Forum points to the challenges and potential of formal advisory structures. After interviewing 21 organizations from California and around the country with diverse advisory structures that ranged from American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and

[40] All of these options (and likely others) have their pros and cons. However, it is beyond the scope of this project to address these.

International Code Council voluntary peer review groups to California PCGs, the memorandum points to key cautions and lessons learned about advisory structures in California and elsewhere. Key lessons learned include the need for both a transparent and efficient structure, the need for advisory groups to be serious partners in a program effort, and the benefits of consensus decision-making. Cautions relate to the need in California, in particular, to structure any formal advisory group in such a way as to ensure regulatory alignment, support, and legal compliance.[41]

The issue of a long-term stakeholder engagement strategy is an important one that needs to be resolved at the front end of the establishment of a formal SMT initiative. As previously noted, each initiative will have its own needs and stakeholder engagement requirements and should be considered individually. This said, current WG structures, PCGs, and program advisory groups (PAGs) in California provide valuable and ongoing volunteer input to current RA-focused efforts and likely provide workable models, at least to some degree, for the case of the SMT effort. Non-profit support organizations, such as the Western HVAC Performance Alliance and Efficiency First, also provide targeted vehicles for specific market actor stakeholder involvement and support.

2.4.13.4 Regional Stakeholder Involvement Best Practice Example

In Navigant's view, perhaps the best example in the country related to regional and state stakeholder long-term involvement in energy efficiency exists in the Northwest. Northwest energy efficiency professionals collaborate on regional and state energy efficiency issues using a social media vehicle called Conduit. Efficiency experts from all elements of the policy and delivery chain communicate in a non-regulatory, social media structure that allows for the sharing of creative ideas, announcements, and other ways of interacting in the service of furthering energy efficiency in the region. Conduit sends out a weekly newsletter that California efficiency stakeholders may find valuable as an example of non-program-level communications.[42] The efficiency community in the Northwest also meets annually in what is called an Efficiency Exchange to share ideas and collaborate on region efficiency issues and needs.

2.4.13.5 Specific Program/Initiative Long-Term Stakeholder Involvement Example

Once again, in the Northwest, NEEA provides the home for facilitating the NW Industrial Strategic Energy Management (SEM) Collaborative.[43] This collaborative consists of stakeholders with a single SMT initiative focus. It engages stakeholders in developing regional strategy pieces and identifying technical for the SEM effort, and it shares marketing and outreach strategies to industry among its utility members. The Industrial SEM collaborative holds several well-organized conferences a year on targeted issues. In this way, stakeholders wishing to stay involved in helping brainstorm ideas and new approaches can do so in a non-regulatory setting.

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[41] Alejandra Mejia, "Memorandum to Various California Technical Forum Interested Stakeholders on Energy Efficiency Stakeholder Group Research," Future Energy Enterprises, LLC (May 1, 2014), notes that the memorandum specifically points to the need for the advisory body to not have decision-making powers, as this was a major issue in creation of the California Energy Efficiency Board in the late 1990s.

[42] Conduit Weekly Update, https://conduitnw.org/

[43] http://neea.org/get-involved/northwest-industrial-sem-collaborative.

Navigant recommends review of these (and other examples) for long-term stakeholder participation, with a special focus on the example Industrial SEM collaborative approach as a potentially viable model for a Home Upgrade/pre-ZNE existing home collaborative specific to a potential Home Upgrade SMT initiative. These example approaches fall outside the advisory structures normal to California that also plays an extremely important role in support program implementation.

2.4.14 Current Status: Governance and Administration and Stakeholder Engagement (Pre-Launch Components 7A and 7B)

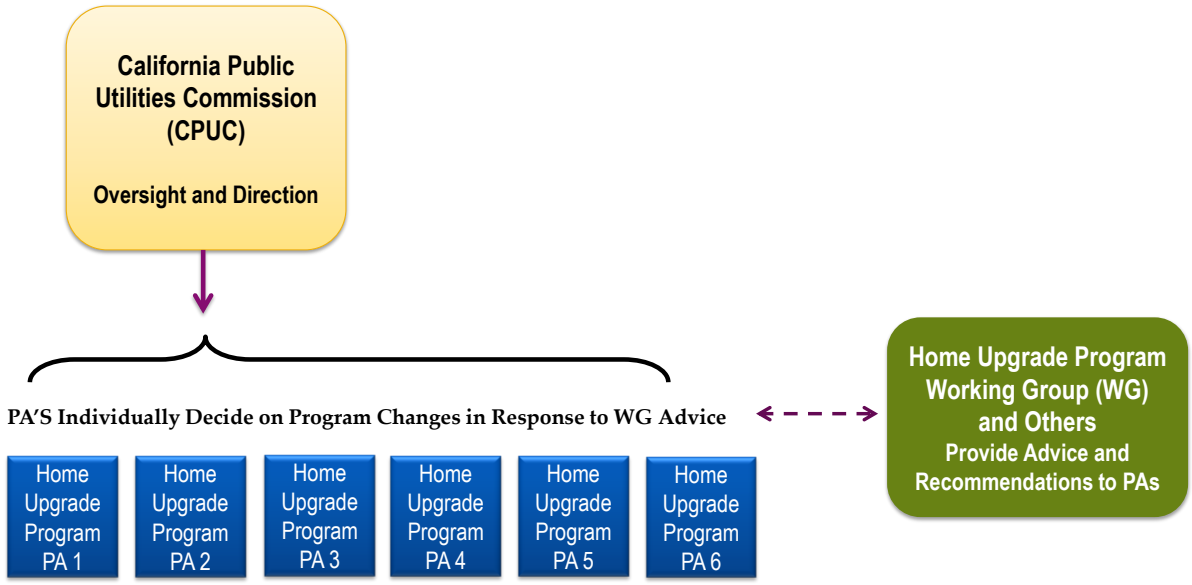
The WG leadership developed and presented a proposed governance structure for the Home Upgrade Program market transformation initiative at the October 2014 workshop. This proposal is in draft form. Navigant recommends that the WG and stakeholders provide input and approval next step project activity. If formally agreed to by the WG, Navigant recommends that the governing group develop a charter to define the specifics of how the governance body will operate. Below, Navigant presents a brief overview of the current structure of decision-making for the Home Upgrade Program as it has generally operated prior to this project.

2.4.14.1 Current Governance of Home Upgrade as an RA Program

The current approach to Home Upgrade Program operation is that the WG (and others outside the WG process) provides advice and recommendations to the PAs. The PAs then independently decide what program changes to make in response. Coordination between PAs does occur now. For example, there is a great deal of coordination among IOUs and RENs—and affected IOUs coordinate with their local REN. However, prior to this SMT effort, not as much coordination occurred between all six IOUs and RENs statewide. Coordination meetings involving all parties were not common prior to the SMT project, with the exception of coordinating the spring 2013 Program Implementation Plan (PIP) filing process. Since the SMT effort started, the PAs have initiated statewide coordination meetings to coordinate among all PAs on SMT elements.

Figure 2-13 provides an overview of the current governance structure for the Home Upgrade Program as a RA effort.

Figure 2-13. Current Governance Structure for Home Upgrade Program



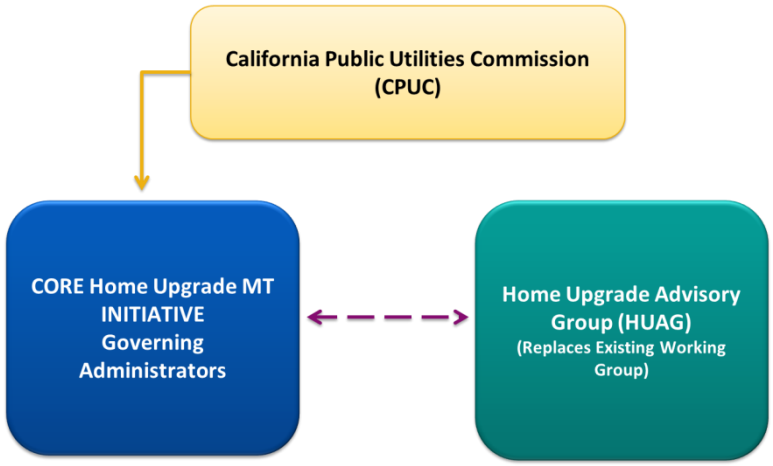
2.4.14.2 Proposed (Draft) Governance of Home Upgrade as an SMT Initiative

The new, proposed approach going forward is that the PAs will formally meet as SMT governing administrators and seek statewide alignment on the critical contractor and customer-facing program elements. The purpose is to ensure consistency on program elements that should be consistent statewide to better enable SMT while still allowing for local innovation and variation on program elements that do not need to be coordinated and consistent statewide (e.g., local marketing, contractor mentoring and support, and field verification/QC). Going forward, the WG becomes a central means and focal point for non-PA organizations and individuals to provide their input to the SMT process. The governing administrators will then meet and collectively decide the SMT initiative actions to take based on the WG (and other) input.

In the proposed draft structure, the PAs will still make the same regulatory filings for all changes that require it, in accordance with current regulatory policies. The goal is that the key market transformation elements of those filings will be consistent statewide.

Figure 2-14 presents a graphic description of a proposed collaborative SMT governance structure for a potential Home Upgrade SMT initiative. This is followed by a discussion of the proposed structure and the roles and responsibilities of each group.

Figure 2-14. Basic Proposed Governance Structure for Home Upgrade Program SMT Initiative



Source: Home Upgrade Program Working Group

The CPUC responsibilities will be as follows:

- Provide regulatory approval as needed for core SMT initiative elements requested by governing administrators
- Provide regulatory approval as needed for local SMT program elements requested by individual administrators
- Conduct market indicator measurement/tracking and other market and impact evaluation studies
- Coordinate with governing administrators regarding technical issues
- Participate in governing administrator meetings/discussions
- Participate in advisory group meetings/discussions

The Core Home Upgrade Program SMT initiative governing administrators will be a group consisting of the IOUs and RENs, as well as a representative from the Home Upgrade Program Advisory Group (HUAG), and non-voting CPUC staff members. The group proposes having a rotating secretary (role to be filled by IOU or REN members only) but no chairs. The group intends to use consensus decision-making through closed meetings but may need to develop a resolution process to resolve tough issues and keep a single entity from having veto power.

The governing administrator body's responsibilities will be:

- Overall governance of SMT initiative and strategic intent
- Overall operational excellence
- Handshake partner management
- Funding and structure of centralized activities

- Strategic planning documents for 3, 5, and 10 years of the initiative
- Consideration or development of proposals to revise core and basic issues
- Consideration or development of proposals to expand scope of the initiative to IDSM and zero net energy (ZNE) areas

The HUAG as proposed would be open to any interested stakeholders and would replace the current Home Upgrade Program Working Group. Thus, members will likely include local government partners, statewide marketing, education and outreach team members, participating contractors, the California Energy Commission (CEC), initiative implementers, and initiative handshake partners. Two elected co-chairs will set the agenda for open meetings, which will be held in spaces funded by the administrators. The responsibilities of the HUAG are to:

- Develop recommendations for the governing administrators
- Provide input and recommendations in regard to proposals and strategic direction provided by governing administrators

Although this group will not have the authority to require any action by the governing administrators in the current proposal, the HUAG will be the forum for direct feedback from stakeholders to initiative governance.

2.4.15 Next Steps: Governance and Administration and Stakeholder Engagement (Pre-Launch Components 7A and 7B)

Navigant recommends that the WG develop and formally agree upon this structure and engagement approach as described below:

- **Governance approach:** The WG developed and presented a draft governance approach at the October 2014 meeting in Oakland. Navigant recommends further discussion and vetting of that approach by a larger audience than was present at the Oakland meeting. We also recommend the development of a governance charter for the Home Upgrade Program initiative. Such a charter would be developed with a small team of WG stakeholders and presented to one to two broader core WG meeting(s) for feedback and refinement before being submitted to the broader WG for review. The charter would provide the structure for long-term governance of the SMT initiative.

- **Stakeholder engagement approach:** Navigant recommends three meetings to develop an agreed upon approach to stakeholder engagement for the Home Upgrade Program moving forward. This approach will detail what processes the program will use to engage stakeholders, such as market actors and industry groups, in a long-term, transparent, and productive manner. At least one of these meetings should be open to a wider audience of stakeholders for input and collaboration.

2.5 B&O Plan Research Elements

Business and Operations (B&O) Plan Research

SMT initiatives, as noted, are different from RA programs in major ways. Chief among these is the need for an initiative champion to be required to incorporate key business operation and market research planning into their application (should that be the form the commission desires, if adopting an SMT approach) for approval by the CPUC. An SMT initiative is similar in its planning stages (see Chapter 2) as those planning stages that were incorporated into the IOU's/PG&E's original advanced metering initiative (AMI) applications as part of CPUC Rulemaking 02-06-001. In the rulemaking, PG&E (and later SDG&E and SCE) was required in its application (Decision 06-07-027) to provide a comprehensive plan for implementing its AMI projects to show cost-effectiveness. Navigant believes that it will best serve the Home Upgrade initiative well to follow this example, as the interrelationship between pre-launch components requires coordination amongst the different areas of needed business and operational research for developing the initiative.

The project team believes that a SMT proponent, including the Home Upgrade Program WG, will need flexibility as part of their planning effort to ensure that the following pre-launch business operational and market research elements are developed:

- Characterization and assessment of the target market and market sub-segments
- Counterfactual baseline development
- UES assessment
- SMT initiative cost-effectiveness analysis
- Incentive step-down approach

Though the commission precedent allowed utility AMI proponents to develop market and cost-effectiveness parameters, in this instance, the project team recommends that SMT initiative proponents be required to identify a professional market research firm to contract with for development of these important areas of initiative planning. Additionally, the project team recommends that such market research—including a potential Delphi Panel review of a counterfactual baseline and cost-effectiveness modeling scenario—be overseen by a peer review group that includes the Energy Division (ED) and Office of Ratepayer Advocates (ORA) to ensure public insight and oversight of the process.

Below, the project team provides a brief discussion of the needs in each of these areas.

2.5.1 Market Characterization and Assessment of the Target Market (Pre-Launch Component 8A)

Characterization and assessment of the target market and sub-segments are important components of any SMT initiative and should accompany planning for development of both the counterfactual baseline and the initiative cost-benefit analysis discussed below. The knowledge gained from the market characterization is also used in program design and overall IIP strategy. Key elements of the market characterization focus on the size of the market; overview of market dynamics; understanding of customer markets, motivations, and dynamics; current product penetration; assessment of supply chain structure and dynamics; supporting market drivers and potential barriers; the role of codes and standards; and related secondary data research (e.g., industry associations, California energy consumption data, Dodge, etc.).

2.5.2 Counterfactual Baseline Development (Pre-Launch Component 8B)

It is critical at the front end of the planning effort to identify what is known as the counterfactual market baseline. Many definitions and names exist for this term,[44] but all revolve around the notion that the market baseline is a "hypothetical projection of what sales patterns would have looked like in the complete absence of the specific program(s) promoting the specific technology, either now or at any time in the past."[45] Another more formal definition comes from NEEA:

> *The naturally occurring baseline is a forecasted market penetration, or adoption rate. It refers to the changes in the market relative to the adoption of an efficient product, service, or practice over a 20-year timeframe assuming no intervention by a utility program …*[46]

While these definitions tell us what the counterfactual market baseline is, they need to be supplemented with an understanding of how an SMT market baseline is functionally used to track initiative progress over the target SMT period. In Figure 2-15 the bottom (blue) portion represents naturally occurring increases in adoption of an efficiency product, service, or process (the counterfactual baseline). As noted previously, in a market transformation initiative, savings claims include both program activity (green area) and savings from activity outside the program—i.e., market effects (purple area). Initiatives savings are calculated by reducing the combined program and non-programmatic (gross) savings by the naturally occurring counterfactual market baseline to estimate net market transformation savings.

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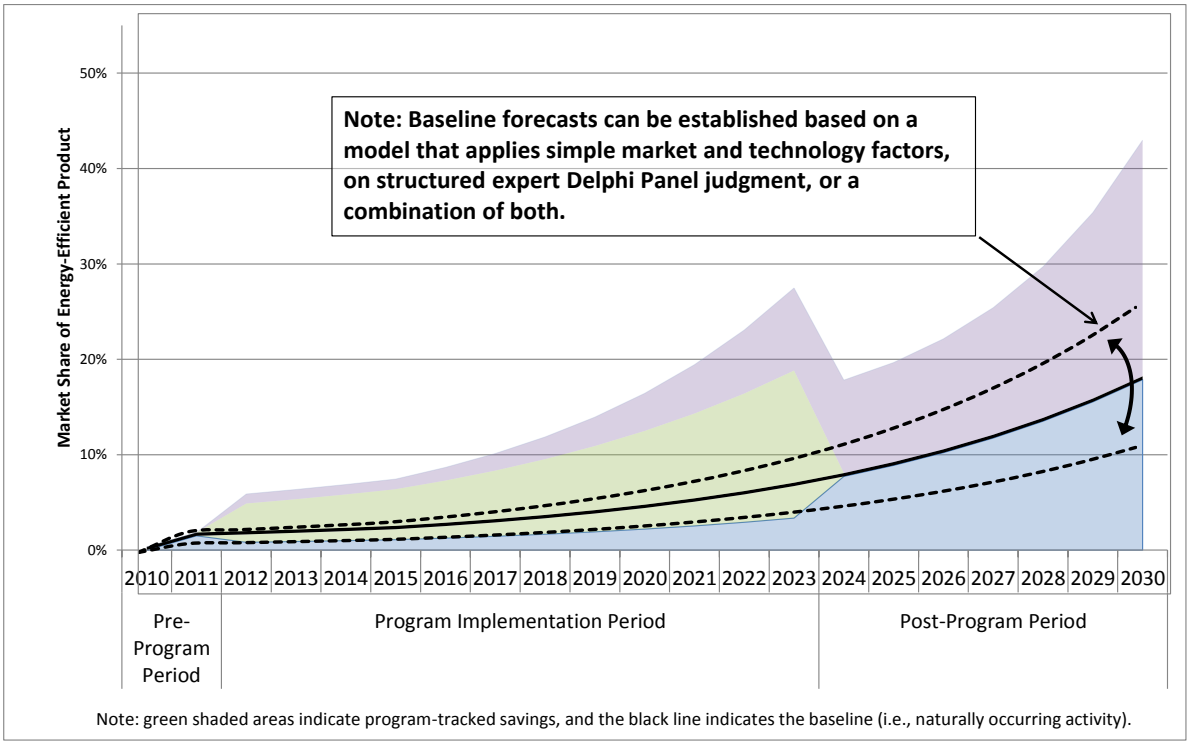
[44] Market baseline is also known as the naturally occurring baseline (NOB) and the naturally occurring market adoption (NOMAD).

[45] E. Vine, R. Prahl, S. Meyers, and I. Turiel, "An Approach for Evaluating the Market Effects of Energy Efficiency Programs," Energy Efficiency, 2010, 3:257-266, http://download.springer.com/static/pdf/209/art%253A10.1007%252Fs12053-009-9070-x.pdf?auth66=1426528653_57f2da66b6edfb28272c77abd1cacece&ext=.pdf.

46 Navigant communications with NEEA staff, November 2013.

Figure 2-15. Illustration of Counterfactual Baseline



Source: Navigant

This task involves developing a market baseline projection for the Home Upgrade Program for what would have happened had there been no California IOU or REN intervention in the market. This counterfactual market baseline, also known as naturally occurring market adoption (NOMAD) in relation to the California IOU codes and standards program, is a critical component of an SMT effort in that it provides a base metric from which the progress of the initiative may be assessed.

Several approaches exist for developing a counterfactual baseline for an SMT program; the most prominently used are technical analyses (i.e., modeling), structured expert panel (Delphi Panel) input, and/or a combination of both to project a market baseline for the transformation market effort. No matter the approach, each focuses on a market projection timeline that covers the years of the program's intervention in the market (and related market effects during the program implementation period). This timeline also covers a reasonable period beyond the program effects period where structural changes and market actor behavior have evolved to a point where the program intervention is deemed to be no longer needed. At this point, savings generated from the initiative in the form of market effects beyond the program's implementation period provide a significant savings benefit for the SMT effort and thus need to be tracked, monitored, and accounted for in the SMT initiatives savings profile.

Typically, if a targeted SMT initiative lasts, for example, for 10 to 12 years, it often will make sense to track the benefits of the program effort beyond that implementation period for up to 20 years. For the Home Upgrade Program effort, Navigant recommends use of a 20-year program effects tracking horizon. This

timeline provides a long enough horizon to estimate the benefits of a successful market adoption intervention where the benefits of the effort continue after the initiative itself has transitioned...[47]

Establishing the counterfactual baseline is the first step for assessing the initiative's potential and laying the groundwork for future evaluation. There are three main approaches for setting counterfactual baselines:

- **Modeled approach:** Using market research, historical data, and computer models to forecast market penetration or adoption rates over the initiative period; a model structure and inputs are agreed upon before an initiative begins and inputs are updated on a regular basis.
- **Delphi Panel approach:** Using a structured panel of experts (Delphi Panel) to estimate market penetration or adoption rates over the initiative period.
- **Combined approach:** Combining the two prior options and using the Delphi Panel to refine the model inputs and forecast.

Whichever method is chosen, the simplest way to think about the role of the counterfactual baseline in market transformation initiatives is to see it as the base of market activity occurring naturally without any market push from the program and from which all initiative progress in transforming market structures, behaviors, and energy savings is evaluated.

Below, Navigant presents an example output of a Delphi Panel focused on developing a 20-year counterfactual baseline for a NEEA-sponsored commercial building deep energy retrofit initiative. As noted above, a foundational need for development of a counterfactual baseline is the definition of the initiative being offered into marketplace. The dual definitions for this example market baseline assessment are presented below.

2.5.2.1 Illustrative Example of NEEA Commercial Deep Energy Retrofit Product and Target Market Definitions

1. **Broader definition:** Deep energy retrofit defined as ALL commercial buildings savings > 35 percent over their pre-retrofit state
2. **Narrower (target market) definition:** DER defined only those commercial buildings *savings > 35 percent over their pre-retrofit state* <u>*plus*</u> buildings and being:
    - Office buildings
    - 20,000 square feet
    - Privately owned
    - Majority leased
    - >20 years old

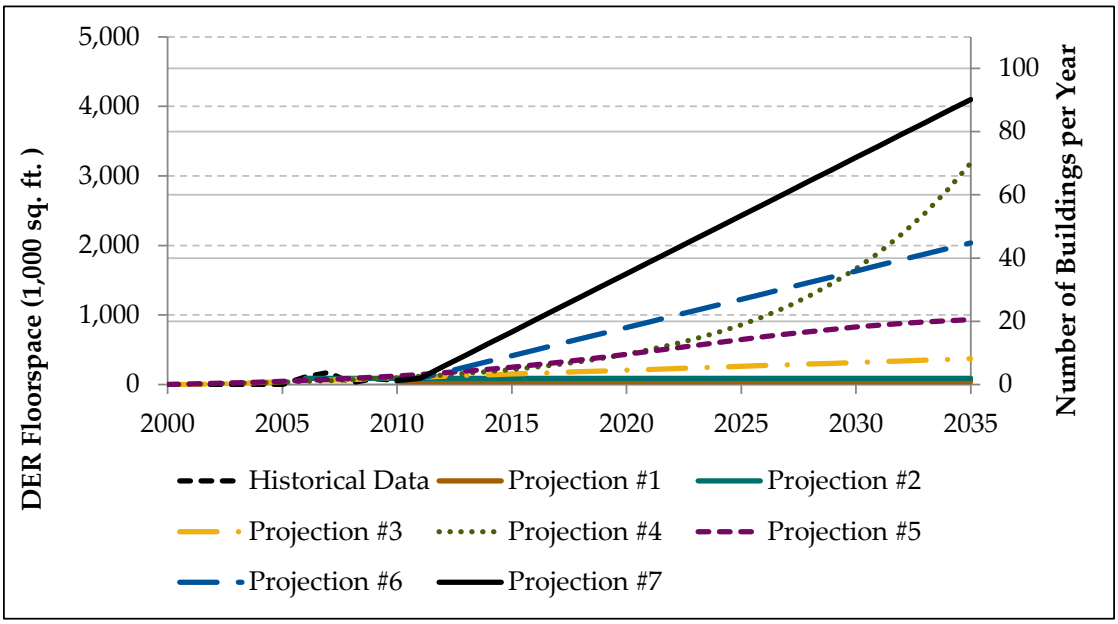
As can be seen, for this SMT initiative, the sponsor has defined two levels of detail in the definition: the broader market and the target market goals. These definitions become the parameters by which the Delphi

[47] Navigant assumes that the timeframe for the Home Upgrade Program initiative and the period of long-term monitoring and tracking will be vetted in working group meetings and stakeholder workshops on EM&V in an SMT environment.

Panel decision-making process can view the potential naturally occurring market adoption of these definitions in the 20-year baseline assessment. In particular, in this instance, the initiative sponsor's goal is to transform the smaller of the two defined markets, the target market, with its narrower definition.

For Delphi Panel consideration of its 20-year baseline forecast, Navigant developed seven different scenarios that presented the likely bounds of naturally occurring adoption of the deep energy retrofit measure package by commercial building owners. Figure 2-16 presents a graphic illustrative view of the scenarios.

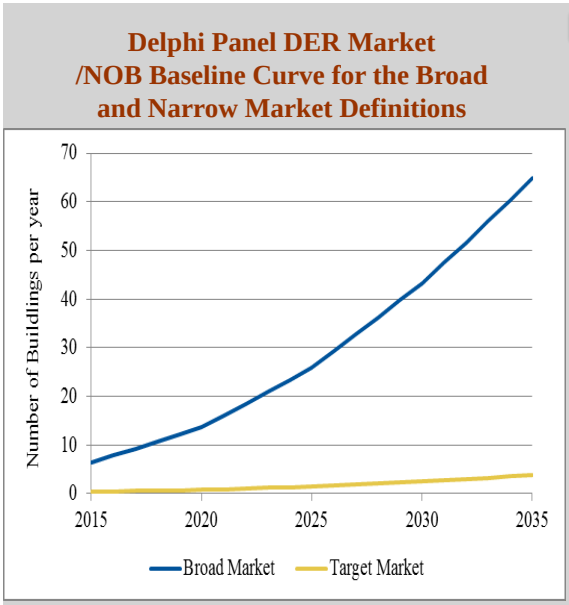
Figure 2-16. Illustrative View of Seven Baseline Forecast Scenarios



Source: Navigant

After deliberation on the scenarios — which Delphi members had the flexibility to adjust or reject as they saw fit, the panel forecasted its estimate of a likely 20-year counterfactual baseline. Figure 2-17 presents a graphic illustrative of the results of the panel's efforts.

Figure 2-17. Illustrative Example of Delphi Panel 20-Year Forecast



Target Market Counterfactual NOB		
	Number of DER Buildings per Year	Total DER Floorspace per Year
2015	0.4	15,400
2016	0.5	18,700
2017	0.5	22,100
2018	0.6	25,500
2019	0.7	29,000
2020	0.8	32,500
2021	0.9	38,300
2022	1.1	44,100
2023	1.2	50,000
2024	1.4	56,000
2025	1.5	62,000
2026	1.7	70,200
2027	1.9	78,400
2028	2.1	86,600
2029	2.3	95,000
2030	2.5	103,400
2031	2.8	113,500
2032	3.0	123,600
2033	3.3	134,000
2034	3.6	144,500
2035	3.8	155,200

The figures above provide a high-level understanding of the counterfactual baseline development process. This baseline is then used as the basis for estimating the success of the initiative over its implementation period.

2.5.3 Current Status: Market Characterization and Counterfactual Baseline Development (Pre-Launch Components 8A and 8B)

Planning an SMT initiative requires a thorough understanding of the market and a clear vision of how the initiative intends to change the market. The Home Upgrade Program PAs began by defining the product and outlining basic characteristics of three target markets. The team also drafted a preliminary logic model and MTIs. The next step will be to conduct a market characterization study to better understand these potential markets and develop a counterfactual baseline.

The WG assigned a sub-committee to develop a product definition and identify the target market(s) for the initiative. This sub-committee presented a proposed product definition and target market to the rest of the WG and iterated to reach a final product definition and list of potential target markets.

2.5.3.1 Product Definition

The sub-committee reviewed the current program offerings and defined the Home Upgrade Program product as follows:

While adhering to EE and IDSM loading order and the identification of demand-side management opportunities, the professional installation may include either:

1. *Two or more home building shell measures*
2. *Three or more Home Upgrade Program measures (including at least one building shell)*

Building shell measures include whole building air sealing, duct sealing or replacement, insulation of the attic, walls, ducts, or floors or high efficiency windows. Home Upgrade Program measures may vary region to region and change over time but generally include all building shell measures in addition to energy efficient HVAC and water heating. The performance of the above installation must meet defined standards and be confirmed by testing to improve the efficiency of the home.

This definition is intended as a long-term vision for the Home Upgrade Program product and may vary over the implementation period.

2.5.3.2 Target Market Definition

Before defining specific target markets, the group agreed to adopt the following definition of a market:

> *A market is an economic system where a particular good or service is transacted between entities offering them and those seeking to purchase them. A market consists of customers, manufacturers and other suppliers, channels of distribution, and transactions.*[48]

The WG identified three potential target markets, listed here by segment size:

- **Home renovation market:** This is a $140 billion–$145 billion industry nationally and could represent as much as $30 billion in the California market.
- **HVAC replacement market:** The CEC estimates that 560,000 HVAC units are currently replaced each year, but this could grow to as many as 1.6 million units annually in the next 10 years.
- **Whole house retrofit market:** There are 8.98 million single-family homes in California; further market characterization research is needed to determine how many could be candidates for retrofits.

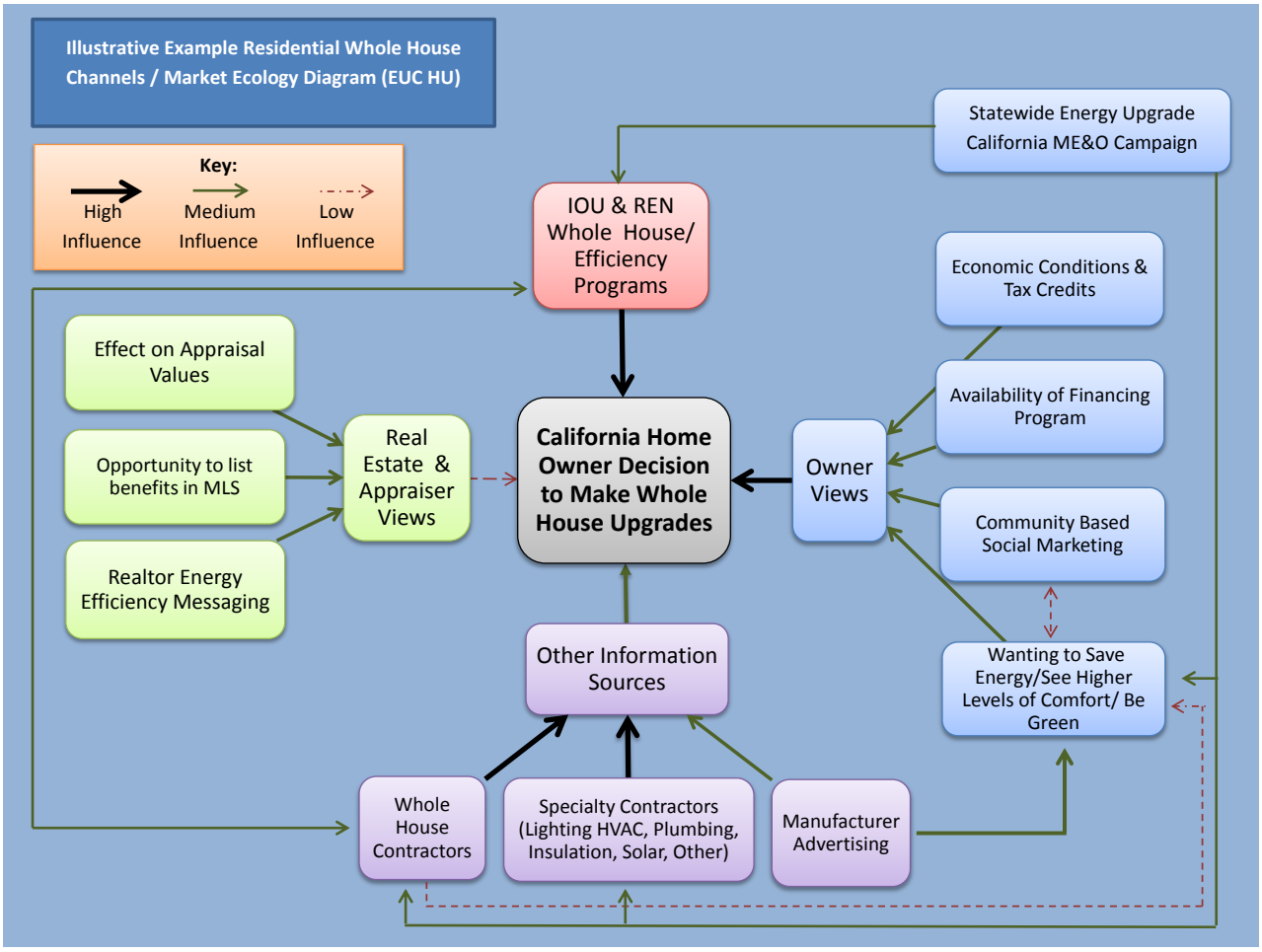
In each of these three market segments, there are interactions from homeowners, contractors, lenders, real estate professionals, manufacturers, and suppliers. Additional market research is needed to better understand how the program affects or could affect each of these markets. Understanding these markets will allow the program to clearly define which market(s) it seeks to transform, a key step in establishing a counterfactual baseline and measuring future transformation.

[48] Mary Sutter and Mikhail Haramati, Opinion Dynamics to Cathy Fogel and Ralph Prahl, CPUC, "Definitions of Various Market Studies," July 14, 2014, p. 1.

2.5.3.3 Market Characterization

The WG has begun the process of mapping the market for whole house upgrades. Figure 2-18 shows an initial map of the residential whole house market ecology, with several market actors and influences and their effect on homeowner upgrade decisions. Additionally, the figure that follows provides a WG-developed set of questions to be addressed in the market characterization study for this effort.

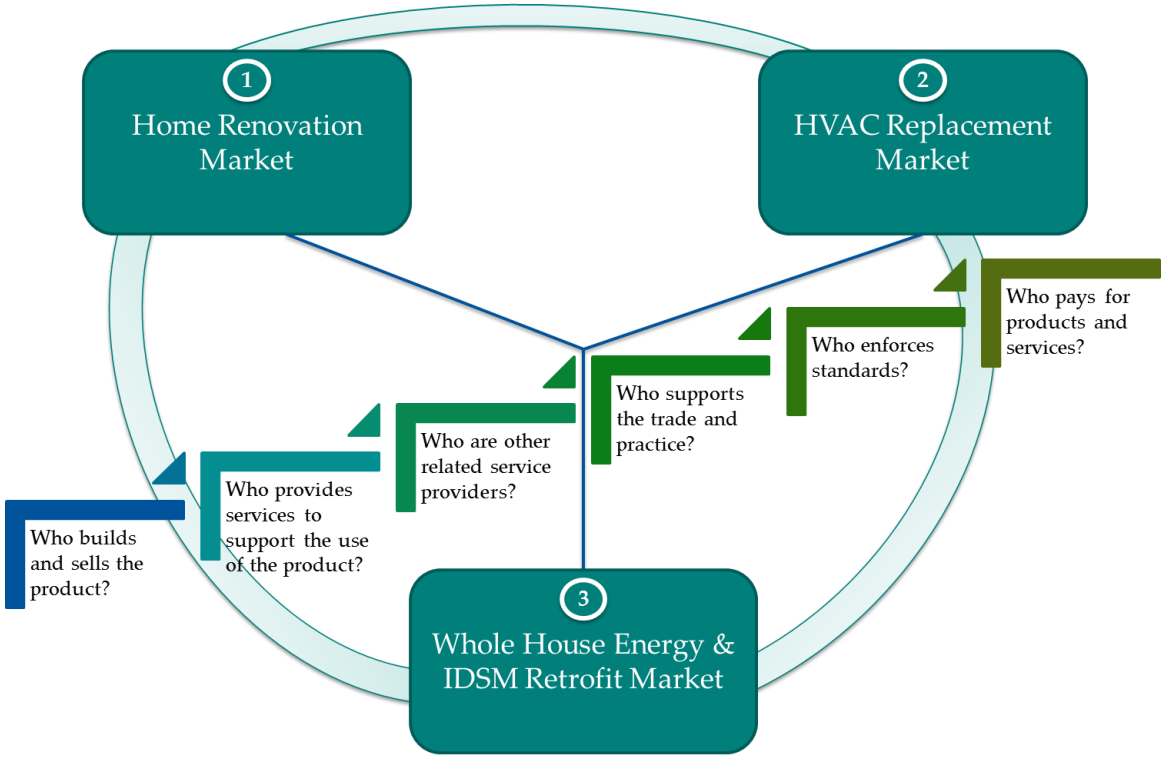
Figure 2-18. Draft Mapping of Residential Whole House Market Ecology



Source: Navigant

Figure 2-19 illustrates potential research questions for characterizing each sub-market that were developed by the sub-WG marketing committee.

Figure 2-19. Example Market Characterization Research Questions



Source: Navigant

2.5.3.4 Counterfactual Baseline

Developing a counterfactual baseline requires several key components, including having a clear definition for the product or service that is being offered into the marketplace and a clear understanding of the market and sub-market targeted for the initiative. Fortunately, over the project Phase 1 period, the Home Upgrade Program WG teams focused on these two required elements, making it possible to move forward in developing a counterfactual baseline for the Home Upgrade Program. A third and linked element that is not yet complete, but is required for conducting the counterfactual analysis (as well as providing valuable information to other parts of the initiative development process), is the Home Upgrade Program market characterization study noted above.

2.5.4 Next Steps: Market Characterization and Counterfactual Baseline Development (Pre-Launch Components 8A and 8B)

Navigant recommends that the next step should be to formally agree upon product and market definitions and conduct a market characterization study and counterfactual baseline assessment. For the Home Upgrade Program effort, Navigant recommends use of a 20-year program effects tracking horizon. A counterfactual market baseline estimate for 20 years will likely provide a reasonable picture of the

program's benefits during the intervention period and after the intervention has ceased—although, as noted, the benefits of the transformed market continue even after the 20-year period.[49]

Navigant recommends specific tasks for the market characterization study activity:

- **Literature review:** Undertake a thorough, though targeted, literature review of current, past, and projected trends for each of the three Home Upgrade Program target sub-segments, including review of national, regional, and California-specific activities and trends affecting these markets.
- **Identify and interview key target sub-segment market actors:** Research and identify a list of key industry market actors in the following areas of market influence: remodeling and HVAC upgrade[50] contractors, distributors, and manufacturers.
    - Specific recommended tasks include:
        - Develop and vet interview guides with the Home Upgrade Program WG team
        - Conduct market actor interviews
        - Tabulate responses into a coherent understanding of where these markets are today and future trends
- **Identify market drivers:** In each of the target sub-segments, identify the primary drivers and related opportunities for integrating the Home Upgrade Program effort.
- **Identify market channels for partnerships:** In each sub-segment, identify the key channel actors and influence mechanisms for potential integration of Home Upgrade into these channels.
- **Identify leading upstream potential partners:** Key upstream partners will likely play a large role in the eventual success of Home Upgrade to go to scale. This is an important research element for this reason.

Navigant recommends specific activities be undertaken for development of the counterfactual baseline:

- **Baseline and cost-effectiveness modeling linkage**: Link counterfactual baseline development with SMT initiative cost-effectiveness modeling for a Home Upgrade SMT initiative (see discussion of cost-effectiveness below) by working with a structure expert panel (i.e., a Delphi Panel) to help assess the baseline and related scenario inputs to the cost-effectiveness model.
- **Organize a Delphi Panel of experts:** Under WG sponsorship, enlist a panel of experts to assist in refining both the baseline inputs and the cost-effectiveness model inputs.

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[49] Navigant assumes that the timeframe for the Home Upgrade Program initiative and the period of long-term monitoring and tracking will be vetted in working group meetings and stakeholder workshops on EM&V in an SMT environment.

[50] The project team notes that a good deal of focus and interview activity has taken place over the past several years with whole house market contractors under the leadership of PG&E. Navigant will seek input from PG&E and use the most recent whole house contractor interview data to inform this market characterization study and will undertake targeted interviews in this segment as needed.

- **Define Delphi Panel category needs:** Identify the broad categories of relevant market expertise needed to ensure a high quality, neutral forecast of the Home Upgrade Program baseline. The list may include representatives from construction, architecture, codes and standards, policy, utility, market experts, economic and/or finance, and other relevant market actors and observers.
- **Identify and recruit members:** Develop a listing based on a discussion with the state's experts in the relevant category areas of potential Delphi Panel participants. The focus should be to recruit between 7 and 12 members to the panel.[51]
- **Develop background information:** Use market characterization study data and Home Upgrade Program SMT cost-effectiveness analysis, along with other relevant data, to provide the Delphi Panel members with structured background information, including historical tracing of the California residential sector drivers and influencers, etc., to assist member decision-making.
- **Historical tracing research of residential sub-segment trends and drivers:** In conjunction with the previous activities, develop a historical tracing analysis of energy efficiency in the California residential market (over the past 10 to 15 years) to inform Delphi Panel counterfactual baseline deliberations.[52] The tracing needs to identify specific policy and programmatic efforts statewide that have played major roles in promoting energy efficiency in the residential sector, with the goal of providing Delphi Panel members with a common understanding of the influences that have contributed to the creation of the existing residential energy efficiency profile in the CPUC utility territories.
- **Hold Delphi Panel:** Use a third-party consultant to facilitate a half- to one-day expert panel meeting—either online or face-to-face. The third-party consultant should also support any member follow-up voting needs beyond the half- to one-day meeting.
- **Report results:** Develop a draft and final report to document results, methods, best practices, and lessons learned from this experience.

2.5.5 UES Assessment/UES and SMT Initiative Evaluation Framework Plan Approach (Pre-Launch Components 9A and 9B)

UES represent the average energy savings associated with the energy-efficient product promoted through a market transformation initiative. UES estimates are used to evaluate savings from program market effects (beyond those of program participants) based on the notion that market effects savings will be consistent with the average UES from program homes. In this way, UES calculations may provide the basis for program evaluators to estimate the market effects savings for the initiative.[53]

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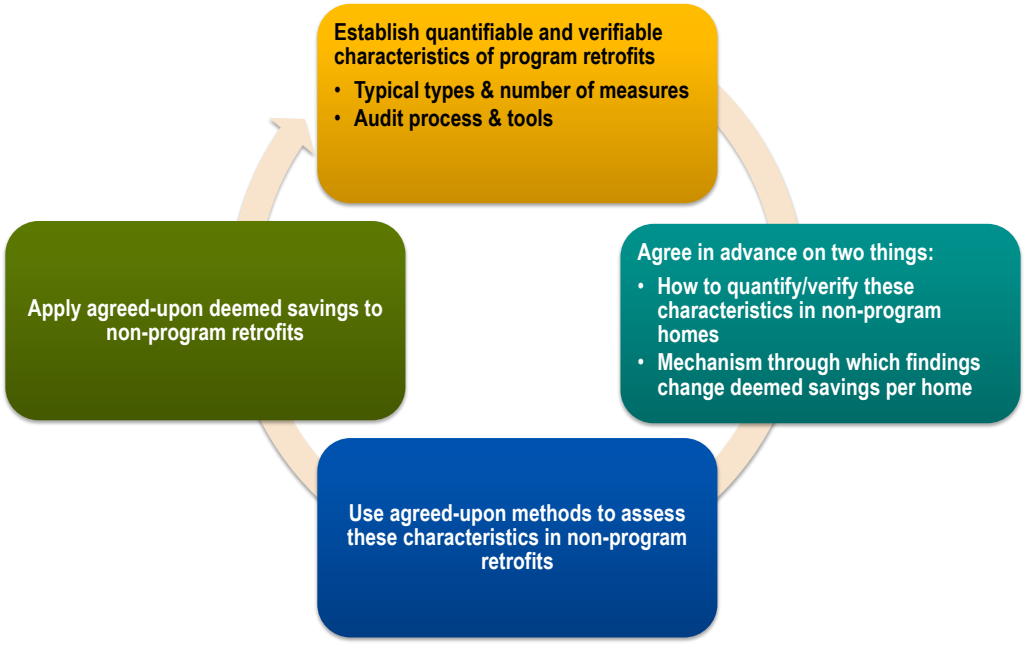
[51] Navigant has found that Delphi Panels of this range of size are able to communicate well, stay focused and on point, and develop quality forecasts and rationale for each forecast decision. Navigant assumes this range to be a best practice.

[52] Navigant has undertaken several counterfactual baseline forecast Delphi Panels (residential and commercial) over the past several years, including ones for NEEA, DTE, and Arizona Public Service (APS) Company in which historical tracing played important roles in supporting panel decision-making.

[53] Depending on the diversity of different configurations of a package of technologies being promoted and adopted by program participants, more than one typical (prototype) home with attendant energy-savings technology package(s) may be estimating UES for an SMT initiative.

Once an initiative develops a well-framed definition of the product, evaluation and research will determine what characteristics need to be known to estimate UES for projects both inside and outside of the program. More traditional (i.e., similar to RA program) evaluations conducted in the early years of the initiative will support the development of UES for the product(s). This research will quantify the known characteristics and achieved energy savings of homes within the program; the next challenge is to determine how non-program Home Upgrade Programs may differ (in terms of their household characteristics and retrofit characteristics—i.e., which measures were installed) from program homes and how this affects their savings. A high-level methodological approach for doing so is outlined in Figure 2-20.

Figure 2-20. Process for Establishing UES for Program and Non-Program Homes



Source: Navigant

It is important to determine this unit of measurement as early on in the initiative as possible to support ongoing evaluation efforts. It should be noted that the UES may need to be updated over the course of the SMT initiative to ensure the assumptions are as accurate as possible regarding non-program participant savings.

2.5.6 Current Status: UES and SMT Initiative Evaluation Framework Approach (Pre-Launch Components 9A and 9B)

There are two main questions that EM&V for market transformation must address: Is the share of homes undergoing upgrades increasing, and what level of savings are these homes generating? The first question relates to the market penetration of the product, whereas the second question seeks to determine if the product itself is remaining constant both inside and outside of the program. This second question is

answered through ongoing market research that informs the development and regular updates of UES estimates.

Navigant presented a high-level process for developing and updating UES estimates to the WG. The WG generally agreed with this approach (summarized again in Figure 2-17, above). While these high-level concepts have been vetted, the WG must begin to put each of these pieces in place in order to determine a formal EM&V plan. Agreeing on evaluation activities in advance will allow evaluation to occur routinely and smoothly throughout the initiative. As the details of each component come into place, the group will need to develop initial UES estimates to forecast initiative savings in the short and long term.

2.5.7 Next Steps: UES and SMT Initiative Evaluation Framework Approach (Pre-Launch Components 9A and 9B)

2.5.7.1 UES

Navigant recommends research be undertaken in Phase 2 to development a UES for the Home Upgrade Program product(s). The research should focus on quantifying the known characteristics and achieved energy savings of homes within the program. It should also focus on developing a UES for non-program Home Upgrade-oriented homes and determining how they may differ from program homes and how this affects their savings. Once developed, the UES will be an input to the cost-effectiveness model.

2.5.7.2 Evaluation Framework

Navigant recommends that the next step should be to develop a Home Upgrade Program Evaluation Framework. This task is linked to the previous technical and economic market tasks, in particular to tasks that focused on logic model and MTI development. An evaluation plan for the Home Upgrade Program Initiative will begin once the logic model and MTIs are complete. This process will be similar to that used in developing the logic model and MTI but will require less time and staff commitment from utilities and stakeholders.

Step 1: Preparation

First, the group should collect relevant evaluation information from secondary sources and telephone interviews with utility evaluation staff. This market information will include, but not be limited to, the following:

- Evaluation reports of programs similar to Home Upgrade Program in other states
- Identification of market intelligence regarding residential market trends
- Existing data sets associated with residential customers, relevant trade allies, and other market actors

With this information, the group should develop an initial straw-person Home Upgrade Program evaluation plan for review as part of the in-person meetings for the evaluation framework.

Step 2: In-Person Meetings and Follow-Up

Navigant recommends convening two in-person meetings in California with utility and stakeholder staff. Based on the evaluation framework, the group will need to revise and refine the sampling, data collection, analysis, and reporting elements. After the first meeting, a sub-committee or contracted consultant will follow up with attendees to address any unanswered questions and drive consensus regarding any outstanding issues. Navigant recommends the following structures for this step:

Meeting 1
Goal: Develop a shared understanding of existing evaluation approaches and data sources
Topics:

- *Review of existing evaluation approaches and discussion of advantages/disadvantages*
- *Identification of effective data collection techniques to assess MTIs*

Between the first and second meeting, the sub-committee or consultant will circulate an updated evaluation framework based on stakeholder input and the final Task 3 logic model. Based on stakeholder comments, the sub-committee or consultant will update the evaluation framework in preparation for the next meeting. This interim revision process is intended to drive consensus without taking up meeting time.

Meeting 2
Goal: Develop an evaluation framework that will assess market transformation
Topics:

- *Determine data sources for each MTI*
- *Confirm data collection techniques for each MTI*
- *Agree upon an appropriate reporting schedule and format*

If any issues remain outstanding or questions unanswered, the sub-committee or consultant will follow-up with stakeholders and provide resolution.

The interval between meetings will be approximately 15 working days.

Step 3: Reporting and Final Presentations
To fully memorialize the evaluation framework, the sub-committee or consultant should develop a document for the Home Upgrade Program WG that details all aspects of sampling, data collection, analysis, and reporting. If necessary, the sub-committee or consultant should provide a webinar for stakeholders and interested parties. The sub-committee or consultant should also document methods, best practices, and lessons learned from this experience for inclusion in the final report how-to manual section that describes a general process that may be applied to other market transformation initiatives.

2.5.8 Market Transformation Cost-Effectiveness Analysis and Incentives Step-Down Structure (Pre-Launch Components 10 and 11)

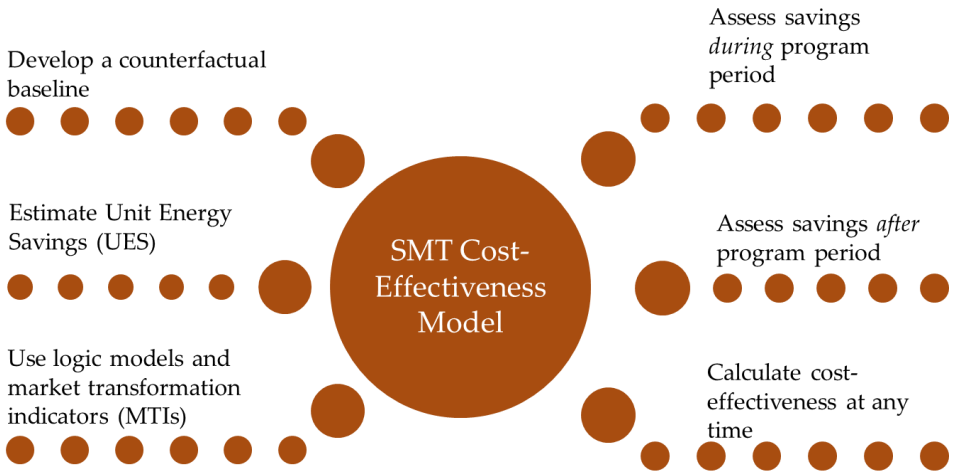
Determining cost-effectiveness for a market transformation program can utilize the same principles and general structure as cost-effectiveness approaches for RA programs, but they require different inputs in

many cases. One clear example is timeframe: SMT programs will likely have low year-to-year benefit-cost ratios in the early years of implementation, but the goal is life-cycle cost-effectiveness rather than immediate benefit-cost ratios above 1.0. Thus, one tenet of a market transformation cost-effectiveness model must be assessing costs and benefits over the lifetime of the initiative. In order to accomplish this and serve annual program needs, a market transformation cost-effectiveness model must have the following capabilities:

- **Bank savings for the program:** The model will house data from each year since the initiative launch and be updated annually to track ongoing program/initiative savings.
- **Track cost-effectiveness to-date:** The model will chronicle cost-effectiveness of the program as market changes (i.e., as both program and market effects savings increase).
- **Establish a 20-year (±) forecast of savings:** The model will predict changes in market penetration, UES, and resulting long-term cost-effectiveness.

Figure 2-21 illustrates the inputs and outputs of an example cost-effectiveness model.

Figure 2-21. Inputs and Outputs of an SMT Cost-Effectiveness Model



Source: Navigant

2.5.8.1 Components of Home Upgrade SMT Cost-Effectiveness Model

This section identifies a recommended approach to integrating market transformation programs and market effects into existing cost-effectiveness approaches with appropriate rigor. Although the details of the recommended approach presented here are developed by Navigant, this approach is based on: 1) a long history of thought, debate, and innovation by experts in California[54] and 2) the documented success of

[54] Especially including work by Ed Vine, Ken Keating, Ralph Prahl, Jane Peters, members of the Comprehensiveness Working Group, and many others.

approaches in other jurisdictions[55]—notably the NEEA Alliance Cost-Effectiveness (ACE) model and long-term monitoring and tracking approaches applied by NEEA.

There are three overarching steps to calculating the cost-effectiveness of SMT programs/activities:

- **Estimating SMT program target market activity:** This task includes estimating the market activity for the total market and for a naturally occurring market baseline.
- **Estimating SMT program impacts:** This task involves estimating the physical impacts (e.g., energy reduction) associated with the market activity.
- **Assessing the economic value of impacts:** This activity involves estimating the economic value of the impacts to account for costs and determine cost-effectiveness.

These three steps correspond to evaluating the market, the application of technology, and the associated economics. Below, Navigant presents a detailed discussion of the needs and approach each of these components of Navigant's recommended cost-effectiveness approach for estimating the cost-effectiveness of the Home Upgrade Program.

Navigant presents this recommended approach understanding the need for development of the Home Upgrade Program SMT cost-effectiveness analyses to be closely coordinated with similar work being undertaken in the codes and standards arena at the CPUC. Thus, Navigant provides this high-level approach as a starting point for joint discussions with CPUC staff and appropriate stakeholders—with a goal of developing a consensus approach to assessing the cost-effectiveness of SMT and related CPUC codes and standards for energy efficiency savings efforts.

2.5.8.2 Market Analysis

The greatest difference in estimating the cost-effectiveness of SMT and resource programs is in establishing the market activity. Resource programs begin with participant tracking data that identifies the application of a financial incentive. This provides a numeric starting point for evaluation, and studies often focus on determining installation rates and the influence of the incentive on the adoption. SMT programs do not have numeric participant tracking data. The approach to estimating changes in market activity from the program are instead based on estimating the total market gross activity based on market indicators and adjusting by an agreed upon estimate of a naturally occurring baseline. This approach for SMT utilizes a model that:

1. Estimates total market gross activity based on program-specific market indicators.
2. Simulates/forecasts adoption with and without program interventions.

Market modeling is a well-established practice in forecasting potential and setting efficiency goals in jurisdictions across the United States, and it has a long history in California for that purpose. Market

[55] Daniel M. Violette, Michael Ozog, and Kevin Cooney, *Findings and Report: Retrospective Assessment of the Northwest Energy Efficiency Alliance Final Report*, Northwest Energy Efficiency Alliance, December 8, 2003, www.theboc.info/pdf/Eval-BOC_SummittBlue_NEEA_2003.pdf.

modeling has been suggested—and articulately explained—for market transformation planning and evaluation purposes in the Northwest in the 1990s[56] and in California even as early as 2001 by a collaboration of technical and program experts in the state.[57]

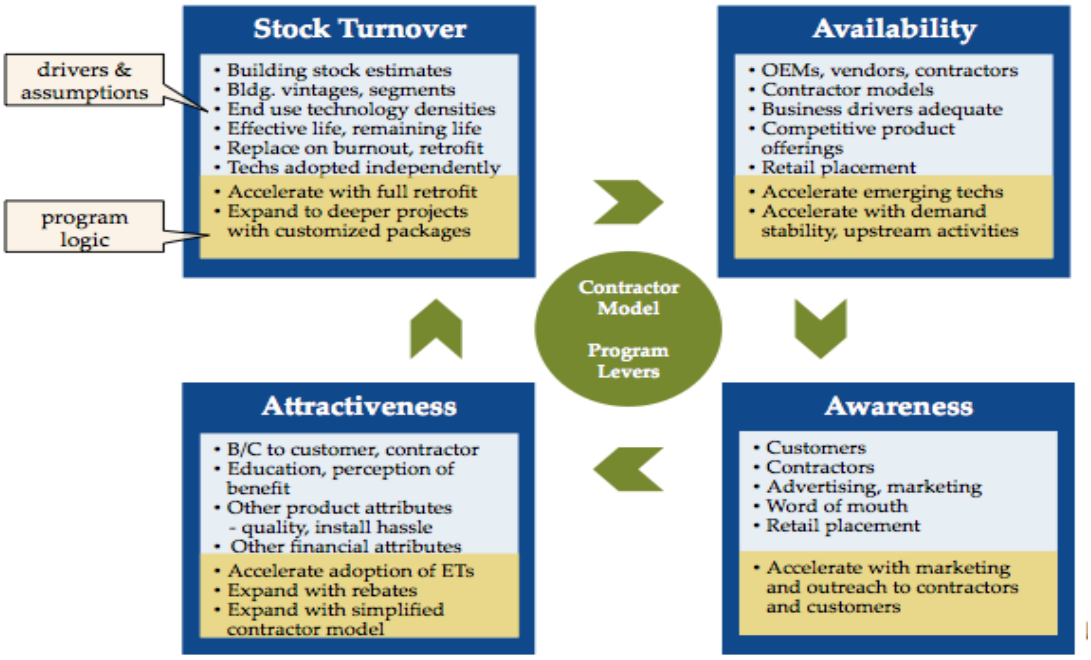
Because each SMT program is unique and each targeted market may have different types of available or obtainable data, the market model for each SMT program will be unique. Despite this uniqueness in inputs and methods, a common structure, process, and output can be specified. The success of this concept has been observed with NEEA's ACE model platform/suite. Although existing cost-effectiveness tools may be applied to SMT programs, existing tools in California do not include market models as ACE includes and would need to be developed for each SMT program.[58]

The market model is used to facilitate and estimate the counterfactual baseline and market characterization processes discussed in Section 2.4.2.1. For this effort, Navigant recommends developing a baseline and three market transformation scenarios that correspond to different values of market indicators.

Figure 2-22 provides an illustrative example of the kinds of driver and consumer behavior attributes used in an SMT market model. This is followed by a listing of typical market model inputs and a discussion by Navigant of an optional approach to a Home Upgrade Program market model. This would include direct linkages of the market model forecast to the program agreed upon MTIs, with a goal of helping articulate the potential linkages of the Home Upgrade Program logic model and MTI hypotheses against the several market scenarios proposed for development.

[56] Joseph Eto (1998), op. cit.
[57] Frederick D. Sebold, et al. (2001), op. cit., Section 7.
[58] Navigant proposes to develop this cost-benefits approach with California calculation tools based on the E3 calculation tool model. Members of the Navigant Home Upgrade Program SMT framework and plan team also work on the California Potential and Goals Study and will endeavor to ensure consistency of approach between this project and Potential and Goals Study approaches.

Figure 2-22. Illustration of Drivers, Assumptions, and Logic Addressed by a Market Model



Source: Navigant

Market model inputs:

- Technical and financial characteristics (i.e., costs, savings, lifetime, etc.)
- Consumer attributes (awareness and willingness factors, discount rate, etc.)
- Stock turnover (retrofit/retirement vs. replace on burnout, new construction, and end-use densities)
- Market indicators and barriers associated with each scenario (and their relationship to other variables in the model)

Market model methods:

- Bass diffusion,[59] marketing factor, and word-of-mouth factor
- Stock turnover and order of delay (first, third, and pipeline)
- Consumer decision-making, product attributes (financial only or other), implied discount rate, logit model, or payback curves
- Supply-side model and availability

[59] Appendix C provides detailed discussion of Bass diffusion "Awareness" and "Willingness" model algorithms.

Market model outputs:

- Total market gross forecast
- Naturally occurring market baseline

2.5.8.3 Impact Analysis

The impact analysis for SMT may still vary from resource programs, but not to the extent previously described for market analysis. In theory, the impact analysis would not necessarily differ from that of a resource program. For example, an SMT program might be devised for a single simple measure in place of an incentive program. Such a measure would require similar/identical impact analysis/evaluation. However, SMT programs frequently deal with more complex, ambiguous, or varying measures that might include inconsistent bundles of technologies, varying applications, and often combinations including behavioral or operational changes. These complexities may require evaluation and analysis more akin to custom evaluation (but still without ex ante-reported savings estimates).

Establishing the physical impacts of the SMT measures may require combinations of use of existing utility and REN data, surveys, interviews, field studies, building simulation, and engineering analysis to help define measure-application prototypes and to establish appropriate impact values for:

- UES[60]
- Use load profiles
- Demand savings/peak coincidence
- Emission savings
- Life extension
- Operational benefits (i.e., maintenance, production, etc.)

The degree to which savings can be estimated with evaluation activities drives the cost-effectiveness approach. There is compelling evidence that savings from SMT activities can be measured.[61]

For the cost-effectiveness assessment of the Home Upgrade Program initiative, Navigant will develop UES model(s) to be used in developing the scenario models of Home Upgrade Program cost-effectiveness over the life of the initiative.

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[60] UES are a key measure input to the counterfactual model, as these estimates provide the basis for assessing potential Home Upgrade Program market effects savings, which affect the cost-effectiveness estimate over the life of the SMT initiative.

[61] DNV GL, "Whole House Retrofit Impact Evaluation of Programs, CALMAC ID: CPU0093.01," California Public Utility Commission, Energy Division, September 2014.

2.5.8.4 Assessing Market and Impact Analysis Results[62]

The market model results and associated market indicator forecasts serve as a collective hypothesis for the program design.[63] Hypotheses are specific causal steps whereby program activities result in estimated changes in the market, and whereby changes in the market result in quantifiable savings. PIPs already contain many of the foundational elements required to establish hypotheses, such as logic models, program performance metrics, and MTIs. These hypotheses will serve as the basis for evaluation. Independent third-party evaluations will concentrate on testing the program logic by establishing evidence that supports or opposes the hypotheses.[64] Program claims can be validated with analytical methods that include end-use field estimates to ensure that the anticipated impacts are occurring as expected.[65]

2.5.8.5 Cost-Effectiveness Analysis

Cost-effectiveness calculation for SMT may be aligned with existing California cost-effectiveness calculation tools and will apply similar methods. One of the key differences is the definition and calculation of net-to-gross (NTG) and its instantiation in existing tools. NTG has come to commonly refer to the adjustments made to the program gross to account for free ridership and spillover. In the case of SMT, there is not a program ex ante starting point. Instead, the starting point is total market gross activity. Accordingly, in the SMT initiative/program case, NTG would refer to the adjustment made to the total-market-gross (TMG) market activity by subtracting the naturally occurring baseline. By definition, this NTG must always take a value less than or equal to one. Because of the common definition/use of NTG is different than that for SMT and because the starting points are different (program gross vs. TMG), it might alleviate confusion to develop different but parallel/corresponding fields in existing tools rather than attempting to include such inputs into existing tools. Navigant recommends working closely with CPUC staff and WG stakeholders to assess needs in this area.

No matter the potential need for existing tool adjustment, standard cost-effectiveness issues and inputs are still required; these include:

- Cost tests
- Avoided costs
- Other valuation data

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[62] This discussion of hypothesis testing links directly with the Phase II Task 3 logic model and MTI and Task 6 EM&V for SMT evaluation planning activities proposed in this scope of work.

[63] E. Vine, California Institute for Energy and Environment, *California's Market Effects Studies: Key Findings, Lessons Learned, and Future Directions*, CPUC, August 2011, p. 24 states that evaluating market effects "will become even more robust if … [we] require hypothesis testing as part of evaluation."

[64] E.G. Guba and Y. S. Lincoln, *Effective Evaluation: Improving the Usefulness of Evaluation Results through Responsive and Naturalistic Approaches* (San Francisco: Jossey-Bass, 1981); L. J. Cronbach, *Designing Evaluation and Social Action Programs* (San Francisco: Jossey-Bass, 1982). These argue that qualitative research methods are as valid in determining causal explanation as purely quantitative ones, if they are well-designed to avoid threats to the validity of explanation.

[65] Edward Vine, et al., "A Framework for Evaluating Market Effects of Energy Efficiency Programs: Guidance for Evaluators," Proceedings of the 2009 International Energy Program Evaluation Conference, 2009, www.iepec.org/2009PapersTOC/papers/120.pdf#page=1.

- Energy benefits
- Demand benefits
- Non-energy benefits
- Incremental upfront costs
- Operational costs
- Incentive costs
- Program administration
- Marketing and outreach
- Discount rate
- Dual baseline

2.5.8.6 Appropriate Discount Rate for Cost-Effectiveness Calculator

A variety of perspectives exists in relation to selecting a discount rate to use for an analysis such as this one. Most reputable economists advocate for using a societal discount rate for policy decision, especially policies specifically targeting long-term risks and benefits. Societal discount rates usually range from 0% to 3% (in real dollars). Selection of discount rate is considered a policy choice. Choosing a discount rate is a way of deciding to what extent the future is worth less than the present. Corporations often use high discount rates (or hurdle rates) for investment decisions simply because corporations are faced with allocating a limited budget across many investment opportunities. A high corporate discount rate is usually an indication of the opportunity costs of allocating budget to alternative investments versus their typical business investments. This logic, however, does not apply to policy objectives that balance more than just financial consequences. Navigant's general recommendation and approach on this issue follows.

Best Response for Discount Rate Selection

1. The discount rate is always established by policymakers.
2. A societal discount rate is most aligned with the intent and long-term objectives of market transformation.
3. The cost-effectiveness calculator treats discount rate as an analytical variable rather than a hard-coded assumption. It is possible, and Navigant has often done so, to show results associated with multiple discount rate assumptions.
4. Selection of this single assumption can often make or break the economic assessment of programs where the benefits are expected to occur later than the costs simply because future benefits can become overwhelming devalued in out years. For this reason, Navigant generally does sensitivity analysis on discount rate assumption for estimates such as this.

2.5.8.7 Time Horizon for SMT Home Upgrade Program and Other SMT Efforts

The time horizon for analyzing market transformation is longer because the logic of the activities and interventions is intended to make continued and increasing impact over a longer period of time. This

differs from the logic of a resource program where the primary goal of each incentive is a single installation—while spillover effects are considered tertiary to the program logic. Navigant recommends evaluating cost-effectiveness on a 20-year time horizon for the Home Upgrade Program.[66] Two cost-effectiveness metrics are calculated: cumulative total resource cost (TRC) and forecasted total TRC. The cost-effectiveness of an SMT program evaluated for its entire history rather than a given year. The overall concern for SMT is that the program is on a trajectory that is expected to prove cost-effective in the long run. There are several reasons that an SMT program may not appear cost-effective near its inception but may still prove cost-effective in the long run:

- Improving product costs
- Improving product efficacy
- Compounding diffusion effects of adoption
- Levelization of program costs during a short period over incremental adoption increases that persist beyond the program period[67,68]

The project team notes that the issue of the time horizon for the Home Upgrade Program Initiative is identified in Section 2.4.10 as a key Phase 2 agenda item for the Home Upgrade Program WG.

2.5.8.1 Incentive Step-Down Analysis

Introduction of an SMT initiative, as was the case in developing the CSI, may be accompanied with an incentives step-down plan. Such a plan will include several scenarios that should be built into the initiative's cost-benefit modeling analysis and provide initiative champions with design options/guidance that are directly linked to cost-benefit analyses. The analysis will reflect the savings potential, benefits, and costs of the initiative over the implementation and post-implementation market momentum period. In this way, the initiative incentive policy is linked to scenario options related to the most efficacious way to roll out and implement an incentive approach over the course of the effort—with a key focus on the relationship between the IIP adoption goals and the incentive step-down strategy taken by initiative champions.

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[66] The timeline should be determined based on the technical and market conditions for each measure or program. Twenty years is likely a good starting point. But when one considers even the brightest case of market transformation, compact fluorescent lights (CFLs), it has been nearly a 20-year effort and its base technology (incandescent lights) has a life of less than one or two years. Navigant thinks many other measures, initiatives and like efforts might require an even longer horizon to capture the full picture.

[67] In the TRC tests, program incentives are considered mostly a transfer payment and do not contribute to the program TRC costs. However, administrative and marketing costs linked with delivering incentives are counted toward TRC costs.

[68] Navigant notes that the approach to cost-effectiveness analysis for SMT discussed above neutral as to the cost-effectiveness test chosen, whether TRC, societal, ratepayer impact measure (RIM), public purpose, or otherwise. The project team views the selection of test as a policy decision and the team's task is to develop appropriate methods and a process for including market transformation impacts as inputs to the desired cost-effectiveness tests.

2.5.9 Current Status: SMT Initiative Cost-Effectiveness Analysis and Incentives Step-Down Structure (Pre-Launch Components 10 and 11)

Navigant vetted the concept of a market transformation cost-effectiveness model at a high level with both the WG and IOU EM&V teams. Additionally, Navigant presented the high-level concept of SMT cost-effectiveness analysis at the CPUC-sponsored workshop on the subject in December 2014. Once a working model is built, the WG or governing administrators can develop scenarios to design the initiative incentive structure, including eventual incentives step-down over time. However, several other steps must be in place in order to build an accurate cost-effectiveness model:

- The counterfactual baseline model must be completed, vetted, and used to project the baseline beyond which the initiative can claim savings.
- The initiative must have initial estimates of UES and how savings will change over time.
- The initiative must develop estimates of initiative administration, marketing, outreach, education, and other costs (e.g., under the straw-person SMT framework, these costs would be developed during Stage 2).

2.5.10 Next Steps: SMT Initiative Cost-Effectiveness Analysis and Incentives Step-Down Structure (Pre-Launch Components 10 and 11)

Navigant recommends that the WG sponsor development of Home Upgrade Program cost-effectiveness model to assess initiative life-cycle cost-effectiveness. The Home Upgrade Program cost-effectiveness model can be developed in five steps.

The first step is to construct a market model prototype for the Home Upgrade Program. The model should leverage best-in-class potential modeling methods but not be overly complicated. If additional complexities are required by stakeholders, those changes may be addressed in a version update to the model. The techniques employed should align closely with those in the most recent IOU potential model.[69] Navigant recommends this activity be completed in five steps.

Step 1: Define Requirements

The WG needs to determine the required and desired functionality of a market model specific to Home Upgrade Program. This should then be synthesized into a list of prioritized requirements for the model. This activity will yield a prioritized list of requirements for the market model and cost-effectiveness calculations.

Step 2: Develop Model

The second step is to design and execute a market model, the results of which will feed cost-effectiveness calculations based on approved cost-effectiveness methods. Several activities are included in Step 2:

- Model construction

[69] California Public Utilities Commission, *Energy Efficiency Potential and Goals Studies*, www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Energy+Efficiency+Goals+and+Potential+Studies.htm.

- Data acquisition
- Model testing and quality control

This activity will result in a computational model that fulfills the defined requirements to the fullest extent possible. **Step 3: Define Scenarios**

The third step should build on the Delphi Panel facilitation, using the model to develop appropriate input values associated with three levels of market transformation. The panel should also be used to create a naturally occurring baseline. Please refer to Section 2.5.4 for more discussion of the Delphi Panel process.

Scenarios are important to understanding the range of potential activities and the cost-effectiveness of each scenario. This activity will result in development of a memorandum documenting the market transformation scenarios resulting from the Delphi Panel process, including forecasted scenario results for adoption and cost-effectiveness.

Step 4: Vet Initial Scenario Results

The fourth step is to present initial scenario results in a workshop meeting and collect comments from workshop participants. This could result in changes to the model based on workshop feedback.

Stakeholder input will be sought in the form a presentation at a workshop meeting that will result in a list of workshop comments and responses; updates to deliverables in Step 2 and/or Step 3 resulting from workshop feedback.

Step 5: Documentation for How-To Manual

The final step is to document methods, best practices, and lessons learned from this experience. The intent of this task is to incorporate this effort into a draft section for a general how-to manual for general SMT cost-effectiveness analysis.

2.6 Evaluation Elements

2.6.1 Whole Market (Market Effects) Evaluations (Pre-Launch Components 12 and 13)

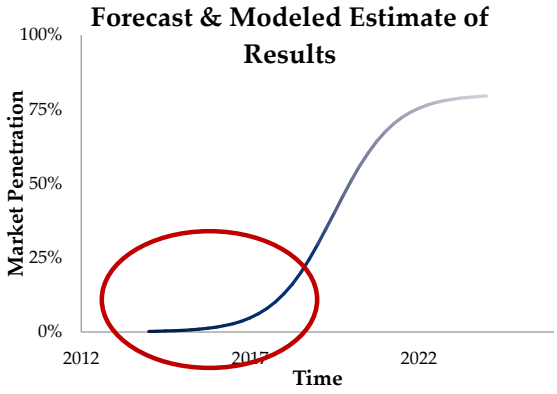
Evaluation Elements

This section presents a high-level overview of evaluation considerations for an SMT initiative. It is intended to be viewed in conjunction with the evaluation framework plan approach presented above in Section 2.5.5, above.

SMT initiative evaluations are undertaken on a regular basis during the implementation of the initiative. Below, Navigant presents illustrative examples of an SMT initiative evaluation at three different stages of initiative development: early transformation, transforming market, and transformed market. These stages correspond to the categories of innovators and early adopters (early market); mainstream adoption (transforming market); and late adopters and laggards (transformed market) in the Rogers Theory of Innovation Diffusion presented in Chapter 1.

Figure 2-23 presents a typical view of the **early market transformation** stage, followed by a description of evaluation activities undertaken during this period.

Figure 2-23. Early Market Transformation Stage



Source: Navigant

Early market transformation stage evaluation activities include:

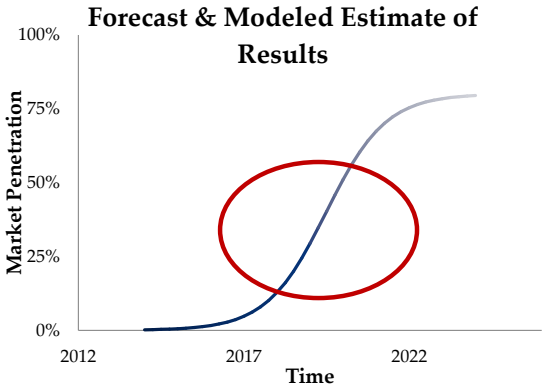
- Establishing a baseline agreed upon by all stakeholders
- Forecasting results without SMT initiative naturally occurring baseline
- Identifying MTIs that support evaluation approach
- Tracking changes in earliest indicators to determine if the program has started as expected
- Evaluating program savings and measure market effects to confirm early UES (per home) estimates

Typical evaluation methods during this stage include:

- Surveys of program participants and nonparticipants within the program area to develop estimates of current upgrades occurring with and without the program
- Development of the counterfactual baseline using a structured panel of experts (Delphi Panel).

Figure 2-24 provides an overview of the evaluation focus for the **transforming market** stage, followed by a description of evaluation activities undertaken during this period.

Figure 2-24. Transforming Market Period



Source: Navigant

Transforming market stage evaluation activities include:

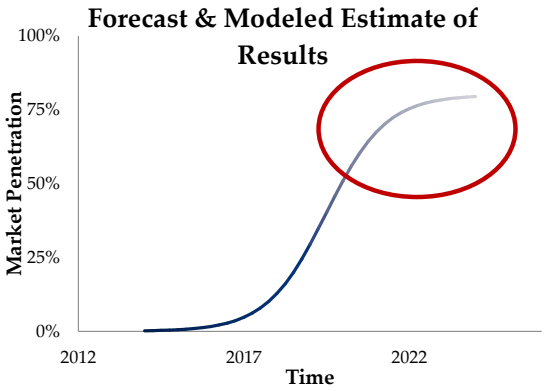
- Continuing to track MTIs
- Performing regular and ongoing research into the status of the market to assess market effects
- Evaluating program participant savings
- Refining the UES
- Considering a theoretical maximum UES
- Looking for signs of sustainability
- Assigning attribution of savings

Typical evaluation methods during this stage include:

- Comparison of changes in MTIs from regions with no programs to MTIs within program areas
- Field study/onsite data collection to verify UES values on various upgrade measures
- Surveys of program participants and nonparticipants within the program area to develop estimates of market effects (e.g., spillover)

Figure 2-25 presents a graphic description of the **transformed market** stage, followed by a description of evaluation activities undertaken during this period.

Figure 2-25. Transformed Market Period



Source: Navigant

- **Transformed market** stage evaluation activities include: Continue to track market effects after the program reaches sustainability
- Use adjusted and vetted model to estimate savings
- Assess sustainability (e.g., activities at the regulator level)
- Confirm attribution

Typical evaluation methods during this stage include:

- Surveys of program participants and nonparticipants within the program area to confirm estimates of market effects
- Surveys of program participants and nonparticipants to confirm sustainability

2.6.1.1 Long-Term Monitoring and Tracking of SMT Benefits

In market transformation programs, it is possible to continue claiming savings from the initiative even after the program component (i.e., directly funded activities) has ended. In the long term, savings become 100% market effects; thus, the EM&V approaches used to determine overall market penetration and non-program home UES throughout the earlier stages of market transformation will continue, albeit with decreasing frequency. A typical approach is to conduct post-program evaluations annually in the first three years after the program ends, every other year for the next three years, and every third year thereafter or until market transformation has been achieved. These long-term monitoring and tracking evaluations tend to focus on specific modeling assumptions, such as UES and actual/counterfactual market share. Long-term monitoring and tracking evaluation tends to rely on low-cost/high-level data collection efforts.

One component in determining whether market transformation has been achieved is measuring evidence of sustainability. As the initiatives come closer to reaching its long-term goals, sustainability must be

evaluated to provide a gauge of market reliance on programming. Assessing evidence of sustainability regularly is important at all stages, but especially so as the program begins to remove its support of the market. Table 2-14 provides a listing of typical sustainability indicators.

Table 2-14. Potential Indicators of the Probable Sustainability of Market Effects

Generic Initiative Sustainability Indicators
• Is someone making money by offering it?
• Has a private market developed to continue the facilitation?
• Has the profession or trade adopted it as a standard practice?
• Would it be difficult or costly to revert to earlier equipment or practices?
• Are product performance issues resolved?
• Have more efficient codes and standards been adopted (and implemented)?
• Has the product achieved a dominant market share, pushing out less efficient options?
• Does customer awareness make the targeted measure the likely choice?

Source: CPUC Market Transformation White Paper

In addition, initiative designers should plan for continued activity to support the market for energy savings. The major role that an initiative planner must assume is that of a supporter of deepening energy savings through continual marketing, introduction of newly emerging efficiency technologies, integration of demand response, smart meter, or renewable energy approaches, or other relevant savings techniques as a means of sustaining the market momentum created by the initiative. Planners need also to consider whether new barriers may have arisen that require the initiative to develop new activities to address these.

2.6.2 Current Status: Whole Market (Market Effects) Evaluations (Pre-Launch Components 12 and 13)

Navigant proposed an approach for evaluating whole market savings in the short- and long term to the WG and EM&V communities through the following activities:

- High-level summary at the kickoff meeting in April 2014
- More detailed presentation at the July 2014 workshop
- Webinar with EM&V teams in September 2014
- Coordination with CPUC and CPUC consultants on key EM&V issues

As stated above, the fundamental EM&V approach will bring together several of the key elements described throughout the report:

- The product definition determines what characteristics must be known to estimate UES for each project, both inside and outside of the program.
- The market definition sets the scope for the counterfactual baseline determination, which in turn establishes the baseline UES and market penetration against which the initiative will be measured throughout its life cycle.

- The logic model and MTIs provide the critical logical linkages between program activities and outcomes, enabling evaluation of programmatic and known external influences during and after the initiative.

The WG and EM&V teams have initially vetted this approach; the team will need to establish a more detailed plan for the exact evaluation activities to be continued in the long term as part of the EM&V approach finalization.

2.6.3 Next Steps: Whole Market (Market Effects) Evaluations (Pre-Launch Components 12 and 13)

Navigant presented to the WG and IOU EM&V staff a general framework for evaluating market transformation initiatives. Substantial work remains in terms of developing and agreeing upon a formal evaluation plan for the initiative. Navigant recommends the development of a Home Upgrade Program evaluation plan based on the evaluation plan framework recommended for development above. This would be completed in three steps and would build off the framework: preparation/step 1; two meetings applying the information developed in step 1 (step 2); and finalization of the Home Upgrade evaluation plan.

The key elements of the plan would include:

- Application of the UES and program participant data to the plan
- Data sources
- Evaluation timing over the course of the Home Upgrade SMT initiative
- MTI evaluation techniques, sampling protocols, etc.
- Evaluation plan updates and inputs to the cost-effectiveness model

2.7 Policy Elements

Policy Elements

The CPUC Consultant MT Policy White Paper identifies eight important areas of need for the integration of initiative component into current CPUC RA portfolio rules, policies, and procedures. These are outlined below:[70]

- Ascribe a role to market transformation within an energy efficiency portfolio
- Determine appropriate PA(s)
- Manage the risks
- Determine a process to identify and vet market transformation initiatives
- Assess the cost-effectiveness of market transformation initiatives
- Measure progress toward market transformation goals
- Consider the need for market transformation performance incentives
- Reflect market transformation opportunities in Potentials and Goals Studies

Navigant's charge in this process was to work closely and interactively with Home Upgrade Program Working Group stakeholders to identify workable positions on Home Upgrade Program market transformation planning and framework issues. As such, while the above issues have been identified and reviewed by some WG stakeholders—with the IOUs filing comments on these to the CPUC—the entire group has not participated in discussions on the above issues.

Nevertheless, Navigant presents an overview of these issues, their current status, and the potential needs associated with each related to the adoption of an SMT framework in California. We note that the discussion in this section is focused on vetting of these issues in a recommended next step, Phase 2 of this process.

[70] Keating and Prahl (2014), op. cit., p. 5.

2.7.1 Current Status: Regulatory Policy Integration (Pre-Launch Component 14)

The project team and WG have addressed several of the eight identified issues identified in the CPUC white paper. In Table 2-15, all eight of the issues are identified, along with Navigant's assessment of the current status of each issue and potential approaches to resolution of the issues. Issues in bold and italicized are those addressed in the Chapter 2 straw-person SMT framework. This is followed by a brief discussion of each of the white paper issues.

Table 2-15. Summary of CPUC Policy Issues; Status and Potential Next Steps

	CPUC Consultant Market Transformation White Paper Policy Issues	Issue Status	Potential SMT Next Step Issue Resolution
1.	Ascribe a role to market transformation within an energy efficiency portfolio	Currently, no role exists for SMT in the CPUC energy efficiency portfolio.	The California Strategic Energy Efficiency Plan (CSEEP), the Standard Policy Manual and Potentials Studies would likely require changes, among other documents,[71] should the CPUC make a decision to incorporate SMT into its current portfolio. *(This is a projected as a next step need for WG stakeholder input and vetting)*
2.	***Determine appropriate PA(s)***	No process currently exists to solicit, vet, and select SMT PAs within the current CPUC efficiency portfolio of programs.	Navigant's next step WG recommendations include review, vetting and agreement on a SMT framework that may include this element *(This is a projected as a next step need for WG stakeholder input and vetting)*
3.	Manage the risks	No risk for SMT efforts currently exists, as the portfolio does not recognize these.	A requirement for appropriate SMT initiative vetting, collaboration, balanced portfolios, shared risks with non-IOU-ratepayer entities, and other creative approaches will be needed to help mitigate risks *(This is a projected as a next step need for WG stakeholder input and vetting)*
4.	***Determine a process to identify and vet market transformation initiatives***	No process currently exists to identify and vet new SMT initiatives.	See comment on #2 *(This is a projected as a next step need for WG stakeholder input and vetting)*

[71] The CEC *Integrated Energy Policy Report* and recently released CEC AB 758 action plan would likely be among other documents affected by CPUC adoption of an SMT framework.

CPUC Consultant Market Transformation White Paper Policy Issues		Issue Status	Potential SMT Next Step Issue Resolution
5.	***Assess the cost-effectiveness of market transformation initiatives***	The Standard Practice Manual (SPM) provides guidance on parameters for assessing cost-effectiveness of a RA program.	Cost-effectiveness assessment for an SMT initiative needs to be developed for each initiative based on the product, service, or practice; expected implementation period; and expected benefit accruals post-implementation. Chapter 2 above provides a detailed discussion of nationally accepted approaches to assessing cost-effectiveness savings for SMT. *(This is a projected as a next step need for WG stakeholder input and vetting)*
6.	***Measure progress toward market transformation initiative goals***	As RA programs, the current CPUC energy efficiency portfolio requires MTIs as part of PIPs, but they do not specify measurement of these toward an SMT-oriented goal.	Measuring progress in the SMT initiative requires a somewhat different evaluation framework than energy efficiency evaluation efforts. Discussion of component 9B in this chapter identifies the one-time need for the Home Upgrade Working Group to develop an SMT initiative evaluation framework/protocol and also provides further discussion of this issue. *(This is identified as a projected WG next step need to work with EM&V stakeholders to develop, refine, and finalize a recommended approach.)*
7.	Consider the need for market transformation performance incentives	CPUC Decision 13-09-023 establishes the current energy efficiency incentive framework under which the state's IOUs operate.	Navigant recommends further discussion of this issue with stakeholders in a projected as a next step WG stakeholder activity
8.	Reflect market transformation opportunities in Potentials and Goals Studies	Currently, CPUC Potentials and Goals Studies do not consider savings from an SMT framework point of view, and the Home Upgrade Program is thus evaluated from a RA perspective.	Navigant recommends further Phase 2 discussion of this issue with stakeholders—to consider the white paper idea of adding a "*market transformation savings potential*" component to the current Potentials Study typology of technical, economic, and market savings potentials. *(This is a projected as a next step need for WG stakeholder input and vetting)*

Source: Navigant

2.7.2 Next Steps: Regulatory Policy Integration (Pre-Launch Component 14)

Navigant recommends that the Home Upgrade Working Group sponsor discussions of each of the eight items noted above to: a) receive broad stakeholder input on the issues; b) refine current approaches suggested in the straw-person Chapter 2; and c) finalize Home Upgrade Working Group stakeholder positions and relevant approaches to each of these issues. Below, Navigant provides a Phase 2 proposed work plan for vetting these issues.

2.7.2.1 Steps for Vetting CPUC Market Transformation White Paper Policy Issues

Navigant recommends the following steps to vet these issues:

Step 1: Preparation Research

Prior to any in-person meetings on these topics, the WG consultant will need to research each of the issues noted above prior to meeting with stakeholders. The technical policy issues associated with these policy issues—assessing the cost-effectiveness of SMT initiatives (issue 5) and measure progress toward SMT initiative goals (issue 6)—are components of other pre-launch component development tasks. WG vetting of the policy issues arising from the white paper associated with the adoption of an approach to incorporating an SMT framework into current CPUC efficiency policy, rules, and practices will be addressed as part of this recommended activity.

Step 2: In-Person Meetings and Follow-Up

The WG should convene two in-person meetings in California with PA and WG stakeholders, with the goal of seeking input and agreement where needed and possible on key policy white paper issues.

Meeting 1

Goal: Develop a shared understanding of the policy issues in question and identify common steps and positions to address them

Topics:

- *Review of existing and background information presented on each*
- *Identification of common positions and needed actions to move toward consensus*
- *Identification of issues, if any, needing resolution to assist the group in reaching consensus*

Between the first and second meeting, a sub-committee or consultant should develop a memorandum and/or position paper(s), as appropriate, on each of the issues resulting from the first meeting. The sub-committee or consultant will ask for comments on these, which will be incorporated into a second draft position paper for consideration and discussion at the second meeting.

Meeting 2

Goal: Seek consensus on positions, language, and any questions still needing further research or action to achieve consensus positions on relevant issues.

The interval between meetings will be approximately 15 working days.

Step 3: Reporting and Final Presentations

The WG should sponsor a webinar for stakeholders and interested parties to codify WG meeting final agreements on agreed upon approaches and positions, including the development of a final memorandum finalizing Home Upgrade Working Group agreements on these issues.

3. Conclusions and Recommendations

Chapter 4 presents information on the following:

- Summary and discussion of Navigant's general conclusions on the Home Upgrade Program effort to transition to an SMT initiative
- General recommendations for continuing the work of the working group
- Specific recommendations on next-step activities to complete development of the remaining SMT initiative pre-launch components: design, business and operations, evaluation, and policy

Navigant's *National Best Practice Market Transformation Programs* report on the residential sector market in California found that it is arguably the most difficult and challenging market to transform. The diversity of this large market; variations in climate; past construction practices; and cultural, language, and other differences provide the backdrop for attempting to transform this energy impactful market.[72] In the project team's view, any effort to transform the market toward deep energy retrofits through the operation of the Home Upgrade Program or to encourage significant increases in ZNE retrofits—as the recently released CEC draft *California Existing Buildings Energy Efficiency Action Plan* recommends[73]—will require an extremely concentrated, focused, well-planned, and organized effort.

The Home Upgrade Program WG appears to be focused on developing several of the key components of a potential SMT initiative, which may lend itself well to support the state's ongoing and future residential energy efficiency goals.

3.1 Summary of General Conclusions and Recommendations

Table 3-1presents the project team's general conclusions and recommendations about the efficacy of the Home Upgrade Program's ability to potentially transition from its current RA-focused status to a longer-term, collaborative SMT focused program, in addition to related high-level recommendations if the program is implemented.

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[72] California Energy Commission, *California Energy Demand 2014–2024 Revised Forecast*, *Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency*, September 2013 http://www.energy.ca.gov/2013publications/CEC-200-2013-004/CEC_200-2013-004-SD-V1-REV.pdf; Navigant calculates residential electric demand at 37 percent of 2014 CEC forecasted statewide demand and 39 percent of statewide natural gas demand for the same year

[73] California Energy Commission, "Draft - CA Existing Buildings Energy Efficiency Action Plan," March 2015, http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-05/TN203806_20150310T093903_California%E2%80%99s_Existing_Buildings_Energy_Efficiency_Action_Plan.pdf.

Table 3-1. Navigant's General Conclusions and Recommendations

General Conclusion(s)	
Navigant makes the following broad conclusions about the feasibility of a potential SMT initiative for Home Upgrade: • In Navigant's view, the Home Upgrade Program meets many of the broad requirements for a potential SMT initiative and should be considered a viable candidate for potential continued development as an SMT initiative. These SMT areas include: a) appropriateness of the market; b) collaborative and coordinated statewide effort; and c) potential and actual market partnerships to transform the sector. • The Home Upgrade Program Working Group will need to develop an SMT initiative cost-effectiveness model and scenarios to prove the potential for the program as an SMT initiative. • The WG should begin drafting a transition plan to move from its current resource acquisition structure to the proposed Governance structure, including determining operational lead partners for specific areas of SMT initiative operation, as appropriate. • The program administrators and other stakeholders will need to continue to assume the need for staff and other stakeholder resources to complete development of the program into a formal SMT initiative. • To fulfill the needs of original project design, the WG should consider developing the components of the SMT life cycle stages and related pre-launch components into a formal SMT framework in its next step deliberations to facilitate possible incorporation into the state's long-term efficiency portfolio plans.	
General Recommendations	
Recommendations	**Comments**
• The WG should continue to develop the needed components of SMT initiative for the Home Upgrade Program.	The project team believes that the potential exists for the Home Upgrade SMT collaborative to successfully rethink the program from a longer-term statewide SMT perspective and incorporate that perspective into a potentially successful statewide initiative design and IIP.
• The WG should explore creative collaboration approaches that go beyond the traditional regulatory framework.	Collaboration in reaching whole market goals is a pre-requisite for initiative success. New models of collaboration are being developed in the Northwest related to energy industry social media exchanges and collaborative stakeholder partnerships to support initiatives. Beyond traditional stakeholder advisory roles, Navigant recommends exploration of these kinds of collaborative initiative support efforts.

• The WG should continue to deepen its current practice of building flexibility and innovation into its development and implementation processes for a potential Home Upgrade SMT initiative	Transforming the culture of the existing residential market in California will require significant flexibility and creativity. Such effort is the hallmark of current program administrator's approach to Home Upgrade as a resource acquisition program. Navigant recommends that this kind of innovative thinking be built into the IIP best practice initiative design and the implementation and related components of the SMT initiative
• The WG should deepen its focus on consumer messaging needs and drivers in order to increase the demand for a home upgrade.	Successful initiatives focus on influencing adoption on both the supply side and the demand sides of the market. During this first project period, the Working Group has rightfully focused on supply-side partnerships, issues, and concerns. Navigant recommends a continuation of this focus and an added focus and concern on developing strategies to educate California residential consumers about the benefits of deep energy and near zero net energy retrofits. The initiative's vision and story could provide the basis for initiative messages presented to California homeowners.
• The WG should pursue and develop statewide public/private handshake partnerships.	The core team of the WG was involved with the project team in interviewing national manufacturer representatives—all of whom were positive about a statewide public/private partnership. Navigant strongly recommends that the WG develop a formal strategy and approach for firming up these partnerships as part of development of its IIP.
• The WG should seek to expand the public partnership as part of developing the IIP (as possible and advisable).	SMT initiatives require broad input to support the market for success. In other words, the more voices in the market giving the same message, the more likely the success. Given this, Navigant recommends that the core Home Upgrade team consider reaching out to public entities (i.e., jurisdictions and POUs) in a formal way to seek development of as broad a public coalition as possible prior to initiative launch.
• The WG should purse continuation of this effort to establish the parameters and discussion points for future CPUC rulemaking R.13-11-005 Phase III deliberations.	Navigant believes that completion of this prototype SMT initiative effort for the Home Upgrade Program will help the state better understand the issues and needs of incorporating an SMT framework into the CPUC's efficiency portfolio during R.13-11-005 Phase III deliberations. Continuing to develop the Home Upgrade program as a pilot SMT initiative could provide a much needed real world example of a collaborative, statewide partnership to create a potentially workable SMT initiative and framework.

Source: Navigant

3.2 Discussion of General Conclusions

The following sections provide further discussion of the project team's assessment of the current program's progress toward developing the needed components of a formal SMT initiative in four areas related to Navigant's general project conclusions:

- **Appropriate market:** The appropriateness of the SMT initiative effort to address market failures to adopt the energy efficiency measures or packages of measure without a targeted SMT effort
- **Collaborative, coordinated statewide effort:** The need for a coordinated collaborative approach that involves a common statewide effort to transform the residential market
- **Market partnerships to transform the sector:** The much needed public/private go-to-market handshake partnerships that will significantly enhance the potential for initiative success
- **Needed cost-effectiveness and evaluation planning activities:** SMT initiatives need to be projected to be cost-effective and have clearly stated and measurable evaluation goals
- **SMT framework development:** To fully have a Home Upgrade SMT initiative incorporated into current CPUC portfolio considerations, the WG will need to develop a workable SMT framework that can act as a model for Commission consideration.

3.2.1 Appropriate Market

Transformation of the existing residential market has been an important focus of energy efficiency policy and RA programs since the late 1970s. Introduction of audits, retrofit efforts, home energy rating systems, energy efficient mortgages, and related efforts have all been components of California's successful effort to keep per capita energy expenditures below national averages for over three decades.[74] Still, the move toward ZNE new construction homes and the potential promotion of ZNE homes in the residential existing home market requires significant resources to transform the market.

While it may be argued that a single measure or multiple voluntary measure programs might be most successful in helping California transform the structure and market actor behavior of the residential existing home market, it is the project team's view that a clear goal needs to be established for statewide homeowner adoption of energy efficiency measures that will allow them to reach or come closer to reaching statewide ZNE and California Energy Efficiency Strategic Plan (CAEESP) goals. Such an effort will require an organized and well thought out plan to encourage homeowners to incorporate deeper than normal energy efficiency upgrades and to be part of a changing culture and structure of the residential market that makes such adoption the new- normal.

Long-term SMT initiatives are intended to both establish and meet this goal—i.e., to save energy by changing market structures and consumer behavior. For such an effort to succeed, however, existing programs (e.g., PACE loan programs, IDSM, smart homes, and other such efforts) will need to be

[74] U.S. Energy Information Administration, "Ranking: Total Energy Consumed per Capita, 2012 (million BTU)", 2012, http://www.eia.gov/state/rankings/?sid=CA#series/12. The U.S. Energy Information Administration (EIA) reports California as being the third-lowest state in the nation in per capital energy use, lagging only behind Rhode Island and New York.

coordinated as much as possible with a common statewide SMT initiative to change the culture and operation of California's existing residential market.

It is the project team's view that, from a programmatic perspective, at this time no other effort in California outside of the Home Upgrade Program has the potential to successfully address existing residential market needs for a focused deep energy retrofit (near ZNE) campaign to change California's existing residential culture toward Home Upgrade Program-type retrofits over the long period of time necessary. . Navigant also notes that the Home Upgrade Program initiative may seek to initially focus on clearly defined sub-markets, such as the renovation or HVAC replacement markets, in order to tighten initiative scope for a given period of time and target barriers specific to each mode of adoption, with the goal of moving its focus to other sub-markets over the course of the SMT initiative.

3.2.2 Collaborative, Coordinated Statewide Effort

Decision 12-11-015 approved the IOUs' request to engage an MT consultant. The focus of the project team's effort since the kickoff meeting in April 2014 has been on working closely with the Home Upgrade Program WG to develop a coordinated statewide business operations model that would allow statewide market entities (retailers, distributors, manufacturers) to support and participate in go-to-market collaborative efforts to transform the existing residential market toward deep energy retrofits. The project team notes that at the initiation of this effort, PAs operating Home Upgrade from a post-ARRA REN-based perspective and IOU administrators of the newly introduced Home Upgrade Program effort often found it challenging to come together in common approaches to implementing the program.

Since the April 2014 meeting in San Francisco and the first Home Upgrade Program SMT workshop in July 2014 in San Diego, the multiple IOU and REN PAs and interested WG stakeholders have diligently worked to develop a statewide business operations structure (presented above in Figure 2-13) that has required a tremendous focus on collaboration, coordination, and agreement on challenging issues related to how best to move a program with multiple PAs with local perspectives and needs to a single, coordinated statewide effort with appropriate local touch and reach. This kind of collaborative effort aligns well with the needs of an SMT initiative (as established in the straw-person SMT framework detailed in Chapter 2) for cooperation and collaboration in implementing such an approach.[75]

3.2.3 Market Partnerships to Transform the Sector

As part of this Phase 1 effort, the project team and WG core team leads spoke with nearly a half-dozen national manufacturers. These conversations became the focus of the Home Upgrade Program WG discussion related to the universally positive inclinations of national (HVAC, insulation and duct sealing)

[75] The project team notes that the cooperation among PAs for the Home Upgrade Program makes it possible to conceive potential ways in which POUs, CCAs, and/or state or local jurisdictions may become part of a unified SMT initiative to transform the existing residential culture toward higher states of home energy efficiency.

manufacturers to partner with the Home Upgrade Program team to develop a statewide public/private deep energy retrofit go-to-market strategy.

It is Navigant's view that the prospect of statewide public/private upstream and mid-stream partnerships, when combined with already existing local contractor partnerships, provides the basis for a focused IIP strategy that can potentially go to scale on a statewide basis. The Phase 2 planned characterizations of the three targeted residential sub-segments will help align the vision of a collaborative public/private effort with the needs, channels, and drivers of the key market segments.

3.2.4 Needed Cost-Effectiveness and Evaluation Planning Activities

Beyond the above, however, the project team understands that key analytic information will need to be developed to support a Home Upgrade Program SMT initiative. Such information will need to include key long-term savings potential and cost-effectiveness data. Working group vetting of these issues will need broad stakeholder input and review to ensure the development of a fully agreed upon approach that can both guide the Home Upgrade SMT initiative effort and be incorporated into next step development of a SMT framework.

3.2.5 SMT Framework Development

The project team and WG were unable for time considerations to review, vet and agree upon a formal SMT framework that might accompany development of this plan in the first year of the project. This element could provide much needed support for future CPUC deliberations on MT as a part of the Commission's efficiency portfolio.

3.3 Summary of Recommendations to Complete Home Upgrade SMT Initiative Pre-Launch Components

In Chapter 3 Navigant identified the next-step needs for the WG to complete the pre-launch components required to successfully prepare the Home Upgrade effort for a statewide SMT initiative. In the following sections, Navigant's next-step recommendations are summarized in the four categories of the SMT initiative:

- Design
- Business and operations research planning
- Evaluation
- Policy integration

Table 3-2 provides a summary of the next-step design component recommendations. This is followed by further discussion of the details of the design component recommendations.

Table 3-2. Summary of Home Upgrade SMT Initiative Pre-Launch Design Component Recommendations

Recommendations	Comments
Pre-Launch Components 1, 2, and 3 (SMT Initiative Barriers Identification, Logic Model and MTI Development)	
• The WG should vet and finalize the SMT initiative barriers identification, logic model, and MTIs early on in the continuation of the project.	• These are critical components for developing an SMT initiative. These elements lead intervention design, go-to-market strategy, IIP development, and evaluation efforts. They are must haves for the WG to continue Home Upgrade SMT initiative development activities.
Pre-Launch Components 4 (SMT Initiative Best Practice Intervention)	
• The WG should develop a comprehensive IIP that includes experimentation elements, such as the proposed NRDC/PG&E contractor pay-for-performance pilot, with a focus on building ongoing innovative solutions to enhance market adoption into the initiative.	• To successfully go-to-market within the challenging existing home residential market the Home Upgrade initiative will need to constantly experiment with innovative best practice program delivery and intervention ideas.
Pre-Launch Component 5 (SMT Initiative Vision and Success Story)	
• The WG should develop a clear and cogent vision and success story than can inspire movement toward success over the life of the SMT initiative effort.	• Sustainability goals should be developed as desired outcomes for the initiative as part of the logic model. These goals should be used to help craft the SMT initiative's vision and success story.
Pre-Launch Component 6 (SMT Initiative Timing)	
• The WG should meet, per the Navigant recommendation, to vet this issue in relationship to realistic views on how long it might take to reasonably move the market to the desired levels of customer adoption for Home Upgrade.	• This issue is important to the whole initiative and will impact IIP planning, the logic model, MTIs and other development issues including the cost-effectiveness calculations and counterfactual baseline deliberations. Because of this, Navigant recommends that the WG adopt a temporary timeline for the initiative (e.g., 10-12 years) that can be revised as cost-effectiveness analysis presents scenarios over the life of the effort.
Pre-Launch Component 7A and 7B (SMT Initiative Governance Structure and Long-Term Stakeholder Engagement)	
• The WG should meet to finalize the proposed governance structure prior to formalizing its SMT initiative component development package. Navigant recommends the development of a draft governance charter and the vetting of it with WG stakeholders.	• The development of a collaborative governance structure is no small matter for an SMT initiative. The structure will need to be resilient and able to address key collaborative partner issues and concerns over the life of the initiative. Hence, a well thought out governance process and charter is a necessary component of future success in Navigant's view.
• The WG should consider example models stakeholder collaboration and engagement not only related to stakeholders providing advice to SMT initiative administrators in a regulatory format, but also collaboratively working outside the regulatory framework to support the initiative's success.	• Navigant recommends the WG team meet to explore creative new ways to engage stakeholders in the SMT initiative beyond the formal regulatory bounds of historical input.

3.3.1 Recommendation to Finalize Barriers Identification, Logic Model, and MTI Development (Pre-Launch Components 1, 2, and 3)

Navigant recommends the WG build off of the existing Phase 1 work on barriers identification, logic model development, and potential MTI areas and convene a sub-working group team of the state's EM&V team and other stakeholders to agree on a well-documented logic model, including a set of MTIs. To do this, Navigant recommends holding a series of three in-person meetings with utility and stakeholder staff as part of an iterative process to build upon the well-laid foundation of the MT process. This iterative process will take three steps and is modeled after Navigant's successful MT sustainability review of the CSI. The three include: 1) meeting preparation, including research on key market barriers, meeting agendas, and outcome expectations; 2) conducting three WG sponsored iterative meetings in between which time the Navigant project team will develop the next meeting's materials; and 3) develop final agreed upon Home Upgrade logic model and relevant MTIs.

3.3.2 Recommendation to Develop and Finalize Best Practice Market Intervention (Pre-Launch Component 4)

Navigant recommends that the next step should be to confirm the operational structure and deepen and refine WG positions on go-to-market strategy, initiative timing, governance, and stakeholder engagement. Next steps should also include development of the IIP, which should contain a sub-plan for the gradual transition of the initiative and ongoing support to market momentum, following the SMT initiative life cycle Stage 5 sustainability assessment.

The IIP needs a refined Home Upgrade Program implementation action plan strategy that incorporates a focus on developing handshake partnerships with major industry actors. Navigant recommends exploring the development of these partnerships as early as Phase 2 of this effort.

The implementation strategy—in particular the go-to-market approach and market metric targets—is closely linked to findings from developing a counterfactual baseline, logic model, and MTIs and should incorporate a focus on the activities that the initiative will undertake to achieve the expected market outcomes. A key component of the IIP development effort will be to identify creative program design enhancements to assist contractor sales of home upgrades. One such creative approach is the one recently suggested by NRDC and accepted by PG&E to pilot a pay-for-performance experiment. Navigant recommends that the IIP contain an element of continuous improvement to ensure that new design, implementation, marketing, and other ideas be incorporated into the ongoing mix of offerings provided to the market as a means of identifying the most successful approaches available to meeting initiative goals.

3.3.3 Recommendation to Develop and Finalize the Initiative Vision and Success Story (Pre-Launch Component 5)

Navigant recommends that the whole WG should formally agree upon the initiative objective that was agreed to by sections of a sub-working group committee. Further, while Navigant recognizes that at least some elements of the initiative success story will need to incorporate the findings from the logic model,

MTI, and cost-effectiveness analyses, much of the story has already been vetted at the project kickoff meeting and at the first workshop related to sustainability metrics or goals for the Home Upgrade Program SMT initiative.[76] Given this, Navigant recommends that the WG hold one sub-working group meeting to draft a Home Upgrade Program Success Story for the larger WG to vet and approve, including a clear vision of what success means.

3.3.4 Recommendation to Develop and Finalize the Initiative's Timing (Pre-Launch Component 6)

Navigant recommends that the Home Upgrade WG hold one initial meeting and one follow-up meeting (as necessary) to review and discuss timeline issues, with a goal of achieving a consensus WG approach. In reviewing this issue, WG stakeholders need to define recommendations for the timeframe for the initiative with a focus on when stakeholders believe the initiative can meet its desired MT adoption goals. Determining the best timeframe will also impact several aspects of the Home Upgrade Program's future activity. In particular, the development of the counterfactual baseline and related Home Upgrade Program SMT cost-effectiveness analysis (as part of the B&O plan) will need this timeline as an input to those efforts. In this regard, Navigant's recommended market characterization study will provide further insights to support, or modify, the WG's collaborative's decision on SMT initiative timing. Additionally, the results of the cost-effectiveness analysis may help confirm or lead to a revision of the timeline projection.

At the outset, Navigant recommends a minimum 10- to 12-year timeframe for a Home Upgrade SMT initiative, with a 20-year benefits assessment for the counterfactual baseline. Navigant makes these recommendations based on the challenges inherent in transforming the residential culture toward the statewide vision for deep energy retrofits and near ZNE retrofits as common practice in California's residential sector.

3.3.5 Recommendations to Agree upon an Initiative Governance Structure and a Long-Term Stakeholder Engagement Approach (Pre-Launch Component 7A and 7B)

Navigant recommends further discussion and vetting of the draft governance structure. This could happen during PA deliberations and then be presented to a broader stakeholder group at one meeting. Navigant also recommends the development of a governance charter for the Home Upgrade Program initiative. Such a charter could be developed in draft by Navigant, vetted with a small team of WG stakeholders, and then presented to one to two broader core WG meeting(s) for feedback and refinement before being submitted to the broader WG for review. The charter would provide the structure for long-term governance of the SMT initiative.

Navigant also recommends three meetings to develop an agreed upon approach to stakeholder engagement for the Home Upgrade Program moving forward. This approach will detail what processes the program will use to engage stakeholders, such as market actors and industry groups, in a long-term, transparent, and productive manner. For at least one of these meetings, Navigant recommends reaching out to a wider audience of stakeholders for input and collaboration.

[76] These sustainability metrics are stated in logic model Figure 2-6, as the purple boxes to the right of the figure.

3.4 Summary of Business and Operations Research Plan Recommendations

Table 3-3 provides a summary of the next-step B&O research plan component recommendations. This is followed by further discussion on the specific details of the recommendations.

Table 3-3. Summary B&O Research Plan Recommendations

Recommendations	Comments
Pre-Launch Components 8A and 8B (SMT Initiative Market Characterization Study and Counterfactual Baseline)	
• The WG should initiate planning and implement a market characterization study for the three target market sub-segments as early as possible, as this component informs other SMT initiative B&O and design elements. • The WG should initiate development activities for the counterfactual baseline Delphi Panel meeting soon after initiation of the market characterization study. SMT baseline studies are typically conducted using a 20-year timeframe.	• The market characterization effort needs to be designed with the needs of other Home Upgrade SMT initiative component elements in mind, especially the counterfactual baseline and cost-effectiveness analyses. • The counterfactual baseline will use the information from the marketing study and other information for developing background materials for the Delphi Panel. Delphi Panel development, recruitment, and planning will take up to 3 to 5 months. Navigant recommends doing the market characterization and baseline studies in a staggered fashion. (Note: The baseline will likely need to be reviewed and updated over the course of the initiative.)
Pre-Launch Components 9A and 9B (SMT Initiative UES and Evaluation Planning Framework)	
• The WG should initiate development of the UES SMT initiative component at about the same time as planning for the counterfactual market baseline begins to ensure its availability as an input to the cost-effectiveness analysis recommended in the next section. • The WG in conjunction with CPUC staff should sponsor a meeting to develop a draft of the evaluation planning framework component of the straw-person SMT framework that would be incorporated into any updates to this report	• Developing UES estimates for the SMT initiative will require secondary research that will use existing Home Upgrade Program data and other market studies, as well as information from the Home Upgrade SMT initiative market characterization study and thus is not dependent on the latter. • The evaluation planning framework activity is a one-time process to develop and finalize EM&V stakeholder input and agreement on initial protocols for evaluating the SMT initiative for the Home Upgrade Program. Navigant recommends this effort be undertaken prior to development of a specific SMT initiative plan for the Home Upgrade Program in pre-launch component 12.

Pre-Launch Components 10 and 11 (SMT Initiative Cost-Effectiveness Analysis and Incentive Step-Down Structure)	
• The WG should undertake a focused activity to develop an SMT initiative model based on successful approaches in the Northwest and elsewhere. Such a model should incorporate multiple planning scenarios to that are closely tied to the projected initiative outcomes in the logic model and incorporate market research data, potential product cost impacts over time, discount rate(s), and other relevant information • The WG should develop incentive step-down scenarios as a sub-element of the cost-effectiveness model development.	• The SMT cost-effectiveness analysis for the Home Upgrade Program is an important component for the overall planning and success of the initiative. The analysis must include both the benefits of the planned intervention over the life of the initiative as well as market effects benefits accruing from the success of the SMT initiative efforts implementation over a longer timeframe. Navigant recommends a 20-year timeframe similar to that which it recommended for the counterfactual baseline assessment. • The incentive step-down structure will be an important input into IIP development and should be completed as part of the scenarios development for the cost-effectiveness study. • Navigant recommends that approaches to both of these components be incorporated into any updates to this report.
Pre-Launch Component 12 and 13 (SMT Initiative Evaluation Plan and Long-term Market Monitoring)	
• The WG in conjunction should sponsor EM&V stakeholder meetings to facilitate the development of the Home Upgrade evaluation plan; protocols for the long-term monitoring and tracking plan should be part of the evaluation planning framework development and completed in later stages of the initiative.	• These evaluation elements and plans are critical to the implementation and progress tracking of a SMT initiative. Navigant recommends including broad stakeholder input into the development of the evaluation plan, based on the Evaluation Framework protocols developed in component 9B, above

3.4.1 Recommendation to Undertake a Market Characterization Study and a Counterfactual Market Baseline Analysis (Pre-Launch Component 8A and 8B)

Navigant recommends that the next steps for these pre-launch components are:

- Conduct a market characterization study
- Formally agree upon product and market definitions
- Conduct a counterfactual baseline assessment

Navigant recommends the following specific tasks for the market characterization study activity: 1) a literature review of three target market sub-segments (remodeling, HVAC, and whole house; 2) identify and interview key target sub-segment market actors; 3) identify market drivers and barriers; 4) identify market channels for partnerships; and 5) identify leading upstream potential partners.

Navigant also recommends the following specific activities be undertaken for development of the counterfactual baseline: 1) use a Delphi Panel of experts to forecast 5-, 10-, 15-, and 20-year counterfactual market baselines; 2) identify categories of experts needed for a Delphi Panel; 3) Recruit members; 4) develop background information; 5) develop historical tracing analysis; 6) hold Delphi Panel; and 7) report results.

3.4.2 Recommendation to Undertake a UES and SMT Initiative Evaluation Plan Framework Development (Pre-Launch Component 9)

3.4.2.1 Unit Energy Savings

Navigant recommends research be undertaken in Phase 2 to develop a UES for the Home Upgrade Program product(s) that can be used in other B&O plan modeling needs and, in the future, for any needs to incorporate the Home Upgrade SMT initiative cost-effectiveness effort into CPUC Potentials and Goals studies.

3.4.2.2 Evaluation Plan Framework

Navigant recommends that the next step should be to develop a Home Upgrade Program evaluation framework and plan. Such a framework would serve two purposes. First, it would allow the WG to sponsor meetings to firm up an approach among the state's EM&V experts on the agreed upon protocols/procedures for evaluating a long-term SMT initiative that would be incorporated into a Phase 2 project report. Second, such an effort would allow for the follow-on development of a Home Upgrade evaluation plan (see Navigant's pre-launch component 12 recommendation below) using the protocols. These protocols should focus both on the SMT initiative evaluation and on the long-term monitoring and tracking of savings. The evaluation framework process will be similar to that used in developing the logic model and MTIs but will require less time and staff commitment from utilities and stakeholders. For this effort, Navigant recommends a three-step process: preparation, two iterative meetings, and finalize agreed upon findings.

3.4.3 Recommendation to Develop Market Transformation Cost-Effectiveness Analysis and Related Incentives Step-Down Structure (Pre-Launch Components 10 and 11)

Navigant recommends that the WG sponsor development of the Home Upgrade Program cost-effectiveness model to assess initiative life-cycle cost-effectiveness. The Home Upgrade Program cost-effectiveness model can be developed in five development steps, with the goal of incorporating the process into a final Phase 2 report for this project: Step 1: Define Requirements; Step 2: Develop Model; Step 3: Define Scenarios; Step 4: Vet Initial Scenario Results; and Step 5: Documentation for "How-To" Manual. Constructing a market model prototype for the Home Upgrade Program should leverage best-in-class potential modeling methods but not be overly complicated. If additional complexities are required by stakeholders, those changes may be addressed in a version update to the model. The techniques employed should align closely with those in the most recent IOU potential model[77] developed by Navigant.

[77] California Public Utilities Commission, "Energy Efficiency Potential and Goals Studies," http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Energy+Efficiency+Goals+and+Potential+Studies.htm.

3.4.4 Recommendation to Develop a Home Upgrade SMT Initiative Evaluation Plan and Summary Plan for Long-Term Monitoring and Tracking of Savings (Pre-Launch Components 12 and 13)

3.4.4.1 Home Upgrade SMT Initiative Evaluation Plan

Navigant recommends that the WG work closely with CPUC staff to support development of a specific evaluation plan for the SMT initiative Home Upgrade effort. Such a plan is required as a part of the next step recommend development of a SMT framework. The plan can be developed using similar approaches as other planning elements, building off of previous work undertaken in developing the SMT evaluation framework recommended. Such a plan would include a focus on whole market evaluation methods, UES application and refinement of nonparticipant savings estimates, and the identification of data sources and evaluation timing and other relevant approaches. Navigant believes that such a plan can be completed as a follow-on activity to the evaluation framework development recommendation (pre-launch component recommendation 9B) and completed in three steps: preparation, two iterative meetings with EM&V personnel and staff, and finalization of the plan. As noted, Navigant recommends that the plan be developed in conjunction with CPUC staff.

3.4.4.2 Home Upgrade Long-Term Monitoring and Tracking of Savings

Navigant recommends that discussion of this element be incorporated into the evaluation planning structure. Long-term monitoring and tracking of savings has its own timeframes and elements and is intimately associated with market savings claims after the original SMT initiative has transitioned to support market momentum. For this reason, Navigant believes the majority of work on defining this element will take place as part of the evaluation planning framework discussions.

3.5 Summary of CPUC MT Policy Paper Recommendations

A summary of next steps for the WG and broader stakeholders, as appropriate, and a review of the eight policy issues identified in the CPUC white paper is presented in Table 2-15. Below Navigant makes its recommendations for WG vetting of these important issues, which are discussed more fully in Section 2.7.2.1.

3.5.1 Recommendation to Review and Vet Remaining CPUC MT Policy White Paper Issues

The CPUC consultant MT white paper identifies eight important areas of need for the integration of initiative components into current CPUC RA portfolio rules, policies, and procedures. After consultation with IOU policy staff, Navigant recommends a two-meeting process to review and vet these issues and formalize WG recommendations to the Commission. The three-step process recommended would mirror those discussed above: preparation, two iterative meetings, and finalization WG agreements on key issues.

It should be noted that of the eight issues, four are directly relevant to the policy area, two are addressed in the straw-person SMT framework, and two others relate directly to the evaluation of SMT initiatives. Each grouping is listed below.

3.5.1.1 Policy-Related CPUC White Paper Issues

- Issue 1: Ascribe Role for SMT in CPUC Energy Efficiency Portfolio
- Issue 3: Manage the Risk
- Issue 7: Consider the Need for MT Performance Incentives
- Issue 8: Reflect SMT Initiative Savings in Potentials and Goals Studies

3.5.1.2 Straw-Person SMT Framework CPUC White Paper-Related Issues

- Issue 2: Determine Appropriate Program Administrator
- Issue 4: Determine a Process to Identify and Vet SMT Initiatives

3.5.1.3 SMT Initiative Evaluation Framework Planning CPUC White Paper-Related Issues

- Issue 5: Measure Progress Toward SMT Initiative Goals
- Issue 6: Assess the Cost-Effectiveness of SMT Initiatives

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Appendix A. Glossary of Terms

American Recovery and Reinvestment Act of 2009 (ARRA): Also known as the stimulus bill, this legislation included the single largest investment in energy efficiency in history with approximately $20 billion specifically for efficiency. This legislation included funds for the Weatherization Assistance Project, State Energy Offices, and Energy Efficiency and Conservation Block Grants. A large proportion of the stimulus funds related to energy efficiency went to states and municipalities.

Attribution: The extent to which an energy policy may be seen as directly or indirectly responsible for measured energy and non-energy impacts. The definition of attribution is the acknowledgement that the impacts can be attributed to one or more policies, programs, or market forces that theoretically could be responsible for the measured results.

Baseline: Market and building conditions, including energy consumption and associated operational and equipment purchase practices that would have occurred without the implementation of an energy policy, government standard, or energy efficiency program. Baseline conditions are sometimes referred to as business-as-usual conditions and are used to calculate energy and non-energy impacts.

B&O Research Plan: This plan contains foundational elements needed for development of a SMT initiative. The plan typically includes characterization of the target market, an assessment of the counterfactual market baseline and unit energy savings, as well as a cost-effectiveness estimate for the initiative and related analysis.

Champion: A lead party in proposing an SMT initiative

Counterfactual Market Baseline: The naturally occurring baseline is a forecasted market penetration, or adoption rate. It refers to the changes in the market relative to the adoption of an efficient product, service, or practice over a 20-year timeframe assuming no intervention by a utility program.

Codes and Standards: These are mandatory requirements for certain minimum levels of energy efficiency (or other focused areas) within federal, state, or local jurisdictional boundaries that are enforced by appropriate level codes and standards enforcement authorities.

Delphi Panel Method: The Delphi method is a structured communication technique that relies on a panel of experts to make estimations—e.g., to estimate market penetration or adoption rates over the initiative period.

Energy Efficiency: Actions taken in a building that reduce energy consumption and do not negatively impact the service being provided by the use of energy, such as a reduction in cooling loads from more efficient cooling systems or better maintenance practices.

Energy Impact: The impact on energy consumption, usually but not always in terms of energy savings, resulting from an energy efficiency program or policy. For a building's program, the energy impact is generally expressed as the change in a building's site usage (e.g., kilowatt-hours for electricity, therms for natural gas, or fossil fuel use in thermal unit(s)).

Evaluation: Conducting any of a wide range of assessment studies and other activities aimed at determining the effects and impacts of a policy or program. This includes understanding or documenting policy or program performance in terms of energy impacts, market operations, and other intended and unintended consequences of the policy or program.

Free Rider: For an energy efficiency program, free riders refer to those participants who would have taken the same energy efficiency actions regardless of whether or not the program was implemented. In a resource acquisition (RA) energy efficiency program evaluation, the share of these customers is often measured to ensure they are not double-counted.

Gross Impacts/Resource Acquisition Program: This refers to the change in energy consumption resulting from policy- or program-related actions taken by resource acquisition program participants, regardless of why they participated.

Gross Impacts/SMT Initiative: This refers to the change in energy consumption resulting from SMT initiative-related actions taken by both initiative direct participants and nonparticipants in the market who also adopt the energy efficiency measure(s) or service(s) offered by initiative implementers.

Impact Evaluation: The evaluation program-specific or initiative-specific changes directly or indirectly due to the program.

Initiative Implementation Plan: A comprehensive plan developed by an SMT initiative champion collaborative that encompasses key elements of the short-term, intermediate, and long-term strategy and actions for intervening in a targeted market and/or market sub-segments.

Logic Model: The graphical representation of a program theory showing the connections between the market barriers a policy or program is intended to overcome, the specific activities implemented through the policy or program, and the expected short-term, intermediate, and long-term outcomes of the activities.

Market Actor: Organizations or individuals participating in a market.

Market Effect: A change in the structure of a market or the behavior of market actors in a market that is reflective of an increase in adoption of products or services or practices and is causally related to market intervention(s) (e.g. programs).

Market Transformation: The process of intervening in a market to create lasting change in market structures and market actor behaviors by removing identified barriers or exploiting opportunities to accelerate the adoption of all cost-effective energy efficiency as a matter of standard practice. A reduction in market barriers resulting from a market intervention, such as an energy efficiency policy or program, where there is a set of measured market effects that is likely to last after the intervention has been altered or eliminated.

Market Transformation Indicator (MTI): A metric or milestone indicative of progress in the market. MTIs are needed, particularly in the early stages of policy or program implementation, to evaluate the progress and impact of the policy on intended outcomes.

Net Energy Impacts/Resource Acquisition Program: The subset of measured energy changes attributable to an energy efficiency policy or program. In the context of utility-sponsored, voluntary resource acquisition-oriented energy efficiency programs, the isolation of net energy impacts from gross energy impacts typically involves taking into account free ridership.

Net Energy Impacts/SMT Initiative: The subset of measured energy changes attributable to an energy efficiency policy or program. For an SMT initiative, net energy impacts typically involve assessment of whole market savings (i.e., program participant plus market effects), taking into account the counterfactual baseline of naturally occurring market savings.

Non-Energy Impacts: The non-energy impacts that may result from energy policies include changes in greenhouse gas (GHG) emissions, job creation, and real estate valuations.

Resource Acquisition: Resource acquisition program denotes a program strategy that focuses on generating measurable energy savings in the short term, primarily by providing incentives directly to customers to adopt proven energy efficiency technologies. Resource acquisition programs focus on providing new, typically less costly resources to an electric or natural gas supply system.

Spillover: In the context of utility energy efficiency programs spillover is seen as additional energy savings beyond the program-related gross savings of the participants and without financial or technical assistance from the program. For example, spillover might be other measures installed due to participants becoming more educated about their energy usage, or nonparticipants installing program measures because they learned about them through the program but for whatever reason do not want to apply for incentives. In the context of an SMT effort, spillover is accounted for as part of whole market effects savings.

Strategic Market Transformation (SMT): The strategic targeting of a market and/or market sub-segment intervention to create lasting change in market structures and market actor behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of all cost-effective energy efficiency as a matter of standard practice.

Strategic Market Transformation Framework: An design structure that incorporates the needed component elements of a SMT initiative over the life cycle of typical initiatives to provide guidance to proponents/champions of SMT initiatives identifying the needs and requirements of such

Target Market: A market is an economic system where a particular good or service is transacted between entities offering them and those seeking to purchase them. A market consists of customers, manufacturers and other suppliers, channels of distribution, and transactions.

Whole Market Savings: Savings generated within a market from both participant and nonparticipant adoption of a product, service, or practice due to a program or initiative intervention, not including savings from market actors who would have adopted the product absent the intervention.

Appendix B. 2011 Navigant Draft Market Transformation Planning Framework

This appendix presents supporting background information to the SMT framework approach presented in the body of this report. The information here was developed by member of the Home Upgrade Program project team in 2011 as a draft discussion document as part of Navigant's CPUC Potentials and Goals analysis. Both this work and companion 2011 teamwork on a potential cost-benefit approach to market transformation have helped inform, along with other influences, the project team's approach to the development of a formal SMT framework that is presented in this document.

B.1 Overview of the Market Transformation Planning Framework

This document presents a framework for planning program interventions, which are expected to induce market transformation. For the past several decades, the energy efficiency community has discussed the concept of market transformation—what it is and is not and how to measure market activities as indicators of progress toward market transformation. Terms such as spillover, naturally occurring savings, conservation-based activities, resource/widget-based activities, non-resource programs, and market effects have all become part of the long-standing debate on market transformation, its impacts, and the best approach to implementing it and measuring its benefits.

In the 1980s and 1990s, the CPUC and California utilities promoted a strong focus on market transformation and studied various approaches to assessing and quantifying the impacts of broader market effects from energy efficiency programs.[78] A statewide organization devoted to market transformation, the California Board for Energy Efficiency (CBEE), was established for a brief period. With the onset of the California energy crisis in the early 2000s, the focus on energy efficiency RA replaced a focus on market transformation, and serious discussions of market transformation became dormant as the focus of commission- and state-based efforts. In recent years, the question of how best to understand the impact of customer behavior, decision-making, attitudes, beliefs, and practices on the outcomes of energy efficiency programs has been at the fore of industry discussions on how to deepen energy savings.[79]

Despite the re-emerging interest in market transformation, California is still in the process of agreeing upon approaches to quantify the energy savings associated with market transformation. The emerging interest in behavior along with the development of the *California Long-Term Energy Efficiency Strategic Plan*[80] [the

[78] Much of this research is documented in the 2001 PG&E report, Frederick Sebold et al. (2001), op. cit.
[79] This recently intensified focus on customer behavior and decision-making is evidenced by the immediate success of the ACEEE/CIEE/Precourt-sponsored Behavior, Energy, and Climate Change (BECC) conference, which has drawn crowds of 500–800 participants each year of its four-year existence, as well as the proliferation of behavior-focused panels at the other major energy efficiency industry conferences.
[80] California Public Utilities Commission (2011), op. cit.

Strategic Plan] and its attendant Big Bold Initiatives have given renewed urgency to the creation of viable ways of measuring and accounting for the impacts on energy efficiency markets.[81] These methods are needed for resource-based efforts as well as efforts that include both non-resource and behavioral-type program approaches.

The Track 2 goals and targets study has refrained from assigning savings to market transformation in the absence of fully developed approaches to quantifying energy savings associated with market transformation. The model does provide the framework, however, to enable the addition of savings from market transformation in the future. This approach allows the model to represent the methodology agreed upon by policymakers and stakeholders. In the meantime, it avoids speculation about the approach that policymakers and stakeholders will take; this should provide for more flexibility in the discussions among the parties.

Future goals and targets studies would benefit from an agreed upon approach to quantify savings from market transformation. Using that agreed upon approach, those future goals studies could include savings from market transformation in their estimates of market potential. More comprehensive and inclusive estimates of energy savings would result. The quantitative estimates would be available to better inform policy decisions and make funding for market transformation efforts more readily available.

This market transformation planning framework provides a structure within which policymakers and stakeholders might consider quantifying energy savings from market transformation. It is intended to frame the debate rather than provide specific research or to specify metrics and indicators to track. Where possible, it seeks to build on existing efforts in California to quantify energy savings from market transformation.

It is outside of the scope of this goals and targets study to quantify savings from market transformation or to specify which metrics or indicators should be tracked. Those responsibilities would fall within the bounds of the parties involved in developing the formal approach to quantifying the savings from market transformation, which is an effort separate from the goals and targets study.

[81] As an ancillary project to the Track 2 effort, the CPUC has funded a study by Navigant to develop an approach for measuring the benefits and costs of market transformation-type efforts. Development of the benefits and cost approach is a critical step in the creation of an overall framework for design, development, and implementation of market transformation activities. Within this program framework, PAs can reliably expect to see consistent measurement of costs and benefits of their program efforts, including both resource and non-resource or market-based activities.

Given this background, it is advisable at this point to briefly discuss what the market transformation planning framework is and what it is not intended to do. The market transformation planning framework is:

- A conceptual framework of how market transformation programs can be effectively planned.
- Consistent with market transformation cost-effectiveness methodology currently in development (to the extent possible).
- An effective framework for planning all types of programs, not only those that fit into preconceived notions of market transformation; resource programs can also have long-term market effects, too, and do not operate in a vacuum.
- Intended to provide program planners with a focus on exogenous market factors that may influence positive market transforming effects.
- Intended to provide a structured process through which market intelligence can be collected and shared among IOUs as expertise in market transformation is developed.

The market transformation planning framework is not:

- Prescriptive to the point of defining exogenous market factors and recommending specific intervention strategies for specific situations.
- Prescriptive with regard to what metrics and indicators should be tracked for specific program types.
- Prescriptive with regard to evaluation methodologies.

B.2 Overall Concept and Definitions

This section discusses the overall concept of market transformation and the mechanisms that lead to market transformation and presents definitions of key terminology.

Market transformation is defined by the CPUC as:

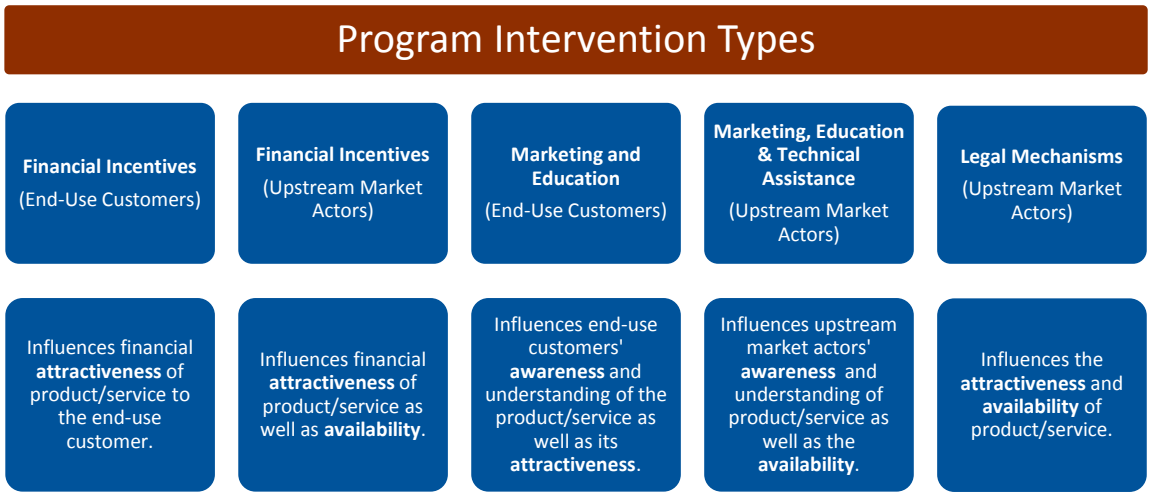
> *Long-lasting, sustainable changes in the structure or functioning of a market achieved by reducing barriers to the adoption of energy efficiency measures to the point where continuation of the same publicly-funded intervention is no longer appropriate in that specific market. Market transformation includes promoting one set of efficient technologies, processes or building design approaches until they are adopted into codes and standards (or otherwise substantially adopted by the market), while also moving forward to bring the next generation of even more efficient technologies, processes or design solutions to the market.* [82]

[82] D.09-09-047, September 24, 2009.

Energy efficiency programs, at their core, exist to alter market behavior related to specific energy efficiency measures (products and/or services) by reducing market barriers[83] and increasing the measure's attractiveness to the end-use customer. Market transformation occurs when that altered market behavior continues after the program's interventions have ceased. Some program interventions intend to induce market transformation; others are intended more for near-term RA but also have some lasting effects on the market behavior beyond the program's active period. For instance, a CFL rebate program may be intended primarily for a utility to gain short-term energy savings. However, if the program influences some stores that previously did not stock CFLs to start stocking them and the stores continue to stock CFLs after the program ceases, the program has had a lasting effect on the availability of the product in the marketplace.

Market Interventions: All energy efficiency programs can be broken down into their sub-component interventions. An intervention is an activity intended to influence the behavior of market actors and the structure and operations of a market by reducing market barriers and increasing the financial and/or non-financial attractiveness of an energy efficiency measure. Interventions fall into five broad categories and are grouped based on the type of market actors they influence, which are either end-use customers or upstream market actors (e.g., manufacturers, distributors, retailers, contractors, etc.), as well as the type of influence that they have on the market actors.
Figure B-1. Program Intervention Types displays the five types of program interventions and describes the type of influences that they have on market actors.

Figure B-1. Program Intervention Types



Source: Navigant

[83] Market barriers are market conditions that inhibit otherwise economic transactions from taking place.

Influence Mechanisms: Interventions seek to alter market behavior and mitigate market barriers by influencing one or more of the following attributes of a particular product or service from the customer's perspective: availability, awareness/understanding, and attractiveness. Attractiveness can include both financial attractiveness (i.e., affordability) as well as non-financial attractiveness (positive perceptions of aesthetics, comfort, social status, usefulness, etc.). An important component of attractiveness is often the perception of personal responsibility and the sense that there would be negative consequences to not adopting the product or service (e.g., a poor performance review for a facility manager or social consequences from neighbors that value energy conservation).

All three of the above attributes are interrelated (e.g., customer awareness of positive attributes leads to greater attractiveness), and all three are necessary for a product to achieve widespread adoption within a market. A product or service must be available, customers must be aware of it, and they must find it attractive on some level in order to adopt it. On the flip side, as more customers adopt a product or service, word of mouth increases awareness and upstream market actors increase availability in response to demand, as shown in Figure B-2.

Figure B-2. Influence Mechanisms Leading to Adoption of Product/Service

Source: Navigant

The three A's described above are the influence mechanisms through which a program can alter market behavior. By influencing one or more of the three A's, an intervention can alter market behavior related to that product or service. For instance, financial incentives to the end-use customer improve the financial attractiveness of a product, thereby increasing the likelihood that the customer purchases the targeted

product. Interventions can also seek to modify market behavior related to an undesirable product; for instance, an appliance efficiency standard (a legal mechanism) limits the availability of a lower efficiency product, pushing the market toward higher efficiency products.

B.3 Current State of Energy Efficiency in California

The last 30 years have seen several major shifts in California's demand-side management policy.[84] After the energy crisis of the 1970s, California was seen as a leader in energy efficiency, but by mid-1980s, demand-side efforts had diminished largely due to excess generating capacity. From 1990 to 1997 (the pre-restructuring era), a new administrative structure was put in place to reinvigorate the energy efficiency culture in California's IOUs. Program development and portfolio management responsibilities lay with the IOUs and the CPUC developed a system of financial rewards and penalties to encourage investment in efficiency programs. This started with an experimental system from 1990 to 1995 and developed into the shared savings mechanism in 1995–1997 program years. Under the shared savings mechanism, IOUs earned a percentage of the net energy savings after costs, based on ex post estimates.

The CPUC solicited proposals for programs that would result in major reductions in demand and energy use in the shortest time possible in response to the onset of the California energy crisis in the summer of 2000. This established a new administrative structure in which the CPUC solicited and reviewed program proposals from the IOUs and third-party implementers and made final program decisions for each funding cycle. This structure remained in place through the 2004–2005 program cycle. Beginning in 2006 with the prior-year CPUC selection of the state's IOUs as administers of CPUC-authorized programs, the structure was modified.

Beginning in the 2006–2008 program cycle, the CPUC made several key changes. First, the IOUs were ordered to incorporate third-party programs directly into their portfolios as opposed to those programs being selected by the CPUC. Concomitant to that decision, the CPUC became the lead agency for evaluating the impacts of the energy savings captured by the utility administrators, rather than allowing the IOUs to continue their lead in this area. This system is still in place today, with the CPUC overseeing and monitoring all IOU energy efficiency programs, while being directly responsible for evaluating those programs.

Beginning in 2003–2004 with the creation of the first California Energy Action Plan (EAP I) and continuing through the creation of the update to the EAP (II), the state's agencies responsible for energy efficiency

[84] The source for historical background on California's 1990–2005 energy efficiency efforts is Decision 05-01-055, January 27, 2005, http://docs.cpuc.ca.gov/published/final_decision/43628.htm.

began a concerted effort to coordinate their efforts.[85] This effort resulted in the establishment of a loading order for priority RA that established energy efficiency as the first resource in the loading order.

The sequence of events set in motion by the California energy crisis has resulted in an energy efficiency paradigm that is focused on (and rewards) programs that can produce near-term, highly quantifiable savings. However, many program implementers and stakeholders recognize that some programs generate additional savings that are not captured in the current evaluation paradigm. Many also recognize that there may be effective program approaches that are currently underutilized because their savings are less easily quantified or will accumulate over a longer time period than the next three-year portfolio cycle.

In 2008, the CPUC adopted the Strategic Plan in an effort to promote coordination among the many actors contributing to energy savings in the California energy efficiency marketplace. The Strategic Plan stressed the need for adopting long-term market transformation goals, to carefully define endpoints for energy efficiency programs, and to track progress toward those end points.[86] A major outcome of the Strategic Plan process was the adoption of four Big Bold Energy Efficiency Strategies:

1. All new residential construction in California will be ZNE by 2020.
2. All new commercial construction in California will be ZNE by 2030.
3. The HVAC industry and market will be transformed to ensure that its energy performance is optimal for California's climate.
4. All eligible low-income customers will be given the opportunity to participate in low-income energy efficiency programs by 2020.

Market transformation is described in the Strategic Plan as a unifying objective with the goal of creating an "incentive for utilities to engage in measures with a longer-term orientation – those very measures which produce meaningful market transformation." The Strategic Plan prioritized developing a new statewide energy efficiency brand and an integrated marketing/education/outreach strategy to support these Big Bold Energy Efficiency Strategies and ambitious market transformation goals.

The current energy efficiency program portfolio[87] started in 2010 and will run through 2012. The CPUC approved a budget of $3.1 billion for the 2010–2012 portfolio cycle, an increase of 42% over the 2006–2008 program cycle. Out of the $3.1 billion budget, $167 million is allocated to marketing, education, and outreach efforts. The CPUC limited marketing, education, and outreach costs to 6% of the total budget. The CPUC also placed a limit of 20% of the budget on non-resource support, which was defined as "direct

[85] The initial EAP was created by three agencies: the California Public Utilities Commission, the California Energy Commission, and the now defunct California Power Authority. EAP II was adopted in 2005 by the CPUC and CEC jointly.
[86] Adopted in D.08-09-040.
[87] Approved in D.09-09-047.

implementation non-incentive costs associated with incentive-based programs, such as education and training, engineering support and project management, and long term strategic plan support."[88] These limits, combined with the caps on administrative costs at 10% and EM&V costs at 4%, indicate that 60% of the budget is intended for direct implementation of resource programs (i.e., incentives and direct install costs). The CPUC decision indicated that the IOUs' initial proposed budgets were rejected on the basis of spending only 40% of funds on incentives and direct install costs. The approved budget for the 2010–2012 portfolio reflects a continued reliance on financial incentives for end-use customers as the primary intervention strategy for most programs; however, the CPUC has also indicated a willingness to fund more innovative program approaches on a pilot basis:

> *"We conditionally approve and fund pilot projects designed to advance the core objectives of the Strategic Plan and our Zero Net Energy targets through innovative program design and delivery methods. We require a clear end point for, and increased oversight of, these pilots in order to justify that their lessons are identified and disseminate successful pilots into core statewide programs."*[89]

As part of this portfolio cycle, the CPUC required that the IOUs develop program performance metrics (PPMs) and MTIs to enable tracking of progress toward program goals. The development of MTIs is consistent with the Strategic Plan's directive that progress toward market transformation goals be tracked and studied.

B.4 Market Transformation Planning Framework

Future goals and targets studies would benefit from an agreed upon framework for quantifying energy savings from market transformation. The goals and targets team acknowledges that the market potential estimated in the model does not include energy savings from market transformation activities. This decision reflects the fact that the parties have not yet reached agreement on an approach for quantifying those savings. The model provides the framework to enable the addition of savings from market transformation in the future, but it was deemed prudent to await agreement on quantification methodologies before integrating those savings in the model.

The market transformation planning framework identifies the steps during program design and implementation that can be taken to lay the foundation for providing sound estimates of energy savings from market transformation to inform future goals and targets studies. It is intended to provide a framework for policymakers and stakeholders to consider approaches for quantification. This structure does not specify which metrics and indicators should be tracked, nor does it prescribe the interventions or influence mechanisms that would qualify as market transformation. Policymakers and stakeholders will resolve those details during the policymaking process.

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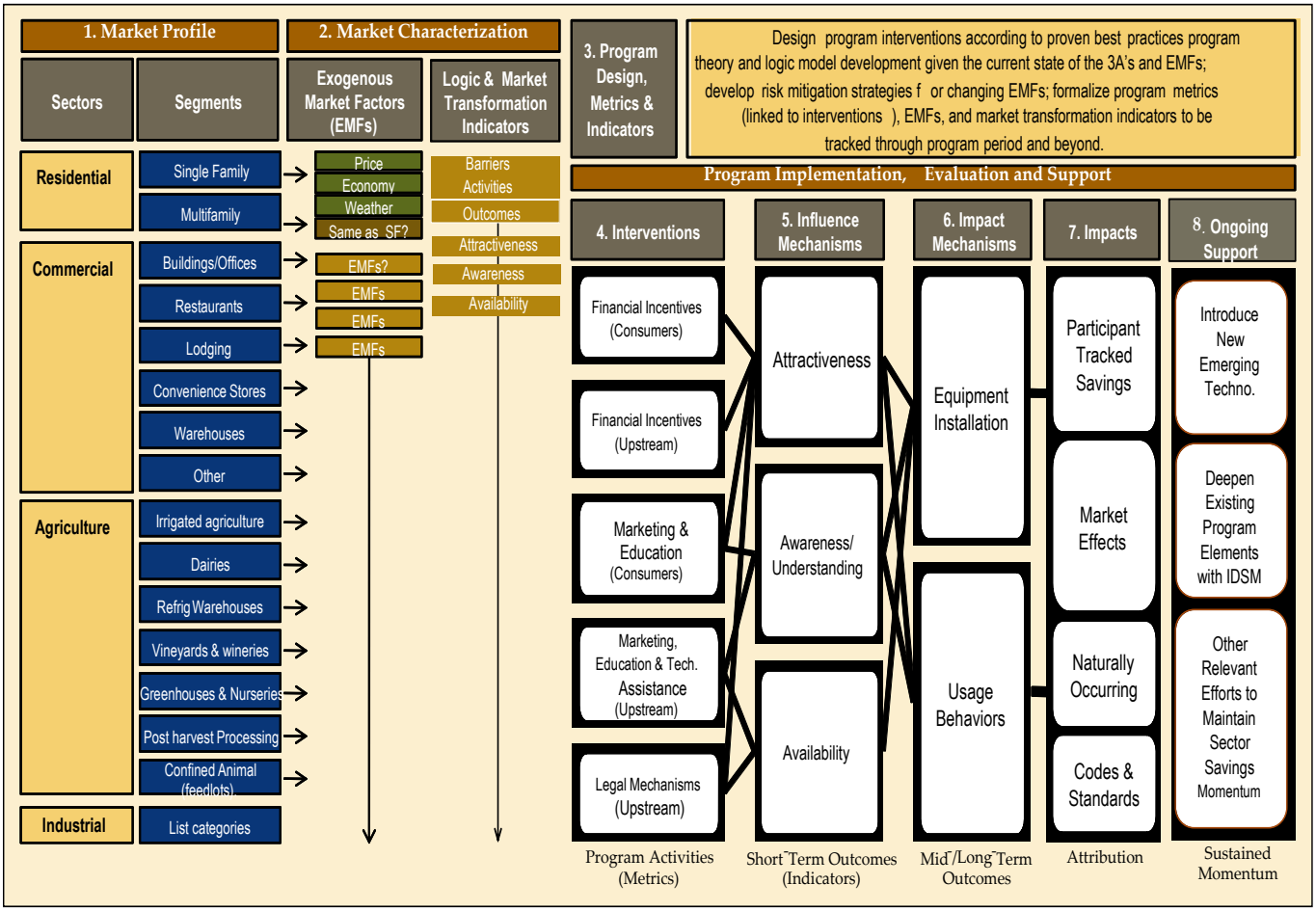
[88] D.09-09-047, p. 6.
[89] D.09-09-047, p. 8.

Figure B-3 presents the initial draft results of this effort to combine market operations and market interventions into a comprehensive market transformation planning framework.

Figure B-3. Strategic Market Transformation Planning Framework



Source: Navigant

Stage 1: Market Profile

The first stage is selecting an appropriate target market segment for the promoted product or service and reviewing the market profile for the targeted segment. Market profiles are compilations of market research and intelligence on specific market segments, covering topics such as:

- Key decision makers
- Trusted information channels (e.g., thought leaders, media habits, trade associations, professional journals, etc.)

- Supply chain (where do they buy their equipment/products from?)
- Sensitivity to electromagnetic fields (EMFs) (e.g., economic downturns, extreme weather, etc.—with regard to the ability to invest in new equipment, access capital, etc.
- High-level baseline market transformation indicators (to the extent data is available—there may not be data on a specific segment's awareness of LED down lights, but perhaps there is an overall estimate of their awareness of high efficiency lighting options from other market research)
- Suggested intervention strategies for different situations (in terms of current EMF indicators and market transformation indicators
- Findings from previous evaluations of programs targeted to that segment
- Any other information that may aid program designers in understanding the market segment

These market profiles should be living documents that evolve over time. Updates can be informed by additional market research and the evolving understanding by the IOUs and program implementers of how segments respond to different interventions during various EMF scenarios. This latter point is critical, as it is often the case that program design is developed with a focus on a single market profile that may conform and respond well to average market conditions but may not have the flexibility of program approach and design to quickly adjust to changes in EMFs that may significantly alter customer perspectives and decision-making criteria. For this reason, proven practice program design under this market transformation planning framework will need to be developed with an understanding of the potential for EMF changes over time during program implementation, and program plans will include contingency strategies to switch or alter interventions based on predicted or actual changes in EMFs. Program implementers can mitigate the risk associated (fairly or unfairly) with market transformation approaches by explicitly including such contingency plans in program design.

Note that segments can be broad or specific; segmentation is important only to the extent that potential savings, market structure (e.g., supply chain, information channels, etc.), and decision-making criteria vary. For instance, if there is little distinction between offices and banks with regard to these factors, there is little reason to split them into two segments.

A program can have multiple target market segments, but program designers need to be careful that they are structuring the program in such a way that important differences in the segments can be accommodated. For instance, if an industrial program includes one segment that primarily receives information through its trade association and another segment that relies on its utility account managers, the program design and its logic model will need to take into account these varying preferences in information channels if it intends to reach both audiences.

Stage 2: Market Characterization

In this stage, program designers need to review the current state of EMFs that the target segment is sensitive to (as identified in the market profile) to begin selecting the appropriate interventions. Programs

may seek to leverage favorable EMFs (e.g., banks are lending money for home improvement projects) or they may need to focus on mitigating unfavorable EMFs (e.g., customer disposable income has gone down). The EMFs are essentially the reality of the market context for a program's interventions, and program goals need to be established with that context in mind.

In addition to EMFs, some baseline market research is necessary to understand the current state of the three A's (availability, awareness, and attractiveness) for the targeted product/service among the target market segment.

Stage 3: Program Design, Metrics, and Indicators

The program design is informed by the previous two stages: the review of the market profile and the market characterization research on EMFs and availability, awareness, and attractiveness. Interventions are selected based on current and forecasted EMF conditions, as well as on which of the three A's have the most room for improvement and can be influenced by the program at that time.

Table B-1 summarizes the expected effects of the different intervention types on availability, awareness/understanding, and attractiveness.[90]

Table B-1. Expected Effect of Interventions on Influence Mechanisms

Interventions	Availability	Awareness/Understanding*		Attractiveness	
		Awareness	Understanding	Financial	Non-Financial
Financial Incentives (End-Use Customers)	Low	Medium	Low	High	Low
Financial Incentives (Upstream)	High	Low	Low	Medium	Low
Marketing & Education (End-Use Customers)	Low	High	High	Low	High
Marketing, Education & Technical Assistance (Upstream)	High	Low	Low	Medium	Medium
Legal Mechanisms (Upstream)	High	Low	Low	Low	Low

** Note that this table reflects only direct influences on the awareness/understanding of end-users, not upstream market actors.*

Source: Navigant analysis, 2011

The program and its interventions should be designed according to proven practices for the target market segment(s), taking into account the realities of EMFs, baseline levels of availability, awareness/

[90] Table B-1 presents expected influences from well-designed program interventions; influences will obviously vary based on the size of the financial influence, effectiveness of the educational effects, enforcement of legal mechanisms, etc.

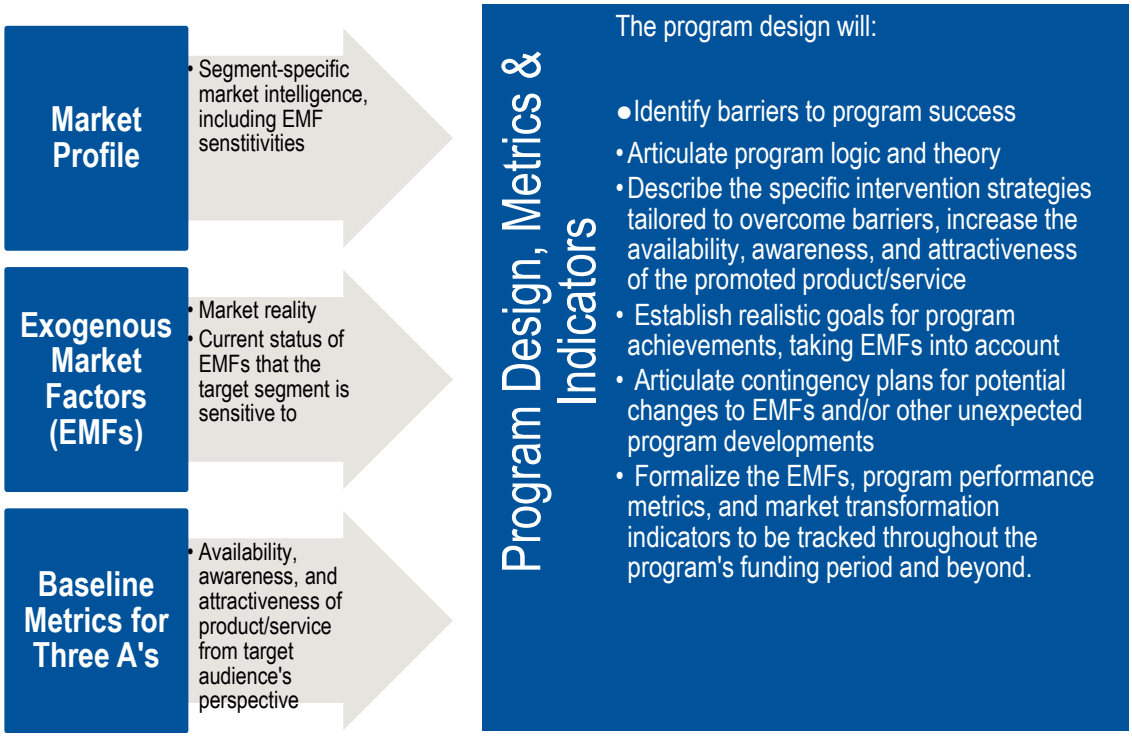
understanding, and attractiveness of the promoted product/service, and available program resources (staff expertise and funding).

A crucial part of the program design stage is the formalization of program metrics and indicators to be tracked throughout the program's implementation phase (and beyond). There are three main types:

- **EMFs:** Basic indicators of economic status (e.g., Dow Jones Industrial Average, other stock market indices, state unemployment rate, availability of small business loans, etc.), weather conditions, cultural/attitudinal factors (e.g., Californians' belief in climate change), and others. EMFs could be tracked by a central research group, not program managers, as many EMFs will be useful across multiple programs.
- **PPMs:** Metrics directly tied to program activities and traceable by program staff. See Stage 4 for more discussion.
- **MTIs:** Indicators of availability, awareness, understanding, and attractiveness (including financial and non-financial factors) within the target segment.

Figure B-4 summarizes the program design process.

Figure B-4. Inputs into the Program Design Process



Source: Navigant

Stage 4: Interventions

As discussed in previous stages, interventions are selected based on review of the market profile, analysis of current EMF realities, baseline indicators of availability, awareness and attractiveness, and proven practices in program design. After the interventions are selected, PPMs need to be established. PPMs are quantifiable metrics directly tied to program interventions and, as such, can be measured and tracked with relative certainty by the program staff.[91] PPMs would vary based on the types of interventions as well as the target market segment and promoted products and services but may include, among others, the following:

- Number of customers receiving financial incentives
- Average dollar amount of customer incentives
- Number of television ads aired
- Number of newspaper articles featuring the program
- Number of trade allies trained
- Number of manufacturers receiving incentives (and market share represented)

PPMs are tracked throughout the program implementation period at specified intervals and typically compared to interim goals to provide early feedback to program stakeholders.

Evaluation at this stage centers on these PPMs (did the program staff do what they said they would do?) as well as assessment of program logic (is it reasonable to expect the interventions as they were implemented would result in the desired changes in availability, awareness turning to understanding, or attractiveness?). This may involve a qualitative assessment of program collateral (e.g., marketing materials and training manuals) as well as benchmarking against other programs.

Stage 5: Influence Mechanisms

The influence mechanisms are the three A's (i.e., the factors that the program hopes to influence through its interventions): availability, awareness turning to understanding, and attractiveness of the promoted product/service. For a program to successfully increase adoption of the promoted product/service, all three A's need to be reasonably high: the product or service needs to be available, key market actors need to be aware of it, and it must be attractive (financially and/or otherwise).

MTIs are used to track changes in the influence mechanisms.[92] In Stage 3, baseline market research determined pre-program levels of availability, awareness turning to understanding, and attractiveness.

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[91] PPMs for the 2010–2012 program cycle were established in Resolution E-4385, December 2, 2010.
[92] MTIs were discussed in Resolution E-4385 and the CPUC held a workshop to further develop MTIs for the 2010–2012 program cycle on November 8, 2011. Files related to that workshop can be downloaded here: www.cpuc.ca.gov/NR/rdonlyres/FCCB5C84-8E09-48CC-AEDB-58F867D01F8A/0/MTIWorkshop.zip.

Program evaluators may use customer surveying, surveys or focus groups with trade allies, Delphi Panels of industry experts, mystery shopping, incremental cost studies, or any number of other research techniques to track changes in MTIs over time.

MTIs would vary significantly by the type of product or service that is promoted. Some examples of MTIs for a program promoting residential high efficiency clothes washers would include the following:

- Number of retailers with high efficiency clothes washers in stock (availability)
- Percent of retail salespeople who can articulate the benefits of high efficiency clothes washers to customers (awareness)
- Percent of residential customers who are aware of high efficiency clothes washers (awareness)
- Percent of residential customers who believe that high efficiency clothes washers will clean their clothes as well as standard models (attractiveness)
- Incremental cost of high efficiency water heaters over standard efficiency models (attractiveness)

If one or more of the three A's remains low after the program has been in effect for an extended period of time, program implementers or evaluators need to determine the cause, which might be one or more of the following:

- Program logic is flawed—the interventions do not lead to the intended changes in the three A's or they are targeted to the wrong market actors.
- Program logic is valid, but program is not being implemented as intended.
- Program is operating as planned and has a valid program logic, but EMFs are creating insurmountable barriers at the time that cannot be cost-effectively overcome.
- Program is operating as planned but program logic is now invalid because it was designed around baseline EMFs that have altered or in some way are no longer applicable.

Stage 6: Impact Mechanisms

Stage 6 is when adoption of the promoted product or service actually occurs and energy/demand savings are realized. There are two categories of impact mechanisms (i.e., actions that result in energy/demand savings):

- **Equipment installation**, which includes replacing inefficient equipment[93] with more efficient equipment or adding equipment, such as thermostats and motion sensors that reduces wasteful usage.
- **Usage behaviors**, which are changes in equipment usage that result in energy and/or demand savings, such as turning off lights or shifting appliance use to off-peak hours.

At the outset, program designers should articulate all of the expected impact mechanisms from their program interventions, so that the program can be evaluated based on its full range of impacts. Some programs may encourage or require participants to take both types of actions; for instance, a program that provides discounted programmable thermostats requires people to both install the thermostat and actually program it; otherwise, no energy savings will be realized.

Programs focused on equipment installation should be aware of the potential for negative impacts from usage behaviors such as snapback or take-back. For instance, some customers may be willing to run the new air conditioner more often because they rationalize that they are allowed to because it is energy-efficient. On the other hand, if a program focused on equipment installation also provides some education that encourages customers to reduce usage, the program should be credited with savings from usage behavior in addition to savings from equipment installation.

Depending on the type of program, there may or may not be records of program participants and their equipment installed. Programs with a financial incentive intervention typically have a participant tracking system with detailed records of installed equipment; evaluation methods for those types of impacts are well-established. However, programs may have significant impacts beyond what is captured in the program tracking system, particularly when there is strong marketing, education, or technical assistance interventions and usage behaviors are not captured in program tracking systems. Thus, analyzing marketwide adoption of the promoted measure, product, or service is essential to reliably estimating the program's full range of impacts. Then evaluators must determine the extent to which the program influenced the increase in adoption (assuming that an increase occurred), which is discussed in the next section.

[93] Note that the word equipment is used loosely; other energy-saving measures that are permanently installed and not dependent on changes in usage would also fall into this category, such as building shell measures like insulation and windows.

Stage 7: Impacts and Attribution

The impacts of energy efficiency programs can be divided into two broad categories: program-tracked savings and untracked savings. The full range of marketwide impacts (including naturally occurring market activity) from the promoted product or service can be divided into four categories, as outlined in Table B-2.

Table B-2. Types of Savings

Type of Savings	Tracked by Program?	Influenced by Program?	Status
Nonparticipant naturally occurring	✗	✗	Baseline/naturally occurring
Free ridership (participant naturally occurring)	✓	✗	
Program-influenced tracked savings (participants)	✓	✓	Program-attributed savings
Program-influenced untracked savings (market effects)	✗	✓	

Source: Navigant

Market transformation programs by their very nature are expected to generate impacts that occur after the program has ended. These post-program savings may often be larger than the program-tracked participant savings. Thus, estimating the full range of program-influenced impacts including the post-program period is critical to ensuring that stakeholders are able to make wise investments with their energy efficiency funds.

There is currently less certainty in estimates of untracked savings than in estimates of participant-tracked savings. In part, this is due to incomplete data on total market adoption for all measures. The need to subtract naturally occurring savings from the untracked savings also contributes. Higher uncertainty in savings estimates, however, does not mean that those savings do not exist. Approaches are being developed and refined to improve the estimation of market effects.

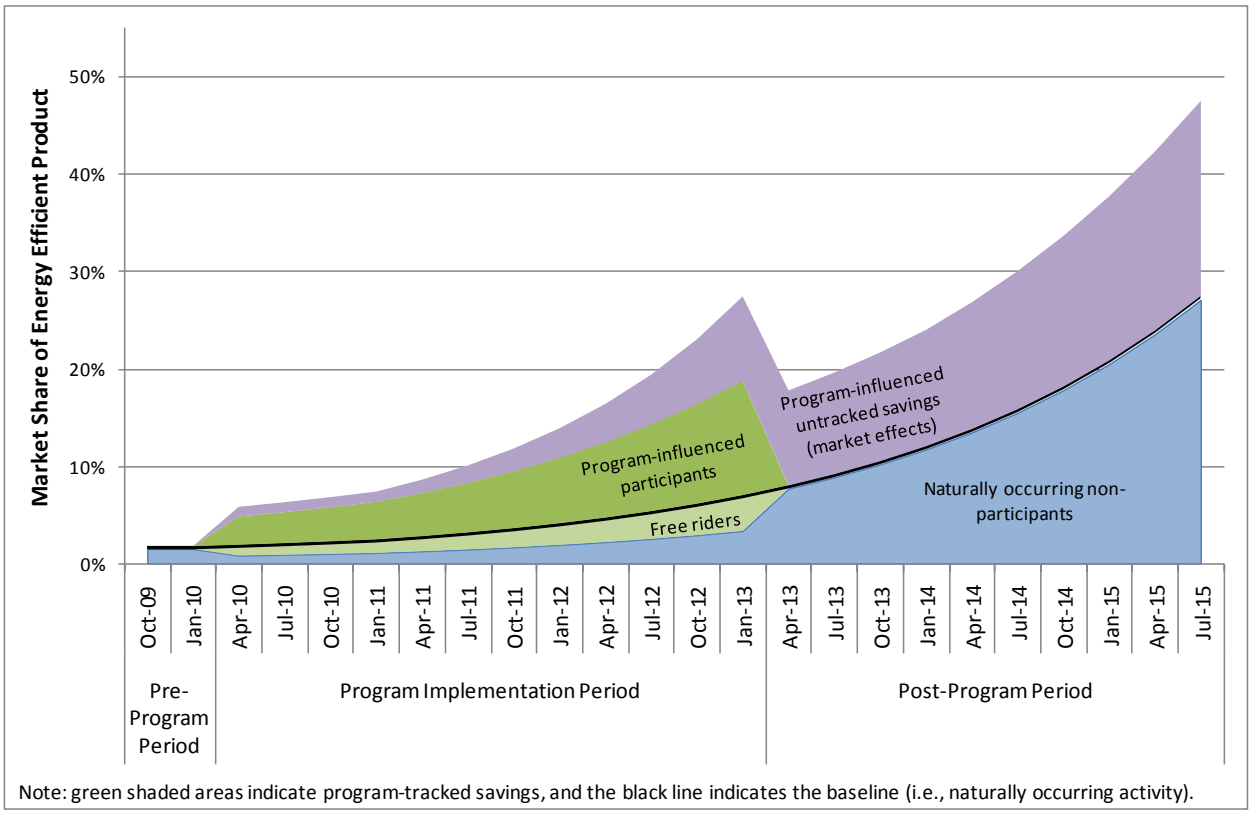
Figure B-5 demonstrates how market share of an energy efficiency product or service may be divided into those four types of savings: nonparticipant naturally occurring, free ridership, program-influenced participants, and program-influenced untracked savings (market effects).

- The green shaded areas represent the savings captured in the program tracking database.
    - The light green represents free riders (i.e., program participants who would have installed the measure anyway).
    - The darker green represents program participant savings net of free ridership.

  *The green area disappears after the program's interventions stop, as there are no additional program-tracked savings.

- The blue/purple areas represent the savings that are not currently captured in the program tracking database.
    - The light blue area is the naturally occurring market adoption that would have happened in the absence of the program.
    - The dark purple area represents the market effects—i.e., measures adopted as a result of the program that are not captured in the program's tracking system.

Figure B-5. Market Transformation Baseline and Attribution of Impacts



Note: Note that this figure is just an example to demonstrate how savings are divided into the four categories and is not intended to represent actual market adoption curves that are expected from market transformation programs.

Source: Navigant

A key element of estimating market effects is acknowledging the uncertainty in savings attribution. Total market share estimates can be achieved using surveys, manufacturer shipment data, or focus groups or Delphi Panels of industry experts. Program evaluators have well-accepted methods for estimating program-tracked savings and free ridership levels. The difficulty lies in determining the division between naturally occurring market activity and program-influenced market effects (the two categories of untracked savings). As discussed in previous sections, if a program has a solid program theory and has met its PPM

and MTI targets, evaluators can more confidently credit the program with a larger share of the untracked savings. If a program has not met its PPM and MTI targets and particularly if there are exogenous market factors at play (e.g., strong economic conditions) that may have accelerated adoption regardless of the program's influence, the program is not credited with significant market effects and the untracked savings are mainly attributed to the naturally occurring market activity.

Stage 8: Continued Support to Market Momentum

Stage 8 is when the program has been assessed to be sustainable in the market without significant amounts of program intervention required, but with a need to support continued momentum in energy-savings market actions. At this stage, codes and standards may play a strong role in supporting energy-savings technologies as the baseline approach. Given this, the major role that a program or program planner must assume is that of supporters to deepen energy savings through continual marketing and the introduction of newly emerging efficiency technologies, integration of demand response, smart meters, renewable and other technologies into the market, and other strategies to maintain the market momentum of the initiative.

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Appendix C. Home Upgrade Program: Best Practice Research Findings

C.1 Introduction

Navigant undertook a review of best practice programs from across the country as one aspect of the California IOUs' study to develop an MT plan and framework for the Home Upgrade Program. The overall goal of this review was to provide the California IOUs with the most comprehensive information on, and approaches to, strategically transforming the whole house retrofit market. The best practices discovered as a part of this process are often specific to the programs from which they have developed; therefore, it is often the case that best practices discovered here will not be directly applicable to the Home Upgrade framework but must be tailored to fit the objectives of the study, the realities of the California marketplace, and the confines of the existing Home Upgrade program design.

A great number of state and utility efforts around the country promote residential retrofits; however, there are relatively few SMT residential retrofit programs, per se.[94] This is particularly true of efforts targeting a whole house approach. The best practice programs Navigant interviewed PAs or program managers for included residential retrofit RA programs, MT programs in areas other than whole house energy efficiency (e.g., upstream HVAC), and programs exhibiting one or more strong components required for MT, such as workforce training or consumer marketing and outreach. Additionally, the programs selected were not constrained to merely those programs similar to the Home Upgrade Program in characteristics such as size, climate zones served, or other key elements. Rather, the project team endeavored to glean a more robust set of findings that could be successfully applied to the Home Upgrade Program with appropriate tailoring.

C.2 Overview of Programs Interviewed

Navigant's literature review and discussions with subject matter experts resulted in a listing of nine programs recommended to interview for the best practice research. A review by Home Upgrade Program stakeholders added one program to the final list of programs to interview. Table C-1 describes the two-step process and criteria used to select programs, while Table C-2 lists the selected programs and which of the criteria each met.

[94] NMR Group, Inc. (2013), *op. cit.* identified two MT residential retrofit programs in New York and Vermont.

Table C-1. Criteria Used to Select Best Practice Programs to Interview

Step 1 Criteria: Used to Generate Master List of Programs for Consideration
Showed notable[95] levels of success or improvement in recent years in moving homeowners from audit findings to installation of recommended efficiency measures
Showed success in one or more of three areas critical to transforming a market (trained workforce, access to financing, and strong network of allies)
Were recommended as leaders in the field by industry experts (interviews and publications included in our literature review)
Won a 2014 ENERGY STAR award (and/or had participating ENERGY STAR Contractor Century Club winners) or 2013 ACEEE "Leader of the Pack" Recognition

Step 2 Criteria: Used to Refine the Step 1 Program List to Those to be Interviewed
(1) Notable audit-to-installation conversion rate/energy savings
(2) Notable program design and delivery model
(3) Use of MTIs
(4) Notable program evaluation and monitoring protocol
(5) Notable education efforts (e.g., increase in trained contractors in area)
(6) Notable marketing and outreach (e.g., network of industry allies and/or community engagement)
(7) Availability of financing options for market actors
(8) Not included as a Best Practice Program in 2013 NMR Market Transformation Study[96] (NMR MT Study)

[95] Notable levels of accomplishment are those recognized in the literature, including but not limited to: evaluation studies, profiles of award winners, and case studies.
[96] NMR Group, Inc. (2013), *op. cit.*

Table C-2. Best Practice Programs Selected and Interviewed

Location	Program Administrator	Program Name	Key Best Practice Criteria	Result
MA	Berkshire Gas, Cape Light Compact, Columbia Gas, National Grid, New England Gas, WMECO, and Unitil	MassSave Home Energy Services Program	(2) Statewide, fuel-blind program offers most competitive incentives (2,4) Regular working groups including all stakeholders (6) Broad-based, statewide marketing (7) Short-term incentives to stimulate additional participation and savings	Yes
MA	BrainShift Foundation (with utility and foundation funding)	Energy SmackDown	(2,6) Engaging community competition—TV show format (3,6) Developing community to sustain participation (6) Harnessing local leaders to engage the community	No
MN	Center Point Energy and Xcel Energy	Home Energy Squad	(2) Unification of gas and electric utilities (6) Outreach targeted to each area/neighborhood (6) Engagement of local leaders	Yes
OR	Clean Energy Works Oregon	Clean Energy Works Oregon	(1) High conversion rate (5,6) Community workforce agreement (6) Link marketing efforts to non-energy benefits (7) Use of on-bill financing	Yes
WI	Focus on Energy	Home Performance with ENERGY STAR	(4,6) Trade ally advisory group, marketing through community resources	Yes
TX	Austin Energy	Home Performance with ENERGY STAR	(5,6) Partnering with workforce agencies (7) Offering additional work to low-income customers	Yes
AZ	Arizona Public Service (APS)	Home Performance with ENERGY STAR	(5) Partner with workforce agencies to train a qualified contractor workforce	Yes
CA	PG&E and Energy Solutions	PG&E Distributor Channel Engagement	(3) MT program that engages upstream market actors to increase sale and stocking of high-efficiency HVAC	Yes
CO	Boulder County, City of Boulder, City of Longmont, Xcel Energy, and Platte River Power Authority	EnergySmart	(3) Cross-market integration (2,7) Denver Energy Challenge Energy Call Center's start-to-finish advising	Yes
VA	LEAP	Virginia LEAP	(6) Engage community and local leadership, community-based, public/private partnership (6) Focus on non-energy individual and community benefits (8) Provides one-stop shop and trusted third-party advisor	No

Source: Navigant

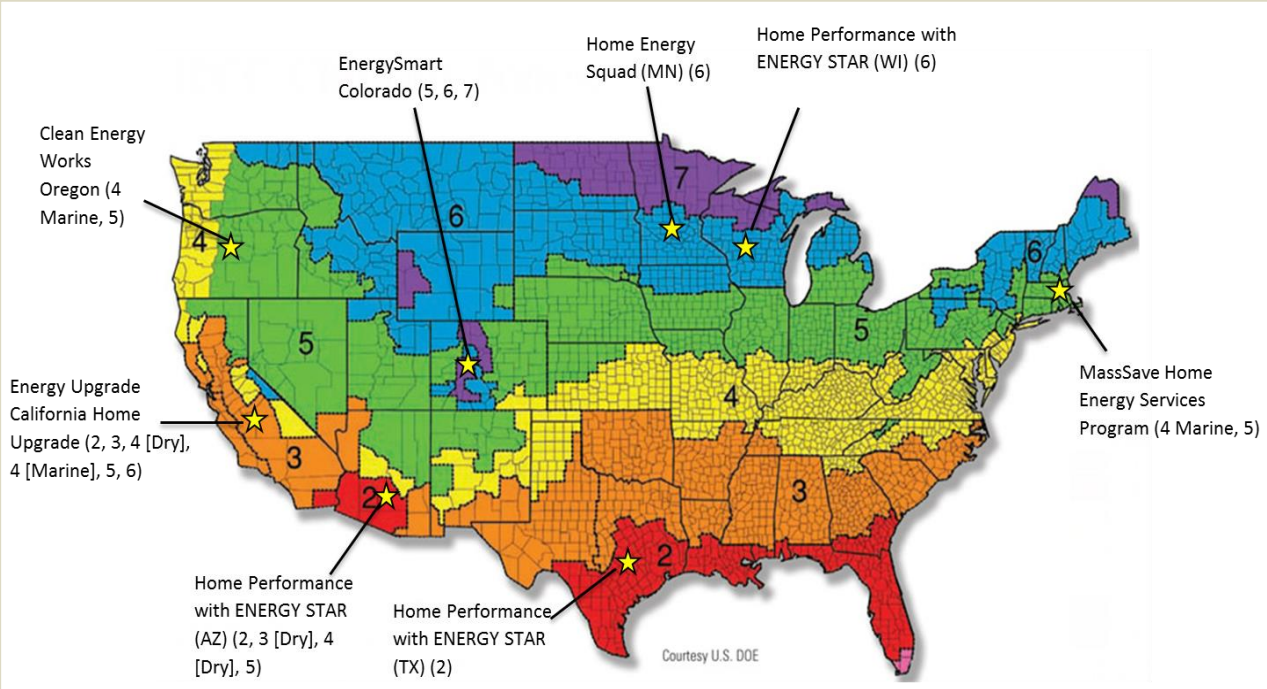
Navigant completed interviews with eight of the ten selected programs. Of the two programs that were not interviewed, one program did not respond to Navigant requests for the interview and the other declined an interview without payment/compensation.

Similarities and Differences with the California Market/Program

When considering the best practices gathered it is important to consider the variety among the programs interviewed to develop this list. Some of these programs are more like to what is being attempted with the Home Upgrade Program, and some are very different. Best practices gained from an understanding of those different programs should not be discounted, but they do need to be considered in a different light. Even best practices from similar programs may not be applicable due to differences in climate, regulatory requirements, market needs, funding sources, and fundamental program design. Most of the home retrofit programs are not attempting to meet an MT goal such as the Home Upgrade Program. A description of the climate covered by each of the interviewed best practice programs can be found in Figure C-1. Some of the more specific characteristics of the interviewed programs are presented in Table C-3.

Figure C-1. Best Practice Programs by Climate Zone

Program	2	3	4		5	6	7
			Dry	Marine			
California programs	✓		✓	✓	✓	✓	
MassSave Home Energy Services Program (MA)				✓	✓		
Home Energy Squad (MN)						✓	
Clean Energy Works Oregon (OR)				✓	✓		
Home Performance with ENERGY STAR (WI)						✓	✓
Home Performance with ENERGY STAR (TX)	✓						
Home Performance with ENERGY STAR (AZ)	✓	✓	✓		✓		
EnergySmart (CO)					✓	✓	✓



Source: Navigant

Table C-3. Program Characteristics: Best Practice Programs[97] and CA Home Upgrade Program

Program Name (Location)	Program Size	Typical Retrofits per Year	Typical Verified Savings per Home	Typical Measure Combinations	Typical Conversion Rate
Home Upgrade Program (CA)	Statewide	~3,500[98]	7% for Home Upgrade 30% for AHU	Insulation, air sealing, duct sealing, HVAC replacements	Unknown
MassSave Home Energy Services Program (MA)	Statewide	At least 6,300[99]	~100 therms* ~900 kWh**	Lighting; air sealing, insulation, oil rebates (Program is fuel-blind and offers a wide range of rebates)	30% currently
Home Energy Squad (MN)	Local	2,500	700 therms 869 kW	Insulation, furnace/boiler replacement	30% pre-2013
Clean Energy Works Oregon (OR)	Statewide	1,200	30% savings from code	Average 4.3 measures Primary: Weatherization (whole house sealing, duct sealing, insulation); Secondary: mechanical systems and windows	20% currently, 30% historical
Home Performance with ENERGY STAR (WI)	Statewide	1,900-2,000	300 therms, 340-350 kWh	Air sealing, attic insulation, wall insulation, foundation insulation, sill box insulation	85% currently, (45%-55% - 5 years ago, 25% - 20 years ago)
Home Performance with ENERGY STAR (Austin, TX)	Local	2,000	1.8 kW	HVAC, solar shading , attic insulation, comprehensive sealing (air infiltration and duct sealing)	Unknown
Home Performance with ENERGY STAR (AZ)	Utility	1,700-2,000		Duct sealing, return upsizing, insulation, shade screens (when incentivizing), air barrier alignment	38% currently
EnergySmart (CO)	Local	526[100]		Requires at least three measures to be completed: insulation/air sealing most common	

*Gas heated homes, average weatherization package only (insulation and air sealing)

**Electric heated homes, average weatherization package only (insulation and air sealing)

Source: Navigant

[97] Table C-3 only includes those best practice programs that were interviewed and are residential retrofit programs. The PG&E Distributor Channel program, though interviewed, has a different focus and does not have comparable metrics to the other interviewed programs.

[98] Based on 12-month share of January 1, 2013 to completions as of June 30, 2014.

[99] Based on rebated participants from 2010 report.

[100] Number of participants in 2012: 263% of goal so results may not be typical.

Beyond the metrics presented in Table C-3, it is important to understand the larger program context of what makes these programs successful: How are the program elements and regulatory environments similar to or different from those of the Home Upgrade Program? Some of these similarities and differences were gathered through the interviews with best practice programs. Significant takeaways from the interviews on the similarities and differences of the best practice programs with California's Home Upgrade program are presented below. It must be noted that while these similarities and differences are important to consider, they may not cover all program characteristics of importance, as they are only the characteristics that were gathered through the context of the best practice interviews.

Best Practice Program Descriptions

MassSave Home Energy Services Program (MA): The MassSave program began in the 1990s and has been extremely successful in the Massachusetts market with several thousand participants per year in recent years. The program attributes much of its success, especially recently, to the large incentives offered. For example, the MassSave program offers an insulation incentive of 75 percent of the measure cost up to $2,000. If the large incentives were no longer available, the MassSave program would likely not experience the high participation rates it sees today. Navigant chose to interview the MassSave program because of its high levels of success attributable to best practices, such as offering competitive incentives through a statewide, fuel-blind program; regular working groups with all stakeholders; and broad-based statewide marketing.

Home Energy Squad (MN): The current Home Energy Squad Enhanced program provides direct installation of gas and electric measures, comprehensive whole house assessments and follow-through assistance and financing to enable the completion of recommended energy upgrades. The program is administered by Xcel Energy (electric) and CenterPoint Energy (gas) and is implemented by the Center for Energy and Environment (CEE) and the Neighborhood Energy Connection (NEC). Initially offered only in Minneapolis proper, the program has expanded to serve surrounding "inner-ring" suburbs of the Twin Cities metro area (focusing on areas with older housing stock) and select out-state cities where crews can reach homes cost-effectively. While the program model and evaluation requirements bear similarities to those used in California, Minnesota has much colder winters, and the Home Energy Squad serves a much smaller target market. The team interviewed program representatives to learn more about the outreach tactics in driving success for this dual-utility program. Of particular interest were the use of community-based marketing, neighborhood-targeted outreach, and local leader engagement.

Clean Energy Works Oregon (OR): The Clean Energy Works Oregon (CEWO) program was developed through the availability of ARRA funding. Because the program was developed using ARRA funds the program included a vast range of goals, including economic growth objectives, community equity, and energy efficiency. Unlike California programs, cost-effectiveness testing has never been a focus of this program, as it has not had to report to a statewide regulatory agency. The program is currently experiencing a paradigm shift as the ARRA funding runs out, and CEWO is adapting to a model that will meet the requirements of the statewide Oregon regulatory framework. The CEWO program was of specific

interest to the best practice interview team because of its historically high conversion rate, use of on-bill financing, and the development of program messaging materials focusing on non-energy benefits.

Home Performance with ENERGY STAR (WI): The Wisconsin Home Performance with ENERGY STAR was one of the first state programs to be associated with the national Home Performance with ENERGY STAR campaign. This program is currently focused only on building shell improvements; no incentives are provided for equipment upgrades. The Wisconsin program has been redefined in the past couple of years to be organized around trade allies (contractors, auditors, and advisors) rather than contractors only. This trade ally approach allows a wider variety of companies to engage with the program. Navigant chose the Wisconsin Home Performance with ENERGY STAR program for a best practice interview specifically because of the program's grassroots approach to marketing through community resources including interactions with a trade ally advisory group.

Home Performance with ENERGY STAR (Austin, TX): The Home Performance with ENERGY STAR program offered by Austin Energy has been a whole home energy efficiency program for almost 30 years. The Austin Energy program focuses on a hot, dry climate and, therefore, sees different measure combinations than programs in more diverse climates. Additionally, the only program savings that are tracked are demand savings, which can change the cost-effectiveness calculations dramatically from a program focused on energy savings. The team interviewed the Austin Energy program because of their innovative approaches to growing the program, including partnering with workforce agencies and offering additional free work to low-income customers.

Home Performance with ENERGY STAR (AZ): The APS Home Performance with ENERGY STAR program is a relatively new program, launched in March 2010. The vast majority of installations associated with this program are in Phoenix, where HVAC is the measure of greatest concern. Most of the homes in Phoenix are slab-on-grade, stick and stucco, or masonry exterior walls, so there is not much opportunity for air sealing measures. Navigant selected the APS Home Performance with ENERGY STAR program because of its historically deep work partnering with local workforce agencies to train a qualified workforce.

PG&E Distributor Channel Engagement (CA): Launched as a pilot program in 1998, PG&E's Distributor Channel Engagement has enjoyed a long and successful run, spurring the development of the utility's Commercial HVAC Quality Maintenance Program and the Residential HVAC Upstream Program launched in May 2014. Program objectives include changing the HVAC market business models for installing and maintaining heating and cooling systems from commodity-based businesses to value-added services. While these are California IOU programs funded by ratepayers, regulated by the CPUC, and categorized as MT programs, they address a different market segment (nonresidential HVAC) than the Home Upgrade Program. Navigant selected the PG&E program because of its success in its MT objectives, in particular involving the HVAC industry in all aspects of the program including public policy, program design and implementation, and using an adaptive management process across utilities and the program to ensure that the program is responsive to the changing market environment. Also of note was its foundational strategy of focusing up beyond customers to distributors.

EnergySmart (CO): Launched in January 2011, the EnergySmart program provides energy advising and financial assistance to households and businesses in all Boulder County communities. The program provides a variety of services including rebates, loans; step-by-step energy advising, personalized energy assessments, assistance finding and working with contractors, technical assistance, and project monitoring and verification. Other differences between the EnergySmart program and the Home Upgrade Program include the fact that while this program works with local utilities (e.g., it does not report to them and is not required to follow their evaluation requirements) and has a considerably smaller program service area. Navigant chose the Energy Advisor program because of its start-to-finish service and community-based marketing strategy that has positioned the program as a trusted community resource.

C.3 Best Practice and Gap Analysis Findings

A truly transformed market can be hard to see because the activities and attitudes associated with it have become part of the social fabric. One does not think about behaving in a certain way, buying or selling a certain type of product, hiring a certain kind of contractor or installing/building in a certain way—it is the norm. Put simply, creating that new normal requires building demand and being able to meet it. The challenge is finding the integrated strategies that can work together to move all the levers necessary, at all parts of the market: upstream, mid-stream, and downstream. Consumers, the ultimate market drivers, must trust the value of efficiency to demand it. That trust must be earned over time through effective outreach and educated installers. Legislation is often required as a stopgap until that trust is won. Once demanded, efficient technologies must be readily available from manufacturers and distributors, and accessible to a broad consumer base. The best practices and corresponding summaries of current California practices discussed below each function to address a portion of this equation.

Contractor Training and Engagement

A well-qualified workforce that provides trustworthy services and information is vital to transforming a market—and to a sustainable market once transformed. Not only must contractors be able to install efficient equipment correctly and explain its proper operation and maintenance well to consumers, they must also be able to effectively sell specific efficient technologies and energy efficiency more generally. As one of the primary face-to-face customer contacts, contractors essentially become spokespeople for efficiency. As such, program implementers will benefit by educating this industry segment as broadly as possible. Participating contractors act as program ambassadors; thus, they must be treated as true partners and allies and must understand and buy into program objectives and elements.

In order to move the market to a scalable industry that procures efficiency and demand-side resources as cost-effectively as possible, many of the areas under the purview of programs will become the responsibility of contractors. Training, technical assistance, quality control, and marketing are among the activities that this industry will come to own. A type of succession planning must happen for this transition to succeed. Contractors must believe in this overarching MT goal and buy into what it entails. In addition, PAs must understand the impacts of program requirements and protocols on the contractors' business.

Developing strong alliances with this market segment is critical to ensure this happens; these alliances should begin by offering contractors a seat at the table as early as possible in program planning stages.

Table C-4 summarizes the gap analysis Navigant performed for contractor training and alliances. The sections below expand on the details of each best practice. Navigant offers the following summary of California's strengths and weaknesses in contractor training and engagement:

Areas of Strength:

- Most PAs offer multiple training formats.
- BPI certification requirements are in place for the Advanced Home Upgrade (AHU) Program.
- There is targeted outreach to specialty contractors involved in HVAC and insulation.
- Several contractor engagement platforms have been established, and the WG is aware of need to solicit input from the contractor community.

Areas for Improvement:

- The PAs need to transition from requiring BPI-certified staff on a project team (via direct employment of subcontracting) to actually onsite supervising project installation.
- Improving technical training offerings for other trades will also help ensure that the people actually carrying out upgrades understand the importance of their work to efficiency performance.
- Engagement platforms need to become part of a clearly defined process for incorporating contractor feedback into program planning. Unless the WG demonstrates a formal process for addressing contractor input, contractors will lose faith in the effort.

Table C-4. Contractor Training and Engagement Best Practices

Sub-Area	Best Practice	Current California Practice	Assessment of California Practices
Training	Require building science credentials from BPI for all field supervisors (AZ, MN)	Require at least one person on staff to have BPI certification	
	Offer technical training for trades: boots on the ground support (AZ)	Training focused on home performance contractors	
	Offer sales training for people engaging with customers; do not underestimate this component! (AZ, MN, CO)	PAs all have offered or plan to offer sales training	
	Offer training in multiple formats (in-person, online) (CO, CA)	PAs offer both in-person and online training	

Sub-Area	Best Practice	Current California Practice	Assessment of California Practices
Engagement	Provide forums for direct input from contractors and auditors (WI, MA, PG&E)	Regional contractor forums gather feedback on a quarterly basis; WG invites contractor participants; other monthly contractor calls	
	Use regional managers to distribute information and act as a go-to person for contractors' program and technical questions (WI)	Account managers serve as point person for contractors	
	Leverage industry/trade alliances to involve contractors in program planning cycles (AZ, CO)	Efficiency First holds monthly calls with contractors but has chosen not to participate in WG because they do not feel feedback has been integrated	

Source: Navigant

Training

Require building science credentials from BPI for all field supervisors: While many programs offer BPI training and require BPI certification of participating firms, not all demand that contractors who will be onsite and directly responsible for the job are so credentialed. MassSave, Home Energy Squad, and APS' Home Performance have successfully implemented such requirements as a means to both better ensure savings are captured and certification is valued.

> **California status:** AHU Program contractors are required to have on staff or contract with at least one BPI-certified individual, but BPI certification is not required for all supervisors. Navigant recommends that the California PA consider ways to integrate this best practice into the Home Upgrade Program effort.

Offer technical training for trades: Trained boots on the ground support is key to program success and to fostering a sustainable market. Correct installation garners projected savings and builds consumer confidence. As additional skills give contractors an edge in a competitive marketplace, offering training adds value to the program. Offering continuing education units raises that value. EnergySmart residential customers must use a contractor from the program's pool, all of which have been vetted for license, insurance, and certain certifications. The program has enjoyed success by working closely with this manageable group of contractors, providing a variety of technical and sales trainings. Technical training is required for every non-BPI-certified air sealing/insulation installer doing work for the program.

> **California status:** Training is focused on contractors but not all installers. Most California Home Upgrade PAs have outreach and training offerings geared toward specialty contractors, namely HVAC contractors and insulation contractors. The Navigant team recommends continued use and deepening of specialty contractor training as an outreach component.

Offer sales training for people engaging with customers; do not underestimate this component: In the words of one interviewee, contractors can be huge sales sources, and as such, it is critical to support them in these efforts. Training them on how to sell efficiency and the program—not just on the technical specifications and/or how to correctly install efficient measures—is arguably the most important element of such support. APS has found sales training to be quite effective in addressing the steep learning curve for selling, positioning, and pricing products in the challenging home performance market. EnergySmart offers (but does not require) a well-received half-day sales training that includes five modules (residential, commercial, residential home energy advisors, and loan advisors) with a focus on customer message, service, and financing. To help contractors sell the program and understand its objectives, program orientation training is required for at least one manager at each participating company. PG&E's HVAC Quality Management (QM) program also offers and requires training for contractors on HVAC industry standards, sales and marketing of the value of those standards, and their implementation in the field. The sales and an HVAC basics component have been successfully grown over time, after initially thought unnecessary.

> **California status:** Many PAs offer sales training. SCE is working with sales professionals to develop a new sales training offering. Navigant recommends that the new SCE sales training effort be integrated into a possible package of statewide training tools offered by PAs locally, with local nuances included.

Offer training in multiple formats: Contractors are busy professionals and should be treated accordingly. By offering trainings in multiple formats (e.g., in-person, online), a program dramatically improves its chances of filling enrollment. Online sessions can offer a more convenient schedule, allowing participants to take them when and where they are able. Additionally, recognizing that people learn in different ways increases the rate of class completion and knowledge retention. For example, some find it difficult to maintain concentration during an online class and/or miss the face-to-face interaction of an in-person session as an effective way to gauge understanding.

> **California Status:** Most PAs offer training in multiple formats. For example, PG&E uses recorded webinar trainings as an option for some courses. The Statewide Financing ME&O Plan has provided a series of market research facts justifying the adult education process and the retention values of current workshop and webinar models. The implementation strategy for contractor and building industry training is to utilize video marketing training housed on an interactive platform with pop-out quizzes and printable ancillary information the student can take with them. Additionally, companies participating in the financing pilot programs can earn points for multiple employees taking the training modules and passing the exams, which can be redeemed for additional marketing materials and resources and other prizes. Navigant recommends that the best-of-the-best, in terms of training, be shared statewide and integrated into a core Home Upgrade training package that can be regularly updated. Such a package should have local component "build-ins" that can customize the training to the local PA area needs.

Engagement

Provide forums for direct input from contractors and auditors: As discussed above, key trade allies must have a seat at the table and feel an integral part of the process to facilitate a successful transition to a sustainable market in the long run, and a successful program in the short term. PG&E involves the HVAC industry in all aspects of its HVAC program including public policy, program design and implementation – both formally through the Western HVAC Performance Alliance and informally through various ad-hoc working groups. PG&E reported that industry involvement is a crucial step in achieving its desired market transformation goals. Wisconsin's Focus on Energy instituted a Trade Ally Advisory Group last year, with members selected from across the state. The group meets twice a year to provide input to the program and to learn more on the rationale for non-implementation of certain recommendations. MassSave's regular working group includes representatives from all stakeholders and meets monthly. The group also meets with HVAC contractors to get their input. Contractors reportedly feel they are getting good representation in the program, and are buying into it. A key piece of engaging these industries is maintaining transparency on the process program planners will use to incorporate their feedback.

> **California status:** Regional contractor forums gather feedback on a quarterly basis; working group invites contractor participants; other monthly contractor calls. Navigant recommends that as part of the core business process sub-working group team effort, statewide contractor and real estate professional stakeholder councils be built into the EUC HU effort to provide a vehicle for continued engagement of renovation, HVAC and whole house contractors, as well as real estate professionals, appraisers and lenders.

Use regional managers to distribute information and act as the go-to person for contractors' program and technical questions: Focus on Energy attributes much of its success to a strong trade ally program component, and to being tied in closely with the trade allies in delivering a quality program. Participation rates are kept high, in part, by making allies feel a valued team member. Three regional managers throughout the state, each assigned 20-30 trade allies in their region, act as the go-to people for any program questions. This type of engagement has worked well to build very strong relationships.

> **California status:** Implementation contractors and appointed account managers serve as point person for contractors.

Leverage industry/trade alliances to involve contractors in program planning cycles: As noted above, PG&E leverages the Western HVAC Performance Alliance and other working groups to involve the HVAC industry in all aspects of its HVAC program including public policy, program design, and implementation. APS also notes the importance to program and market transformation success of having an organized contractor base that understands the vision, is on board and ready to go. This requires the program to work hand-in-hand with contractors, starting with the planning process. APS believes that they have an exceptional base of early adopter contractors, recognizing this as an advantage the program went as far as to develop a communication channel with this contractor base to allow the program implementers to hear what contractors needed from the program before it was even designed. APS feels this was key to its

successful program model. EnergySmart used its relationship with Colorado Green Building Guild to involve contractors in program planning.

> **California status:** Efficiency First holds monthly calls with contractors, but has chosen not to participate in working group because they do not feel feedback has been integrated. Process for integrating industry input is not clearly established. Additionally, Renovation and HVAC contractors need to be brought into the discussion in a more formal way as the market transformation long-term initiative gets underway.

Marketing and Outreach

Weaving efficiency into the social fabric requires building demand for the proper products and services, as well as ensuring it can be met. Marketing and outreach activities serve to inform, educate, drive desire, and foster a new community norm. When selling anything, having the trust of your buyer is a necessity—this is particularly true of new items, ideas, and behaviors. Building strong relationships with a range of industry actors, from equipment manufacturers and distributors to those in the real estate market allows program implementers to more easily accomplish objectives and gather market intelligence. Getting buy-in from these stakeholders is dependent upon open communication, trust, and providing them something of value in the give-and-take. Program design should incorporate a strategy that serves to build industry alliances across multiple sectors from the beginning.

A successful marketing and outreach campaign increases consumer awareness and stimulates consumer preference. It should be designed to create demand through raising awareness, providing validation, and underscoring benefits that matter to the targeted audience (by creating emotional reactions to them and/or by monetizing them.) Coordinated efforts across multiple channels such as traditional paid and earned media, social media, web sites, and face-to-face venues like local festivals and conferences are key, as is repetition. Increasingly, use of community based social marketing (CBSM), as articulated by Doug McKenzie-Mohr and Wesley Shultz, has been shown to be effective at bringing about behavior change. Its effectiveness is due to its pragmatic approach. This approach involves carefully selecting the behavior to be promoted; identifying the barriers and benefits associated with the selected behavior; designing a strategy that utilizes behavior-change tools to address these barriers and benefits; piloting the strategy with a small segment of a community; and, finally; evaluating the impact of the program once it has been implemented broadly.[101]

Frequently mistaken for CBSM, community engagement through the use of trusted messengers such as community-based organizations, neighborhood groups, religious organizations, and schools have also proven effective in giving credibility to sustainability messaging, since people have more trust in the people with which they relate. Involving local government representatives has the added benefit of providing a conduit for strengthening building codes and regulations in response to constituents' demand.

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[101] www.cbsm.com/pages/guide/fostering-sustainable-behavior

Table C-5 summarizes Navigant's gap analysis for this section. The team identified the following key strengths and weaknesses in the current California program marketing and outreach:

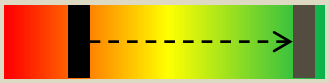
Areas of Strength:

- At an individual level, most PAs are meeting, if not exceeding, many marketing and outreach best practices. All PAs are doing the following:
    - Using social media and community engagement using trusted messengers
    - Making efforts to engage stakeholders and market actors
    - Using the net-energy benefits of home performance upgrades to their advantage
- Some PAs are working to leverage local governments and local government programs while also engaging the real estate community.

Areas for Improvement:

- Marketing efforts cannot be tracked back to the actions taken by homeowners due to a lack of coordination and data sharing. ME&O efforts cannot be fully evaluated for success when key performance metrics are the end action that can be measured.
- Another drawback to the California program is the lack of effective statewide coordination. Although various PAs represent many of the nation's best practices, the WG and statewide ME&O team are still working on improving organized ways for PAs to share ideas and prioritize adopting effective strategies. CSE holds quarterly meetings to coordinate and share resources, and recently redesigned monthly calls to better serve this need.
- Not all PAs are engaging local governments. Local governments have proven to be trusted partners in marketing and outreach, but many PAs are not using them to their full potential.
- The Home Upgrade Program does not provide significant market intelligence to market actors, and most of these market actors are not yet true partners to the program. This may also be partially due to a lack of statewide collaboration in the program.
- The building industry has not yet embraced the energy home improvement market as having value for home appreciation, although studies have researched green building labeling resulting in increased home value surpassing the energy efficiency investment. In a transformed market, increased home resale values and comparables will be more motivation than even rebates and incentives; real estate professionals will then recognize their ability to profit on energy efficiency upgrades prior to or after a sale transaction.

Table C-5. Marketing and Outreach Best Practices

Sub-Area	Best Practice	Current California Practice	Assessment of California Practices
Industry Alliances	Treat market actors as true allies and partners, listening and engaging in dialogue (PG&E)	RENs and IOUs working to find ways to engage contractor community	
	Provide market intelligence to partners on their performance relative to competitors and use reward systems to create competition (PG&E)	Proposed CalTrack could provide feedback to contractors if implemented	
	Bring a wide range of stakeholders together in order to obtain continual input and feedback on program design and adapt according to barriers brought to the forefront (CA)	WG includes IOUs, RENs, CPUC, CEC, NRDC, and CSE	
	Develop relationships with real estate professionals and appraisal communities to educate on value of energy efficiency homes	Varies by region: Some PAs have put significant work into developing real estate relationships, but no statewide approach to date	
Community Outreach: Strategy	Use CBSM to drive local demand (CO, MN)	CBSM pilots occurred during the ARRA stages but have not been activated during the 2014-15 ratepayer period of Home Upgrade	
	Engage and partner with local government leaders to help support implementation and messaging (CO, MN)	REN PIPs refer to local government engagement; some local government programs involved in WG	

Sub-Area	Best Practice	Current California Practice	Assessment of California Practices
	Design and implement a comprehensive, well-funded, and coordinated plan that defines roles and responsibilities between statewide and local marketing (CO)	Statewide ME&O program has broader focus and can only highlight Home Upgrade during specific campaigns[102]	
Community Outreach: Marketing	Single statewide shared message and brand clear to all customers (MA, CO)	Home Upgrade has support from statewide ME&O, but local efforts have different messages for Home Upgrade and AHU and differences in requirements by PAs	
	Sell non-energy benefits of whole house retrofits	Many PAs emphasizing saving money, increased comfort and health	
	Engage customers with customized content and personable auditor/advisors to help them overcome the wall of information technology can present (CO)	Some PAs using energy advisors, energy coaches	

Source: Navigant

Industry Alliances

Treat market actors as true allies and partners, listening and engaging in dialogue: PG&E's Distributor Engagement Channel program was designed to foster a partnership with distributors and has succeeded. These efforts have resulted in a productive information exchange that allows program implementers to understand what is entering the marketplace with sufficient time to address these measures in program planning. PG&E meets quarterly with top participating distributors: twice a year in person and twice via webinar or teleconference. PG&E also holds ad-hoc meetings when requested by either distributors or PG&E.

[102] The statewide ME&O has migrated from whole house program marketing to general energy management awareness and education efforts.

California status: RENs and IOUs are working to find ways to engage the contractor community in the WG. Navigant recommends expanding efforts to focus on three types of contractors: renovation, HVAC, and whole house—with a special effort to create alliances with relevant trade organizations as well.

Provide market intelligence to partners on their performance relative to competitors: As part of the above-described information exchange, PG&E's Distributor Engagement Channel program provides bi-annual reports to participating distributors showing their rank in efficient sales and identifying gaps. Program managers feel that offering this valuable information helps drive participation, boosts awareness of the value of efficiency, and facilitates ongoing dialogue.

California status: Proposed CalTrack could provide feedback to contractors if implemented; few other analogous options exist for the home performance market.

Bring a wide range of stakeholders to the table: PG&E has stated that successful MT programs depend on coordinating efforts across a wide range of market actors. Recognizing that lasting change will only be made when all stakeholders fully buy into the goal and undertake activities to achieve it, PG&E works to facilitate discussion and overlapping interventions across multiple sectors. This includes coordinating efforts with other IOU programs such as Workforce Education & Training and Emerging Technologies.

California status: The WG includes many stakeholders: IOUs, RENs, CPUC, CEC, NRDC, and CSE all participate. The PAs also work with other market actors such as realtors and appraisers, contractors, and auditors on a regional basis.

Develop relationships with realty and appraisal communities to increase awareness of the value of energy efficient homes: Real estate market actors should not be overlooked as key stakeholders with whom relationships should be built. Realty brokers and appraisers play critical roles in helping homebuyers understand and appreciate the value of efficiency. Working with this industry to educate them on whole home retrofits and to learn from them what levers truly move consumers should be an integral part of program design. The Home Energy Squad program uses their Home Energy Fitness Score to give homeowners a goal and help them prioritize activities. The program has developed a process for certification of "Energy Fit Homes" for those with scores of 96 and above. These certifications can be used at time of sale. Program implementers feel the system is helping to increase awareness and to build the value of efficiency into home sales, particularly of existing inventory.

California status: Several PAs have put significant effort into developing relationships with local real estate communities, but the process has been slow and is not coordinated at a statewide level. Build It Green has performed real estate agent training and certification in both their ARRA work for the Association of Bay Area Governments (ABAG) as well as their current work for SoCalREN, covering both Northern and Southern California. Although their Certified Green Real Estate Professional (CGRP) certification has been accepted by the National Association of Realtors as a

green certification, real estate agent awareness of the benefits has not translated well into Home Upgrade Program participation. This is primarily attributed to the lack of home appreciation values based on the invisibility of the work performed. Greater acceptance of the green addendum by the appraisal industry will lead to increased comparables, higher home values for Home Upgrade Program participants, and financial motivations by ratepayers. Navigant recommends that Home Upgrade program planning coordinate further education efforts with expected rollout plans for energy ratings into the residential market, using the expected labeling effort as a lever for early real estate and appraisal market education and possible recognition.

Community Outreach—Strategy

Fund and implement a well-designed M&O plan from the outset of the program: Perhaps because it is harder to accurately attribute energy savings to marketing and outreach activities, they are frequently placed as a lower priority in program planning and spending. However, particularly for MT efforts, which depend on a broad-base embrace of the targeted vision, this is ill advised. EnergySmart ascribes much of its success to having invested in a well-designed marketing and outreach plan at the beginning of the program, which it then implemented fully. In addition, for MT to truly take hold, a well-designed ME&O plan must be accepted by all parties involved, focusing on the end result of implementation and achieving energy savings.

California status: Although the ARRA period provided key statewide marketing for the whole house program, current marketing is focused at the statewide level for the entire Home Upgrade Program effort; thus, only minimal marketing is expected to be focused on the Home Upgrade Program—at least initially. Because the program sales process is not directly linked to current statewide marketing efforts, lead generation and connecting customers with the right contractors has been difficult.[103] Navigant recommends a coordinated and continually funded statewide approach to the Home Upgrade and AHU Programs so that customers receive multiple touches with the same messaging, minimizing market confusion.

Use CBSM to drive local demand: Energy efficiency is not a typical product, and a number of interviewees feel that conventional marketing is not as effective as social marketing tactics like word of mouth, competitions, and social network-based campaigns. A CBSM approach is a cost-effective way to help to establish social norms about taking efficiency actions and further promote investing in energy upgrades. It allows a program to reach new audiences, leverage common interests and efforts of community organizations, and effectively engage local governments in efficiency programs. It also allows administrators to test program designs that result in a single end action to be tested against a control group

[103] CSE reports that it has been an enormous challenge to attribute marketing and outreach activities when the program sales process is out of control of the marketers. During the ARRA period, passing the lead to the contractors resulted in frustration and lost interest. During this ratepayer cycle, leaving leads to find their program implementers in shared territories has resulted in confusion and lack of action.

before rolling out territory-wide. A secondary marketing strategy that explicitly seeks to find ways to engage communities can help to build loyalty for the program by using word of mouth referrals about a product perceived to be homegrown. The Home Energy Squad and EnergySmart programs both employ strong community-based and social marketing strategies to great effect. Home Energy Squad reports that the personal and institutional relationships developed through community-based marketing can provide opportunities for program positioning—and that a program perceived as connected to the community is often more enthusiastically received than one marketed through more traditional channels. Community and congregational workshops have proved especially effective for the program.

EnergySmart's Energy Ambassador Program has gained considerable traction and is proving an effective way to spread the word through trusted sources, which is felt to be a better use of funds than a more traditional big campaign. Indeed, most people who sign up for the program do so because they heard about it from a friend, colleague, or family member. After customers implement retrofits, they are sent an automated email asking them to take a survey and if they would be willing to share their experience. Those who agree have suite of options including blogging, Facebook posts, letters to local newspapers or HOA newsletters (the program provides templates), yard signs, and an energy party package (including program-provided snacks, favors, games. and presentations). The energy party package serves to bring neighbors together and provides the opportunity for the Ambassador to show off their projects. Home Energy Squad is planning to begin a similar effort.

> **California status:** Several PAs are also using CBSM techniques, leveraging the lessons learned during the ARRA Better Buildings Program pilots. SoCalREN has piloted several versions of the Energy Champions program, focusing on engaging community-based organizations to lead their spheres of influence toward choosing participating contractors in exchange for additional incentives as an example.
>
> SoCalREN has been developing extensive, targeted community-wide marketing and outreach over the past four years and SDG&E uses demo homes and community-based partnerships and newsletters to market the program. Navigant recommends utility and REN market research continue to focus on key customer segments most likely to participate in early market uptake of the Home Upgrade MT effort.

Engage and partner with local government leaders to help support implementation and messaging: Local governments are engaged in their communities and can play a productive role in helping to promote energy efficiency programs. Engaging them may also promote collaboration in developing local initiatives, additional incentives, and localized policies involving energy efficiency in the local community. EnergySmart (administered by the County of Boulder) feels that engagement with county commissioners and other area local governments is a critical component of program success. Due to program efforts, a group of local cities and counties meets on a regular and ad-hoc basis to collaborate and share ideas across the state. Home Energy Squad has local government as well as local neighborhood group leaders to effectively bring the program to its target market.

California status: Local governments have been identified in the AB758 draft plan as integral outreach components throughout the marketplace, since they have cross-promotional events, access to contractors through their building departments, and distribution lists through their public information offices. Some local governments have Councils of Governments or have banded together as members of the Local Government Sustainability Coalition (LGSEC) in order to share best practices and stay represented in the regulatory and policy environment. The RENs and SDG&E are working closely with local governments and local government programs; additionally, some local government programs are active in the WG, but there is not a standard approach statewide. Navigant recommends continued coordination toward a statewide Home Upgrade approach.

Community Outreach—Marketing

Employ a single statewide message and brand that is clear to all customers (MA, CO): Particularly in today's environment of information overload, a clear, trusted brand is critical to program success. In areas with multiple program implementers/administrators (e.g., a statewide program run by numerous utilities), a single message and brand lessens potential customer confusion and leverages the marketing dollars of each implementer/administrator. MassSave uses and recommends this approach, providing the example of statewide radio ads that are non-utility specific and promote a single program phone number that then redirects callers to the appropriate representative. Similarly, EnergySmart (which also has components in other areas in Colorado) has agreed to use a single brand name, which is felt to be critical in cutting down on customer confusion and building brand loyalty and recognition.

California status: The Home Upgrade Program recently migrated from the whole house program brand to the multi-sector energy management and education brand across the state. The Home Upgrade Program continues to support the Home Upgrade incentive programs through campaign cycles as laid out in the statewide Integrated Communication Plans. However, the program should have statewide marketing support on an ongoing basis. There are also currently different local marketing messages for the Home Upgrade and AHU Programs, as well as differences in participation requirements between PAs. Navigant recommends continued stakeholder efforts to support continuous statewide marketing support for the Home Upgrade Program and improved coordination of local marketing messages to make the individual PAs appear as a single statewide program.

Sell non-energy benefits of whole house retrofits: Studies conducted over the past decade[104] have shown that homebuyers value the non-energy benefits of energy efficiency features over their direct energy impacts. Non-energy benefits such as thermal comfort, reduced outside noise, lighting quality, indoor air quality, protection of indoor fabrics from fading, safety, and higher resale or rental value collectively are valued equally or even more highly by ENERGY STAR homeowners than energy benefits— some so on an individual basis (e.g., low-E windows were preferred for sun damage protection over energy efficiency or energy savings.)[105] Typically, ENERGY STAR homeowners strongly believe their new homes provide positive non-energy benefits in thermal comfort and a higher resale or rental value. They also tend to believe, although at a lower frequency, that their new homes provide noise reduction, better lighting features, better indoor air quality, or more safety. Such findings have led many new construction programs and builders to promote these attributes to sell their homes. The whole house retrofit market should follow suit for existing inventory. EnergySmart successfully incorporated non-energy benefits into its marketing campaign, promoting, for example, the warmth and comfort an EnergySmart Advisor could help bring to a home.

> **California status:** All PAs work to emphasize comfort and other non-energy benefits.

Engage customers with personable auditors/advisors who ask about lifestyles needs before technology (CO, MN): In line with their approaches to community-based marketing, both Home Energy Squad and EnergySmart found a trusted, personable source of information key to getting homeowners involved in their respective programs and committed to making improvements. EnergySmart's implementer, Populus, is a company founded on the motto "People first, buildings second." While their Energy Advisors must be knowledgeable, they are hired based on their personability. They are good at listening to customers, understanding their challenges and goals and being able to adjust to a customer's needs. When talking with participants, they use a non-technical approach based on life needs (e.g., having a baby, kids moving out, parents moving in) rather than building science. As Energy Advisors are separate from the contractor and auditor, they help customers through the whole process and are not perceived as trying to sell anything. People reportedly appreciate having an unbiased, third-party advisor. Similarly, Home Energy Squad's advisors provide a start-to-finish service that provides the handholding and gentle nudging that it frequently take to cross the "retrofit finish line."

> **California status:** Some PAs are using energy advisor and energy coach models, and working on sales training for contractors.

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[104]Representative examples include: Hanson, Mark, Mark Bernstein and Rob Hammon, "The Role of Energy Efficiency in Homebuying Decisions," 2006; Summit Blue Consulting, LLC and Quantec, LLC, "Non-Energy Impacts (NEI) Evaluation Final Report," New York State Energy Research and Development Authority, 2006 and Tolkin et al., "What Else Does an ENERGY STAR Home Provide? Quantifying Non Energy Impacts in Residential New Construction" (paper presented at the 2009 International Energy Program Evaluation Conference).

[105]Hanson et al., *op. cit.*

Financing

Financing is an integral part of any energy efficiency program, but its relationship to an MT program is different from that of a more traditional RA program. In an RA program model, financing or rebates are the mechanism by which program savings are achieved. In an MT model, financing is considered a singular mechanism, in a long list of mechanisms, toward market growth or transformation. With this in mind, Navigant has selected financing best practices that are already contributing toward an MT model or could be easily adapted toward this program design.

Table C-6 summarizes Navigant's gap analysis for each identified best practice. The team has identified the following key strengths and weaknesses in the current California program financing options:

Areas of Strength:

- There are many financing options available to homeowners looking to make energy efficiency improvements, including several local financing programs offered to Home Upgrade Program participants only.
- Many financing programs are easy to participate in even if onsite pre-approval is not possible.
- Statewide unsecured financing products are rolling out during 2015 and will allow for flexibility in participation in rebate and incentive programs. This offering only requires 70 percent of the construction costs to cover eligible energy efficiency measures to have 100 percent of the loan covered by a credit enhancement.

Areas for Improvement:

- The statewide program needs to simplify the messaging: financing has a negative connotation in the public eye even though it is merely a solution to overcome the barrier of first cost.
- Energy-savings quantification is not standardized across financing products. Resolving this inconsistency will equalize the marketplace and could lead to better data on what customers in the market desire when it comes to financing energy saving projects.
- The Home Upgrade Program needs to continue to work on streamlining its integration with available financing options, especially those that are popular among nonparticipants.

Table C-6. Financing Best Practices

Best Practice	Current California Practice	Assessment of California Practices
Offer easy-to-access low-interest loans with eligibility requirements program projects can meet (MA)	Several partnerships with local credit unions; little direct coordination with HERO PACE program but discussions in progress[106]	
Emphasize benefits of leveraging financing to contractors (CO)	PAs working with contractors to understand financing options	
Enable pre-approval for loans at initial audit (goal, not implemented) (MN)	PAs working with contractors to understand pre-approval process; most lenders not yet familiar enough with energy projects to enable pre-approval[107]	
Extend energy efficiency financing rates to cover some general renovation costs (OR)	Current financing only covers energy efficiency measures, but upcoming pilot will allow up to 30% non-energy efficiency costs[108]	

Source: Navigant

Emphasize the benefits of leveraging financing to contractors: A whole home program is only as strong as its contractors. The benefits to a program of financing should not be separate from the program contractors, but instead must be an integral part of their toolkit when selling to contractors. The Colorado EnergySmart program provides a good example of this practice, educating the contractors on the benefits of them of leveraging financing, including selling more of their services through the program.

> **California status:** Most PAs recognize that a contractor creates partnerships with a single lender and then refers all business in that direction regardless of what is in their customer's best interests. Statewide training is moving toward helping contractors build credibility and confidence in learning and speaking about various financing options.

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[106] Several PAs have local programs available, but they are only attached to Home Upgrade participation, which can limit a customer's flexibility. For a long-term MT effort, it may be beneficial to not only integrate programs like HERO and PACE into the Home Upgrade Program, but also improve standardization of their savings claims to offer these programs as standalone choice options to fit some customer needs while still contributing to MT.

[107] Pre-approval depends on the individual financial institution's participation requirements. Hopefully as more energy project loans are issued and fewer defaults occur, lenders will become more comfortable offering lower interest rates with relaxed underwriting criteria for these projects.

[108] Renewables will not be included. However, HERO data shows that many participants are doing solar installations. Integrating renewable and energy efficiency financing could provide more of a true whole house energy solution.

Offer easy-to-access low-interest loans with eligibility requirements that can be met by program projects: It might seem obvious to offer only loans that will be accessible to program participants, but many programs struggle with this. Whole home program financing options are notorious for tough eligibility requirements that severely limit the population of individuals that can qualify for the benefit. The MassSave Home Energy Services program has worked hard to make their 0 percent interest Heat Loan available to the majority of their customers. The 0 percent interest Heat Loan can be used with eligible measures across many Massachusetts programs and is taken advantage of by a large percentage of their customers to help defray the high initial cost of energy efficiency improvements.

> **California status:** PAs currently offer a variety of financing programs through local credit unions. The HERO PACE program appears easier for homeowners to access than other direct Home Upgrade Program financing, and the PAs are looking into possible ways to leverage HERO and other upcoming financing options.

Enable pre-approval for loans at initial audit: One of the ongoing challenges with program financing has been the separation of the financing discussion and financing application from the contracted work. In an attempt to address this problem, the Minnesota Home Energy Squad program has been working toward giving auditors/contractors the ability to complete the loan pre-approval during the initial audit. As of this time, this practice is not yet a reality, but if implemented, it could reduce one of the barriers that customers experience when working through a home energy performance program.

> **California status:** The California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA), through the California Hub for Energy Efficiency Financing (CHEEF) Pilot Programs, is working hard to find ways to integrate simpler financing programs, such as the HERO PACE program and other CPUC finance, efforts to reduce the time needed to approve financing. The statewide Energy Upgrade CA financing program is creating a marketplace for different financial products presented in a way for consumers and contractors to weigh their options and evaluate the different products objectively.

Extend energy efficiency financing rates to cover some general renovation costs: Most home performance programs put a relatively high requirement on the percentage of a loan financed through their program that must be used for energy efficiency measures. The Clean Energy Works program has taken a very different approach and has achieved some interesting results. The Clean Energy Works program allows up to 49 percent of a loan financed through their program to be used for non-energy benefits. Allowing this high of a percentage of the loan to be used for non-energy benefits has required some growth over time as lenders became comfortable with the idea, but it has had the benefit of pushing people toward the program that may have otherwise not been interested in energy efficiency upgrades. Individuals interested in completing a home renovation with no energy efficiency upgrades in mind are often pushed toward adding home energy upgrades to their renovation project in order to access the low loan rates offered through the program.

California status: The statewide Residential Energy Efficiency Loan (REEL), rolling out in the second quarter of 2015, will allow up to 30 percent of the loan amount receiving a credit enhancement to be for non-energy benefits. Eligible energy efficiency measures will cover the materials and labor associated with being able to install the approved equipment—including asbestos removal—while the additional 30 percent covered can include water measures, drywall, granite counter tops, etc. Demand response measures are covered in the 70 percent as well, but no distributed generation measures can be included in any part of the 100 percent receiving the credit enhancement from the CPUC.

Program Design and Delivery

Program design and delivery, similar to financing, will be organized differently for an MT program than for a traditional RA program. With no true whole house MT programs are included in the best practice program interview list, the best practices related to program design and delivery are mostly related to program goals rather than currently existing program practices. While untested, the best practices presented here reflect a compilation of the thoughts of individuals who have been active and successful in the whole house energy efficiency market for decades. These best practices reflect a transition to where the market may be heading as traditional RA programs become less cost-effective with the increasing code baseline and the disappearance of low-hanging fruit.

Table C-7 summarizes the gap analysis for California for each best practice. Navigant also identified the following key strengths and weaknesses for the current program design and delivery:

Areas of Strength:

- SCE and SCG have made strong efforts to streamline application processes in response to contractor feedback.
- CalTest is being developed to improve the accuracy of modeling tools, and CalTrack is being developed to assess ongoing performance.
- The program is flexible enough to allow a variety of contractor models, ensuring that the market can grow and adapt unrestricted.

Areas for Improvement:

- Program design must be designed to meet the specific needs of each program's product definition and target market, two elements that California is currently working to define. Incentive levels and specific requirements vary across best practice programs depending on each program's goals and regulatory environment.
- California can improve future offerings by streamlining and standardizing the application process as well as contractor and homeowner participation requirements on a statewide basis.

Table C-7. Program Design and Delivery Best Practices

Best Practice	Current California Practice	Assessment of California Practices
Recognize need for variations in offering by region within a statewide context due to climate, housing stock, etc.	Targeted marketing in place; program offerings differ slightly statewide	
Shift incentive design over stages of market transformation	Incentive step-down plan requested as part of this project	
Consider issues for a transparent transition to performance-based incentives using accurate modeling and measurement tools (AZ)	Developing CalTest and CalTrack	
Minimize administrative burden for contractors	HU program particularly burdensome; AHU less so	
Program design should be flexible enough to accommodate multiple contractor models (WI)	CA program does not explicitly require a particular contractor model	
Require someone—contractor, auditor, or advisor—to guide customers throughout participation process (hand-holding)	Some PAs offering energy advisor or coach options but not required	

Source: Navigant

Recognize the need for variations in offering by region due to climate, housing stock, etc.: The need to recognize the variation in program offerings by region seems almost too elementary to be called out as a best practice. However, the recognition in regional variation that is recognized here is more complex than just needing to offer different measure mixes in Northern California versus Southern California. This idea of tailoring the program offerings to region also relates to contractor training, making sure that contractors understand the specifics of the housing market in which they work and have the training to respond to any unique building science concerns. Additionally, the tailoring of program offerings to region should be extended to the identification of regions where savings potential is the highest. While program offerings should be offered to any individual with interest, the program should also be smart in recognizing and focusing program activities to those areas that have the highest savings potential.

California status: SCE is initiating targeted marketing for high-propensity customers in 2014, and previous research has illustrated potential impacts for different climate zones. Program requirements do not differ by region. Navigant notes that customer target marketing should take into account not only current customer profiles but also potential future ones for those likely to be drawn into the program.

Minimize the administrative burden for contractors: Contractors are the life blood of any whole home energy efficiency program, especially one built on an MT platform. With this in mind, a program should do its best to reduce the administrative burden for contractors to participate in the program. Contractors need to see a benefit of working with the program, beyond just a monetary value. If every time they think about the program, they picture the paperwork that needs to be completed to comply, there will be no way for the program to be successful as an MT program. The APS Home Performance with ENERGY STAR program has addressed this barrier by allowing contractors more control over the building model. Through the use of HPXML, a national data standard for the transfer and labeling of building details for residential energy efficiency, contractors in the APS program are able to use the software that they are comfortable with to model building energy efficiency while the program still receives the building data that they need, in a usable format without extra administrative work on either end.

California status: Contractors have indicated that participation in the program (in particular the Home Upgrade component) is onerous due to paperwork and requirements for certain measure combinations and test in/test out procedures. SCE and SCG have worked to reduce the administrative burden for contractors to streamline the application process, but statewide program requirements remain a barrier.

Shift incentive design over stages of market transformation: One of the tenets of a true MT program is the removal of traditional rebates from the program design while still maintaining energy saving activities. This is not a transition that any whole home program across the country has fully taken, yet many industry experts have given this thought. A whole home program will not survive a brutal cutting of all incentive dollars over a short number of years, as the programs that are being run today are not really set up to function without incentive dollars. The transition from a traditional RA program to an MT program must happen slowly, slowly ramping down the incentive levels expected by customers and slowly ramping up other program benefits such as greater contractor training, better financing options, and marketing materials more focused on comfort and design issues.

California status: The Home Upgrade WG is aware of the need to shift incentive design over time in an MT program. There are no current plans for this kind of shift, but Navigant's market transformation framework will include a plan for incentive step-downs in the upcoming years.

Program design should flexible enough to accommodate multiple contractor models: The Wisconsin HPwES program has shifted its definition of a trade ally to encompass contractors, auditors, and third-party energy advisors. The key requirement for being the trade ally for a given customer is being responsible for walking the customer through each stage of the participation process.

> **California status:** Current program design does accommodate all contractor models.

Consider transparent transition to performance-based incentives using accurate modeling and measurement tools: The opportunity for market transformation relies on two tenets: having the financial mechanisms in place to drive transformation and having the means in place to create market competition. Letting contractors know how they are doing in relation to the rest of the population might provide incentives for them to change their practices. Currently, most programs do not foster a level of competition between their contractors. Products like CalTrack, being developed in California, could help to foster this transition and differentiate contractors so that they can focus on their business model to yield higher performance. The performance-based incentive model may be what is needed to drive toward an MT program, an incentive given not for perceived performance or energy savings but actual energy savings. While performance-based incentives from the ongoing monitoring of participants raises concerns about behavioral impacts and the role of the contractor, incentives based on savings projected by accurate modeling tools can be a significant step forward in showing contractors which measure packages are worthwhile for each customer. This transition, if workable, must also occur slowly and transparently so that contractors have time to understand their performance, and programs can evaluate the accuracy of these tools before the new incentive structure becomes effective.

> **California status:** The efforts to develop CalTest and CalTrack show that California is invested in developing tools for modeling savings more accurately as well as monitoring performance over time. Significant additional planning and contractor input will be required if California seeks to implement performance-based incentives. Simply basing incentives off of modeling tools that predict savings more accurately could, however, be an effective change alone.

C.4 Conclusion

Navigant's best practice review demonstrated that while individual program offerings across California individually meet or exceed many national best practices, a lack of statewide standardization and formal idea sharing may be the largest limitations to market transformation. The gap analysis did reveal some specific areas for improvement (summarized below), but no individual fix will enable the program to evolve into a true transformative force in the market. In addition to this broad need for statewide coordination, Navigant identified the following recommendations for improvement in California:

- **Transition to requiring BPI certification for field supervisors**. This requirement must be phased in over time to allow contractors to train additional staff if needed.
- **Improve and increase frequency and depth of technical training for both contractors and trade subcontractors.** This will improve contractors' abilities to increase savings in homes and alleviate issues with untrained subcontractors.
- **Integrate existing sales training efforts, such as SCE's new offering, into a statewide package.** Having a core statewide training package that is regularly updated would improve consistency across the state for contractors working in multiple service territories. Such a package should have local component "build-ins" that can customize the training to the local PA area needs.
- **Build statewide contractor and real estate professional councils into the Home Upgrade Program effort.** This will provide a vehicle for continued engagement of renovation, HVAC, and whole house contractors as well as real estate professionals, appraisers, and lenders.
- **Coordinate real estate professional education efforts at a statewide level with the expected rollout of residential energy ratings.** The expected labeling effort could be a level for early real estate and appraisal market education and possible recognition.
- **Streamline integration with easy-to-use financing programs**. Many financing options exist in California, and the program needs to identify ways to integrate with these options to improve homeowner experiences.
- **Collect internal state best practices on working with local governments and community-based marketing and develop a coordinated statewide marketing campaign.** This will allow statewide offerings to integrate the best of internally developed marketing approaches into a strategic campaign aimed at market transformation.

By maintaining and growing areas of strength and acting on a few key areas of improvement, the Home Upgrade Program can work toward national best practices on all fronts. Table C-8 summarizes the program elements where California should maintain the program's strengths as well as elements that can be improved to strengthen the program's effort.

Table C-8. Summary of Areas of Strength and Needed Improvement for Program

Maintain Areas of Strength	Grow in Areas for Improvement
Program Design and Delivery	
• SCE and SCG have made strong efforts to streamline application processes in response to contractor feedback. • CalTest is being developed to improve the accuracy of modeling tools, and CalTrack is being developed to assess ongoing performance. • The program is flexible enough to allow a variety of contractor models, ensuring that the market can grow and adapt unrestricted.	• Program must be designed to meet the specific needs of each program's product definition and target market, two elements that California is currently working to define. Incentive levels and specific requirements vary across best practice programs depending on each program's goals and regulatory environment. • California can improve future offerings by streamlining and standardizing the application process as well as contractor and homeowner participation requirements on a statewide basis.
Financing	
• There are many financing options available to homeowners looking to make energy efficiency improvements, including several offered through programs. • Many financing programs are easy to participate in even if on-site pre-approval is not possible.	• The program needs to continue to work on streamlining its integration with available financing options, especially those that are popular among nonparticipants.
Marketing and Outreach	

• At an individual level, most PAs are meeting if not exceeding many marketing and outreach best practices. All PAs are doing the following:
  ○ Using social media and community-based marketing (all)
  ○ Making efforts to engage stakeholders and market actors
  ○ Using the non-energy benefits of home performance upgrades to their advantage
• Some PAs are working to leverage local governments and local government programs as well as engaging the real estate community.
	• One of the biggest drawbacks to the California program is the lack of effective statewide coordination, which makes it difficult to enlist market actors able to support going to scale. Although various PAs represent many of the nation's best practices, there is not an organized way for PAs to share ideas and prioritize adopting effective strategies, including enlisting upstream and mid-stream trade ally partners.
	• Not all PAs are engaging local governments.
	• The Home Upgrade Program does not provide significant market intelligence to market actors, and most of these market actors are not yet true partners with the program.
	• Outreach to the real estate community has only been at the local level and not statewide.

Contractor Training and Alliances	
• Most PAs offer multiple training formats. • BPI certification requirements are in place for the AHU Program. • There is targeted outreach to specialty contractors involved in HVAC and insulation. • Several contractor engagement platforms have been established and the WG is aware of need to solicit input from the contractor community.	• The PAs need to transition to requiring BPI-certified staff not only on a project team (via direct employment of subcontracting), but also actually onsite supervising project installation. • Improving technical training offerings for other trades will also help ensure that the people actually carrying out upgrades understand the importance of their work to efficiency performance. • Engagement platforms need to become part of a clearly defined process for incorporating contractor feedback into program planning. Unless the WG demonstrates a formal process for addressing contractor input, contractors will lose faith in the effort.

Source: Navigant

NAVIGANT

Appendix D. Comments on Draft Report

Navigant thanks stakeholders for their thoughtful comments and input to the draft report. In this section Navigant provides the text of stakeholder comments and a summary of Navigant's responses. In posting this report on Basecamp, Navigant also posts a spreadsheet listing each comment and the disposition of each in relationship to the final report.

Overall, Navigant received nine comments from stakeholders. Navigant placed these into three categories. Below is a listing of each category and related stakeholder comments.

I. **General Comments** (found in Appendix D.1):
   - Requests for clarification or addition of information on specific SMT issues
   - Report structure and clarity
   - Request for additions/revision to best practices section

Stakeholder Commenters: Natural Resource Defense Council (NRDC); CPUC Energy Division; CSE

II. **Program Implementation** (found in Appendix D.2):
   - Overall program design and approach
   - Specific program rules
   - Certification and testing improvements

Stakeholder Commenters: Efficiency First California (EFCA); Nate Bellino, SDI-Insulation; Tom DiCandia SDS-Insulation; Jim Apperson, Energy Management; Building Performance Institute (BPI)

III. **Support for Implementing the Straw-Person SMT Framework** (found in Appendix D.3):

Stakeholder Commenter: PG&E

D.1 General Comments on Report Structure and Content

NRDC Comments

NRDC draft Navigant market trai FILE EXTRACTED BELOW

Comments of the Natural Resources Defense Council (NRDC) on
A Comprehensive Strategic Market Transformation Framework, Plan, and "How-To" Manual for Energy Upgrade California Home Upgrade
April 24, 2015
Submitted by: Lara Ettenson
lettenson@nrdc.org

I. Introduction and Summary
The Natural Resources Defense Council (NRDC) appreciates the opportunity to offer comments on the draft "A Comprehensive Strategic Market Transformation Framework, Plan, and "How-To" Manual for Energy Upgrade California Home Upgrade," March 27, 2015. (draft report). NRDC is a non-profit membership organization with nearly 80,000 California members who have an interest in receiving affordable energy services while reducing the environmental impact of California's energy consumption. NRDC appreciates the hard work that went into developing this document and offers the following recommendations.

II. Discussion

1. Provide a check list for the CPUC and stakeholders to use as guidance.
The draft report outlines a number of critical market transformation issues and progress to date on the Energy Upgrade California Home Upgrade (HU) program, yet it is hard to discern the key matters that still need to be addressed, by whom, and in what order. To make this document as easy as possible to use as a guide for improving HU and advancing market transformation generally, the final report should providing a clear checklist using Figure 2-10 (p. 24) and Table 2-4 (p.26) as a template. The final table/figure should specifically outline:

- whether a stage of market transformation has been accomplished
- if not, what tasks remain to be done
- what are the specific next steps to accomplish each task
- who is responsible for the activity
- is there is a particular "order of operations" to be followed

While much of this information is likely sprinkled throughout the report, it would be beneficial to reorganize the recommendations in this manner to help Commission staff and stakeholders successfully implement the remaining key activities.

2. Include more specific recommendations in Chapter 4, the "how to" manual.
There are a number of key policy issues teed up for Phase 3 of the current CPUC energy efficiency proceeding (R.13-11-005) that are needed to support and expand market transformation initiatives (e.g., cost-effectiveness, counterfactual baseline, time horizon of program planning). To support Phase 3 progress, Navigant should provide detailed proposed changes in the "how to" chapter based on its extensive national expertise. (e.g., what is an ideal discount rate for market transformation programs, what is the time horizon used in the calculator, how should "net" savings be addressed for a market transformation program, etc.).

While the various market transformation documents referenced in the report outline key high level matters that the CPUC should consider in setting up a framework, they do not go as far as to outline what the current processes are and what they *should be* to support a market transformation effort. For example, for the eight listed items on p.64, the final report should include a table that highlights what the current practice is as well as what the proposed practice should be, referencing further details provided throughout the report.

3. Further flesh out the "Collaborative Administration Design Approach"
One identified challenge in California is the fact that numerous entities operate in different territories across the state (or even in parts of the same territory). Organizing action and providing a strategic approach to transforming markets requires a concerted, organized, and cohesive collaboration – something that is not inherent in the state's current policy framework or structure. Given Navigant's expertise across the country and within California, the final report should include proposed options for what such a collaborative structure would look like in California.

III. Conclusion
Market transformation programs are key to advancing the most efficient products and strategies in California. While the program administrators have accomplished varying degrees of market transformation, the state needs a much more concerted and dedicated effort to advance efficiency markets. This "how to" document should be the guidebook that helps the Commission and stakeholders drive toward changes that can enable market transformation initiatives to thrive.

Navigant Response to NRDC comments

1. Provide a check list for the CPUC and stakeholders to use as guidance.

Response: Navigant has added Table 1-1, Table 2-2, Table 2-3, and Table 2-4, which provide an overview of: a) the SMT initiative pre-launch components that have been completed by the Home Upgrade WG; b) a summary of remaining tasks; c) description of the next steps to vet and address development of the remaining

pre-launch component needs; and d) identification of the responsible party for completing the remaining tasks.

Additionally, newly added Figure 2-2, provides a schedule that identifies the current and next steps needs for the Home Upgrade WG to complete the SMT initiative pre-launch component tasks needed to potentially be the first state's SMT initiative. Lastly, newly added Figure 1-11 in Chapter 1 provides a generic schedule of completion of the pre-launch components.

2. Include more specific recommendations in Chapter 4, the "how to" manual.

Issue A: Navigant should provide detailed proposed changes in the "how to" chapter based on its extensive national expertise. (e.g., what is an ideal discount rate for market transformation programs, what is the time horizon used in the calculator, how should "net" savings be addressed for a market transformation program, etc.).

Response: Navigant has included a detailed discussion of the differences between net and gross savings issues for an RA program versus an SMT initiative in Chapter 1, Section 1.3.5. Navigant has also included in Chapter 2as part of the section entitled "*Overview of SMT Cost-Effectiveness*," and a new section entitled "*Appropriate Discount Rate for Cost-Effectiveness Calculator*." Finally, Navigant has included in the manual information and recommendations on the time horizon for SMT initiatives in the Chapter 2 cost-effectiveness analysis Section 2.5.8.7, recommending a 20-year benefits horizon (and sometimes longer—see newly revised footnote 77) for most SMT initiative efforts. Additionally, Section 2.4.10 on Initiative Timing (pre-launch component 6) has a detailed discussion on initiative timing.

Issue B: While the various market transformation documents referenced in the report outline key high level matters that the CPUC should consider in setting up a framework, they do not go as far as to outline what the current processes are and what they *should be* to support a market transformation effort. For example, for the eight listed items on p.64, the final report should include a table that highlights what the current practice is as well as what the proposed practice should be, referencing further details provided throughout the report.

Response: This document is, as noted, a first year report. It is beyond the scope of this current report to identify each of the many RA processes currently in place and how they would be affected by the introduction of an SMT component into the CPUC efficiency portfolio. Navigant has inserted in Chapter 2, Table 2-10, the requested table that highlights the current practice and next-step proposed practice for the eight regulatory policy related issues identified in the CPUC MT Policy White Paper.

3. Further flesh out the "Collaborative Administration Design Approach"

Response: Navigant has added further detail to its discussion of collaborative governance and implementation in Section 2.4.12 on Governance and Administration. Further, Navigant has also added a discussion of best practice stakeholder collaboration that provides several examples of collaborative program support efforts from the Northwest that may lend themselves well to application in California.

CPUC Energy Division

From: Gibbs, Syreeta [mailto:syreeta.gibbs@cpuc.ca.gov]
Sent: Monday, May 04, 2015 4:11 PM
To: Jay Luboff
Subject: ED Staff comments re SMTI Draft Report
Thank you for the opportunity to provide input Jay. Below staff provides high level observations and proposed modifications to the 5chapters outlined in Navigant's draft report. Please let me know if you have questions or prefer to discuss.

1. Executive Summary /Introduction –
    - Remove EUC from program title and refer to as Home Upgrade Program throughout the document (i.e., any references to prior program names, including Energy Upgrade California, Whole house Upgrade Program should be footnoted.)
    - Text should be clarified to avoid confusion – The Home Upgrade Program is described as Market Transformation-oriented, yet is not considered a formal strategic market transformation initiative; the difference between these two classifications should be clearer.[1] Perhaps HUP is better characterized as a "potential" MT program or candidate for MT.
    - Is the text in figure 1-1 (p.4) supposed to align with preceding bullets (I. – III)? If so, please update accordingly.
    - This document should be reviewed and revised by a technical editor to ensure clarity and grammatical accuracy (i.e. typos and duplicative text) in this section and throughout the report.

2. Strategic Market Transformation Theory and Component Elements –
    - 1st paragraph is redundant (identical to earlier text) and should be omitted.
    - Specific examples of metrics and trends pertaining to program uptake, savings, expenses, etc. from program inception to today are needed to accompany some of the theoretical, illustrative charts and content in this section.
    - Better to incorporate certain appendices (relevant content) into the overall report: Appendices B-E should be incorporated in the main body of the draft to eliminate unneeded cross references; Appendices without explanatory context (e.g., Appendix H) are unhelpful should be revised or removed.
    - This section should also be revised to streamline redundant text/charts (i.e. bullets under section 2.2 and figure 2-9) and include summary of conclusions

[1] The executive summary states in Paragraph 2 that "there exists no formal role for SMT initiatives in the California Public Utilities Commission's (CPUC's) energy efficiency portfolio policy rules and procedure," and in Paragraph 4 that "the goal of this effort is to provide a workable model for the potential authorization of a plan and SMT framework that can be applied to the Home Upgrade program".

and/or recommendations discussed throughout this section (i.e. component elements of an SMTI, need for market characterization, governance charter, etc.)

3. Application of SMT Concepts to EUC Home Upgrade—Current Status and Recommended Next Steps –
    - A word other than "codify" should be used throughout section 3, where appropriate, because this term generally applies to either pending or adopted legislative mandates.
    - Section 3.1.5 regarding proposed governance structure should include a current structure as a point of comparison.
    - This section should be reorganized and revised to include the conclusions and recommendations outlined in Appendix F.4 and also incorporate relevant portions of Appendix J, which includes actionable recommendations to complete remaining tasks and sub tasks specified in Table 3-1 (p.48).
    - References to CalTest and CalTrack in Appendix F should be updated with current status of both projects as appropriate.

4. Straw-person "How-to" Process to Identify, Vet, and Select SMT Initiatives –
    - The hypothetical straw-person example presented in section 4 mirrors existing CPUC/ proceeding practices. This section should be revised to include specificity regarding how the straw-person proposal coincides with proposed phase 2 issues and remaining tasks and sub tasks.
    - What is the order of priority for these remaining tasks?
    - Which remaining tasks/sub tasks can be completed/conducted in parallel with one another?
    - Which remaining tasks/sub tasks must be completed/conducted independently?
    - Is R.13-11-005 Phase III deliberation a potential alternative or additional element to the phase II proposal?

5. Navigant Perspectives on EUC Home Upgrade as an SMT Initiative –
    - Consider reformatting into a conclusion section with a summary/recap of final conclusions and recommendations including challenges that prevented completion of all specified tasks. (i.e. time, resource constraints, budget, etc.)

Staff recommends that a substantially revised version of Navigant's draft manual be shared prior to its finalization in July. Staff also recommends that the working group reconvene once the report is finalized to discuss and determine how best to move forward with this initiative.

Regards,

Syreeta Gibbs | Analyst | Energy Efficiency Residential Programs and Portfolio Approval
California Public Utilities Commission | 415 703 1622 | syg@cpuc.ca.gov

Navigant Response to Energy Division Comments

Overall Response: Navigant has redrafted major parts of this report to address ED comments related to removing redundancies and other editorial issues. In this regard, Chapters 2 and 3 related to SMT Theory and Application of the Theory to the Home Upgrade Program, respectively, have been combined. Below, we provide responses to ED non-editorial chapter-by-chapter comments.

1. **Executive Summary /Introduction –**
    - Remove EUC from program title and refer to as Home Upgrade Program throughout the document (i.e., any references to prior program names, including Energy Upgrade California, Whole house Upgrade Program should be footnoted.)
    - Text should be clarified to avoid confusion – The Home Upgrade Program is described as Market Transformation-oriented, yet is not considered a formal strategic market transformation initiative; the difference between these two classifications should be clearer.[1] Perhaps HUP is better characterized as a "potential" MT program or candidate for MT.

Response*:* Navigant has used the Home Upgrade Program throughout the document; clarified reference to Home Upgrade as a potential SMT initiative throughout the document.

2. **Strategic Market Transformation Theory and Component Elements – (merged with Chapter 3)**
    - Specific examples of metrics and trends pertaining to program uptake, savings, expenses, etc. from program inception to today are needed to accompany some of the theoretical, illustrative charts and content in this section.
    - Better to incorporate certain appendices (relevant content) into the overall report: Appendices B-E should be incorporated in the main body of the draft to eliminate unneeded cross references; Appendices without explanatory context (e.g., Appendix H) are unhelpful should be revised or removed.

Response: Navigant has incorporated Draft Chapter 2 on Theory and Draft Chapter 3 on Application to Home Upgrade into a single new Chapter 2 — with some foundational theory elements added to Chapter 1 — in the new draft and has also incorporated the recommendation of reducing appendices and has incorporated many of these into the report. Finally, Navigant was unable to gather the requested current Home Upgrade data to incorporate into this report.

3. **Application of SMT Concepts to EUC Home Upgrade—Current Status and Recommended Next Steps (merged with Chapter 2)**
    - A word other than "codify" should be used throughout section 3, where appropriate, because this term generally applies to either pending or adopted legislative mandates.
    - Section 3.1.5 regarding proposed governance structure should include a current structure as a point of comparison.
    - This section should be reorganized and revised to include the conclusions and recommendations outlined in Appendix F.4 and also incorporate relevant portions of Appendix J, which includes actionable recommendations to complete remaining tasks and sub tasks specified in Table 3-1 (p.48).

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[1] The Executive summary states in paragraph 2 that "there exists no formal role for SMT initiatives in the CPUC's energy efficiency portfolio policy rules and procedure," and in paragraph 4 that "the goal of this effort is to provide a workable model for the potential authorization of a plan and SMT framework that can be applied to the Home Upgrade program."

- References to CalTest and CalTRACK in Appendix F should be updated with current status of both projects as appropriate.

Response: The word "codify" has been removed from the document and replaced with appropriate other words; a discussion and graphic (Figure 2-13) of the current Home Upgrade governance structure as an RA program has been added in (new) Chapter 2, Section 2.4.14(current status section). All information on Current and Next Steps have been incorporated into the new Chapter 2. Navigant was not able to update to the latest information about CalTest and CalTrack.

4. Straw-person "How-to" Process to Identify, Vet, and Select SMT Initiatives

- The hypothetical straw-person example presented in section 4 mirrors existing CPUC/ proceeding practices. This section should be revised to include specificity regarding how the straw-person proposal coincides with proposed phase 2 issues and remaining tasks and sub tasks.
- What is the order of priority for these remaining tasks?
- Which remaining tasks/sub tasks can be completed/conducted in parallel with one another?
- Which remaining tasks/sub tasks must be completed/conducted independently?
- Is R.13-11-005 Phase III deliberation a potential alternative or additional element to the phase II proposal?

Response: This chapter has been removed from the current draft and recommended for WG review, vetting and finalizing in a next step activity.

Response: Navigant has added Table 1-1, Table 2-2, Table 2-3, and Table 2-4in Chapter 2, which provide an overview of: a) the SMT initiative pre-launch components that have been completed by the Home Upgrade WG; b) a summary of remaining tasks; c) description of the next steps to vet and address development of the remaining pre-launch component needs; and d) identification of the responsible party for completing the remaining tasks. Additionally, newly added Figure 2-2 in Chapter 2, provides a schedule that identifies the current and next step needs for the Home Upgrade WG to complete the SMT initiative pre-launch component tasks needed to potentially be the first state's SMT initiative. Figure 1-11 in Chapter 1 provides a generic schedule of completion of the pre-launch components.

The next step proposal for this project is exclusive of the Commissions deliberations in R.13-11-005 Phase III and is seen by the project team as providing a working example of a SMT initiative development and perhaps implementation process. The project team sees the completion of the vetting—under the sponsorship of the Home Upgrade Working Group—of the key issues associated with incorporation and implementation of a Home Upgrade SMT efforts in California as an excellent approach to informing future deliberations in Phase III of R.13-11-005.

5. **Navigant Perspectives on EUC Home Upgrade as an** SMT Initiative –
    - Consider reformatting into a conclusion section with a summary/recap of final conclusions and recommendations including challenges that prevented completion of all specified tasks. (i.e. time, resource constraints, budget, etc.)

Response: Navigant has implemented this recommendation

Center for Sustainable Energy Comments

(COMMENTS CSE #1)
EUC Topic Brief – Home Upgrade #2


EUC Topic Brief - Home Upgrade #2 L


EUC Home Upgrade_4.7.15.pdf


April 1 EUC Handouts.pdf

From: Stephanie Wang [mailto:Stephanie.Wang@energycenter.org]
Sent: Friday, April 24, 2015 12:37 PM
To: Jay Luboff; Laura Tabor
Cc: David Cohen
Subject: RE: Comments on Home Upgrade report

Hi Jay and Laura,
We'd appreciate a Word document version of the report so that we can provide our detailed comments on the ME&O and finance sections. We'd also like an opportunity to discuss our comments with you – are you available for a call next Thursday (other than 1-2p) or next Friday after 11am?
My colleague David Cohen, the Programs and Partnerships Manager for the Energy Upgrade California, would like to provide more detailed comments based on his long experience with ME&O for Home Upgrade, including during the ARRA period.
In the meantime, I would also like to share the following information about the statewide ME&O efforts under the Energy Upgrade California brand, and how these efforts have related to the Home Upgrade programs:

- The draft report assumes/proposes that the statewide ME&O efforts direct Californian residents to engage with the Home Upgrade program administrators. However, the statewide ME&O program coordination group, including CPUC staff and IOUs/RENs, had determined that statewide ME&O efforts should direct Californians to a landing page on the Energy Upgrade California website that leads customers directly to *contractors*, not the program administrators. We are happy to discuss the reasons behind this decision next week, as well as plans to revisit the call to action pathway (see attached Topic Brief).
- CPUC staff in consultation with the statewide ME&O program coordination group (including IOUs/RENs) has directed Energy Upgrade California statewide ME&O efforts to cover a broad range of topics, and we have only been directed to implement campaigns for Home Upgrade for limited periods of time, not continuously. Details are available in our Phase 2 and 3 Integrated Communications Plans, as well as the attached PDF for Home Upgrade statewide ME&O Plan in the current phase:
    - https://app.box.com/s/cvu0ac12pvv3yka4joo03cxjdufo1yyo/1/3056417915/258468478 05/1
    - https://app.box.com/s/cvu0ac12pvv3yka4joo03cxjdufo1yyo/1/3056417915/258468663 25/1

- Energy Upgrade California is a social marketing initiative with a broad range of channels. I've attached more information about the launch dates of these channels and other relevant information.
- The report called for better statewide coordination and sharing of best practices for ME&O. Please note that we have quarterly meetings and monthly calls to coordinate Energy Upgrade California and PA's related ME&O efforts. We continue to improve coordination and sharing of best practices and resources – monthly calls were recently redesigned to emphasize coordination and sharing of best practices/resources. We had a call focused on Home Upgrade ME&O and discussed opportunities to improve data sharing and coordination on 4/21.

Best,
Steph

Stephanie Wang
Senior Policy Attorney
Center for Sustainable Energy®
426 17th Street, Suite 700
Oakland, CA 94612
Phone (415) 659-9958
www.energycenter.org

NAVIGANT

CSE Comments on Best Practices Piece (2).docx #2

CSE Comments #2

CSE comments on
Best Practices piece

Navigant Response to CSE Comments

1. The draft report assumes/proposes that the statewide ME&O efforts direct Californian residents to engage with the Home Upgrade program administrators. However, the statewide ME&O program coordination group, including CPUC staff and IOUs/RENs, had determined that statewide ME&O efforts should direct Californians to a landing page on the Energy Upgrade California website that leads customers directly to contractors, not the program administrators. We are happy to discuss the reasons behind this decision next week, as well as plans to revisit the call to action pathway (see attached Topic Brief).
Response: It was not Navigant's intent make this suggestion. We were not able to find the specific reference and will revise if CSE advises us on the location.
2. CPUC staff in consultation with the statewide ME&O program coordination group (including IOUs/RENs) has directed Energy Upgrade California statewide ME&O efforts to cover a broad range of topics, and we have only been directed to implement campaigns for Home Upgrade for limited periods of time, not continuously. Details are available in our Phase 2 and 3 Integrated Communications Plans, as well as the attached PDF for Home Upgrade statewide ME&O Plan in the current phase:
a. https://app.box.com/s/cvu0ac12pvv3yka4joo03cxjdufo1yyo/1/3056417915/25846847805/1
b. https://app.box.com/s/cvu0ac12pvv3yka4joo03cxjdufo1yyo/1/3056417915/25846866325/1

Response: Navigant has updated the best practices appendix to clarify that the statewide ME&O program has been directed to cover a broad range of topics and currently supports Home Upgrade through specific campaigns.

3. Energy Upgrade California is a social marketing initiative with a broad range of channels. I've attached more information about the launch dates of these channels and other relevant information.

Response: No changes made. Thank you for the information.

4. The report called for better statewide coordination and sharing of best practices for ME&O. Please note that we have quarterly meetings and monthly calls to coordinate Energy Upgrade California and PA's related ME&O efforts. We continue to improve coordination and sharing of best practices and resources – monthly calls were recently redesigned to emphasize coordination and sharing of best practices/resources. We had a call focused on Home Upgrade ME&O and discussed opportunities to improve data sharing and coordination on 4/21.

Response: Navigant updated the best practices appendix to reflect these efforts to improve data sharing and coordination.

5. Page 75, Figure 3-4, "Statewide Energy Upgrade California ME&O Campaign" The Statewide ME&O campaign should have a medium influence on the following: Owner views, Availability of, Financing Programs, Whole House Contractors, Specialty Contractors, Rebates and Incentives, Customized Energy Management tools. These would all then have high influence on the Decision making process

Response: Navigant edited this graphic to reflect these additional influences.

6. Page 76, Figure 3-5: "Example Market Characterization Research Questions" I believe the following questions are missing from this mix: How do people normally go about procuring services 1, 2, and 3? What is the difference between how the programs are designed and how the marketplace currently acts? How can changes be made to the program design to align with the way people act naturally?

Response: Navigant added context around this figure to clarify that the questions in the figure should research actual market practices for each of the three sub-markets. The goal of answering these questions is to determine how to best align program offerings with current market operation.

7. Detailed comments and edits in training, ME&O and financing best practices appendix.

Response: Navigant accepted most of the changes proposed by CSE in the best practices section. The attached comment tracking spreadsheet summarizes these changes and how the team incorporated each suggestion.

D.2 Comments on Program Implementation Issues

Introduction to Comment Responses:

This report is a summary of SMT theory and components as they relate to Home Upgrade. The goals of the report are to: 1) identify issues that need to be addressed, and; 2) propose a plan for how to address them. For example, it proposes a process to identify, vet and select SMT Initiatives, but it does not propose specific solutions. The specific solutions for SMT will be identified, vetted and selected in phase 2 of the broader SMT effort. For this reason, some of the comments in this section are not "in scope" for this particular report as they presume that the report is a comprehensive action plan, which it is not. The comments are nonetheless valid. During phase 2, the WG will reconsider these comments, and further engage stakeholders in soliciting more of them. We thank stakeholders for their valuable input on these important program design/implementation issues.

Efficiency First California Comments

EFCA_Comments_Navigant Report v2.0

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4/23/15

Efficiency First California would like to submit the following comments regarding the March 27, 2015 report by Navigant Consulting titled "A Comprehensive Strategic Market Transformation Framework, Plan, and "How--to" Manual for Energy Upgrade California Home Upgrade"

While we commend the authors of the report for their detailed attention to the many aspects of the current EUC program and for identifying some barriers to market transformation, we feel that the report does not do enough to outline effective strategies to overcome those barriers. More importantly, the report fails to address the most important market barriers entirely, and offers no significant program design improvements that would expand the market or lead the way to true market transformation.

We believe that meeting California's energy efficiency goals (as expressed in recent legislation and in the Governor's plans to double the efficiency of existing buildings) requires not incremental changes but a fundamental paradigm shift in how energy efficiency programs work. Unfortunately, rather than advocating for big steps, bold actions, and innovative approaches, this report at best recommends superficial changes that would effectively maintain the status quo.

For example, although the report presents updated definitions for Program Administrators to help them understand the difference between Resource Acquisition programs and Market Transformation Initiatives, from an industry perspective, this distinction provides very few substantial differences from the current process.

The report also describes EUC's current approach providing rebates as a Resource Acquisition program that must now reshape itself to become a true Market Transformation Initiative, even though transforming markets is what the EUC program was supposedly designed to do. We fail to see how simply re--labeling the program from a RA effort to an MTI at this point will produce any measurable changes in outcomes. Without more concrete, substantial goals and definitive actionable items to actually drive change, the program will continue to support an ineffective process and fail to make significant steps to true market transformation whatever it is called.

The report does identify several more specific barriers to market transformation but falls short by failing to outline strategies to reduce or remove these barriers. For example, the report

states that "lack of statewide standardization and formal idea sharing may be the single largest limitation to EUC market transformation," but it makes no recommendations on how to remove this barrier.

The report also recommends "streamlining and standardizing the application process as well as contractor and homeowner participation requirements on a statewide basis," and minimizing "*the administrative burden for contractors:* Contractors are the life blood of any whole home energy efficiency program, especially one built on a market transformation platform." We appreciate the recognition of these challenges but would like to see more specific details on action items that will achieve these goals.

Many of the concepts and much of the language the EUC relies today comes from similar reports and studies that are largely based on theory. Unfortunately, over the past five years we have seen no evidence that these recommendations actually lead to mass--market adoption of efficiency upgrades, let alone drive true market transformation. We fail to see how anything mentioned in this current report is substantially different from the outline of the previous studies.

We appreciated the section that explained the history of relationship between the CPUC to the IOUs. It is helpful to see how the financial equation has shifted funds from the IOUs and into the CPUCs domain.

The authors interviewed program representatives from other states to identify best practices that can shape the EUC program. While this may be a good idea in principle, some of the program models listed for best practice models have been or are in the process of being shut down, suggesting that they may not be the best to duplicate. Additionally, none of the programs that were recommended for the interview process have had success with Market Transformation in the energy efficiency sector. If we model the EUC program on other programs that have failed to be effective, we are setting the stage for a continued struggle with meager outcomes. A more effective approach might be to study other industries that have successfully achieved market transformation, such as the solar industry, and incorporate their best practices as examples for market transformation strategies.

The CPUC and ECU should be looking at any and all new ideas that can drive demand by providing measured energy savings as the goal. Business models need to be defined by innovation, not program design. To foster contractor participation, the program designers need demonstrate a concerted effort to build profitable business models that are not dependent on incentives for survival. Once the market demonstrates higher profit margins for contractors, there will be no lack of interested parties willing to participate.

The report mentions building relationships with stakeholders and encouraging support from contractors. It describes partnerships with industry and other stakeholder groups. We feel that in spite of the large number of man--hours contributed, the EUC working group has failed to

explore truly innovative ideas or consider any approach that has not been attempted before. We have deliberately chosen not to participate in the EUC working group process, as we feel it is expensive and has yet to provide any viable solutions.

In March of last year, EFCA proposed what we believed would be a more useful collaborative working structure in our "Residential Clean Energy Roundtable" proposal. The proposal describes in detail a process that would include industry as an active partner in program design and implementation. Unfortunately, program designers have shown little interest in adopting this approach, and as a result they continue to work without meaningful industry input.

EFCA has been an active and willing partner in the EUC process for several years now. On more than one occasion we have offered useful industry perspectives and valuable examples of potential solutions, only to have our efforts dismissed and ignored. We believe that this failure to involve industry as an equal partner in the early stages of program design is a major oversight. The current practice of basing program design on out--of--date theories and then consulting with industry only after these programs fail is simply no longer a tenable approach.

Efficiency First California is in favor of a new, innovative approach that works towards building a pay--for-- performance market that is based on actual energy savings as opposed to modeled or deemed savings. The current report does mention the need to measure savings as one of the steps to Market Transformation but fails to mention new technologies that could support that effort.

Today we can measure and quantify energy savings using Energy Efficiency Meters. These meters are a software solution that allows a comparison of baseline energy use before and after the retrofit process.

By measuring actual energy savings, we can create a reward structure based on real--world results, unlike the current approach, which relies on deemed or modeled savings. PG&E has been instrumental in developing the CalTRACK system, the first large--scale attempt to implement EE meters into the energy efficiency marketplace. If the EUC program truly wants to achieve true market transformation, it needs any and all approaches to building the market for energy efficiency services.

We are disappointed that this report makes only a brief mention of CalTRACK. The report does suggest that such systems could provide an incentive to contractors to improve their practices by fostering competition and helping to differentiate them. The report goes on to state "the performance based incentive model may be what is needed to drive toward a market transformation program, an incentive given not for perceived performance/energy savings, but actual energy savings." However, it then supports the existing deemed or modeled savings approach, suggesting that "simply basing incentives off of modeling tools that predict savings more accurately could be an effective change alone." The notion that that more accurate modeling tools alone will lead to market transformation is short sighted and

does not address the concern of paying incentives based on deemed rather than modeled savings.

Ultimately, real--world energy savings must be the goal of any of these efforts and market transformation will not happen without exploring new and innovative approaches. Unfortunately we feel that this report offers little in the way of new and uncharted examples of solutions to explore. Instead it offers incremental changes to the existing method that have clearly proven to be less than effective.

At EFCA we believe in the value of energy efficiency upgrades. We recognize the state's ambitious goals to reduce energy consumption as defined in Assembly Bill 758 (AB758 -- Skinner). If we are to meet or even come close to meeting these goals we need to provide solutions that have effective and immediate impact. This report would have us implement incremental changes and then re--evaluate later-- as much as ten years later--to determine the effect. In our view, this is not adequate. The EUC has spent the past five years, and millions of dollars, following a program that is not materially different from the one advocated in this report.

We think it's time to do something different. In order to succeed we need to try any and all new approaches and take measurable steps to achieving the goal of true market transformation. Our concern is that by relying on the status quo with a few changes and expecting market transformation, reports like this may undermine efforts to make more substantial and effective changes. If history proves anything it is clear a business as usual approach with minor tweaks will not achieve anything near the efficiency we need in the time frame necessary; nor do we have confidence that the process described in the report will shift the market closer to true market transformation. It's time to take big steps and bold actions, as business as usual is not an option.

Sincerely,

Charles Cormany
Executive Director
Efficiency First California

Navigant Response to EFCA Comments

1. EFCA comments that the report makes no recommendation for how to achieve statewide standardization
Response: Statewide standardization is addressed in Figure 2-12. Overview of Core Business Structure of this revised report where the core business structures for standardized statewide

contractor enrollment and job submittal processes are outlined. The PAs propose to develop standardized statewide requirements for these two key contractor-facing program elements.

2. EFCA comments that the report did not identify definitive actionable items to drive change
Response: Comment is on elements out of scope for the report. Please see the Introduction to this section. This report, however, does propose recruiting handshake partners, SW standardization and a process to solicit and select more SMT ideas.

3. EFCA comments that the report recommendation are based on theories, not evidence –
Response: Comment is on elements out of scope for the report. Please see the Introduction to this section.

4. EFCA comments that nationwide best practices are from similarly stuck, non-transformative programs. Need to look at other industries
Response: Comment is on elements out of scope for the report. See Introduction. We do note, however, that Appendix C summarizes nationwide Best Practices and identifies how California's Home Upgrade Program matches up positively to these and identifies areas of improvement. Navigant agrees that solar needs to be studied and models adopted, per the EFCA comment.

5. EFCA comments that it prior proposals have been dismissed and ignored
Response: The Working Group has successfully initiated a new effort to bring more contractors into meetings to discuss and shape SMT efforts

6. EFCA comments that the SMT effort needs to consider a Pay for Performance approach
Response*:* Comment is on elements out of scope for the report. See Introduction. PG&E recently agreed with the Pay for Performance pilot proposed by NRDC.

7. EFCA comments that the report advocates for incremental steps and evaluate their effectiveness 10 years later, which is too late, we need to try new and substantially different approaches
Response: The report outlines a process to solicit new ideas in Phase 2 of this SMT project

Nate Bellino Comments – SDI Insulation

From: Nate Bellino
Sent: Friday, April 24, 2015 11:38 AM
To: Jay Luboff; Laura Tabor
Cc: Tom DiCandia; Steve Delorenzi
Subject: Comments Regarding Home Upgrade California

Jay and Laura,
Thank you very much for the opportunity to comment on the Home Upgrade program - both in person and written here. It was good to hear your thoughts at the forum and I appreciate all your help in understanding best practices.

Please find my comments below. I am happy to provide further detail at any time. My perspective is a little different from other contractors, having run 3 in-home programs with large utilities and advising / researching program design on dozens of others when I ran residential programs for Ecova. I also implemented Lean process improvements to our program admin in a streamlining effort. I hope this is helpful!

- **Energy Audits should not require a BPI Analyst.** I have successfully run programs for large utilities across the country without BPI Analysts required for energy audits. I also see not requiring BPI Analyst audits as a trend in program design. The reason for this is twofold: 1) this requirement adds cost and time to the sales cycle and has been identified as a barrier to project commitment, and 2) with software like CAKE, you don't need it - the accuracy of savings estimates is the same if not better and time required is 30-40 min vs. 4 hrs. Is training required? Yes. And we have a BPI Analyst on staff to do so. Is a BPI Analyst required for an accurate energy audit? Absolutely not. When we perform CAS testing, however, I can see a greater need for a BPI Analyst currently, given the risks associated.
- **CAS testing should only be required upon test out.** We need to ensure the safety of every homeowner and this is a task we take very seriously. However, I do not see the need to perform the test twice. The home must be safe once the project is done - this is the new state we should test on and be held accountable for. Testing prior for both Advance and Home Upgrade programs - particularly Home Upgrade, which is supposed to be streamlined - is unnecessary and acts as a barrier to the project process.
- **Testing requirements and program rules should be the same between IOUs and RENs.** Inconsistencies between the RENs and IOUs that make a complex program even more so, and constant changes to both add cost of administering to a contractor. Each rebated project currently costs us $200-$500 to manage to completion, primarily due to administrative complexities. That's 5-15% of our normal project amount and directly affects our profitability. For some reason we continue to eat these costs, yet I can see why other contractors are not willing to. Consistency and streamlining will reduce this to an amount that can more easily be absorbed into the cost of business.

- **The reservation step is unnecessary.** Once a project is done contractors can submit rebate requests with funding available on a first-come-first-served basis. This step again acts as a barrier to project commitment, adds administrative costs, and adds little value to the process.
- **Timing of rebate check could still be improved.** We have seen dramatic improvement over the last couple years, however the timing is still often out of market accepted standards. The issue is consistency as well as length. We need to be able to confidently tell people when they will get their rebate and have it be reasonable. 2-8 months is still not uncommon.

We continue to be supporters of the program and are willing to work together to increase contractor willingness to participate, helps homeowners, and captures savings. The above represent focal areas where we feel improvement is needed for the program to make more business sense for us and all contractors involved.

Thank you again for this opportunity and I am happy to discuss further.
Best regards,
Nate Bellino
Energy Centrex
SDI Insulation

Navigant Response to Nate Bellino/SDI-Insulation Comments

1. Energy Audits should not require a BPI Analyst, however, CAS testing should

Response: The program does require BPI Analyst to perform CAS testing. PG&E does not require a BPI to do the diagnostic testing. However, it is advantageous to have one person perform CAS and Diagnostic testing so that 'issues' from either the safety or performance perspective can be identified and added to a work scope proposal prior to installation.

2. CAS testing should only be required upon test out

Response: CAS testing at test-in is done primarily for two reasons: 1) Identify needed CAS repairs at the beginning of the process that must be performed as part of the work scope so that the customer isn't surprised by additional, unforeseen charges at the end of the project and, 2) to protect the occupants when air sealing is performed early in a retrofit and occupants are unintentionally exposed to enhanced and unknown levels of combustion gases prior to test out. If there is a better way to ensure these two issues are adequately addressed, the WG would vet these in Phase 2.

3. Testing requirements and program rules should be the same between IOUs and RENs

Response: Need specifics here. The IOUs recently aligned Home Upgrade incentive amounts with RENs. Participation rules are nearly identical. Statewide standardization is addressed in Figure 2-12 of the revised report where the core business structures for standardized statewide contractor enrollment and job submittal processes are outlined. The PAs propose to develop standardized statewide requirements for these two key contractor-facing program elements.

4. The reservation step is unnecessary

Response: At least one IOU is currently evaluating this for Advanced Home Upgrade. It is not required for Home Upgrade. Design issues of this sort will be vetted in Phase 2.

5. **Timing of rebate check could still be improved**
Response: There is general agreement that this issue needs continuous improving its rebate processing time.

Tom DiCadia Comments SDI Insulation

From: Tom DiCandia [mailto:tdicandia@sdi-insulation.com]
Sent: Monday, April 27, 2015 9:26 AM
To: Jay Luboff; Laura Tabor
Cc: Nate Bellino; Steve Delorenzi
Subject: Re: Comments Regarding Home Upgrade California

Jay and Laura,
I agree with the points Nate brought up. Efficiency and streamlining of the process is necessary for long term success on all levels of the Home Upgrade program. I have one additional point to bring up.

- **Post Improvement Test-Out should satisfy the HERS test requirement.** When there is an HVAC or Duct Replacement in the project, currently we are scheduling two post improvement final test assessments which adds significant cost, coordination time, and additional complication to the project. Since the contractors in the Home Upgrade and Advanced Home Upgrade programs are already specially trained and certified to perform premium quality work, the completed jobs should only require one final post-improvement test to confirm and report the level of efficiency improvements, safety verified, and confirm integrity of the work performed.
Thank you for your efforts to streamline the coordination between our industry and the current incentive programs.

Regards,
SDI Insulation, Inc.
Tom DiCandia
Home Performance Manager

Navigant Response to Tom DiCandia/SDI-Insulation Comments

1. **Tom DiCandia agrees with Nate Bellino comments and comments in addition that the post improvement test-out should satisfy the HERS test requirement**
Response: This is a state CEC regulatory requirement. Only the CEC can make exceptions like this for the Home Upgrade program.

Jim Apperson Comments

Jim Apperson Working Group.pdf FILE EXTRACTED BELOW

To the Energy Upgrade California Working Group

I would like to take this opportunity to comment on the Market Transformation Framework Plan. This is not so much a commentary on the report as it is some thoughts on the Market Transformation concept as a whole.

First let me say that the report put together by Navigant was obviously well researched and thought out. And it must have taken much time to put together and write. These comments are written from the point of view of a Home Performance Contractor and therefore may not be as polished as the concepts in the Navigant Report.

To me, market transformation means devising a set of activities or strategies that will result in the bulk of the people in this State acting in a way that ends in the majority of homes and business meeting efficiency targets. While many goals have been put forth by Navigant in the report, the actual mechanics of how this will take place are not included. I would guess that is intentional and meant to be a phase two activity. What I believe will be an issue no matter what activity is decided upon is the same problem faced since the first energy conservation programs rolled out in the late 1970's or first of the 1980's. And that is you have a large percentage of people in this State who are not going to be persuaded to take any action towards energy conservation while they live in comfort.

I believe you have certain groups of people who have achieved varying degrees of home energy efficiency for several reasons. First you have the "Green" people. These folks will have energy efficient measures and equipment installed at their homes because they feel it's their duty as a member of society to do their part to save energy and use less fossil fuels. This group would likely engage in energy conservation even without an incentive program or reward. Then you have another group who notes their raising utility costs and feels the best way to keep this under control is thru energy efficiency measures. Some in this group would perform without the incentives but not all. Then you have the group of folks who have equipment failure or are remodeling and see the incentive programs as a way to afford better equipment. These groups are also known as "low hanging fruit" as it's easy to sell them on the concepts or they have already sold themselves. Unfortunately, in my opinion, these folks represent maybe 15-20% of the population as a whole. You then have another 10% who are eligible for free, income based direct installation programs. So you have maybe 25% of the population spoken for, and these are the easy ones, many of whom have already taken advantage of energy programs over the past 30 years or so. The other 75% of the population is going to be the target for the Market Transformation. And it's going to be a tough

sell. These folks have no reason (in their own mind) to spend money on conservation. They are too wrapped up in their own worlds to even give it any thought or consideration. They are not going to act unless they are made uncomfortable. We were possibly headed that way a while back by raising fossil fuel prices but then fracking was discovered and people now again think we have an infinite amount of natural gas and oil. Even if their heating and cooling costs were doubled, or tripled, most would just gripe and write the check and go back to whatever it is occupies their time. Unless a way can be found to make this large, stubborn group uncomfortable enough to act I don't see market transformation achieving their goals.

One way that might appeal to this large group is greed. If you can't make them uncomfortable enough to put down their iPhone and look at a whole house energy upgrade, then money can work. This is likely not going to work for the whole 75% of inactive energy users but something I have noticed is participation in energy upgrade programs seems to start involving chronic nonparticipants when you offer zero interest long term financing. We saw it in the early 1980's when PG&E offered their Zero Interest Program (or ZIP) long term financing, and again a few years back when we had zero interest loans offered by CHF using Stimulus funds. I realize we currently have a couple low interest longish term loans, but what seems to bring out the true non-performers is an honest, no interest long term loan with almost no barriers to qualification. This just really lights the fire for some folks who ordinarily wouldn't respond to say a 1% loan but will grab up a 0% 20 year loan. What could make this more salable still is stretching thee loan out to where the projected energy savings cover the loan payment.

In reading Navigant's proposed or possible hopeful outcomes that might transform the market are is the active participation from the Real Estate industry. I think this might be wishful thinking. While some R.E. professionals do see the value in energy efficiency, and some brokers may even see the advantage of using energy efficiency comparisons as a sales tool, I think the industry over all still sees a required energy inspection at close of escrow to be a deal killer. In addition it's also something to add another several pages to the stack already required to sell a home. By the time a property goes into escrow the buyer and seller have pretty much agreed to a price. So the only different outcome from an energy inspection is the buyer and seller no longer agrees because of items on the energy inspection. Just like a pest and fungus inspection it only holds the power to kill a deal, not cause a deal to materialize where there was no deal before. One theory goes that the R.E. industry will eventually have all their properties inspected before escrow. This is a fine concept, but who pays for this? A HERS inspection that could be used for an Energy Efficient mortgage will cost between $350 & $750. The seller isn't going to want the expense and the R.E. agent isn't going to foot the bill. Back in the early 1990's we were trained as HERS raters so we could handle the huge volume of energy efficient mortgages that were going to materialize in the coming years, it just didn't happen. More than once mandatory energy inspections were brought up in bills to become law and it's my understanding the powerful lobby of the R.E. interests saw these attempts were squashed. If it hasn't happened in 20 years it's probably not going to happen now.

In my opinion I just don't see any viable way of changing the way people feel about spending their money for things like energy efficiency. I do however have a few ideas about how we could make it

happen in the end. And that would be a form of direct installation. I have heard figures mentioned a few times relating to the cost so far of the Energy Upgrade California program. I've heard costs associated with each rebate given out so far as being in the $15,000-$20,000 range. These figures (from what I understand, I could be wrong) are the costs per home for each home that participated in EUC. And that's not counting the actual rebate. This is evidentially administrative and advertising and program monitoring etc. If this is an acceptable amount of money to spend per unit upgrade maybe there is a way to cut the advertising and the costs of qualifying households and checking out whether a rebate is allowed for a certain item and put the money saved into the homes themselves. So let's do away with all the program administration and get the money to the contractors. How about if an area was selected (a city, but eventually everywhere in the State), and a contractor would go door to door doing energy audits. Then give the contractor a whole house energy upgrade budget, but make it substantial, say $10 per sq ft. Now, this money does not go to the contractor, it's just a budget of useable money. The contractor then uses his energy audit and installs whatever is cost effective for that home, but staying within that budget ($10,000 for a 1,000 sq ft home). Some homes won't need the whole amount but some will need more, so if the contractor only spends $8 sq ft because a particular house already has vinyl windows, then he has a $2 sq ft credit that can be used on a house that needs more. The contractor installs everything and is paid enough to cover all labor and materials and any subcontractor used. He is also paid enough to cover his overhead and a small profit. But the way the contractor is going to make his real money is he'll get the homes first year energy savings as his real profit. This would cause something additional to be added that has been lacking in the EUC so far, and that is customer education. If the contractor has a stake in whether or not his customer saves on utilities he is going to make sure the customer knows how to use that nice new programmable thermostat correctly instead of just using it as an on and off switch. Education about everything, lighting habits, how to keep the freezer loaded at all times, and the contractor would be inspired to really educate his customer. And I would think it could be done for less than some of the per unit costs I've heard, if they are in fact correct.

The downside of this would be that after the whole state is retrofitted the Home Performance Contractor would no longer be needed. Hopefully it would take enough time for me to retire.
So those are my ideas. A long term easy to quality for zero interest loan, or a direct install program, but use contractors and give them a stake in the successful outcome and results.
Just a thought.

Navigant Response to Jim Apperson Energy Management Comments

1. **Nonparticipants need to be made uncomfortable enough to motivate them to participate (e.g. higher energy prices) or offer zero interest loan products**

Response: Energy prices are rising in CA. The program has no ability to influence this. The CPUC-approved financing pilots require third party capital. Private residential customer interest rates will be between 6 percent to 9 percent.

2. **Recruiting the Real Estate Industry is unlikely**

Response: Navigant agrees that this is difficult. Some progress has been made in southern California. Efforts will continue in this area.

3. **Make the program a direct install program. Get rid of all implementation, admin and marketing costs. Give the contractor a budget of $10/square foot**
   Response: IOUs are open to other program models. PG&E recently agreed with the pay-for-performance pilot proposed by NRDC. The report outlines a process to solicit new ideas in Phase 2.

Buildings Performance Institute Comments

Hi Laura,
Attached are my comments to the Draft MT Report.

I need to congratulate you on the thoroughness of the report which hit on many key improvements for the CA market. As you will see my comments points to the BPI GoldStar Contractor Program. I am not sure if you were aware that we completely revamped the BPI accreditation program moving away from the "stick" and a perceived back-end penalty associated with the QA inspections to a "carrot" approach to quality improvement enacting proactive quality control guidance and mentoring of contractors to drive front-end quality. Key services and training are provided by the most respected leaders in the home performance industry, including Advanced Energy, EnergyCircle Pro and others.

I would like to schedule a time that we can discuss the BPI GoldStar Contractor Program so that I can demonstrate the benefits to contractors and how this can help PAs meet their goals. I think you will be impressed when you see the program BPI has put together for contractors.

Regards,
John

John Jones
National Technical Director
Building Performance Institute, Inc. (BPI)

Navigant Response to BPI Comments

Response to BPI Comments

1. PAs should look to require BPI GoldStar for Program Contractors
Response: Navigant understands that the PAs are already familiar with the GoldStar contractor program. The PAs already have High Performing Contractor status for participating contractors based on similar guidelines. Navigant understands that the PAs feel that the next step is developing verifiable quality installation metrics as proof of high quality installation. This need goes beyond current GoldStar standards. That said, the PAs encourage BPI to continue its involvement and note to Navigant that they will continue to evaluate BPI standards and programs in their program design.

D.3 Support for Implementing the Straw-Person SMT Framework

Pacific Gas & Electric Comments

PGE EUC Market
Transformation Fran

Comments on A Comprehensive Strategic Market Transformation Framework, Plan, and "How-to" Manual for Energy Upgrade California Home Upgrade

Pacific Gas and Electric Company (PG&E)

April 24, 2015

Summary

Navigant's *A Comprehensive Strategic Market Transformation Framework, Plan, and "How-to" Manual for Energy Upgrade California Home Upgrade* (Report) provides a sufficient intellectual and practical framework to confidently move forward on Strategic Market Transformation (SMT) for Energy Upgrade California® Home Upgrade. If the California Public Utilities Commission (CPUC or Commission), and current Program Administrators (PAs), diligently follow the steps outlined in the *Components of a Strategic Market Transformation Framework* section of the Report, PG&E believes that we can make the Home Upgrade program a successful SMT Initiative. We look forward to co-managing the SMT idea solicitation and vetting process with the CPUC, ultimately partnering with idea applicants and champions to make the SMT Initiative a success as well as leading several initiatives ourselves directly.

1. Support report recommendations to follow steps for a Strategic Market Transformation Initiative

Figure 2 on page xxiii and Figure 2-10 on page 26 of the report, entitled *Components of a Strategic Market Transformation Framework,* summarizes the necessary component elements of an SMT initiative. It serves as a step-by-step summary of what actions are needed to achieve the full benefits of an SMT initiative. We support undertaking all of these actions, in this order, to ensure that all the right issues are addressed at the right time to successfully transform the Home Upgrade market.

2. Explore funding for Strategic Market Transformation implementation and Evaluation, Measurement & Verification

Current authorized Home Upgrade program and EM&V funding covers implementation of the existing Home Upgrade program and evaluation activities. However, SMT activities described in the report may require increased program and EM&V funding. For instance, market transformation-related program activities include engaging in a new intervention strategy with new parties and forming partnerships. Additionally, the EM&V-related efforts described in steps 2, 3 and 8-13 of the *Components of a Strategic Market Transformation Framework* go beyond the current scope of planned EM&V activities for Home Upgrade. To ensure successful implementation of SMT activities, PAs may need to consider funding options, including leveraging existing fund-shifting authority.

Further, PG&E recommends exploring the constraints of, and providing recommendations for, cost-effectiveness evaluation of market transformation programs within the current cost-effectiveness framework. For example, near-term costs may outweigh near-term benefits. Non-participant savings may take years to fully materialize to justify the larger upfront spend. The cost-effectiveness of SMT-specific funding should be separately calculated over a longer time frame.

3. Expeditious approval of Home Upgrade as an official SMT initiative
The proposed SMT effort significantly expands the current scope of Home Upgrade program. Formal CPUC approval and support for the Home Upgrade program as an SMT Initiative is essential so that the implementers can fully engage knowing with certainty that it will be evaluated as such. Specifically, we need to know that key issues like nonparticipant savings will be considered in future program evaluation and that the success of the effort will be judged according to whether the full list of agreed upon market transformation indicators (MTIs) are achieved. The definition of what a Market Transformation program is has evolved with the 2014 publication of the Prahl and Keating white paper as compared to previous definitions. It is the new definition for which we are seeking formal CPUC support.

4. Immediately start the Home Upgrade Strategic Market Transformation Initiative as a working laboratory to provide greater specificity to Phase III OIR proceedings
Approval for making Home Upgrade an official SMT Initiative should not wait for Phase III of the energy efficiency rulemaking (R.13-11-005) to be fully implemented. Initiating Home Upgrade as an SMT Initiative now provides the greatest benefit. The Home Upgrade SMT Initiative can be a living laboratory that will enrich and inform the Phase III discussions and outcomes surrounding MTIs.

5. Support recommendations for the Strawperson Stage Gate Process for Soliciting and Vetting SMT ideas
Table 4-2 entitled *Strawperson Stage-Gate Process for Soliciting and Vetting SMT Ideas* outlines a 14 step process for soliciting and vetting SMT Ideas. PG&E is supportive of the process as outlined. Under this process, Champions for key initiatives from throughout California can apply for, and be selected to lead those initiatives. PG&E recommends that the IOUs and RENs continue to be the Home Upgrade SMT PAs. As PAs, we would participate in the solicitation and vetting process with the CPUC and then partner with the selected Champions to coordinate the efforts of the winning initiatives. The PAs should also have funding to run their own initiatives. PG&E suggests that Navigant clarify how the term "determining appropriate administrators" is being applied in Chapter 4.

6. Remove all references to program administration in the "How-To" Manual designed specifically for the Energy Upgrade California Home Upgrade Program
PG&E believes that the "How-To" manual is not an appropriate venue to discuss the issue of program administration. PG&E disagrees with the authors' assertion stating "Utilities face several challenges as administrators of SMT initiatives because utility territorial and corporate structures may not be in ideal alignment for offering such initiatives" (p. 35). In fact, IOUs have a demonstrated track record of leadership in MT design and implementation. For example, California IOUs can claim success in helping transform the television market, driving significant efficiency in

the upstream market. As part of this market transformation initiative, IOUs approached retailers and manufacturers with incentives to encourage stocking more energy efficient products. To qualify for incentives, TVs were required to surpass the ENERGY STAR® efficiency level by at least 15%. By 2011, all major retailers and 352 stores in PG&E territory were offering high efficiency TV models. Today, TVs are on average 50% more energy efficient than their 2008 counterparts.

Policy barriers are the real challenge to SMT initiatives in California. These barriers include the way in which EE programs are evaluated in California, the way in which cost effectiveness is determined and the ways in which program administrators can estimate EE savings. Regardless of program administration, these barriers will continue to exist and hamper MT efforts until policy changes are made.

Importantly, PG&E has taken strides to overcome the technical and policy barriers and is spearheading the Retail Plugload Portfolio (RPP) trial with a cadre of industry support including EPA, NEEA and others. PG&E is working collaboratively with stakeholders to ensure that we surmount the technical and policy barriers of the past.

Navigant Response to PG&E Comments

PG&E comments generally express support for the continued development of the Home Upgrade program into an SMTI and the incorporation of the SMT Framework component into the state's current RA oriented efficiency portfolio. Here Navigant addresses comments 4 and 6.

4. Immediately start the Home Upgrade Strategic Market Transformation Initiative as a working laboratory to provide greater specificity to Phase III OIR proceedings — Approval for making Home Upgrade an official SMT Initiative should not wait for Phase III of the energy efficiency rulemaking (R.13-11-005) to be fully implemented. Initiating Home Upgrade as an SMT Initiative now provides the greatest benefit. The Home Upgrade SMT Initiative can be a living laboratory that will enrich and inform the Phase III discussions and outcomes surrounding MTIs.

Response: See Navigant response to EDs question on the role of a Phase 2 of this effort and its relationship to the energy efficiency rulemaking (R.13-11-005). In particular, Navigant agrees a Home Upgrade SMT Initiative can be a very informative living laboratory that can support continued market adoption of the program, and inform Phase III CPUC discussions.

6. Remove all references to program administration in the "How-To" Manual designed specifically for the Energy Upgrade California Home Upgrade Program -- PG&E believes that the "How-To" manual is not an appropriate venue to discuss the issue of program administration.

Response: The "How-to" manual chapter has been removed from this draft as it was not fully vetted and agreed to by the WG prior to draft publication. Navigant recommends that the issues related to development of a formal SMT framework be reviewed, vetted and agreed upon as part of next step WG deliberations.