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PROPOSAL TO CONDUCT ANALYSIS TO UPDATE ENERGY EFFICIENCY POTENTIAL, GOALS AND TARGETS FOR 2013 AND BEYOND

Presented to

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NAVIGANT

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1 Cover Letter

1.1 Introduction

Navigant Consulting, Inc. and our partners the Heschong Mahone Group and Waypoint Building Group are pleased to present this proposal to the Energy Division and supporting consultant, KEMA, to conduct an analysis to update the energy efficiency potential, goals and targets for 2013 and beyond. We are submitting a bid for both tracks 1and 2. We view this as an opportunity to not only meet the research needs outlined in the Request for Proposals, but also to deliver a work product that ties together California's broad and diverse energy efficiency goals and ambitions.

1.2 Overview of Approaches to Track 1 and 2

Our approach to achieving the core goals of the RFP include:

- Navigant will conduct Tracks 1 and 2 in parallel and in close coordination to provide guidance for the utilities' next energy efficiency portfolios. This will include clear guidance on sector level potential based on the historic and projected contribution of high impact measures as well as quantify the potential for emerging technologies, markets, legislative initiatives and changing baseline and code environments.
- We will develop the output of our work in a way that supports integration of the study results into the state's energy efficiency planning process, including the IOUs' energy efficiency goals, the California Energy Commission's (CPUC) Integrated Energy Policy Report, and the CPUC's Long Term Procurement Planning Proceeding.
- Members of our team have been fully engaged in various aspects of California's dynamic legislative environment and strategic planning process and will be able to deliver a project that coordinates with various stakeholders and interested parties including AB 32 and related planning initiatives.
- Navigant staff has participated in the previous shareholder Risk Reward Incentive Mechanism procedures and understand the dynamics of this process and how it relates to this work effort.

Track 1will focus on key market drivers as related to IOU territory Economic Potential. A thorough analysis of the economic potential energy saving within the state's IOU territories will be generated using Navigant's EERAM (Energy Efficiency Resource Assessment Model) tool. Navigant has used this Excel based model within California and in other parts of North America for years. It is flexible, transparent and based on inputs that are similar to the ASSET model used in the 2008 study. This allows us to incorporate many of the ASSET model inputs and outputs and calibrate with past studies to ensure continuity of approach while expanding on the modeling capabilities needed to accomplish new objectives, such as incorporating the strategic plan.

Track 2 will focus on identifying key market drivers that can impact the Total Statewide Market Potential, and yield a set of goals and targets that encompass the breadth of activity occurring within the state. Several features of our approach include;

- Conduct a thorough vetting of all assumption related to attribution of savings for each of the market drivers and related sector impacts to ensure savings are not "double counted".
- Develop a bottom-up estimate of the Technical Total Statewide Potential for each driver utilizing

existing assumptions and estimated savings or developing new estimates of strategy savings, as required.

- Conduct a collaborative screening process to categorize each driver as "most likely" "may be likely" or "not likely" to having savings impacts over the planning period.
- Evaluate the market achievable savings potential from each of the KMDs identified as a result of Task 4 under "high", "medium", and "low" scenarios. Compare scenarios to goals when possible.
- Identify the core technologies (HIMs) that are responsible for the energy savings from the KMDs. Calculate the energy savings specifically from the HIMs.
- Develop goals and targets for individual and Total Statewide Market Savings expected over the study period to be captured by the KMDs.
- Provide CPUC and statewide planners a comprehensive set of tools to facilitate planning by easily identifying key opportunities for savings as well be the ability to run "what-if" scenarios.

1.3 Navigant's Previous Potential and/or Goals Studies

Navigant has successfully employed EERAM in numerous potential studies both within California and in other parts of North America, to establish goals and targets for a range of energy industry participants. Most recently Navigant completed DSM potential studies using existing data sources for most of the municipal utilities in California in 2010. These studies are in preparation for the utilities' ten-year energy efficiency plans required in California Assembly Bill 2021. The EERAM model that Navigant used for these California municipal utilities is an earlier version of the one that Navigant proposes for this project. As part of this study, Navigant used the DSM measure and costing information in the utilities' E3 calculators to provide many of the inputs for the EERAM. Another very important source of information used to identify building stock characteristics and DSM technology densities were the input files used by Itron for its ASSET model runs used to develop the 2009 portfolio savings. In addition to the EERAM approach and other modeling skill highlighted in section 3 of the proposal, staff from Navigant and out partner firms have complete numerous engagements that require interfacing with various market actors and incorporating a diverse set of goals into a cohesive plan. This skill will be critical to effectively completing Track 2.

1.4 Navigant's Key Staff and Partners

Navigant's proposed team includes the Heschong-Mahone Group and Waypoint Building Group, two firms that compliment Navigant's team and who bring diverse perspectives on California's unique legislatives and strategic planning environment. Navigant's proposed senior project team includes seasoned individuals who have managed large ED projects before and who have an excellent grasp on the issues surrounding both Tracks 1 and 2. This team includes:

- The Senior Project Management Team consists of Floyd Keneipp, who will be the primary point of contact on all project matters, and Kevin Cooney, who will be the senior Navigant representative on the project.
- Senior Project Advisors include Diane Vrkic and Doug Mahone who will advise on strategic plan and legislative initiatives, respectively, and Cory Welch and Randy Gunn who will advise on modeling uncertainty and potential study quality control.
- Gary Cullen has conducted scores of potential studies across the country, including work on the ASSET model during his employment at Itron, and will lead the Track 1 effort.

- Jay Luboff will lead the Track 2 engagement based on tenure as senior policy analyst at the CPUC where he led the creation of the Energy Efficiency Best Practices Study, the California Evaluation Framework, and supported many of the decisions creating the overall California efficiency framework.

In summary, the proposed team presents a dedicated resource that has demonstrated innovation and quality research delivery through numerous engagements with the CPUC. The team has the availability for this research and has demonstrated a detailed understanding of the relevant issues, analytical methods, and importance of energy efficiency in California. We appreciate the opportunity to submit a proposal to conduct this important work.

2 Strategic Analysis Components

2.1 Overview and Introduction to Structure of Analysis

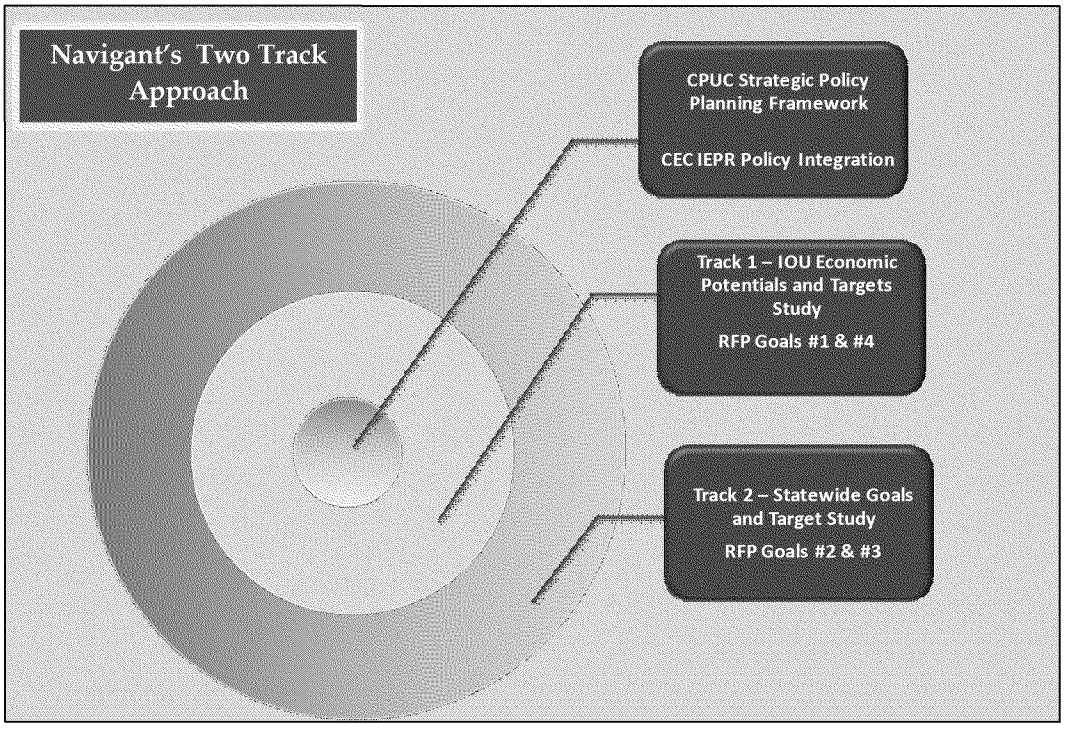
As noted in the Request for Proposal (RFP), the Commission has four goals for this study:

1. Provide guidance (targets) for the utilities' next energy efficiency portfolio
2. Update procurement planning forecasts
3. Inform strategic contribution to California's GHG reduction targets (AB 32)
4. Set benchmarks for the Risk Reward Incentive Mechanism (RRIM)

Navigant Consulting proposes to undertake an all-inclusive study of the state's Total Statewide Market Potential (TSMP) to meet these goals. To achieve this end, our approach incorporates both results from our proposed Track 1: *Economic Potential Study* analysis, with a focus on providing the Commission the data it needs to develop both Investor Owned Utility (IOU) targets and to inform Commission deliberations on the RRIM; Navigant's proposed Track 2: *Goals and Targets Study* evaluation, the focus of which is to provide the Commission with a comprehensive strategic planning framework, which we call here the ***CPUC Goals and Targets Strategic Planning Framework*** that can be used to inform future Commission and CEC policy related to the goals stated within the RFP.

Overview - In Figure 1 we provide a high-level overview of our approach, including its relationship to the RFP goals.

Figure 1 - Navigant High-Level Study Approach



Proposal Features (High-level) – Features of our approach include:

Track 1 – A focus on key market drivers as related to IOU territory Economic Potential to meet CPUC targets and RRIM goals (#1; #4)

- **ERAM Tool Based Analysis** - A thorough analysis of the economic potential energy saving within the state's IOU territories using Navigant's ERAM (Energy Efficiency Resource Assessment Model) tool. Navigant has successfully employed ERAM in numerous potentials evaluation studies both within California (e.g., with the state's POUs) and in other parts of North America.
- **ASSET Model Incorporation** – Calibration and incorporation of the ASSET model inputs and outputs as a building block for our Economic Potential Study
- **High-Impact Measures Evaluation (HIM)** – Evaluation of sector potential with a focus on those measures that currently provide and are projected to continue to provide the majority of savings within the state's IOU utility portfolio of programs, including a residual measures analysis as appropriate
- **Emerging Technology (ET) Incorporation** – A complete integration of electric and natural gas emerging technologies applicable to IOU programmatic efforts that have market and program potential over the study period using Navigant's extensive ET database
- **Code Impact Incorporation** – Integration of expect reduction-to-baseline updates to state and federal codes related to IOU service territories
- **Other Relevant Market Driver Impacts Integration** – Related to IOU Economic Potential, Navigant will incorporate in its analysis other potential drivers deemed appropriate for inclusion

Track 2 – A focus on TSMP within the state, including incorporation of Track 1 outputs and non-IOU market drivers to meet statewide CEC, GHG and CPUC Goals and Targets goals (#2; #3)

- **Identification of All Key Market Drivers -** Identify market drivers that can impact the Total Statewide Market Potential. A preliminary list has been provided though additional drivers will be a topic of discussion e.g., potential local government programs aimed at GHG reduction goals, during the Track 2 Scoping Activity.
- **Attribution Assumptions Assessment to Avoid Double Counting** - Conduct a thorough vetting of all assumption related to attribution of savings for each of the market drivers and related sector impacts to ensure savings are not "double counted".
- **Bottoms-up Estimate of Key Market Driver Savings – Technical Potential** - Develop a bottom-up estimate of the Total Statewide Technical Potential for each driver utilizing existing assumptions and estimated savings or developing new estimates of strategy savings, as required.
- **Screen Key Drivers to Identify Most Likely to Have Significant Impacts - Initial Planning Screen** – Conduct a collaborative screening process to categorize each driver as "most likely" "may be likely" or "not likely" to have savings impacts over the planning period.
- **Develop Key Market Driver Achievable Savings Scenarios** - Evaluate the market achievable savings potential from each of the KMDs identified as a result of Task 4 under "high", "medium", and "low" scenarios. Compare scenarios to goals when possible.
- **Identify HIM and Secondary Measures -** Identify the core technologies or high impact measures (HIMs) that are responsible for the energy savings from the KMDs. Calculate the energy savings specifically from the HIMs.
- **Calculation of the Total Statewide Market Potential from Key Market Drivers** - Develop estimates of individual and Total Statewide Market Potential expected over the study period to be captured by the KMDs.
- **Development of a *CPUC Goals and Targets Strategic Planning Framework*** – Provide CPUC and statewide planners a comprehensive, four component, set of tools to facilitate planning by easily identifying key opportunities for savings and key delivery vehicles to accomplish savings, and as well be able to run "what-if" scenarios analyses to inform policy decision making.

The following sections discuss conceptual approach and general strategy for the project. Each track is discussed separately, though as noted, considerable integration will occur between the two work efforts.

Track 1: Economic Potential Study

Navigant proposes to use their EERAM model to complete the economic potential study. EERAM is an Excel based tool that is capable of detailed, bottoms up potential studies or higher level aggregated approaches to estimating potential as has been requested in the RFP. The following sections discuss the basic structure of the EERAM analysis, and proposed approach for this engagement.

Basic EERAM Analysis Structure

Previous assessments of California Statewide energy efficiency potential have relied heavily on the results from Itron's DSM Potentials Model ASSET. The ASSET model provided detailed estimates by utility service area, climate zone, sector, building type, and measure over a twenty year forecast horizon of Technical, Economic, and Market Potential. These model results were used to help define the investor owned utility annual goals.

Under this RFP, new targets for the years 2013 through 2022 are to be established. However, development of these new targets is to be identified without a new detailed run of Itron's ASSET Model. Instead, the

RFP calls for proposing firms to identify simpler approaches to developing these targets while at the same time expanding the level of analysis to go beyond IOU utility based programs. These utility based programs are still important components of the target setting process, but the target considerations are expanded to include additional considerations:

- Federal and California State Legislative Initiatives
- The various California Strategic Plan Initiatives
- The influence of American Recovery and Reinvestment Act (ARRA) funds

The expansion of setting targets that include more than just traditional utility sponsored DSM programs has led to the desire not to specifically focus on utility program market potential, but rather look at the bigger picture at the economic potential level that include the considerations listed above as well as the traditional utility DSM programs.

Although a detailed ASSET model style assessment is not called for in this RFP, Navigant believes that a modeling framework is needed that can take elements of previous ASSET model runs and add to them the considerations bulleted above. The Navigant team proposes to use its Energy Efficiency Resource Assessment Model (EERAM) as the modeling tool to perform much of this analysis. The current model will need to be modified to include these new considerations, but it has the significant advantage of already including many of the modeling characteristics of ASSET but being in Excel, which is a very flexible modeling platform. EERAM was developed based on many of the modeling concepts and variable inputs that are in ASSET. EERAM is not ASSET, but it does utilize most of the same inputs and provides similar outputs to ASSET. For developing market potential, the decision making algorithms are not as complex as ASSET, but this lowering of complexity was a goal when EERAM was initially developed. Mr. Cullen, who is the developer of EERAM (which is a continuous process) has a good understanding of the ASSET model as he once ran this model while employed by Regional Economic Research and then Itron.

Proposed EERAM Analysis

Navigant proposes using EERAM as its modeling structure as it intends to utilize many of the same input values used in ASSET to develop initial Economic Potential estimates similar to the ASSET estimates. However, Navigant recognizes that building technology densities change over time and where possible, without doing primary data development, will update building technology densities and update the Economic Potential coming from EERAM. These updates will consist of new density variables that can be obtained from the most recent RASS survey, updates to commercial building densities based on federal CBECS survey data, and utilizing achieved savings estimates by measure from utility programs. Specific components of the proposed EERAM analysis are discussed below.

Included Measures

The ASSET Model includes a very large number of individual measures. Within the Energy Divisions (ED) tracking data available for the 2006 – 2008 and 2009 portfolios there were approximately 120 ED measure groups included and an analysis of the 2006 – 2008[1] and 2009[2] ED reports indicates that only 40 measure groups made up 90% of the reported ex-post first year kWh savings, including high impact measures (HIMs) that each contributed one percent or more to the aggregate portfolio level savings.

Navigant proposes not including all 115 measures but rather a subset of the most important in terms of

[1] 2006-2008 Energy Efficiency Evaluation Report, California Public Utilities Commission, July 2010

[2] Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period, California Public Utilities Commission, January 2011

energy savings. Although energy savings will be a guideline as to which measures to include, some measures are unique to a specific application and they may be included as well. It is expected that the energy savings potential from most of the measures dropped from the list will be included in the retained measures as many of the measures are competing measures that are mutually exclusive. Simplifying the list will not reduce the integrity of the goals, but will make the analysis to follow more manageable.

Codes and Standards

Currently EERAM includes the affects of known codes and standards over the forecast horizon. The effects influence individual measures and are identified in a year by year matrix of the measures using a percentage improvement to the baseline technology as the means of accommodating the effects. Using a matrix allows for codes and standards to change as often as needed over time, even for the same measure.

This approach will be continued and can be employed to develop codes and standards impacts under a number of different scenarios. The scenarios would be developed by running EERAM with the matrix unpopulated by the changes from codes and standards as the baseline, then run with the matrix populated.

Emerging Technologies

EERAM currently allows technologies that are just entering the market place to be included in the measure list. A Bass diffusion curve is used to simulate market penetration for these emerging technologies. Navigant proposes to expand on this current treatment by employing a matrix approach similar to that used for codes and standards. Emerging technologies can be characterized with the timing and the identification of which current measure it is supplanting identified in the matrix. If the emerging technology is new and not replacing a current DSM technology, it can be fully characterized in the measure list with timing accommodated within the matrix. As with codes and standards, scenarios would be developed by running EERAM with the matrix unpopulated by the changes from emerging technologies as the baseline, then run with the matrix populated.

Behavioral Initiatives

It is expected that behavioral initiatives will have an impact beyond what is achieved from normal DSM measures. Navigant has already modeled the impacts from an "O Power" type program in other potential studies it has developed and within those studies, the "O Power" program was characterized in a similar fashion as a DSM measure. This approach will be continued for other behavioral initiatives identified.

New Legislation and Other New Initiatives

Any new legislation or additional new initiatives included in the analysis will require unique assessments by legislative initiative as to the best means of modeling impacts. The process may be in the form of characterizing as a DSM measure, utilizing a matrix approach, or developing new methods for analyses.

ARRA Initiatives

The American Recovery and Reinvestment Act of 2009 (ARRA) energy efficiency initiatives will have included assessments of their energy efficiency impacts by program/initiative. It is expected that these savings will be a subset of the Economic Potential developed from the set of DSM measures included in the EERAM portfolio. The ARRA impacts will be part of the process of identifying attribution of initiatives among the different energy efficiency strategies.

Track 2: Goals and Targets Study

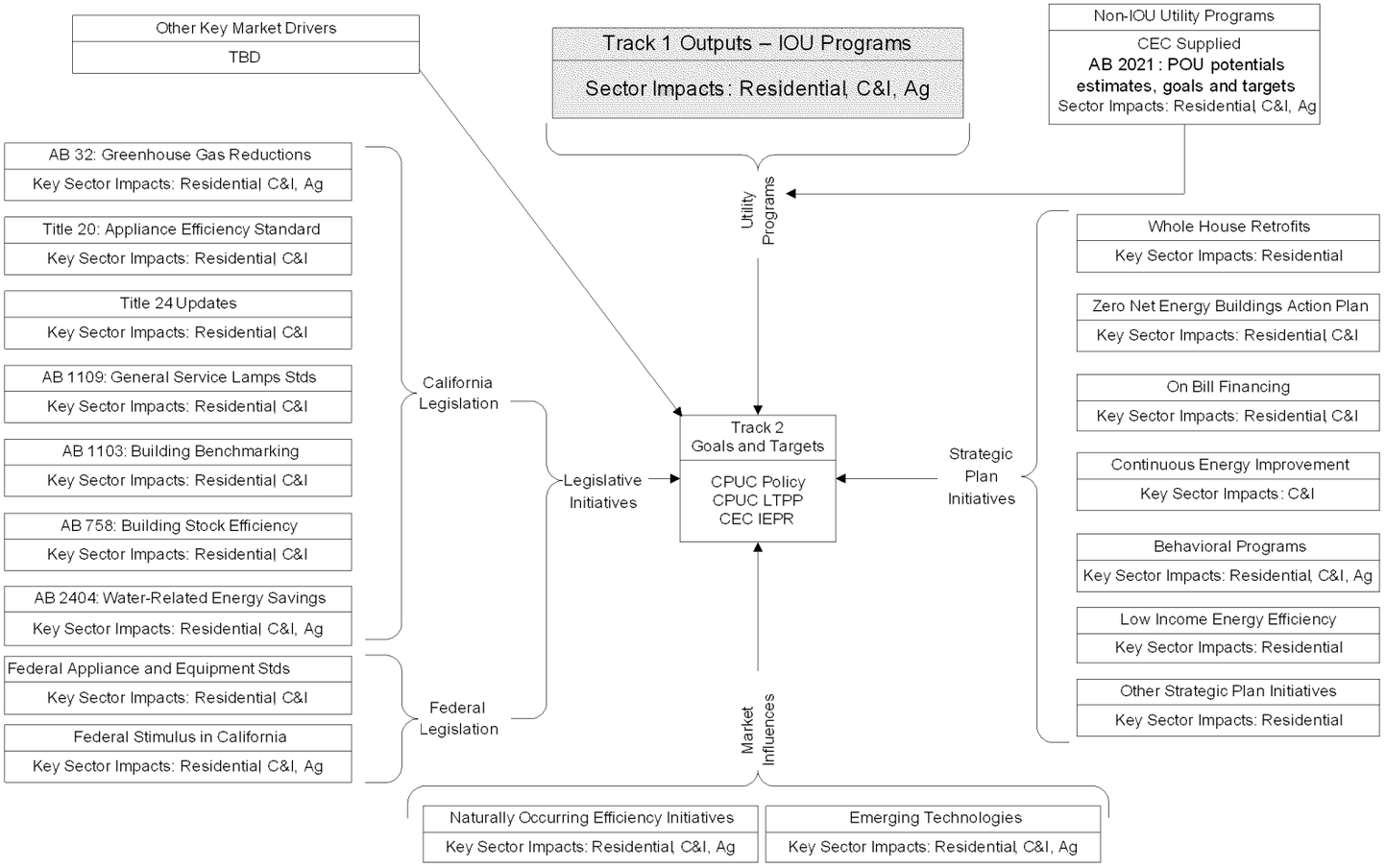
Navigant proposes to undertake a different approach in its Track 2 analyses than is proposed for Track 1.

In Track 1, per the RFP, Navigant proposes to undertake an analysis of *Economic Savings Potential* (ESP) within the IOU service territories as a means of providing the Commission with baseline information from which it may develop IOU savings targets and inform CPUC RRIM deliberations for the state's IOUs administered programs over the course of the study period. In Track 2, Navigant proposes to move the Track 1 analyses a step further and develop a *Market Savings Potentials* (MSP) not only for the IOU service areas and programs, but also for each of the other, (what we are calling) Key Market Drivers (KMDs), which taken together comprise the whole of the state's overall energy efficiency savings potential, called the *Total Statewide Market Potential (TSMP).*[3]

Figure 2 provide an illustrative graphic representation of Navigant's current understanding of the state's Key Market Drivers for energy efficiency, each of which must be incorporated into an overall analysis of Total Statewide Market Potential to understand: (1) the current origins of California statewide energy efficiency savings; (2) where key opportunities for future savings are likely to be over the course of the study period; and (3) provide policy makers with a workable framework.

[3] Total Statewide Market Potential (TSMP) is defined as the cumulative estimated energy efficiency savings potential occurring from projected market impacts of all of the Key Market Drivers over the course of the study period, including expected "naturally occurring" savings. In our understanding it is equivalent to what KEMA defined in the 2008 IOU Goals Update study as the Total Market Gross or TMG. For this proposal, Navigant believes that use of the term, "Total Market Potential" holds the potential of being more broadly understood in the industry in the context of traditional potentials analysis references to "Technical Potential," "Economic Potential" and "Market Potential."

Figure 2 – Key Market Drivers – Illustrative Components Total California Market Potential[4]



[4] While for illustrative purposes for our proposal response, Navigant believes it has captured the major components making up the Total Statewide Market Potential for Energy Efficiency in California

These KMDs fall into four broad categories of activities that taken together provide the potential for nearly all energy efficiency savings in California. Table 1 provides a concise way to visualize the Key Market Drivers Navigant proposes to analyze in our Track 2 analysis.

Table 1 - Key Market Drivers Contributing to TSMP

Table of Key Market Drivers Contributing to Total Statewide Market Potential			
	Category	Energy Efficiency Activity Impacting TSMP	
1.	Legislative Initiatives	California Legislation	Federal Legislation
		Title 24 Update Energy Efficiency Codes Reach Codes and the new CALGreen Code: : Local Government Voluntary Actions Title 20: Appliance Efficiency Standards AB 1109: General Service Lamps AB 1103: Commercial Building Benchmarking AB 758: Comprehensive Energy Savings in Existing Building Stock. AB 2402: Water Related Energy Savings AB 32: Greenhouse Gas Reductions AB 758 (Skinner): Existing Buildings Initiative AB 2021: POU potentials estimates, goals and targets	Federal Stimulus in California (ARRA) Federal Appliance and Equipment Standards
2.	Utility Programs	Investor Owned Utility (IOU) Programs Non-IOU Publicly Owned Utility Programs (e.g., Municipal/REA Cooperatives, Water Utility Residual Energy Savings)	
3.	Market Influences	Emerging Technologies Naturally Occurring Efficiency Initiatives	
4.	California Long-term Strategic Plan Initiatives/ Strategies	Whole House Retrofits Zero Net Energy Buildings Action Plan On Bill Financing Continuous Energy Improvement Behavior Programs Low Income Energy Efficiency Other Strategic Plan Initiatives	

Narrative of Navigant General Analytic Approach/Structure – As can be seen in Figure 2, Navigant's proposed Track 2 Goals and Target Study analysis is structured to include eight (8) steps or tasks

Navigant believes need to be undertaken to successfully meet the goals of the RFP. As an overview to our approach, NCI describes in narrative form below the structure of our analysis and the rationale for undertaking each of the steps/tasks identified within it.

Navigant understands the complexity and the importance of the task ahead in providing the Commission the much needed analyses and analytic tools to assist policy decision making.[5] Given the importance of the task, NCI believes the Total Statewide Market Potential can best be assessed through a "bottoms-up" evaluation of the Market Potential[6] for each KMD, an analysis that:

A. Evaluate the specific Market Potential (impacts) for each "Key Market Driver" that contributes to overall statewide energy efficiency savings.
B. Disaggregate the savings by market sector (residential, commercial, industrial, agricultural) for each of the contributing KMDs.
C. Calculate/evaluate each of the KMDs overall Technical Savings Potential, within each of the sectors impacted by the KMD.
D. Identify which of the KMD provide the most opportunity for savings by evaluating each using and Initial Planning Screen of "most likely," "may be likely," and/or "not likely," based on criteria establish co-jointly by CPUC project management and Navigant (e.g., market savings potential, likelihood of a quick enough ramp-up to impact study period savings, particular difficulty of implementation success due to economic conditions, etc.) This will filter out those KMDs unlikely to be implemented, or if implemented not likely to contribute significant savings to the state's TSMP over the course of the study period.
E. Undertake a Market Achievable Savings Scenarios Analysis ("high," "medium" and "low") for each of the important KMDs[7] to estimate penetration and the potential "achievable" savings contributions of the most important KMDs, once those that are "likely" to make a difference are identified (through task 4, above).
F. Identify high-impact core measures and secondary (residual) measures responsible for the energy savings, calculates estimate energy savings from each measure within the important KMDs, and provides a "set of glasses" that may assist policymakers in evaluating various policy options related to the overall KMD pool of savings opportunities; (HIMs) that are responsible for the energy savings from the KMDs.
G. Calculate Total Statewide Market Potential by aggregating savings from each KMD, and each of their related market savings.
H. Provide the CPUC and state policymakers with a *CPUC Goals and Targets Strategic Planning Framework* to assist policy analysis in easily identifying a) the originating source of overall statewide savings in energy savings and percentage of total savings metrics, b) which entity or combination of entities are delivering the savings, as a means of identifying overlap and duplication or areas where support for multiple delivery vehicles might significantly enhance savings potential, and c) provides a "what-if" scenarios calculator to policymakers that will enable "alternative scenarios" to be evaluated in the service of statewide policy decision making.

[5] In fact, Navigant's proposed lead staff for Track 2 is a former CPUC senior analyst who served as the CPUC "joint staff" along with CEC staff in developing the initial 2006 utility goals

[6] Later in this document, we discuss our understanding and approach to how comparing and incorporating "top down," aspirational goals analyses and "bottoms-up" widget based analysis

[7] Note, that while our Track 1 analysis will focus on the RFP goal of developing Economic Potential savings for the state's IOUs, NCI proposes to "drill-down" on this IOU analysis further (using its ERAM tool) in Track 2 to estimate the market achievable savings for the IOUs. These estimates will be added to estimates associated with other KMDs

Within the context of the analysis described above, Navigant will estimate overall TSMP within each relevant market driver. Below we address a series of important consideration and issues related to successfully completing the study analyses

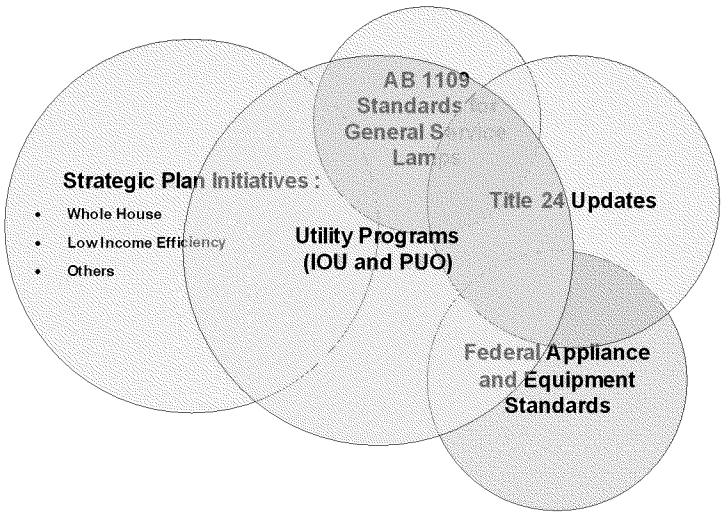
The Complexity of the Task 2 – Understanding Attribution of Savings Within and Among Key Market Driver

While the above drivers as a whole make up the "Total Statewide Market Potential" for energy savings in California, the complexity of evaluating and attributing savings to each Key Market Driver is arguably the most difficult, yet one of the most important task to be undertaken in fully understanding the statewide market for energy savings.

Figure 3 provides a visual illustration of the complexity of the task of determining savings attribution for each KMD.

By way of summary in addressing this complexity, Navigant's approach, which is further delineated the section 2.2 methodology walk-through, calls for a thorough analysis of the each of the variable and important factors overlapping Key Market Driver activities, and the development of set of criteria (in conjunction with CPUC staff) from which attribution decisions may be made after identifying these variables. This analysis will result in attribution of savings to each KMD, which in turn will be incorporated into the overall analysis and to inform development of a *CPUC Goals and Targets Strategic Planning Framework* in Task 8 of our study analysis.

Figure 3: Complexity of Attributing Savings to Key Market Drivers



Approach to Understanding "Gaps" between Top-Down and Bottom up Analyses

Top-down aspirational goals identified in, for instance, the California Long Term Strategic Plan (and elsewhere, for instance, in GHG goals and legislation) will need to be brought into a common analytic framework to assess KMDs on and "apples-to-apples" basis. These goals, usually set from a total market or sector perspective with the idea of providing policy direction to drive desired outcomes, provide encouragement and baseline information for an initiatives potential and scopes. However, it is often difficult to translate these goals into actionable items that can be: a) implemented, b) undergo ongoing tracking and review based on performance criteria, and c) be evaluated on M&V basis. Because of this, Navigant proposes to implement a bottom-up approach that focuses on HIMs (and secondary measures) that most likely will be implemented as part of any initiative. Using this measures based, bottom-up approach, Navigant will evaluate each of KMDs from a viewpoint of identifying key technologies that are

likely to "make a difference" should an initiative be implemented over the course of this study period i.e., pass through the Task 4 Initial Planning Screen previously described. Where applicable, Navigant will review existing Top-down Analyses that have been developed for particular strategies, initiatives and/or KMD approaches and evaluate potential causes for any identified "gaps" resulting from a comparison of the two approaches. The overall outcome of our approach will be to provide state policy makers with, we hope, a comprehensive "set of glasses" from which to view, evaluate and make decisions on desired policy directives.[8]

Further Explanation - Task 8 - CPUC Goals and Targets Strategic Planning Framework (G&TSPF)

As noted, our overall focus and perhaps the key outcome of Navigant's proposed study approach is the development of a comprehensive *CPUC Goals and Targets Strategic Planning Framework.* As presently conceived the G&TSPF includes three major components:

G&T Framework Element #1: A *Total Statewide Market Potential Table of Savings* (TSMPT) - This table, which represents the output of task #7 above, provides totals and sector breakdowns for each KMD by: a) potential energy savings (kWh/KW, therms) for each of the KMD market sectors, and b) percentage breakdowns of the potential contribution to Total Market Potential of each KMD

Purpose: To provide state policymakers with a tool that can be used to identify the most important of the Key Market Drivers and their relative impacts on the Total Market Potential

Table 2 provides an illustrative example of the TSMPT.

Table 2: Illustrative Example - Table of Total Statewide Market Potential Energy Efficiency Savings

Total Statewide Market Potential Table of Savings Opportunities								
	Residential		Commercial		Industrial		Agricultural	
Key Market Driver/Sector Savings	kwh/KW therms	% of sector	kwh/KW therms	% of sector	kwh/KW therms	% of sector	kwh/KW therms	% of sector
1. Legislative Initiatives								
Title 24 Update	.							
AB [illegible]2: Water Rel[illegible] Energy Sav[illegible]								
AB Gre[illegible]ouse Gas Red[illegible]ons								
AB [illegible]1: POU pot[illegible]ls est[illegible]s goals and [illegible]ets								
Reach Codes and the new CALGreen Code Actions								
Title 20: Appliance								

[8] The outcome of our approach is proposed as Task 8 of Track 2 and is briefly discussed above. For a more detailed discussion of our proposed development of a ***CP****UC Goals and Targets Strategic Planning Framework,* please the section immediately following this section

Efficiency Standards			*Populate with Task 7 Results (Track 2)*					
AB 1109: General Service Lamps								
AB 1103: Commercial Building Benchmarking								
AB 758: Comprehensive Energy Savings in Existing Building Stock								
2. Utility Programs								
IOU Programs								
Non-IOU Programs								
3. Market Influences								
Emerging Technology Influences								
Naturally Occurring Energy Savings								
4. California Long-term Strategic Plan Initiatives/ Strategies								
Whole House Retrofits								
Zero Net Energy Buildings Action Plan								
On Bill Financing								
Continuous Energy Improvement			*Populate with Task 7 Results (Track 2)*					
Behavior Programs								
Low Income Energy Efficiency								
Other Strategic Plan Initiatives								

G&T Framework Element #2: A *Key Market Driver Matrix of Existing and Possible Deliver Mechanisms* - Based on the sector and the specific nature of the KMD, Navigant will identify current delivery vehicles

that operate within the "space" of a particular market driver, with a focus on identifying: (1) possible coordination-of-effort potentials; (2) overlapping activities that may present implementation challenges over the study period; and, (3) overlapping activities that could be encouraged and/or supported with the goal of potentially enhancing implementation activities over the study period

Purpose: To assist CPUC and CEC planners in understanding the nature of competing delivery mechanisms operating within each KMD and within the overall statewide market.[9]

G&T Framework Element #3: A *Simplified Strategic Policy Scenarios Calculator* – Based on our work undertaken in evaluating each of the KMD (as delineated in more detail in our methodological walk-through, Navigant proposes to develop a "simplified" tool that allows very high-level policy analysis of various "what-if" scenarios related to encouragement of various KMD activities over others.[10]

Purpose: The tools as presently conceived could provide a means of assessing potential policy direction by providing analysis of potentially varying levels of policy support for various "packages" of KMD initiatives

G&T Framework Element #4: *A Strategic Plan Initiative Classification and Performance Measurement Framework* - that incorporates the key elements of our strategic plan initiatives analyses, including a formal categorization framework from which to consistently identify for evaluation each initiative, and a Navigant developed Performance Framework that may be used by the Commission to inform its evaluation policy and decision making.

Incorporating Key Market Drivers into the Track 2 Analysis

At the current time the process of setting goals and targets is very complex and holds multiple challenges that were not present at the time the CPUC established initial IOU goals in 2006. At that time, the CPUC and the IOUs were the primary entities in California engaged in energy efficiency resource acquisition. Yet, while the existing CPUC IOU goals were established at a time when this was approximately true, in the intervening years there have been numerous goals, initiatives and programs put in place by other entities. These not only provide resources for energy efficiency that can complement or compete with the CPUC/IOU efforts, but they also are based on differing sets of assumptions, baselines and estimates of potential savings. This problem is compounded by federal initiatives and their impacts, as well as spillover from efforts in other states that may influence savings in California.

The following section provides a general discussion of some of the Key Market Drivers that NCI has identified, and their current status as a means of beginning to identify not only the look of the "landscape" for energy efficiency in California, but also the magnitude of the task. A number of these drivers have been discussed as part of the Track 1 discussion above as related IOU programmatic effort. However, Track 2 concerns in some ways multiply the issues identified and vetted in Track 1 due to the unique challenge of developing a bottom-up Total Statewide Market Potential for ALL KMDs that can lead to implementable policy direction as well as programmatic performance monitoring and review for the various savings initiatives.

As well, we also provide initial discussion of several key issues below that have not been previously been

[9] Framework Element #2 is not intended to provide policy direction in that it will simply identify who the "players" are within the various Key Market Drivers. NCI recommends further "Best Practices" analyses be undertaken to determine the "best-in-class" mix of delivery mechanisms within a KMD space and statewide. For example, it may be the case that multiple deliver mechanisms will provide the "best practice" in certain market areas, while a single delivery mechanism may be best for another.

[10] The tool noted here, would be a limited version of Navigant's approach/model developed to assess KMD impacts and is intended to provide cursory information to enable comparative policy approaches at a high-level

addressed in our proposal as a means of providing Commission staff with information on our understanding these key issues. Of particular importance, our focus in the immediate paragraphs below is on discussing key concerns and our approach to the unique issues associated with evaluating and incorporating the California Long Term Energy Efficiency Strategic Plan (Plan) into our Track 2 analysis.

Incorporating the California Long Term Energy Efficiency Strategic Plan of Strategic Plan - Overview

Introduction to Analytic Issues

In 2007, CA's Long Term Energy Efficiency Strategic Plan (Plan) was developed through a collaborative process involving the CPUC's regulated utilities – Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E) and Southern California Gas Company (SoCalGas) – and over 500 individuals and organizations. The Plan sets forth a roadmap for energy efficiency in CA. It articulates a long-term vision and goals in a number of key sectors and identifies specific near term, midterm and long term strategies to assist in those goals. The strategies are at various stages of development and deployment and have both IOU and non-IOU initiatives which will be included as part of this analysis.

Programmatic Goals

This overall intent of the Plan aims to move utilities, the CPUC, and other stakeholders beyond a focus on short-term energy efficiency activities into a more sustained long-term, market transformation strategic focus. In order to guide long-term changes in the market by reducing barriers to the adoption of energy efficiency measures to the point of market transformation - where publicly-funded intervention is no longer appropriate - the Plan embraces four specific programmatic goals, known as the Big Bold Energy Efficiency Strategies or BBEES.
These goals were selected for their easy comprehension and their ability to move market players. The BBEES are as follows:

1. All new residential construction in California will be zero net energy by 2020
2. All new commercial construction in California will be zero net energy by 2030
3. Heating, Ventilation and Air Conditioning (HVAC) 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 the low income energy efficiency program by 2020.

Market transformation is a unifying theme throughout the Strategic Plan. The Plan is designed with a specific focus on defining how energy efficiency programs are or will be designed in the future, with the goal of transitioning to either the marketplace without ratepayer subsidies, or to codes and standards that enable the savings without program funding.[11] The BBEES are meant to affect progress towards market transformation and progress towards more efficient technologies and practices in a number of key sectors listed below.

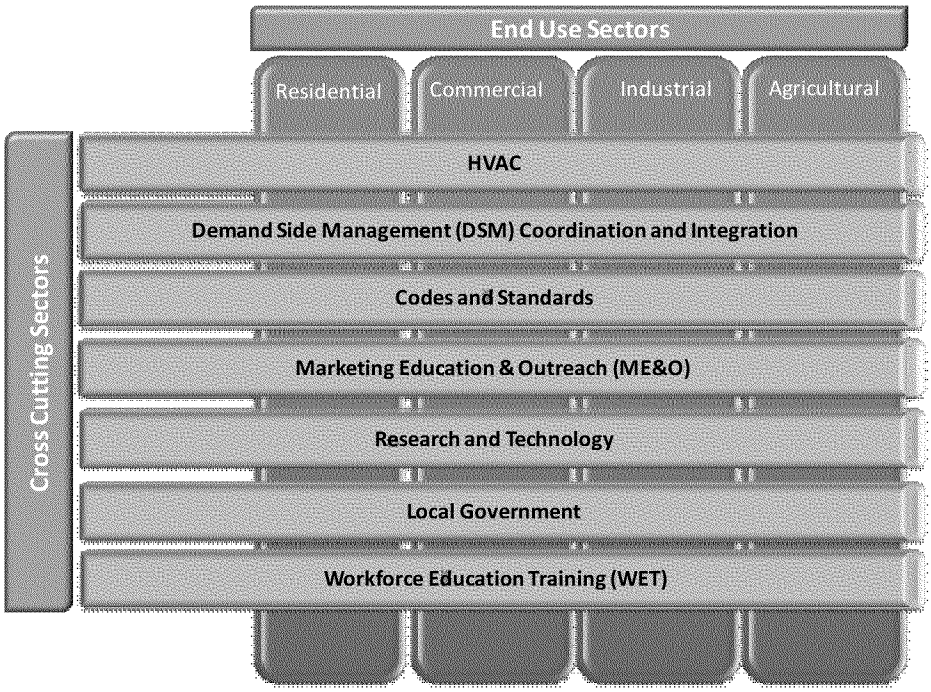
Key Sectors & Strategies

The Plan as it currently stands seeks to achieve market transformation efforts in each of four vertical "Market" sectors (e.g., Customer end use sectors: Commercial, Industrial, Residential, Agricultural) and

[11] CPUC D.07-10-032, p.33.

seven "cross-cutting" sectors (e.g., Codes and Standards, Workforce Education and Training, Marketing Education and Outreach, and Research and Technology) as illustrated in Figure 4.

Figure 4: Strategic Plan Key Sectors and Strategies



The Plan not only details specific goals in each sector but also has incorporated a methodology and process for developing milestones to measure progress towards each goal. Further, unlike traditional regulatory approaches, the Plan identifies near-term, mid-term and long-term initiatives and milestones under each of the key sectors identified. Targeted timeframes have been established for many of the goals and their corresponding market strategies.

Sector Implementation Plans

In the short term, goal or strategy specific tasks forces have been identified to build momentum and progress against the goals developed in the Plan. Through this process, the IOU's and others have developed initiatives to pursue energy efficiency through new strategies and programmatic initiatives. A few are listed below which were identified in the RFP:

1. Whole House Retrofits
2. Zero Net Energy Buildings Action Plan
3. Continuous Energy Improvement
4. Behavior Pilot Program
5. Low Income Energy Efficiency

The Plan is meant to be a dynamic document that will be updated to reflect successes, failures and lessons learned. Adjustments are to be made to the visions, goals and strategies accordingly. As such, there are possible, new and existing initiatives which will need to be identified for evaluation in this analysis.

Navigant's Plan Evaluation Approach

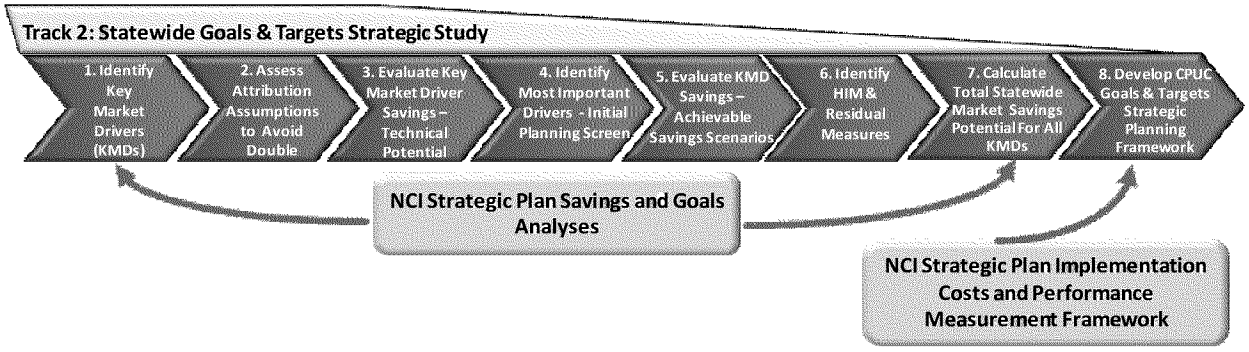
While many of the KMDs identified in Figure 2 and Table 1, above, are "sector focused" having impacts

that occur within one or two market sectors (e.g., codes and standards that relate to commercial buildings sector, or residential, or commercial and/or residential appliances), the Plan has multiple elements that relate to multiple sectors, including (as noted above in Figure 5) multiple cross-cutting issues and elements. Because of this, Navigant proposes to take particular care in reviewing each of the proposed Plan elements and strategies to ensure that we identify the most important strategies and initiatives for inclusion in our ongoing analyses. These strategies, once screened and found to be "likely" have impacts over the course of the study period (based on our Tasks 1 through 4 analyses), will be further evaluated (Tasks 5 and 6) for inclusion in the TSMP analysis (Task 7).

Beyond this basic impacts evaluation, however, Navigant realizes that because of the Plan's importance to the CPUC and CEC's overall efficiency strategy that other elements must be evaluated in order to properly inform the Goals & Targets study regarding the impact of the Strategic Plan. To this end, Navigant proposes to evaluate not only the savings potential and achievable goals for each relevant Plan strategy (in Tasks 1-7), but also, as noted above, develop as a component of our proposed Task 8 deliverable , i.e., the *CPUC Goals and Targets Strategic Planning Framework,* a comprehensive *Strategic Plan Performance Measurement Framework* aimed at providing the Commission a roadmap and strategy for evaluating the Plan elements that are identified as having the potential for relevant impacts over the study planning period.

As noted, these analyses will take place as part of the Market Drivers Evaluation in Step 1 of the Goals & Targets Study (Track 2)

Figure 5: Navigant General Approach to Strategic Plan



The major elements of our approach to Strategic Plan Analysis are listed below and further explained in the sections that follow. Our proposed five step process will include the development of our Plan analysis includes:

1) Initiative Categorization
2) The numeric potential, goals and savings of the Strategic Plan
3) High level assessments of cost to achieve Strategic Plan goals
4) Performance Measurement Framework
5) Methods of marrying the Strategic Plan's goals and objectives to "bottoms-up" potential data

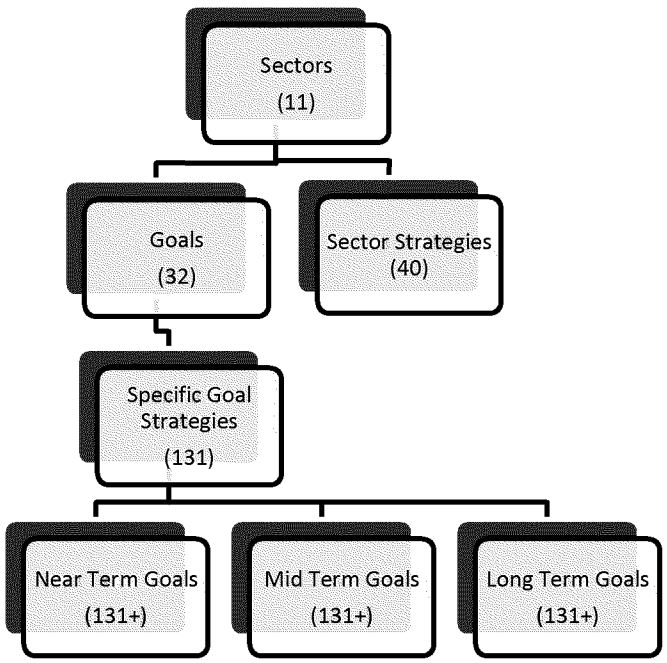
Figure 6 illustrates the approach that will be used as part of this analysis:

Figure 6: Navigant Analytic Approach to Strategic Plan

Step 1 – Initiative Classification & Assessment

The strategic planning process for the development of the Plan's content included over 36 public workshops. The workshops aimed to develop action plans for each sector. The plans were submitted to the IOU's to inform their strategic planning processes. As it currently stands, the Plan contains 11 Sectors (End Use and Cross Cutting), 40 Sector Strategies, 31 Sector Goals and 131 Specific Goal Strategies. In addition, each strategy has near term, mid-term and long term implementation components, all at various stages of development and deployment. Figure 7 describes the complexity of the Plan and the focus of NCI's analytic approach.

Figure 7: Strategic Plan Elements



Step 1 - Assess status of existing Strategic Plan initiatives

Step 1 will focus on defining current status of initiatives, developing a view of potential, new and existing strategic plan initiatives and the development of a categorization methodology. A Strategic Plan Initiative Classification Framework will be developed and communicated to the Commission to improve the Plan's readability and eventual long term planning process which will include streamlining of assessment and prioritization of initiatives. The aim of this portion of the work effort will be to assist the Commission in enhancing the initiative assessment and prioritization process.

Noted in the Plan is the exclusion of the following three items: evaluation and measurement and verification of energy savings; transportation, and water-energy nexus. These items are said to be being

evaluated under separate processes and are to be addressed in future planning cycles. The Framework developed in the step above will define the process for the addition of new components as they occur over time.

Step 2 – Total Market Potential

Step 2 focuses on the development of the total market savings from the Strategic Plan Initiatives. The methodology followed is consistent with the one used to evaluate all other Key Market Drivers. For the Plan, with all its complexity, Navigant may rearrange the order of the steps to accommodate the overall analysis. As presently conceived, our methodological steps (explained above and in more detail in the walk-through section) are listed as follows:

- Evaluate Plan Savings Estimates
- Assess Sector and Sub-Segment Savings Analyses
- Employ Initial Planning Screen
- Evaluate "Achievable" Scenarios
- Undertake HIM and Secondary Measures Analysis
- Total Market Savings from Strategic Plan Initiatives
- Incorporate Plan Initiative Savings Into Total Statewide Market Potential Calculation

Step 3 – Cost to Achieve Goals

The limitations of the Plan are noted within the Plan itself and include an acknowledgement that due to time and other constraints, cost-benefit analysis was not conducted on the Plan components. As stated in the plan "…the strategies and actions have not been fully evaluated for prioritization or for budget and resource allocation decisions"[12].

Because of the need to begin an initial cost analysis of Plan efforts, Navigant proposes to provide the Commission a high level assessment of costs to achieve Strategic Plan goals. As part of this analysis, NCI proposes to develop a cost evaluation of the highest impact measures associated with each of the BBEES. Cost analyses for highest impact measures associated with each of the Sector Goals will also be developed, providing the Commission a flexible framework for cost analysis by Goal level.

Step 4 – Bottom Up Rationalization

As noted in our discussion above, ***Approach to Understanding "Gaps" between Top-Down and Bottom up Analyses,*** Navigant will evaluate each of the relevant Plan initiatives and strategies based on a HIM and secondary measures analyses of each. This approach will allow for a comparison of the aspirational top-down goals established for various Plan elements to a more fundamental "widgets based" (including behavioral programs) approach.

Step 5 – Performance Measurement Framework

The Plan also notes "the strategies and actions described in this Plan will be updated as conditions change and new experience and information is obtained.[13]" The Plan and the process engaged in its development were very dynamic and collaborative. The intent of future planning update processes is to continue in the same collaborative manner engaging increasing numbers of CA stakeholders. Future planning cycles are said to include:

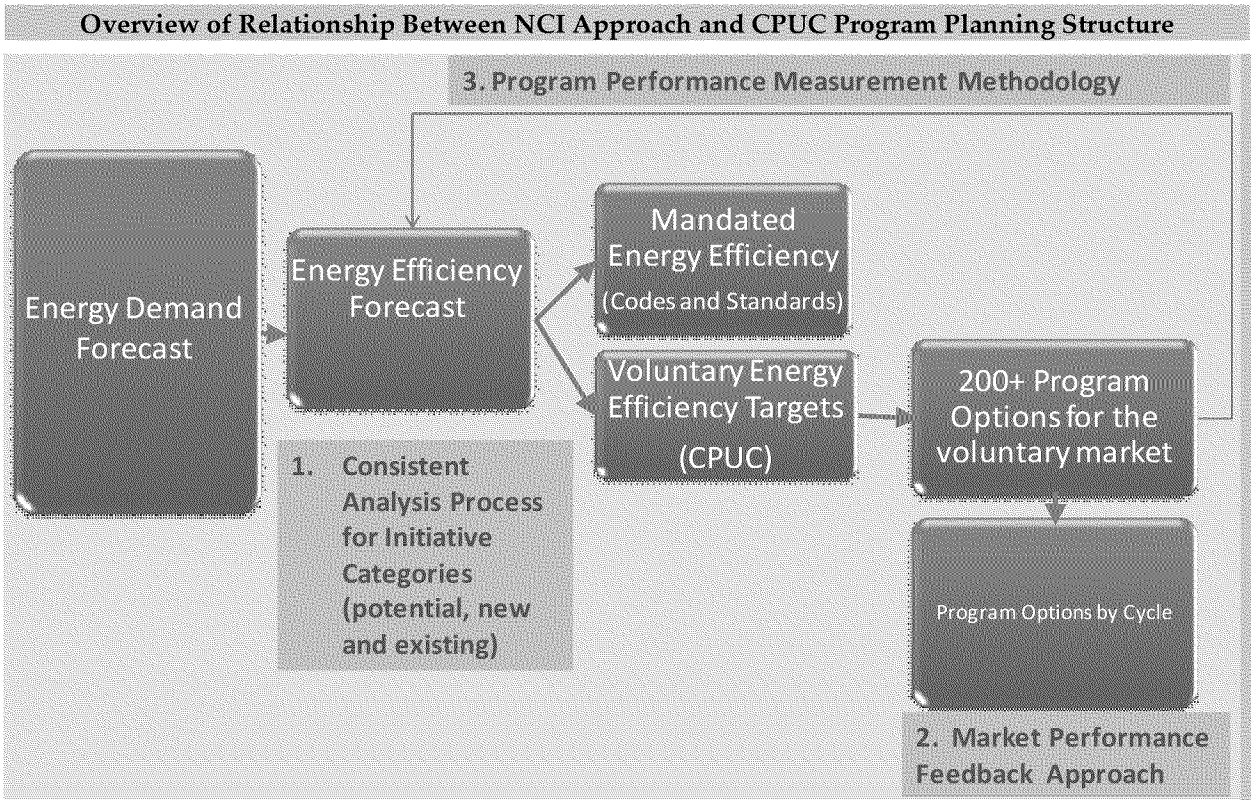
[12] California Long Term Energy efficiency Strategic Plan, Section 1, Page 7

[13] California Long Term Energy efficiency Strategic Plan, Section 1, Page 7

1) Incorporation of data collection efforts (market studies) into planning cycle
2) Aligning planning effort with related statewide long term resource plans
3) Evaluating performance of goals and strategies
4) Engaging more stakeholders.

In order to facilitate the process and develop meaningful constructs around the planning process to allow for better output, the team will provide the Commission with a suggested Strategic Plan Operating Model. The Operating Model will include an Initiative Classification & Assessment Framework to allow for consistent categorization, analysis and incorporation of new sources of information such as the Potentials and Goals & Targets Study. A Strategic Plan Performance Measurement Model will be developed in order to allow the Commission and all stakeholders involved to better gauge effectiveness and success of IOU and non-IOU initiatives. The Performance Measurement Model will have two parts: 1) market performance feedback mechanism and 2) program performance methodology. The aim of this work is to begin moving towards greater consistency in understanding how to develop feedback and performance mechanisms for the Plan which has impact beyond the traditional IOU program and into expanding methods of market transformation initiatives. Figure 8 below provides a view of the relationship of our overall Plan strategy to the Commission's Energy Efficiency Program Structure.

Figure 8: Navigant Approach in Relation to CPUC Program Planning Structure



Incorporation of Additional Drivers

Federal Codes and Standards

Since 2001 Navigant Consulting has continually partnered the Department of Energy's (DOE's) Building Technologies Program (BTP) and its Appliances and Commercial Equipment Standards Program to develop test procedures and set minimum efficiency standards for residential appliances and commercial equipment that are sold throughout the entire United States. Navigant supports all aspects of the Standards Program methodology including the shipment analysis and national impact analysis, which provide the following information:

- *The Shipping Analysis* includes estimating the effects on product shipments from increases in product price projected for alternative energy efficiency standard levels and also considers the countervailing effect of decreases in operating costs from more-efficient products.
- *The National Impact Analysis* projects national energy savings (annual and cumulative) and consumer economic impacts of possible new energy efficiency standards.

Our goals and targets analysis will be structured in a way that uses this accommodates

- Review the 2012 codes and assess impacts on California based on the shipment and national impact analysis. The Navigant project team will compare these estimates with the most recent RASS or CEUS data to assess how values align and how they may be used to collectively improve the accuracy

of potential study result and refine goals and targets projections.

- For out-year codes changes beyond 2112 the Navigant team will assess where other federal codes are in their development cycle and identify where in the 2013 – 2022 study timeline these pending code changes are likely to impact California.

One early example of the Navigant approach is the proposed inclusion within our Track 2 analysis of the Federal Appliance and Equipment Standards (staffed byNavigant) currently being updated by the US Department of Energy for 2011 completion, to take effect in 2012.

Legislative Initiatives

Navigant can incorporate major legislative initiatives at the federal and state level to the Total Statewide Market Potential. A discussion at the scoping meeting for Track 2 can identify which legislative initiatives to include in Track 2. Listed below are several key pieces of legislation Navigant has indentified along with information on how they could be incorporated into Track 2.

- **Title 24 Building Efficiency Standards** - Adopted and administered by the California Energy Commission, these energy standards apply to new construction (both residential and nonresidential), and also to some cases of retrofits. The IOUs have become increasingly active in the development of new standards over the past 10 years, and have claimed very large amounts of savings as a result of their advocacy. It is expected that these efforts and new savings will increase over the life of this potential study, and will significantly influence the savings goals. Estimating the potential savings from un-specified future code changes, while difficult, can be done by making projections from recent standards updates, by looking at the next likely targets for new standards, by extrapolating rates of overall energy savings from standards, or by a combination of these approaches. HMG helped to pioneer the evaluation methods and savings estimation tools for Title 24 energy savings, and so is intimately familiar with the sources of data used to generate savings estimates and to project the trajectory for future energy efficiency through codes.
- **Title 20 Appliance Efficiency Standards** - Also adopted and administered by the CEC, California's appliance efficiency standards have led the way for federal appliance standards, and have contributed substantially to the achieved energy efficiency by the state over the past 20 years. The future potential for California appliance standards is limited by federal pre-emption, which prevents California from adopting standards more stringent than federal standards. Nevertheless, there are likely to be opportunities for improved energy efficiency through better enforcement and adoption of appliance standards for technologies not yet covered by federal standards. As with the building standards, HMG has been actively involved with estimating and tracking the energy efficiency achieved with Title 20 standards, and in projecting future savings potentials.
- **Federal Appliance Efficiency Standards** - Because federal pre-emption limits California's ability to adopt more stringent appliance standards on its own, the greater part of future energy efficiency potential from appliance standards lies in the adoption of federal standards, which require efficiency levels that produce savings in California. Those savings are expected to contribute substantially to the future efficiency potential in the state.
- **Reach Codes and the new CALGreen Code** - In addition to Title 24, which applies statewide, there are more stringent versions of the energy standards that can be adopted by local jurisdictions, with the approval of the CEC. The savings potential for these efforts would depend on the extent advanced standards can be adopted by local jurisdictions, and the degree of enforcement and compliance that may be anticipated. In addition, other government entities, such as the Tax Credit Allocation Committee, or non-governmental organizations such as school districts or corporations

may voluntarily adopt advanced building standards, which could result in significant savings potential. HMG has provided technical support to statewide reach code efforts, in estimating the energy savings potential from reach code adoption by local jurisdictions.

- **AB1103 Commercial Building Benchmarking** - State law now requires commercial buildings to be benchmarked, and the benchmarking information disclosed, at the time of a building sale or leasing. The AB1103 requirements will start to phase in next year, and could be a significant factor in the market during the period of this study. The CPUC, further, has ordered the IOUs to encourage benchmarking through their commercial incentive programs. The savings potential, and the associated goals, for benchmarking will result from material support of the benchmarking process that the utilities could provide, and on the behavioral response from the market as benchmarking information becomes more available. HMG has provided technical and organizational support to the CEC, other state agencies, the CPUC, the EPA, the real estate industry, California munis and the IOUs for the past four years, with the goal of making commercial building benchmarking universal. We understand the challenges and the potentials for benchmarking as a major source of new energy efficiency.
- **AB 1109 Incandescent Lamp Standards** - The Huffman bill has outlawed general service incandescent lamps (the traditional Edison base A lamps), which should give a boost to CFL and, eventually to LED alternatives. The AB 1109 requirements also overlap with more recent federal legislation. The energy savings that will result from AB 1109 may overlap with the energy efficiency potential provided by other mechanisms (codes and standards, IOU incentives, etc.). Potential double counting will be addressed.
- **AB 32 Greenhouse Gas Reductions** - Administered by the California Air Resources Board, sets ambitious limits on future greenhouse gas emissions through a variety of mechanisms, including anticipated increases in energy use efficiencies. Those potentials likely overlap substantially with the other energy efficiency potentials that comprise the technical and economic potentials for energy efficiency, although the AB 32 requirements may affect the judgments about what constitutes cost effectiveness. To the extent the AB 32 mandates require broader and deeper energy efficiency than the CPUC's cost effectiveness criteria would target, then the efficiency potential and goals may need to be increased.
- **AB 758 (Skinner) -** This legislation charges the CEC with developing and implementing a comprehensive program to improve the energy efficiency of existing residential and nonresidential buildings in California. To the extent the efficiency potential targeted by this program overlaps with the general technical and economic potential for energy efficiency, this legislation may not produce any additional savings potential. It may, however, affect which agency goes after which parts of that potential, and also the cost effectiveness with which the potential savings may be achieved.
- **AB 2021** - This legislation required the publicly owned utilities (POUs) to put energy efficiency to the front of the loading order when meeting new load growth. AB 2021 also requires POUs to estimate the energy efficiency potentials within their own service territories, to develop energy efficiency goals and targets, and to implement programs to go after that potential. Those savings will be significant in contributing to the statewide energy efficiency effort, and can be accounted for in this study. Furthermore, it is likely that there will be synergies and spillover between the efficiency efforts in the IOU territories and those in the POU territories. It will be as important to account for those savings as to avoid double counting the savings with the IOUs.

2.2 *Methodology Walk-through*

The following sections discuss the proposed methodology for both the economic potential study and the

goals and targets studies.

Track 1: Economic Potential Study

As discussed earlier, previous assessments of California Statewide energy efficiency potential have relied heavily on the results from Itron's DSM Potentials Model ASSET. The ASSET model provided detailed estimates by utility service area, climate zone, sector, building type, and measure over a twenty year forecast horizon of Technical, Economic, and Market Potential. These model results were used to help define the investor owned utility annual goals. The following section discussed the basic EERAM modeling methodology which Navigant will employ to achieve the objectives of Track 1.

Basic EERAM Modeling Methodology

EERAM is an Excel spreadsheet model based on the integration of energy efficiency and demand response measure impacts and costs, utility customer building characteristics, utility load forecasts, and utility avoided costs and rate schedules. Excel is used as the modeling platform to provide transparency to the estimation process. Using Excel also allows the model to be flexible so that it can be customized to each client's unique needs. The model utilizes a "bottom-up" approach in that the starting points are the study area building stocks and equipment saturation estimates, forecasts of building stock decay and new construction, energy efficiency technology data and past energy efficiency program accomplishments. It first identifies Technical Potential, then screens the individual DSM measures for cost effectiveness (such as TRCs 1.0 or greater) to develop Economic Potential. Market Potential is developed using decision-maker variables that help drive the market scenarios. For energy efficiency measures, EERAM can estimate annual market energy efficiency potential based on a diffusion curve methodology (different for emerging technologies and for existing technologies) or it calculates market potential based on a decision-maker adoption rate algorithm. This algorithm is primarily a measure-by-measure elasticity response to measure payback.

Figure 7 illustrates the current flow of information in and out of EERAM. The model can be segregated into three sections.

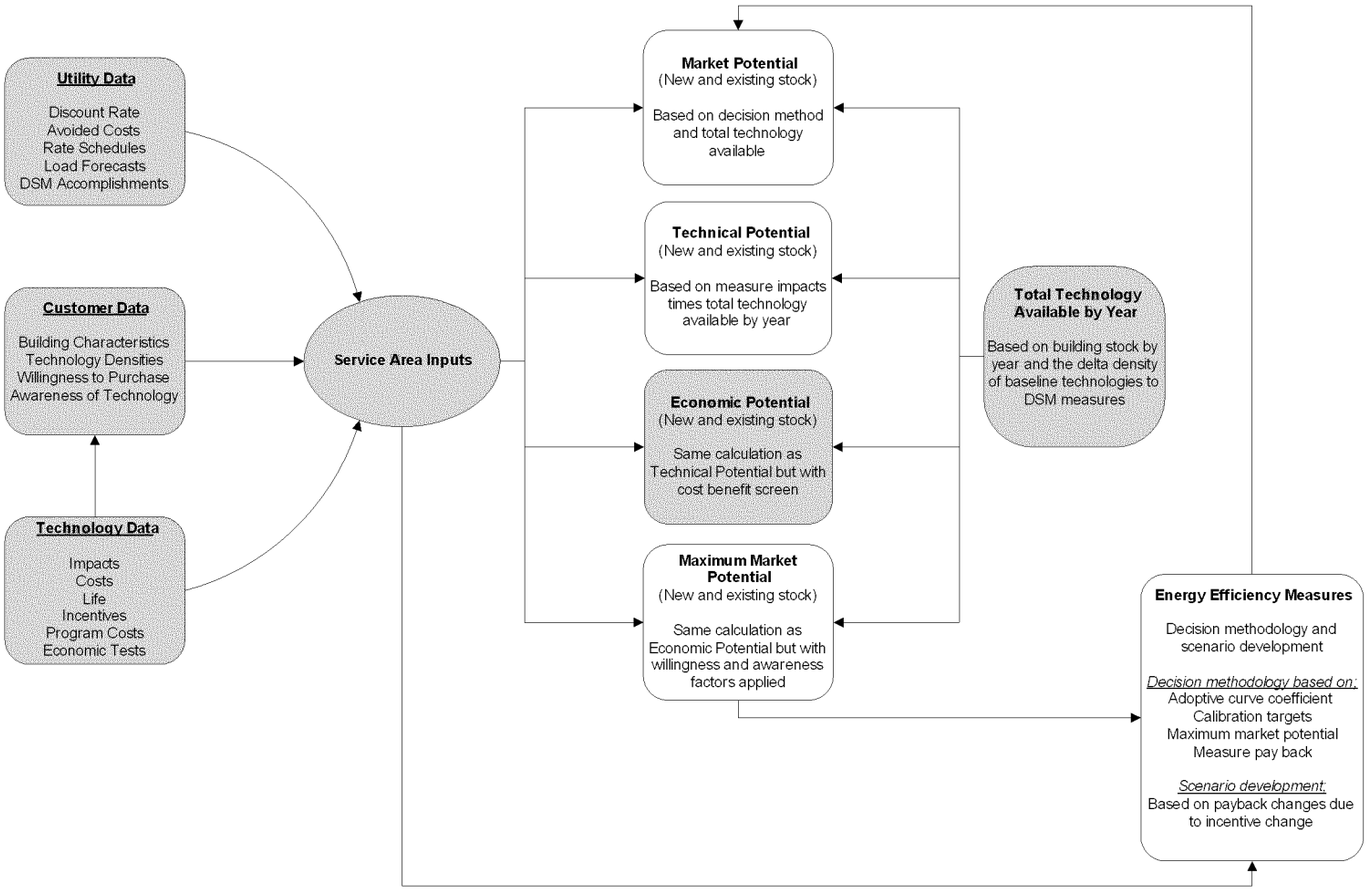
1. **Utility Service Area Inputs**
   - Utility-specific information on rates, avoided costs, load and building stock forecasts, and historical levels of DSM achievement
   - Customer data including building/equipment characteristics, decision-maker awareness of efficiency measures and if aware, willingness to install
   - Technology data, including measure-level impacts and costs, measure life, incentive levels, administrative costs, and net-to-gross estimates
2. **Model Calculations**
   - Tables and graphs on Technical, Economic, and Market Potentials
   - Develop Technical Potential based on the inputs above
   - Develop Economic Potential by screening Technical Potential with a cost test such as the Total Resource Cost (TRC) test
   - Develop Market Potential based on available economic potential, calibration targets, and the decision adoption methodology, detailed in the sections below
3. **Model Outputs**

- Tables and graphs on Technical, Economic, and Market Potentials
- Both cumulative and incremental market potential estimates by planning year. The incremental values are used to define annual goals.
- Both cumulative and incremental administrative and incentive cost estimates by measure and planning year
- Market Potential supply curves

Figure 10 provides an outline of the various inputs to the EERAM model. Outputs from the model will be designed to accomplish multiple objectives, including;

- Determine the total cost-effective energy savings available from 2013-2022 on an annual and cumulative basis for 100% of retail energy use in IOU territories. These estimates will be provided at the sector level and will align with Integrated Energy Policy Report (IEPR) forecast.
- Provide guidance for the utilities' next energy efficiency portfolios at an aggregate level, and at the measure category level where appropriate based on the aggregate level nature of the analysis. To ensure continuity with previous estimates of potential, our approach will be partially calibrated to the 2008 potential study while allowing a more aggregated and flexible view that will accommodate the energy efficiency goal setting process.
- Present a platform to accommodate the need for an expanded view based on the requirements of the loading order established in the Energy Action Plan and the needs of both the California Energy Commission's IEPR and the CPUC's Long Term Procurement Planning Proceeding (LTPP), and to inform analysis of California's greenhouse gas reduction targets.
- Because the methodology is based on tools and approaches used to set benchmarks for Risk Reward Incentive Mechanism (RRIM) in the 2006 -2008 and 2009 portfolios, such as the Standard Program Tracking database and HIM evaluation approach, the analysis will serve as a platform for future reward mechanisms.

Figure 10: EERAM Input Information and Model Calculation Flow



Track 2: Goals and Targets Study

Track 2 Methodology Walk Through.

1. Identify Market Drivers

This step will identify market drivers that can impact the Total Statewide Market Potential. Currently the following drivers had been indentified: recent legislation, Title 24 updates, federal codes and standards, federal stimulus funds distribution in California, utility (IOU and non-IOU) programs, emerging technologies, the water-energy nexus, individual Strategic Plan Initiatives (existing and potentially new), and "naturally occurring" energy savings.

Navigant can review additional drivers to indentify if any should be added to the analysis. Additional drivers can be discussed with KEMA, the CPUC and relevant Subject Matter Experts from the PAC during the Track 2 Scoping Activity. Once the final drivers for analysis are determined, Navigant can research each driver and compile information such as:

- An overall description
- Description of how driver will generate savings
- The key stakeholders

Each market driver will be further segmented into the appropriate sectors (residential, commercial, industrial, and agricultural). Additional applicable subsectors can be indentified if needed (such as offices or retail in the commercial sector and single family and multifamily homes in the residential sector)

2. Assess Attribution Assumptions to Avoid Double Counting

Many of these drivers are cross cutting and may overlap with one another. A key step to properly estimating the Total Statewide Market Potential is to understand the areas in which drivers may interact or overlap and savings could be double counted. Navigant will conduct a thorough vetting of all assumption related to attribution of savings for each of the market drivers and related sector impacts with KEMA, the CPUC and relevant Subject Matter Experts. Examples in which Navigant Foresees potential interaction or overlap;

- The Track 1 IOU program driver can overlap with emerging technologies, federal appliance and equipment standards, and lighting standard drivers.
- The emerging technology driver may interact with strategic plan initiatives
- The naturally occurring savings driver may interact with legislative initiatives and Non-IOU program drivers

3. Evaluate Driver Savings – Technical Potential

Navigant will develop a bottom-up estimate of the technical Total Statewide Market Potential for each driver. We will utilize existing assumptions and estimated savings from each strategy, or developing new estimates of strategy savings, as required. Savings estimates will be disaggregated into the appropriate sectors and subsectors as identified in Task 1. Each driver will require special consideration in calculation of its technical potential. Below are examples of how Navigant could calculate savings for drivers already identified.

IOU Programs

IOU program energy savings will be modeling in Track 1. Navigant's EERAM model (previously described in Section 2.1) is capable of calculating the technical, economic, and market potential disaggregated by sector and HIM. Navigant will use the outputs from Track 1 as inputs to this Track.

Non-IOU Programs

Navigant will reference the recent CEC 2007 study on *Statewide Energy Efficiency Potential Estimates and Targets for California Utilities* to obtain projections for the energy efficiency potential of Non-IOU programs. Projections are available through 2016.

Should data from the 2007 CEC study be insufficient, Navigant can instead reference two additional studies. Navigant completed DSM potential studies using existing data sources for most of the municipal utilities in California in 2010. These studies are in preparation for the utilities' ten-year energy efficiency plans required in California Assembly Bill 2021. The EERAM model that Navigant used for these California municipal utilities is an earlier version of the one that Navigant proposes for this project. As part of the 2010 study, Navigant used the DSM measure and costing information in the utilities' E3 calculators to provide many of the inputs for the EERAM. Another very important source of information used to identify building stock characteristics and DSM technology densities were the input files used by Itron for its ASSET model runs used to develop the 2009 portfolio savings.

Strategic Initiatives

The analysis plan for Strategic Initiatives was detailed earlier in Section 2. Its process follows a similar outline to the analysis of all other KMDs. The key steps that will be taken to analyze the savings potential are listed below:

1. Categorize each initiative
2. Estimate the numeric potential, goals and savings of the Strategic Plan
3. Evaluate Plan Savings Estimates
   - 3.1. Assess Sector and Sub-Segment Savings Analyses
   - 3.2. Employ Initial Planning Screen
   - 3.3. Evaluate "Achievable" Scenarios
   - 3.4. Undertake HIM and Secondary Measures Analysis
4. Total Market Savings from Strategic Plan Initiatives
5. Assess at a high level the cost to achieve Strategic Plan goals
6. Develop a Plan Performance Measurement Framework

When possible, Navigant will reference existing analysis and models previously used to analyze strategic initiatives. For example, in 2009 Navigant analyzed the Existing Homes Initiative using home energy modeling software for the CEC's PIER Buildings Program. Similar modeling may be useful for the Zero Net Energy Homes, Whole House Retrofits, and Low Income Energy Efficiency initiatives.

Legislation

Specific legislation will be analyzed using a bottom-up approach to estimate savings. Legislative impacts are included in Track 1, therefore analysis is only needed for the impacts of legislation on non-IOU service territories. Most of the legislation being analyzed in Track 2 will be included in Track 1. Therefore, Navigant can continue to use the same methodology for each respective

legislative piece used by EERAM in Track 1 for its analysis in Track 2. For example, a specific piece of legislation can be examined to understand the key technologies that are driving its energy savings. That technology can then be analyzed using the algorithms from EERAM.

Possible California and Federal legislation that Navigant has identified as having the ability to potentially impact the Total Statewide Market Potential are listed in Figure 2 and Table 4.

Water Energy

Recent CPUC studies estimated that California's water infrastructure consumes approximately 8% of the state's electricity to supply, treat, and distribute water and subsequently, collect, treat, and dispose of wastewater. Historically energy use by the water sector has been lumped into the industrial sector; however, unique energy savings opportunities specific to the sector warrant a separate analysis. Navigant can examine these unique opportunities in Track 2.

Direct and indirect energy savings can be reaped from the water sector. The majority of electricity consumed by the water sector is used for pumping. Direct energy savings can be achieved by improving the efficiency of motors and pumps. If the embedded energy[14] in water is recognized, indirect energy savings can be achieved from water conservation measures. These savings would reduce the energy required by the water infrastructure to provide water to California customers. Indirect energy savings associated with water conservation can act to decrease both IOU energy demand and non-IOU energy demand. Navigant can examine both direct and indirect energy savings opportunities in the water sector in Track 2.

Water conservation policies such as the *20x2020 Water Conservation Plan*[15] will reduce water demand and subsequently reduce energy consumption. Energy savings can be estimated by projecting water savings and multiplying those savings by the energy intensity of the marginal water supply[16]. Various water conservation scenarios are possible; Navigant could develop a projection of the most likely scenario for the use of this analysis. There are regional variances in the energy intensity of marginal supplies as well as variances in conservation targets. Navigant can account for both of these variables in the analysis.

Navigant's has deep understanding of California's water energy connection. Navigant served as a subcontractor on the recent CPUC Embedded Energy in Water Studies[17]. Members of Navigant played key roles in all aspects of the study including: collecting and analyzing the extensive water-energy data, interviewing water operators to understand the management of water infrastructure, developing models to forecast water-related energy use in California, and documenting the embedded energy of California's water.

[14] The amount of energy it takes to supply, treat and deliver water to an end use customer and subsequently treat and dispose of the wastewater on a per unit basis. Often measures in kWh/Million Gallons or kWh/Acre-Foot. It represents the total energy up and downstream of an end use customer associated with the customers water use.

[15] In February 2008, Governor Schwarzenegger directed state agencies to develop a plan to reduce statewide per capita urban water use by 20 percent by the year 2020. Multiple state agencies participated in developing a plan and setting regional targets.

[16] The water source that would supply an incremental increase in demand or conversely be curtailed during decreased in demand.

[17] CPUC. Embedded Energy in Water Studies 1 and 2. 2010. http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm

Emerging Technology

The impacts of Emerging Technologies (ET) can be accounted in both Track 1 and Track 2. Navigant's extensive work evaluating emerging technologies developed an extensive database of emerging electric and natural gas efficiency technologies. In Track 1, a subset of market-ready emerging technologies can be modeled in Navigant's EERAM tool for the California IOUs. As part of Track 2, Navigant can assess the potential impact of emerging technologies in two ways: 1) as they relate to various drivers, 2) as the impact the market absent of any other driver.

If an ET is applicable to a particular driver within Track 2, a portion of its savings can be attributed to that driver and modeled in that driver's analysis. For example, in home energy displays and cold water default washers may be examined as part of Behavioral Programs Driver under the Strategic Plan Initiatives.

Following review of all ET's for possible inclusion in other drivers (including Track 1), the remaining subset of emerging technologies will be analyzed for their Total Statewide Market Potential in California.

Navigant may need an approach to accurately estimate the market adoption of emerging technologies over the study period. A key consideration is the changing rate at which emerging technologies penetrate the market. Two possible options to model emerging technology impacts are detailed below.

Option 1:

The market penetration of new technologies has been shown to follow a certain trend and can be modeled using a Bass Diffusion curve. Bass Diffusion curves are extensively used in Navigant's EERAM (previously described in Section 2.1) and DSMSim™ models. Modeling emerging technologies in Track 2 can utilize the algorithms and calculation engines from these models.

Option 2:

Historic data may be of use. The 2006 California Energy Efficiency Potential Study forecasted the technical and market potential of a group of emerging technologies in the California IOU utility service territories through 2016. Penetration for emerging technologies was estimated similarly to that of conventional technologies. The 2006 projections could be compared against actual program savings from emerging technologies in IOU programs from 2006-2010. This comparison would show to what extent emerging technology penetration deviates from that of conventional technology. The data garnered from this analysis could be applied to penetration estimates for Track 2.

Naturally Occurring Efficiency Initiatives

In addition to the savings that are achievable from HIMs and secondary measures analyzed, additional naturally occurring savings is possible from both sources. This naturally occurring savings is driven by factors outside the key market drivers. Savings attributed to naturally occurring savings can be calculated using the arithmetic complement to the Net-To-Gross (NTG) ratio.[18]

Normally, the complement of the NTG ratio indicates the level of savings that is not attributable to a utility program; Navigant will use it as a proxy for the naturally occurring savings.

[18] If the NTG is 0.85, the arithmetic complement is 1.0 - 0.85 = 0.15

Navigant will research possible sources to identify the NTG ratios that would be most applicable for each KMD, HIM, and secondary measures[19]. If data is not available, proxy estimates will be used and justified. The complement of each of the NTG ratio will be applied to calculated market potentials of each HIM respectively. This will develop an estimate of the naturally occurring savings for each HIM and can be totaled for each sector and for the whole state

4. **Initial Planning Screen – Identify Key Market Drivers**

Navigant will conduct a screening process to categorize each driver as "most likely" "may be likely" or "not likely" to having savings impacts over the planning period. The screening process will use multiple criteria to score each driver. Parameters could include: technical potential, cost effectiveness, market readiness, and legislative feasibility. Navigant will discuss the screening criteria and importance of each with the KEMA, the CPUC and relevant Subject Matter Experts.

The screening process can be conducted with inputs from KEMA, the CPUC and relevant Subject Matter Experts. This process will identify the Key Market Drivers (KMD) on which to focus further study analyses.

5. **Evaluate Key Driver Savings – Achievable Savings Scenarios**

Navigant will evaluate the market achievable savings potential from each of the KMDs identified as a result of Task 4. Achievable savings for each key driver will focus on estimating "high" "medium" and "low" potential savings

The 2008 Goals and Targets Study defined the "high" savings case as "difficult but feasible", while "mid" and "low" savings cases were more conservative based on trajectories of performance and market penetration milestones that were more modest and gradual over time. Navigant will work with KEMA, the CPUC and relevant Subject Matter Experts to update these definitions of scenarios if needed.

Navigant can develop market penetration curves for high, medium, and low scenarios. Navigant's EERAM and DSMSim™ models use technology savings, cost, and market information to determine appropriate market penetration curves for its DSM potential planning. Navigant can use the methodologies and algorithms in this model to come up with appropriate market penetration curves for analysis of key drivers in this study.

When possible, Navigant will compare the calculated bottom up achievable savings scenarios to the goals or previously estimated top down energy savings for each key driver.

6. **Identify HIM and Secondary Measures**

It is expected that a few core technologies will account for the majority of the savings for each key driver. Navigant will focus on identifying these core technologies (high impact measures). Analysis will be conducted as needed to disaggregate the total key driver savings to its component measures. For example Zero-Net-Energy-Homes energy savings may be primarily driven by savings from solar-PV generation. Analysis will be conducted to determine what portion of the total savings is realized from solar.

Navigant will compile a list of the high impact measures, document their energy savings under each scenario, and attribute their savings to an appropriate sector or subsector. It is possible that a few

[19] Secondary measures are a "package" of measures other than HIMs that together when included with the HIMs make up the majority of the energy savings impact within a KMD.

cross cutting high impact measures appear across various drivers. If so these will be identified and their Total Statewide Market Potential will be reported.

7. Calculate Total Statewide Market Savings from Key Market Drivers

Navigant will develop estimates of individual and Total Statewide Market Savings expected over the study period to be captured by KMDs. These estimates will incorporate the high, medium and low scenarios as previously described. This analysis will include the total and sector level potential energy savings (electric and natural gas) for each of Key Market Driver with accompanying percentage breakdown of the potential contribution to Total Statewide Market Potential.

8. Develop CPUC Goals and Targets Strategic Planning Framework

Navigant will use the results of the above analysis to create a four component/element *CPUC Goals and Targets Strategic Planning Framework.* The four proposed Framework elements include:

- *Total Statewide Market Potential Table of Savings* (TSMP-TS)
  - Navigant will utilize results from the previous task analyses to populate Table savings and develop percentage savings profiles for each KMD
  - The table will provide an overall estimate of Total Statewide Market Potential utilizing the "medium" scenario of savings from the "achievable" savings scenario modeling undertaken in Task 5. An appendix with tables representing "high" and "low" achievable savings will be provided
- *Key Market Driver Matrix of Existing and Possible Deliver Mechanisms and (High-level) Best Practices Analysis*
  - We plan to evaluate each of the Key Market Drivers from the point of view of market delivery of the savings
  - Navigant will list all "players" within each KMD, their role and approximate percentage impact on market savings associated with each market delivery entity
  - Navigant may identify, using a screening process of relevant best practice criteria, "best practice" delivery approaches currently in use in the California KMD,
  - Navigant may also identify areas where further actions might be made to enhance the delivery structure that operates within KMD
- A *Simplified Total Statewide Market Potential Scenarios "What if" Calculator* (TSMP-C)
  - It is planned that Navigant will develop a simplified, interactive spreadsheet calculator that incorporated the results of previous Track 2 analyses
  - The "TSMP-C" Scenarios Calculator, as presently conceived, will incorporate simplified switches within the spreadsheet that will allow planners the ability to:
    - Turn "on" and "off" certain drivers
    - Adjust overall economic factors
    - Switch between the high medium and low scenarios

Strategic Plan Initiative Classification and Performance Measurement Framework that incorporates the key elements of our strategic plan initiatives analyses, including a formal categorization framework from which to consistently identify for evaluation each initiative, and a Navigant developed Performance Framework that may be used by the Commission to inform its evaluation policy and decision making.

Alternative Consumption Reduction Based Goals

The notion of goals based on measurements of consumption is appealing, because it goes to the root of the problems of procurement and greenhouse gas reduction. In other words, if we can achieve a

measurable reduction in overall consumption, by whatever mechanism (physical efficiency, operational efficiency, behavior, etc.), then we will inherently meet other goals. Further, we can avoid all of the evaluation difficulties of measuring gross and net savings, concerns about attribution, and parsing out credit for the result. For instance, for professional who are closely involved with the benchmarking of building performance, a consumption based savings targets, along with the ability to measure progress toward those goals, is seen as one of the possible outcomes of universal benchmarking.

In practice, however, the problem quickly becomes one of "signal-to-noise," and of controlling for extraneous factors that affect overall consumption. By this we mean that even at the gross level, savings goals seldom exceed 2% of total energy consumption per year. Those levels of savings are actually quite large compared to the levels typically achieved by efficiency portfolios across the country. However, there are many factors that could cause a 2% change in energy consumption at the macro level. Among these are major weather events, unforeseen supply or price shocks, changes in economic conditions, even political events. Of course, these are factors that energy supply forecasters grapple with, and we expect that in the course of this project we too will need to address these issues in an attempt to determine whether it would be possible to separate the "energy efficiency signal" from the "energy supply noise" in order to set goals based on changes in consumption patterns. While Navigant's proposed structure of the analysis does not expect to incorporate such an approach at this time, one of this nature could be incorporated into the analysis. Were that the case, Navigant would also need to establish reliable approaches to measure the changes and to conceptualize adjustments to policy based on such changes.

Opportunities to Use Relativistic Goals

In theory, Navigant views the incorporating of relativistic goals within the overall Track 2 analysis as an additional task or sub-task, and sees no problem in incorporating this task into the overall work plan. In practice, should the Commission desire to incorporate these types of goals, Navigant expects the model we propose to develop to assess Total Statewide Market Potential to be flexible enough to integrate the effort. As note, in developing the TSMP analysis, Navigant will develop various scenarios of achievable potential (Task 5) for each of the relevant KMDs and as well develop a simple scenarios calculator (Task 8) that could provide an initial jumping off point for incorporating a relativistic approach to goal setting.

From a process point of view, incorporating relativistic goals will first require us to decide on the set of parameters that could be adjusted to reflect real-world conditions. Related to this, Navigant would need to evaluate the "baseline" conditions under which current programs are designed and operate. In understanding the baseline, various adjustment may be made to it to address changes in the base parameters that are termed here, for want of a better word, as "Normal."

Suggested parameters that might be included in such an analysis are: 1) broad economic conditions, 2) energy price fluctuations, 3) weather conditions, and 4) changes in energy demand forecasts. Undoubtedly, other parameters may also have merit for inclusion. To the extent the potentials model we develop to evaluate Goals and Targets can be accurately tied to the magnitude of changes in these effects, it would simply be a matter of using these parameters to adjust the goals as the effects change over time. Such an approach would be desirable for all stakeholders because it would allow for management of the portfolio risk and reward. For example, if the energy efficiency potential could be tied to broad energy price factors, then the goals and targets could be set based on current projections of those factors. Then, if the energy price factors were to change significantly during a program cycle, say due to a world-wide oil price shock, the goals could be adjusted accordingly. The expectation for energy efficiency accomplishments would change, and the risk/reward mechanisms could be adjusted as well. Program implementers would not be unduly rewarded or penalized for factors beyond their control.

One of the advantages of the Excel-based modeling approach we propose for this project is that the model can readily be adjusted parametrically. The challenge lies not in the modeling, however, but in the ability of the data to correlate energy efficiency potentials to measurable parameters from the real world. Some of those parameters are readily amenable to this sort of analysis. For example, the cost effectiveness of efficiency is a direct function of energy costs that can easily be tracked. Other factors, such as the effects of macroeconomic indicators of economic activity, may be more difficult to accurately parameterize in the model. In any deliberations on these issues, Navigant expects to work closely with CPUC staff, the PAC, and as needed, relevant stakeholders to provide input and direction on incorporating such parameters.

3 Modeling and Data Sources

3.1 Discussion of Modeling Approach

The following section discusses the modeling approach to be used to provide numeric outputs to be determined in the scoping plan. The Navigant team will use Excel based tools, or similarly accessible software to ensure flexibility in use and transparency in method. The significant role played by Navigant staff in the development of the Standard Program Tracking Database used in the 2006-2008 evaluations and RRIM process will ensure that deliverables and datasets conform to CPUC rules on access to models, databases and documentation[20]. Many of the modeling approaches discussed for track one can be applied to track two. Because of the unique study requirements for track 2, the Navigant team will develop new modeling approaches as necessary. See section 2.1 for an outline of the conceptual framework that will be used to develop this modeling.

Track 1: Economic Potential Study

EERAM's "bottom-up" approach uses the input data to calculate Technical, Economic, and Market Potentials. Calculating the estimates of Technical and Economic Potential is relatively straightforward: the estimates are the product of available building stocks, technology densities, and measure impacts.

For ***Technical Potential***, it is assumed that all measures can be implemented in all available applications at the same time. Technical potential changes by small amounts over time to reflect changes in the amount of building stocks over time caused by new construction.

Economic Potential is the subset of Technical Potential that includes only the efficient technologies that pass the TRC screen. However, the measures included in Economic Potential can be modified by the user to include some measures that do not pass the TRC, but are included within a utility's portfolio or measures that do pass the TRC test.

The treatment of mutually exclusive measures differs when calculating Technical vs. Economic Potential. Mutually exclusive measures are a set of available technologies (such as several residential hot water measures including energy-efficient tanks, heat pump water heaters, tankless water heaters, and solar water heat) that serve the same function. However, only one of them can be installed and care must be taken to not double-count potential, but also to identify which measures or what share of each measure should be part of the calculations. EERAM identifies which of these competing, mutually exclusive technologies offers the most energy savings and uses only the savings from this specific measure to

[20] subject to PU Code Section 1822, Rules 10.3 and 10.4

estimate technical potential.

Unlike Technical Potential, Economic Potential recognizes that not all potential comes from the most efficient option. For mutually exclusive measures that pass the TRC or TRC screen, measure applicability represents each measure's share of the available application. The measure applicability share by mutually exclusive measure represents a weighted share based on each measure's TRC value. Equal TRC values would mean equal applicability shares among the measures. The greater the delta in TRC between measures, the greater the applicability for the measure with the larger TRC value.

Interactive effects are also treated differently between Technical and Economic Potential. For Technical Potential, interactive effects are proportionately spread among the competing technologies. For Economic Potential, the interactive effects can be smaller as only measures that pass the TRC screen are included. Interactive effects among only the measures that pass TRC are proportionately spread.

Thus, for some measures screened by the TRC, per measure impacts may be greater for the measure included in Economic Potential compared to the measures included in Technical Potential.

The estimation of economic potential will be carried out using an updated variant of Navigant's EERAM model. The model is 'bottom up' by design; it starts with a list of energy efficiency technologies and assesses if those technologies can be implemented within a utility service territory's specific stock of buildings. Navigant proposes to simplify the 'bottom up' approach by reducing the number of measures assessed to only those that save the greatest amount of energy and measures with unique application.

Many of the inputs used by EERAM are the same or very similar to those used by ASSET. We propose populating the EERAM inputs from the input data used in the last Itron ASSET modeling analysis. We intend to calibrate our EERAM results to first, closely replicate the amount of economic potential identified in the ASSET runs and then second, update building characteristic information and DSM measure penetration using the new RASS model, federal CBECs results, and utility program accomplishments at the measure level. As discussed previously, our measure level data will be focused on those measures (and some measure categories) that have historically contributed the largest portion of energy savings to the California Statewide portfolio. For example, Table 3 provides an analysis showing which measures and measure groups comprised over 90% of ex-ante and ex-post first year portfolio kWh savings in the 2006 – 2008 program cycle, and will likely continue to be important contributors over the 2013 – 2022 timeframe for this study.

Table 3. 2006 - 2009 Portfolio Savings by Measure

ED Measure Group	Ex-Ante First Year Gross kWh	Ex-Post First Year Gross kWh (Interactive)	Ex-Ante First Year Gross kWh %	Ex-Post First Year Gross kWh (Interactive) %
Interior screw lighting	8,061,214,524	3,212,068,717	51%	36%
Linear fluorescent	870,558,323	684,184,733	5%	8%
Recycle refrigerator	708,140,445	447,479,063	4%	5%
Lighting - unknown	309,282,674	276,950,608	2%	3%
Process - unknown	401,973,121	263,885,772	3%	3%
WB - NC	236,356,857	232,725,673	1%	3%
Pump	246,119,828	195,273,875	2%	2%
Process - other	278,710,423	182,857,496	2%	2%
High bay fluorescent	239,856,984	176,676,219	2%	2%
Occupancy sensor	145,114,737	143,328,035	1%	2%
Linear fluorescent delamping	194,627,739	139,595,483	1%	2%

CFL Fixture	238,850,498	137,341,407	1%	2%
Refrigeration strip curtain	248,297,470	128,671,637	2%	1%
Compressed air	180,119,740	113,428,182	1%	1%
Pump off controller	228,191,154	107,870,163	1%	1%
Outdoor CFL Fixture	232,699,223	102,281,839	1%	1%
Other	157,424,585	102,113,610	1%	1%
HVAC controls	105,397,910	91,956,354	1%	1%
Retro-commissioning	125,215,369	91,899,474	1%	1%
RCA	182,637,090	84,125,981	1%	1%
Chiller	94,806,583	79,677,067	1%	1%
VFD - application unknown	104,985,064	78,037,842	1%	1%
VFD - HVAC Fan	82,677,733	76,701,172	1%	1%
Motor	87,239,862	76,584,582	1%	1%
HID	93,226,718	74,084,387	1%	1%
Clothes washer	60,216,493	71,055,155	0%	1%
Coil cleaning	64,648,444	64,648,444	0%	1%
Rooftop or split system	92,368,008	62,501,977	1%	1%
Refrigeration - unknown	71,351,478	60,611,887	0%	1%
Holiday lights	9,671,662	59,256,398	0%	1%
Lighting - other	89,424,781	59,067,222	1%	1%
Recycle freezer	84,045,779	53,764,326	1%	1%
On-site Audit	161,775,673	51,741,011	1%	1%
EMS	54,719,559	47,681,490	0%	1%
Refrigerated case replacement	43,424,615	43,443,716	0%	0%
HVAC Other	52,545,107	42,380,256	0%	0%
Refrigerator	44,362,546	38,437,544	0%	0%
Exit sign	38,285,134	38,260,873	0%	0%
Night light	96,996,097	38,065,233	1%	0%
VFD - non HVAC pumping	52,148,369	36,963,301	0%	0%

For both utility specific information and customer data the Navigant team will use the significant amounts of data gathered in the 2006 – 2008 evaluations. **Error! Reference source not found.** provides a list of market effects studies, behavioral research topics and market assessments that Navigant will review to inform the EERAM modeling effort.

Table 4: Key 2006 – 2008 Evaluation Reports and Study Topics Relevant to Track 1 Analysis

2006 - 2008 Market Effects Studies
CFL Market Effects
High Bay Lighting
New Construction
2006 - 2008 Behavior Studies and Topics
Energy efficiency potential studies and behavior
Measurement and evaluation of energy savings and non - energy impacts from energy efficiency behaviors
Process evaluation's insights on energy efficiency program implementation

Behavioral assumptions underlying energy efficiency nonresidential programs
Behavioral assumptions underlying energy efficiency residential programs
Market segmentation and energy efficiency program design
Experimental design for energy efficiency programs
Motivating policymakers, program administrators, and implementers to pursue behavioral change strategies
Encouraging greater innovation in the production of energy - efficient technologies and services.
2006 - 2008 IOU Market Assessment Studies
Market Baseline Study of the Business and Consumer Electronics Program
Target Market Customer Survey
Codes and Standards Market Adoption Estimation Methods
Codes & Standards PE/MA
Sustainable Communities PE/MA
California New Homes PE/MA
Savings by Design PE/MA
2006 Residential Market Share Tracking

Information on future codes and standards, both federal and state, will be gleaned from existing data sources. The intent is to use this information to populate a matrix by measure and building type that identifies when the code/standard is to be implemented and the expected improvement in efficiency from the code/standard. The matrix will allow for multiple code/standard changes over time to the same measure. Navigant will create a similar matrix for technologies that are expected to appear in the future. This matrix will be somewhat more complex as certain emerging technologies will be replacing currently offered DSM measures and others will be affecting other baseline technologies not currently addressed by DSM measures.

The impacts from some initiatives, such as ARRA funded programs, are a subset of the economic potential developed from the list of DSM measures, both existing and emerging technologies. The challenge with these types of programs will be identifying the proper level of attribution assigned to each. Naturally occurring DSM is also a subset of the economic potential developed from the list of DSM measures, both existing and emerging technologies. Naturally occurring DSM will be estimated based on the inverse of the net-to-gross estimate. Navigant will identify the most current net-to-gross estimates from recently completed EM&V studies. Most of these studies are located on the CALMAC website.

Behavioral programs are assumed to have efficiency effects beyond the economic potential identified with the dataset of measures included for analysis. Characterizations of these programs will be based on the best available information and their overall effect will be to increase economic potential.

Track 2: Goals and Targets Study

3.2 Examples of Previous Potential and/or Goals Studies

As requested in the RFP, a several supplemental files have been included with the proposal that includes past reports that public, and examples of past models. These files are listed below. ***The Navigant team***

would be pleased to provide the proposal selection committee with an overview of these projects and a demonstration of tools and solutions provided on the CD and discussed in this section.

- An MS Word file titled 'DSMSim Methodology' that is an excerpt from a client deliverable discussing the approach used to generate outputs from a market potential study completed using DSMSim™.
- A project completed for the CEC defining various energy efficiency and demand response scenario to be considered in the IEPR titled "CEC EE and DR Response Scenario for California Utilities.
- A work paper completed by Navigant supporting the 2007 IEPR entitled "2007 IEPR Implementation and Scenario Workshop" that demonstrates our understanding of the IEPR process.
- A functional model EERAM model.
- Energy Efficiency Resource Assessment Model - Electricity Sample
- A power point presentation on Navigant's modeling solutions titled "Navigant Modeling Solutions"
- A manual for a Water Energy Model Manual project referenced below that demonstrates our ability to document complex models
- California Wholesale Water-Energy Model, a functional Excel based model for the water emerging mentioned below that demonstrates our ability to model a variety of initiatives.

The following sections provide a brief discussion of past and recent potential studies, including EERAM applications. Other modeling efforts and software tools that the Navigant team might use for the 2012 study are also discussed.

Summary of EERAM Applications

Navigant has considerable experience with energy efficiency assessments across the country—team members have been involved in studies across North America. A summary of Navigant's projects are shown in **Error! Reference source not found.**. As shown above in **Error! Reference source not found.**, Navigant has undertaken some of the largest DSM planning studies, market characterization, and technical screening of DSM operations in the nation. These large studies provided experience in performing ongoing multi-year efforts with utilities and regional conservation and energy efficiency entities.

Table 5: Recent Navigant DSM Market Potential Studies

	Primary Market Research			Market Potential Modeling	Urban / Rural	Year
	End-Use Saturation	Customer Demo-graphic	Customer Psycho-graphic			
City of Palo Alto Natural Gas Market Potential				●	Urban	2010
California Publically Owned Utilities (35 separate assessments)				●	U & R	2010
Maine PUC					U & R	2010
Nova Scotia Power, Res	●	●	●	●	U & R	2010

Unisource Electric and Gas	●	●	●	●	U & R	2010
Northern California Power Authority and Southern California Public Power Authority (for 38 members)				●	U & R	2010
Otter Tail Power (MN)	●	●	●	●	U & R	2010
Colorado Springs Utilities	●	●	●	●	Urban	2010
State of Minnesota	●	●	●	●	U & R	2010
Hoosier Energy, C&I	●	●	●	●	U & R	2009
AEP Ohio				●	U & R	2009
AEP Appalachian Power				●	Rural	2009
Lansing BW&L				●	U & R	2009
State of Kansas				●	U & R	2008
State of Iowa	●	●	●	●	U & R	2007
Nebraska Public Power				●	U & R	2007
Kansas City Power and Light				●	U & R	2007
Duke Energy Indiana				●	U & R	2007
Midwest Residential	●	●	●	●	U & R	2006
Nova Scotia Power				●	U & R	2006
Xcel Energy (MN)	●	●	●	●	U & R	2003
Otter Tail Power, C&I	●	●	●	●	U & R	2002

The following section discusses some of the recent potential studies completed by the proposed project staff, including applications of EERAM and other industry tools.

Recent DSM Potential Studies Using Existing Data Sources

The following section discusses some of the recent potential studies completed by the proposed project staff, including applications of EERAM and other industry tools.

- Navigant completed DSM potential studies using existing data sources for ***most of the municipal utilities in California*** in 2010. These studies are in preparation for the utilities' ten-year energy efficiency plans required in California Assembly Bill 2021. The EERAM model that Navigant used for these California municipal utilities is an earlier version of the one that Navigant proposes for this project. As part of this study, Navigant used the DSM measure and costing information in the utilities' E3 calculators to provide many of the inputs for the EERAM. Another very important source of information used to identify building stock characteristics and DSM technology densities were the input files used by Itron for its ASSET model runs used to develop the 2009 portfolio savings. Randy Gunn was the Principal-in-Charge for these projects, Gary Cullen performed the DSM Potentials modeling for each project, and Laura Agapay led the DSM benchmarking analysis for these studies.
- Navigant/Summit Blue recently completed several DSM potential studies without primary market research for municipal utilities and investor owned utilities in 2009. These include ***American Electric Power Ohio, Appalachian Power,*** and ***Lansing Board of Water and Light***. These studies include DSM measure characterization work using building simulation models, DSM benchmarking and best practices analysis, and DSM potential estimates using Navigant's DSM Resource Assessment model. Randy Gunn was the Principal-in-Charge for these projects, Stu Slote was the project manager for AEP Ohio, Gary Cullen led the DSM Potentials modeling for each project, and Laura

Agapay led the DSM benchmarking analysis for these studies.

- Navigant/Summit Blue conducted a residential and commercial and industrial DSM planning study for ***Nebraska Public Power District*** in 2007. Navigant staff characterized a broad range of residential and commercial/industrial DSM measures using existing NPPD, MEEA, and Navigant information. Benefit-cost analysis for each DSM measure and program was conducted using a spreadsheet model. This information was used in a spreadsheet DSM potential model to estimate technical and achievable DSM potentials for a base case DSM scenario for a 20-year forecast period. The project included developing high-level DSM program plans. Randy Gunn managed this project, and Laura Agapay conducted the DSM measure characterizations and estimated the DSM potentials for this project.
- Navigant/Summit Blue and Energy Insights conducted energy efficiency potential studies for ***Kansas City Power and Light*** in 2007and the ***Kansas Energy Council*** in 2007-2008. Summit Blue was the prime contractor on both projects and conducted most project tasks. Energy Insights was responsible for developing baseline market profiles for KCP&L and Kansas customer bases, since the projects did not include primary data collection. The KCP&L project included DSMore benefit-cost analysis for C&I EE measures, as well as estimating avoided costs for the DSM benefit-cost analysis, and developing DSM program plans. Randy Gunn managed these projects, and Gary Cullen conducted the DSM potential modeling for the Kansas Energy Council. Laura Agapay led the DSM benchmarking analysis for these studies.
- Navigant/Summit Blue and WECC conducted a DSM Planning Study and Action Plan for ***Duke Energy Indiana*** in late 2006-2007. Navigant staff quickly characterized a broad range of residential and commercial/industrial DSM measures using existing Duke, MEEA, and Navigant information. Benefit-cost analysis for each DSM measure and program was conducted using the DSMore model. This information was used in a spreadsheet DSM potential model to estimate technical and achievable DSM potentials for a base case DSM scenario for a 20-year forecast period. WECC developed the Action Plan for this assignment that translated the DSM potential results in to specific program plans and goals. Randy Gunn managed this effort, and Laura Agapay conducted the DSM benchmarking.
- Navigant/Summit Blue provided a DSM potential study and developed DSM program plans for ***Nova Scotia Power Inc.*** (NSPI) in a very compressed timeframe and reviewed, analyzed, and revised NSPI's previously proposed DSM plan. The project includes a fast track DSM potential study, significant benchmarking analysis of NSPI's proposed DSM plan to leading North American utilities, and preparation of a report and DSM plan which were filed with the Nova Scotia's regulator in Fall 2006. Navigant also provided the DSM input into the Integrated Resource Plan developed for the province. Randy Gunn led this project.

Additional Modeling Capabilities

In addition to the EERAM models and tools highlighted in the previous discussion, Navigant has developed a considerable array of models and analytic skills, including numerous other potential and goals studies using software tools such as Analytica[21] and Excel.

[21] Analytica is a visual software package developed by Lumina Decision Systems, Inc. for creating, analyzing and communicating quantitative decision models. Analytica includes hierarchical influence diagrams for visual creation and view of models, intelligent arrays for management of multidimensional data, Monte Carlo simulation for analyzing risk and uncertainty, and a general modeling language. It is designed to enable the creation of models that are transparent, interpretable, extensible, and flexible. The design of Analytica is based on key ideas from the field of

As discussed previously, EERAM will be the tool of choice for the Track 1 economic potential study because it is based on logic similar to ASSET, is Excel based and transparent, and can be modified to accomplish the high level view sought by the ED. The modeling tool to be used for the setting goals and targets under Task 2 may also be Excel, or it might include a combination of Excel and other tools, such as Analytica. The Navigant team may recommend Analytica for Track 2 activity based on several factors, including;

- Is it specifically designed for creating, analyzing and communicating quantitative decision models
- Analytica includes hierarchical influence diagrams for visual creation and view of models, intelligent arrays for management of multidimensional data
- I provide excellent capably for risk and uncertainty modeling, such as Monte Carlo simulation
- It is designed to create model that are transparent, interpretable, extensible, and flexible.
- The design of Analytica is based on key ideas from the field of Decision analysis.

Several of these models are listed below. As discussed in the RFP, we are including a separate folder with this proposal that provides supplemental materials on several of these models and studies, and providing a brief discussion in the following pages.

- Demand Side Management Simulator (DSMSim™), a DSM potential model and program planning tool that simulates energy-efficient (EE) technology adoption under various planning assumptions.
- Renewable Energy Market Simulator (RE-Sim™), a model that forecasts renewable energy credit (REC) prices, calculates least-cost compliance, determines required capacity to acquire, and estimates rate impacts of RPS.
- Demand Response Simulator (DRSim), a model that forecasts the stochastic potential for Demand Response (DR) resources by customer segment and response type (load shed vs. distributed generation) and identifies gaps in current programs.
- CPUC Embedded Energy in Water Studies[22]

Demand Side Management Simulator (DSMSim™)

DSMSim™ is an Analytica based DSM potential model and program planning tool that simulates energy-efficient (EE) technology adoption under various planning assumptions. Figure 11 provides a view of the main screen. Several features of the model include;

- Technology performance and costs, saturations, customer behavior, and other data are considered in the simulation.
- Equilibrium market share is primarily estimated as a function of the simple payback period (exceptions apply), and the approach to calculating equilibrium is simulated using Bass Diffusion Theory[23], [24] (See Figure 12)

Decision analysis. Analytica is widely used for policy analysis, business modeling, and risk analysis, with application areas that include energy, health, pharmaceuticals, environmental risk, wildlife management, defense, R&D planning, financial services, aerospace, and manufacturing.

[22] CPUC. *Embedded Energy in Water Studies 1 and 2.* 2010. http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm

[23] Bass, Frank (1969). "A new product growth model for consumer durables". Management Science 15 (5): p215–227.

[24] Also see Sterman, John D. Business Dynamics: Systems Thinking and Modeling for a Complex World. Irwin

- Outputs include technical/economic/market potential by measure, category, customer segment, and scenario, examples of which are shown in Figure 13 and Figure 14.

Navigant might propose a variation of DSMSim™ for Track 2 modeling because of its ability to manage multidimensional data and it provides excellent capably for risk and uncertainty modeling.

Figure 11: DSMSim™ Main Input / Output Option Page

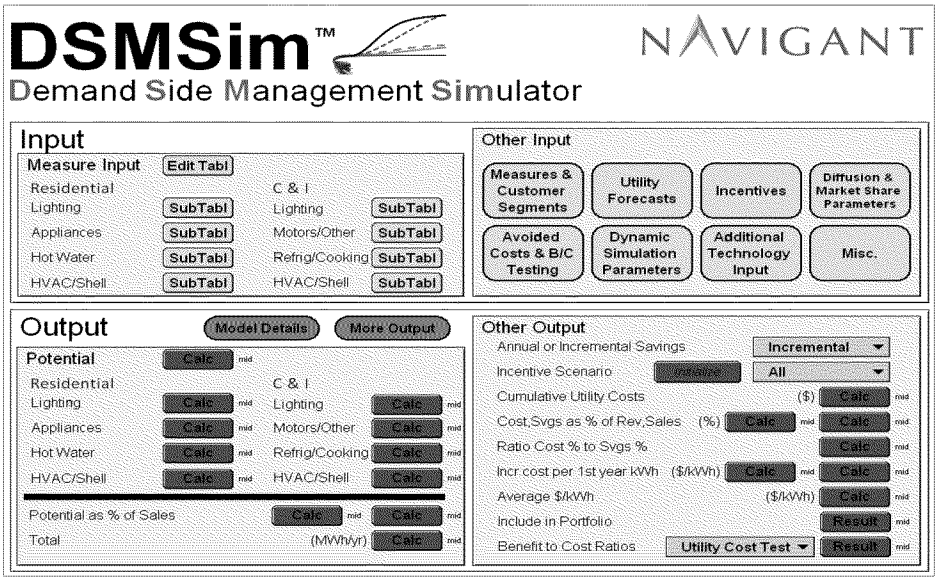
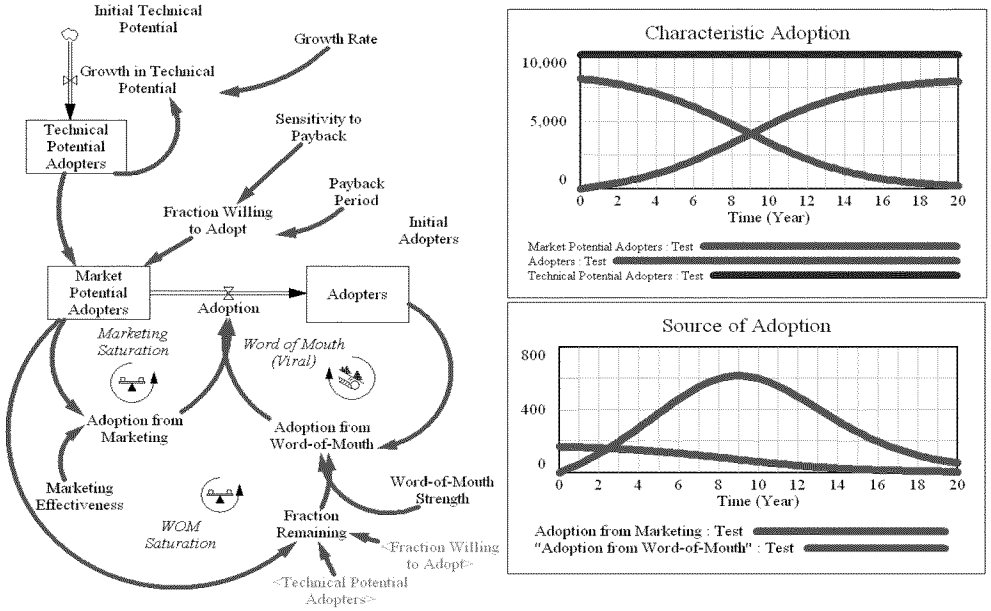


Figure 12: DSMSim™ Bass Diffusion Model



McGraw-Hill. 2000. p. 332.

Figure 13: DSMSim™ Predicted Potential by Specific Measure

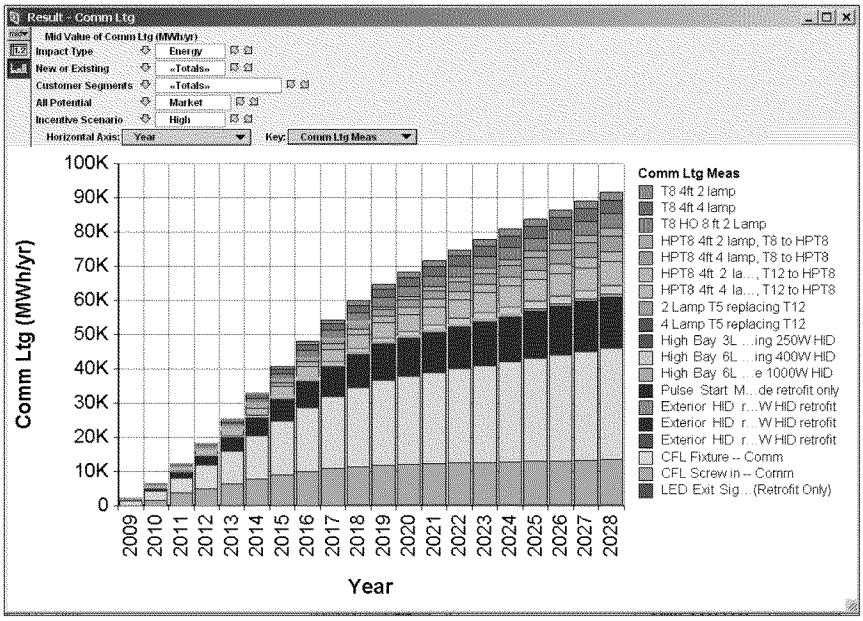
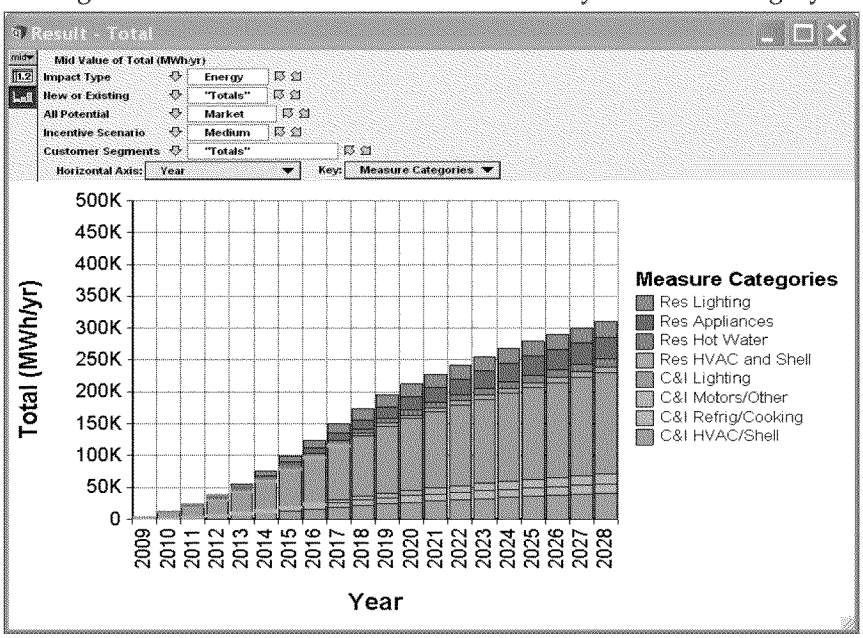


Figure 14: DSMSim™ Predicted Potential by Measure Category



Renewable Energy Market Simulator (RE-Sim™)

Renewable Energy Market Simulator (RE-Sim™) is a large-scale module forecasts renewable energy credit (REC) prices, calculates least-cost compliance, determines required capacity to acquire, and estimates rate impacts of RPS. Figure 15 provides a view of the main screen and several features of this model include;

- Input and output vary by market segment (large-scale vs. small-scale (i.e., distributed)) and include technology costs, tax credits/incentives, economic requirements, and diffusion parameters.

- Large-scale module outputs include capacity to acquire, total RECs generated, RECs by technology (as shown in Figure 16) and "cost+return-based" REC prices.

Navigant might incorporate some of the modeling features in RE-Sim™ that calculate and display unit cost characteristics, as shown in Figure 17.

Figure 15: RE-Sim™ Main Input / Output Option Page

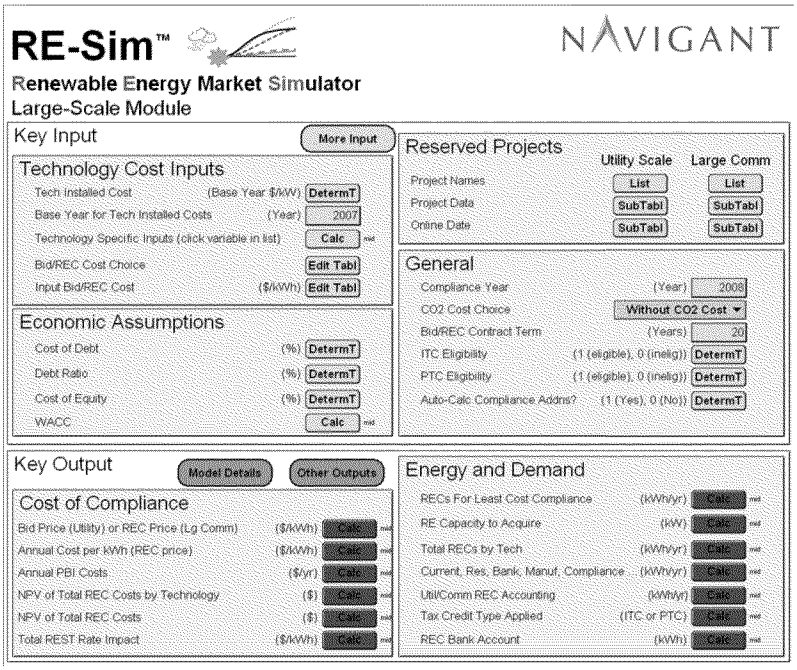


Figure 16: RE-Sim™ Projection of Total RECs by Year by Technology

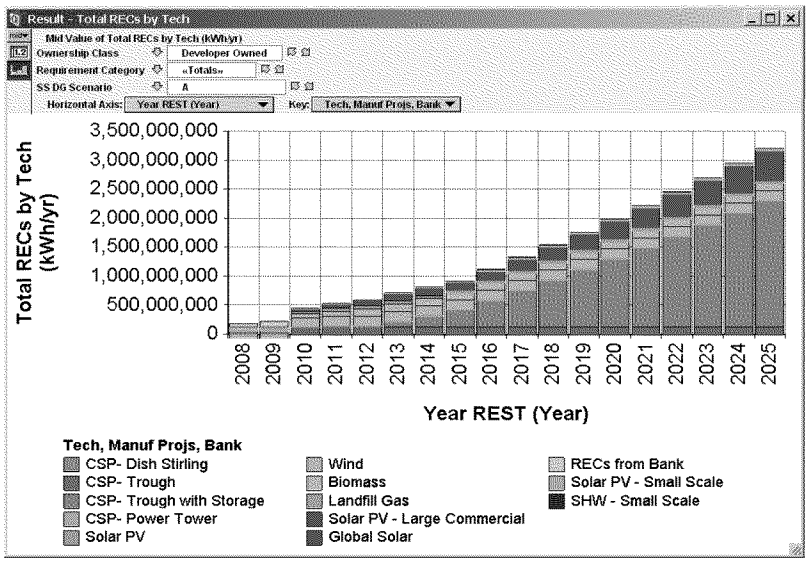
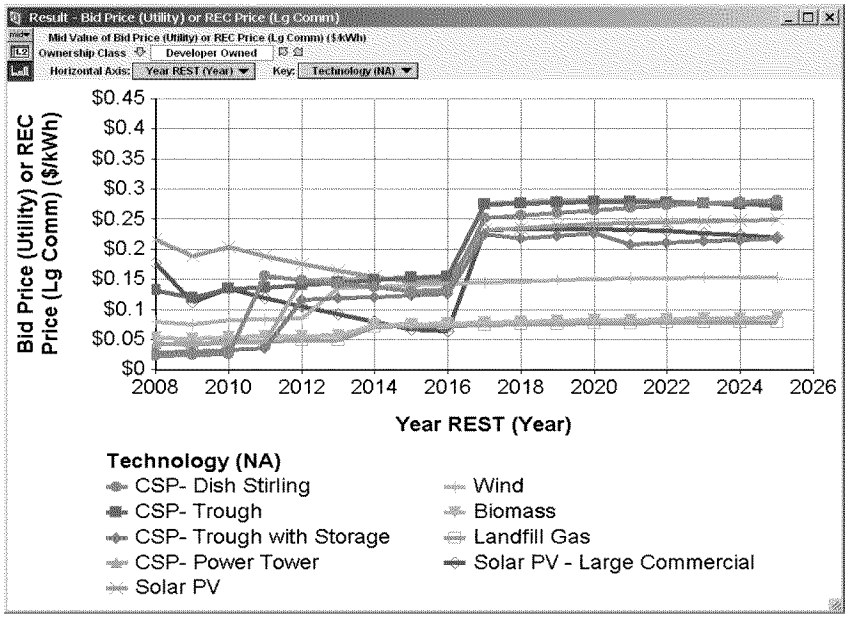


Figure 17: RE-Sim™ Projection of REC Price by Year by Technology



Demand Response Simulator (DRSim)

Demand Response Simulator (DRSim) is an Analytica based model that forecasts the stochastic potential for Demand Response (DR) resources by customer segment and response type (load shed vs. distributed generation) and identifies gaps in current programs. Figure 18 provides a view of the main screen and several features of DRSim include;

- Probabilistic estimates of DR impact by customer segment, estimated achievable DR participation, and utility customer characteristics are used to generate stochastic estimates of DR potential.
- DR potential can be estimated by customer segment (as shown in Figure 19) and various scenario probabilities can be projected, as shown in Figure 20.

Navigant might incorporate into Track 2 some of the scenario modeling features in DRSim.

Figure 18: DR-Sim ™ Main Input / Output Option Page

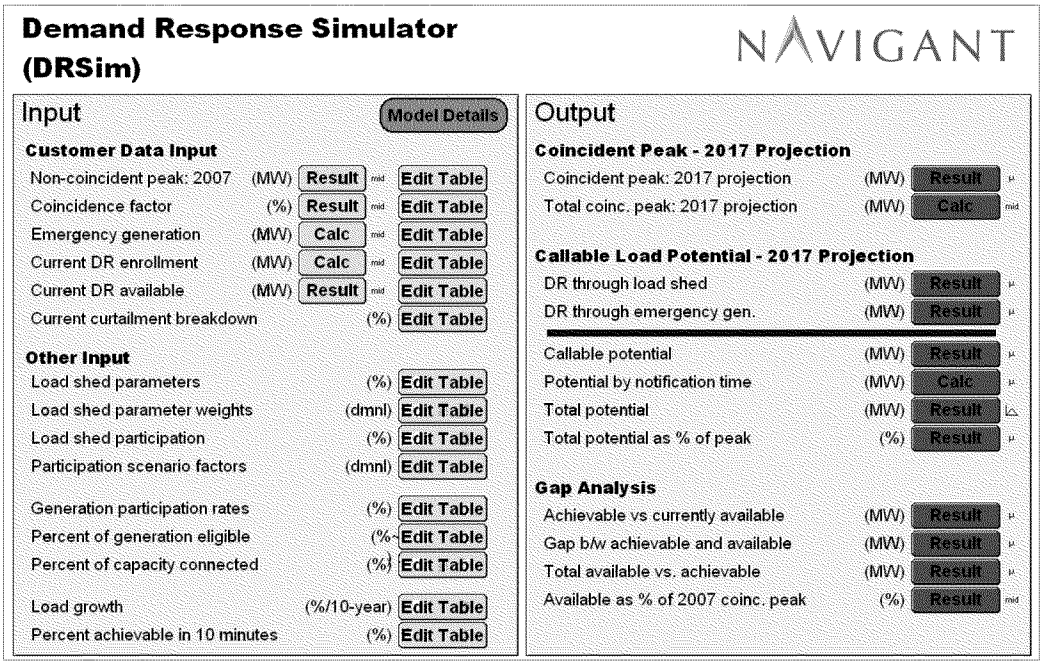


Figure 19: DR-Sim ™ Predicted Demand Response Potential by Notification Time

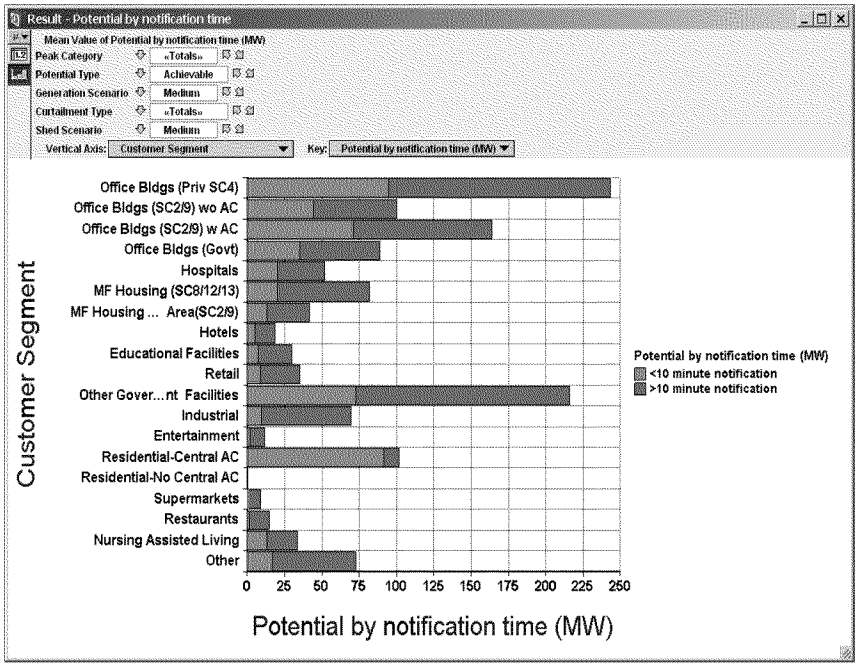
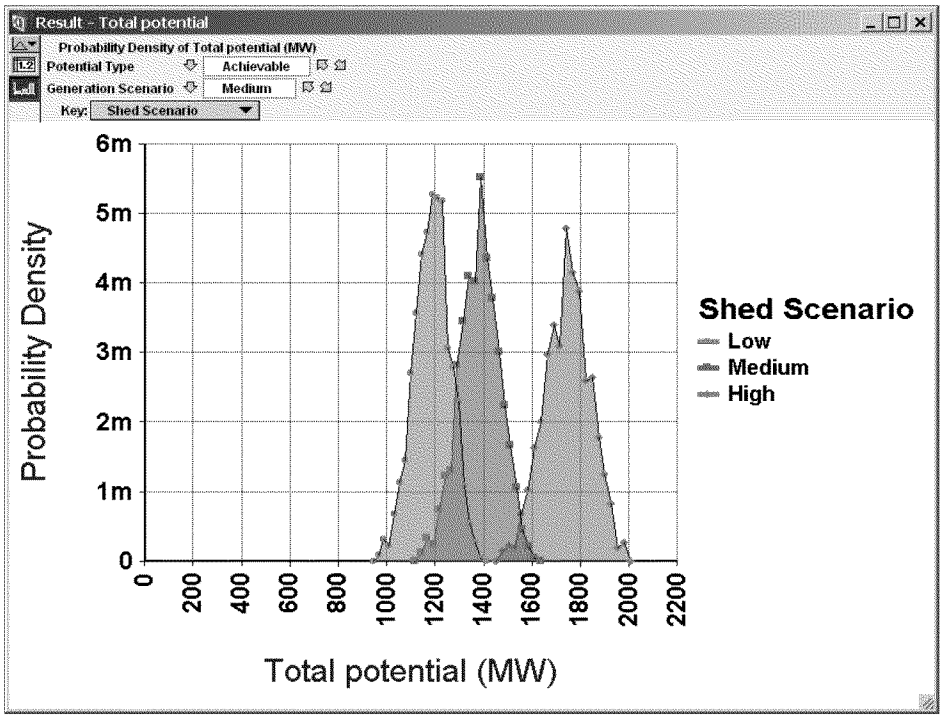


Figure 20: DR-Sim ™ Predicted Demand Response Potential Scenarios



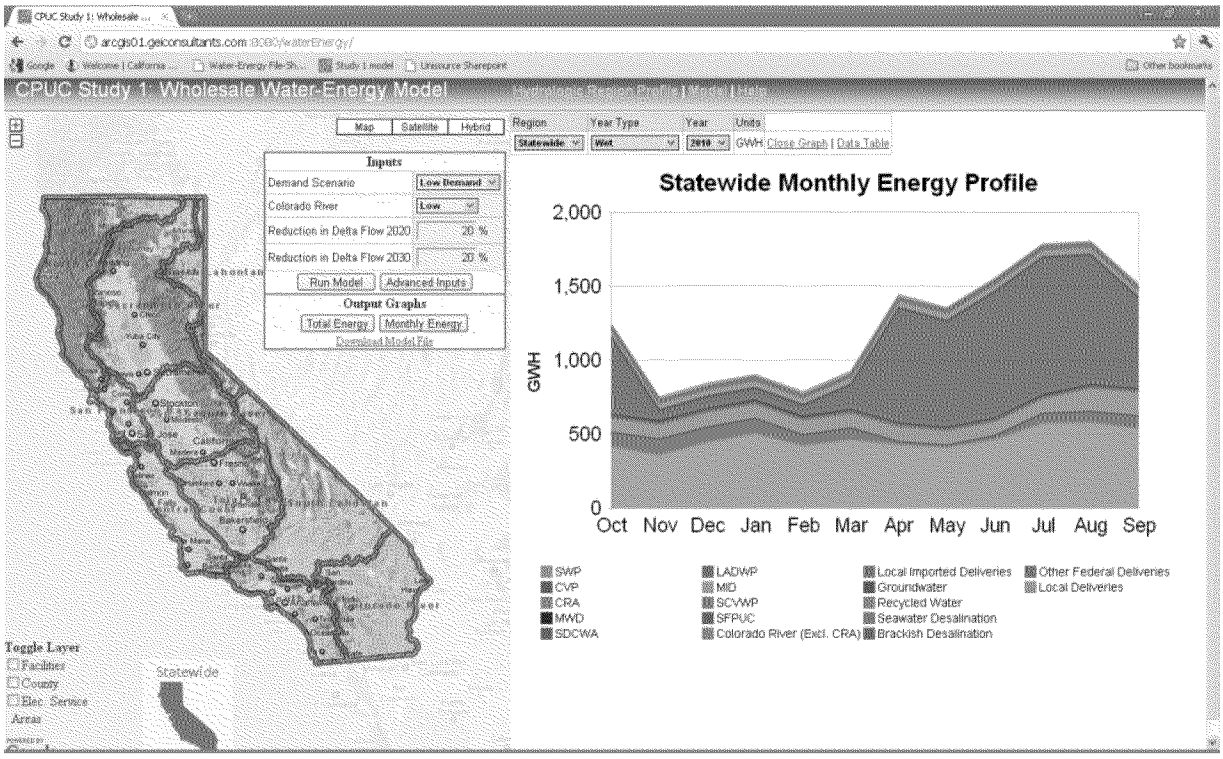
CPUC Embedded Energy in Water Studies[25]

In support of deliberations on water-energy policy in, the California Public Utilities Commission (CPUC) engaged the California Institute for Energy and Environment (CIEE) to conduct three studies on the relationship of water and energy in California. These efforts produced analyses, databases, models and tools used to assess the cost effectiveness of programs, from the perspective of California's investor-owned energy utilities and their ratepayers, designed to save energy by saving water. In partnership with GEI Consultants, Navigant was hired by CIEE to conduct two of these three studies, which focused on energy use in the wholesale supply and retail supply water infrastructure.

The studies were completed in 2010 and produced two tools that further the knowledge of the state's water energy relationship. This engagement delivered a model of the California wholesale water supply system that can be used to predict future energy use based on various future scenarios for water demand, water policy, and water supply availability. The model was developed and calibrated using historic energy and water data from the state's water infrastructure. The model is available at http://arcgis01.geiconsultants.com:8080/waterEnergy/. A screenshot of the model interface is shown Figure 21.

Figure 21: California Wholesale Water Energy Model Interface Displaying Outputs

[25] CPUC. *Embedded Energy in Water Studies 1 and 2*. 2010. http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm



4 Work Plan

4.1 Outline of Work Plan

The following discussions provide a brief description of the work involved, and timelines for the research components, to meet the deadlines for both Tracks 1 and 2. The following section discusses the project scoping meeting that would be held prior to commencing work on either track.

Project Scoping Meeting

Before Navigant completes any meaningful work for this project under Track 1 and Track 2, we propose that a project scoping meeting occur. Navigant recognizes the complexity of this project and the need to first have a clear understanding of the ultimate goals and how best to move toward achieving those goals, and second to be flexible and willing to work in a collaborative manner in formulating the best strategies. This proposal represents the starting point of discussion for ultimately identifying the strategies to be taken and the data and methods needed to implement the strategies.

Navigant is committed to providing its clients with deliverables that meet both the internal and the external needs of the organization. Our experience has shown that this is best accomplished by working in a collaborative fashion with the client. Establishing clear communication procedures and an open working relationship early in the project will help ensure success as project activities proceed. Navigant has experience working with DSM collaborative groups, most recently in Arizona, New Mexico, Ohio, Illinois, Indiana, Ontario, Nova Scotia, Idaho, and Minnesota.

The Navigant Team recommends starting the project with a scoping meeting to validate the objectives and work plan for the assignment, modify as needed the methods and work plan, to assemble and begin reviewing available information that is relevant for this study, and to discuss the strategic importance of each of the work plan elements. Navigant intends to have all key project staff at this meeting the meeting could extend beyond just one day.

Navigant anticipates that many modifications to the proposed work plan will come from this meeting and we will modify both the work plan and budgetary distribution as required. This revised work plan will clearly indicate tasks that require timely review by CPUC staff and the exact dates for each deliverable and review.

Deliverables and Schedule: This meeting will be scheduled at CPUC offices within two weeks of the project award and having the contract established within our own and the CPUC's administrative structure. The upfront deliverable before the scoping meeting will be a Power Point presentation summarizing our proposed approach and the key topics to be covered. The final deliverable will be a revised project work plan and budget indicating deliverable details and timing of CPUC reviews, to be produced within two weeks of the meeting.

4.2 Track 1 Tasks and Timeline

Under Track 1, the Economic Potential is estimated for a number of different initiatives. Seven tasks are outlined under Track 1 and include:

» Conduct Project Scoping Meeting

» Obtain ASSET model inputs and create initial EERAM results

» Update building characteristics and measure density estimates

» Identify impacts from Codes and Standards

» Identify impacts from emerging technologies

» Identify impacts from behavioral programs

» Identify impacts from other non-utility programs

» Identify the amount of naturally occurring energy efficiency

Task 1-1: Obtain ASSET Model Inputs and Create Initial EERAM Results

The first step toward creating Track 1 estimates of Economic Potential is to populate the EERAM model with ASSET Model based inputs so that a defined starting point for the analyses is created and understood. From the ASSET Model, it is expected that we will at a minimum obtain:

- Avoided costs
- Rate forecasts
- Sector based energy and demand forecasts.
- Housing stock forecasts
- Non-residential building stock forecasts
- Measures assessed including measure impacts and costs
- Utility program administrative costs
- Net-to-gross factors
- Measure densities
- End-use saturations

With these input variables, Navigant will populate its EERAM model and calibrate its output to closely match the output from the ASSET model. The analyses will be by climate zone within each IOU service territory. As noted in the methodology portion of this proposal, Navigant intends to use a subset of only the top savings measures as identified in the 2008 ASSET model results.

Task 1-1 Deliverables and Schedule: The deliverable from this task will be a functioning EERAM model that closely replicates the output from ASSET's 2008 statewide results. This version of EERAM will serve as the foundation on which the remaining Track 1 additions will be applied. This task will be completed in June.

Task 1-2: Update Building Characteristics and Measure Density Estimates

Building and measure characteristic data included in the 2008 ASSET model results have changed over time. Where possible, Navigant will use more recent data to revise these characteristics. Since 2008, a new Residential Appliance Saturation Survey (RASS) has been completed and the results from this new RASS will be used to update residential sector characteristics. Unfortunately, the Commercial End-Use Survey (CEUS) has not been updated for over a decade. In lieu of a recent CEUS, the most recent federal Commercial Buildings Energy Consumption Survey (CBECS) will be used to update information where possible. A final source for updating density information is the utility achievements of DSM measure implementation through their DSM programs.

Task 1-2 Deliverables and Schedule: The deliverable from this task will be an updated version of the EERAM model developed under Task 1-1. These results will represent the Economic Potential from measure implementation, given current building codes and standards. This task will be completed in August.

Task 1-3: Identify impacts from Codes and Standards

The EERAM model includes codes and standards, both those currently in effect and those that will be in effect in the future with certainty. It does not include speculative changes to codes and standards.

The effects of future codes and standards influence individual measures and are identified in a year by year matrix of the measures using a percentage improvement to the baseline technology as the means of accommodating the affects. Using a matrix allows for codes and standards to change as often as needed over time; even for the same measure. The effects of codes and standards currently in place are imbedded into the baseline technologies and their effects cannot be estimated without changing the baseline of all affected measures. To estimate the impacts of these future "with certainty" codes and standards, EERAM will be run with the matrix of codes/standards set to have no effect, then a second

run made where the matrix includes the measure by measure effects. The delta between the two runs represents the impacts from codes and standards.

Speculative codes and standards can also be modeled as long as their impacts can be characterized in the measure by measure matrix of energy use improvements. If the effects of future "speculative" codes and standards are desired, they would be estimated in a manner similar to future "with certainty" codes and standards. A baseline run of EERAM would be completed with all the "with certainty" codes and standards in place. A second run would be made where the matrix includes the measure by measure effects of the "speculative" codes and standards. The delta between the two runs represents the impacts from these 'speculative" codes and standards.

Task 1-3 Deliverable and Schedule: The deliverable from this task will be a working paper that identifies by IOU service territory and sector, the impacts of future codes and standards. This working paper will address "with certainty" codes/standards changes as well as any "speculative" codes/standards scenarios. This task will be completed in September.

Task 1-4: Identify Impacts from Emerging Technologies

EERAM currently allows technologies that are just entering the market place to be included in the measure list. A Bass diffusion curve is used to simulate market penetration for these emerging technologies.

Navigant proposes to expand on this current treatment by employing a matrix approach similar to that used for codes and standards. Emerging technologies can be characterized with the timing and the identification of which current measure it is supplanting identified in the matrix. If the emerging technology is new and not replacing a current DSM technology, it can be fully characterized in the measure list with timing accommodated within the matrix. As with codes and standards, scenarios would be developed by running EERAM with the matrix unpopulated by the changes from emerging technologies as the baseline, then run with the matrix populated.

As with codes and standards, a base condition model without emerging technologies (or one that includes a subset of emerging technologies that are already being promoted) will be run and then a second run made where the matrix includes the emerging technology effects. The delta between the two runs represents the impacts from emerging technologies.

Task 1-4 Deliverable and Schedule: The deliverable from this task will be a working paper that identifies by IOU service territory and sector, the impacts of emerging technologies. This working paper will address which measures are expected to have the greatest impact as well as identify which measures have the highest level of uncertainty. This task will be completed in early October.

Task 1-5: Identify Impacts from Behavioral Programs

Navigant intends to characterize behavioral programs much like normal DSM measures. However, it is expected that behavioral initiatives will have an impact beyond what is achieved from normal DSM measures and will therefore have the impact of increasing Economic Potential.

Navigant has already modeled the impacts from an "O Power" type program in other potential studies it has developed, and within those studies, the "O Power" program was characterized in a similar fashion as a DSM measure. This approach will be continued for other behavioral initiatives identified.

Since behavioral programs go beyond measure implementation, the Economic Potential from these

initiatives is easily separated from the effects from DSM measures. Each behavioral initiative will be clearly defined within EERAM and results discernable between them.

Task 1-5 Deliverable and Schedule: The deliverable from this task will be a working paper that identifies by IOU service territory and sector, the impacts from each of the behavioral program initiatives. Each initiative will be clearly defined as to its implementation structure and target population with the resulting expected level of Economic Potential identified. This task will be completed in late October.

Task 1-6: Identify Impacts from Other Non-Utility Programs

The American Recovery and Reinvestment Act of 2009 (ARRA) energy efficiency initiatives, as well as other non-utility initiatives, within the initiative descriptions should include details on the measures being implemented and the target populations. This information will be used to identify which portions of the Economic Potential estimated in the earlier tasks should be attributed to each specific initiative. It is expected that these savings will be a subset of the Economic Potential developed from the set of DSM measures included in the EERAM portfolio.

Task 1-6 Deliverables and Schedule: The deliverable from this task will be a working paper that identifies by IOU service territory and sector the impacts from non-utility initiatives, such as the ARRA funded initiatives. Each initiative will be clearly defined as to its implementation structure and target population with the resulting expected level of Economic Potential identified. This task will be completed in late October.

Task 1-7: Identify the Amount of Naturally Occurring Energy Efficiency

The issue of how to define naturally occurring DSM is hard to delineate. The Economic Potential estimated by EERAM is inclusive of programmatic, codes and standards, as well as naturally occurring DSM. Navigant intends to define the attribution of Economic Potential that is naturally occurring by utilizing the inverse of net-to-gross ratio (NTGR) estimates. NTGR is a complex issue and is more dependent on program design than it is to specific measures. However, EERAM is a measure driven model and NTGR estimates need to be input by measure. In defining the appropriate NTGR value by measure, the type of program where it is being implemented is a strong consideration. When the model is only primarily considering utility programs, there is generally a primary program implementation strategy and NTGR values can be based on those primary strategies. However, it is possible, with the many program strategies being considered (ARRA vs. traditional utility DSM programs as an example) that these different initiatives will have different NTGR values for the same measure. This potential fact can be accommodated.

The final version of the EERAM model will include traditional utility DSM programs, affects of codes and standards, behavioral programs, and a number of non-utility programs. The total Economic Potential will assume a NTGR value of 1.0. Generally, codes and standards have a NTGR of 1.0. Each of the programmatic considerations should have NTGR values by measure ranging anywhere from a theoretical low of 0.0 to 1.0. The Economic Potential for each of the different implementation initiatives will include the effects of NTGR when considered appropriate.

Naturally occurring energy efficiency potential will be estimated by a base condition model with NTGR values in place and then a second run made where all NTGR values are set to 1.0. The delta between the two runs represents naturally occurring energy efficiency.

Task 1-7 Deliverables and Schedule: The deliverable from this task will be a working paper that identifies by IOU service territory and sector, the estimates of naturally occurring energy efficiency. This working paper will address which measures are expected to have the largest amount of naturally occurring energy efficiency. This task will be completed in late October.

Task 1-8: Draft and Final Reports

As requested by the RFP, the Navigant team will provide draft and final reports clearly detailing the steps taken to calculate the economic potential, with a series of tables and charts to supply as input to the goals study. We will also provide various scenario analyses based on discussions with ED and project management staff. All software models will be delivered to the ED and will include all input and supplemental material used to develop the final work products. All analysis material will be functional, clearly documented, and transparent.

Track 1 Collaboration and Stakeholder Input Activity

In order to ensure that the work conducted for the economic potential study is fully informed by other studies and can be leveraged for future research, the Navigant team proposes to conduct ongoing outreach to other study groups. **Error! Reference source not found.**provides a list of pending 2010 – 2012 evaluations studies defined by ED[26] that will be of interest in collaboration with the Track 1 work effort.

Table 6. Planned 2010 – 2012 EM&V Studies Relevant to Track 1

Study Name	EM&V Plan Study Reference Number	Study Manager
Detailed Impact Evaluation of High Impact Measures	1	ED
Impact Evaluation of Custom Measures	2	ED
Impact Evaluation of Strategic Measures	3	ED
Parameter Focused and Cross-Cutting Impact Evaluations	4	ED
Verification and Ex Ante Review/Update Study for Moderate Impact Measures	5	ED
Savings Decay and Cumulative Goals Analysis	69	ED
Energy Efficiency Load Forecasting Integration	70	ED

In addition, Navigant will coordinate with the IOUs as approved by ED, and will discuss with ED the need and practicality of involving additional stakeholders in reviewed and vetting the track one approach and results.

[26] 2010-2012 Energy Efficiency Evaluation, Measurement and Verification Work Plan, Version 1 December 20, 2010, California Public Utilities Commission.

Track 1 Timeline

The Navigant team understands that the Potential Study is due to be complete on September 31, 2011 and Figure 22 provides a block schedule outlining the timeline for the various tasks outlined in the budget.

Figure 22: Track 1 Activity Block Schedule

Track 1 - Economic Potential Study	April	May	June	July	August	September
Task 1-0: Project Scoping Meeting						
Task 1-1: Obtain ASSET Model Inputs and Create Initial EERAM Results						
Task 1-2: Update Building Characteristics and Measure Density Estimates						
Task 1-3: Identify impacts from Codes and Standards						
Task 1-4: Identify Impacts from Emerging Technologies						
Task 1-5: Identify Impacts from Behavioral Programs						
Task 1-6: Identify Impacts from Other Non-Utility Programs						
Task 1-7: Identify the Amount of Naturally Occurring Energy Efficiency						
Task 1-8: Draft and Final Reports						

4.3 Track 2 Tasks and Timeline

For the Track 2 the Goals and Targets Study, we estimate the need for 9 Tasks will be implemented to successfully meet the needs of the RFP. These tasks, outlined below, include a separate Project Scoping Meeting for Task 2 to identify anomalies and other issues that will need to be incorporated into the Track 2 analysis.

Task 2-0: Conduct Task 2 Scoping Meeting

Navigant proposes to hold a separate scoping meeting, beyond the general scoping meeting contemplated in Track 1 for the purpose of: a) Reviewing NCI proposed general approach for feedback/input into the NCI approach as currently contemplated, with a special focus on our analytic approach to evaluating the Strategic Pla; b) Reviewing NCI's proposed approach on each of the steps/tasks identified within the proposal response; c) Reviewing the current list of KMDs to determine the appropriateness of KMDs on the list and the need to add any other potential KMDs that need to be incorporated into the analysis; d) Receiving input on the concept and elements of the NCI's proposed CPUC Goals and Targets Strategic Planning Framework (Task 8)

Task 2-0 Deliverables and Schedule: This meeting will be scheduled at CPUC offices within two weeks of the project award and having the contract established within our own and the CPUC's administrative structure and be held in conjunction with the general project scoping meeting identified in Task 1. The upfront deliverable before the scoping meeting will be a Power Point presentation summarizing our proposed approach and the key topics to be covered. The final deliverable will be a revised project work plan and budget indicating deliverable details and timing of CPUC reviews, to be produced within two weeks of the meeting.

Task 2-1: Identify Market Driver

This step will identify market drivers that can impact the Total Statewide Market Potential. Navigant current list of KMD includes: recent legislation, Title 24 updates, federal codes and standards, federal stimulus funds distribution in California, utility programs, emerging technologies, the water-energy nexus, individual Strategic Plan Initiatives (existing and potentially new), and "naturally occurring" energy savings. In this step Navigant will determine if other drivers should be added to this through discussion with KEMA, the CPUC and relevant Subject Matter Experts from the PAC during the Track 2 Scoping Activity. Each driver will evaluated with a focus on developing an overall description of each KMD, how it generates energy efficiency savings and the key stakeholders involved in driver delivery. Once complete, each market driver will be further segmented into the appropriate sectors (residential, commercial, industrial, and agricultural), with additional subsectors identified as needed.

Task 2-1 Deliverables and Schedule: A final list of Market Drivers to be included for preliminary analysis in Track 2. The list will include: an overall description, description of how driver will generate savings, the affected sectors (residential, commercial, industrial, and agricultural), and other relevant information.

Task 2-2: Assess Attribution Assumptions to Avoid Double Counting

Many of the KMDs identified by Navigant are cross cutting and may overlap with one another. A key step to properly estimating the Total Statewide Market Potential is to understand the areas in which drivers may interact or overlap and savings could be double counted. In this task, Navigant will conduct a thorough vetting of all assumption related to attribution of savings for each of the market drivers and related sector impacts with KEMA, the CPUC and relevant Subject Matter Experts (and other stakeholders as needed)

Task 2-2 Deliverables and Schedule: A matrix identifying and describing the interactive relationships that exist between each market driver. Factors quantifying the level of overlap and interaction will be provided.

Task 2-3: Evaluate Driver Savings – Technical Potential

In this task, Navigant will develop a bottom-up estimate of the technical Total Statewide Market Potential for each driver. We will utilize existing assumptions and estimated savings from each existing KMD, including Strategic Plan strategies and initiatives, or developing new estimates of strategy savings, as required. Navigant will then disaggregate savings estimates into the appropriate sectors and subsectors as identified in Task 1. It is expected that each driver will require special consideration in calculation of its technical potential, with special care given to strategic plan drivers in this task and in task 2-2 above

Task 2-3 Deliverables and Schedule: An interim report on the technical potential of each market driver. Details will include sector attribution.

Task 2-4: Initial Planning Screen – Identify Key Market Drivers

Navigant will conduct a screening process to categorize each driver as "most likely" "may be likely" or "not likely" to having savings impacts over the planning period. The screening process will use multiple criteria to score each driver. Navigant will discuss the screening criteria and importance of each with the KEMA, the CPUC and relevant Subject Matter Experts (and other stakeholders, as required). This process will identify the Key Market Drivers (KMD) on which to focus further study analyses.

Task 2-4 Deliverables and Schedule: An interim report identifying the results of the collaborative

screening process to identify the key market drivers. These key market drivers will be examined in detail in subsequent tasks.

Task 2-5: Evaluate Key Driver Savings – Achievable Savings Scenarios

Navigant will evaluate the market achievable savings potential from each of the KMDs identified as a result of Task 4 on a "high", "medium" and "low" potential savings basis. The 2008 Goals and Targets Study defined the "high" savings case as "difficult but feasible", while "mid" and "low" savings cases were more conservative based on trajectories of performance and market penetration milestones that were more modest and gradual over time. Navigant will work with KEMA, the CPUC and relevant Subject Matter Experts to update these definitions of scenarios if needed. We will develop market penetration curves these scenarios using Navigant's EERAM and DSMSim™ models. Navigant currently uses these models to evaluate technology savings, cost, and market information to determine appropriate market penetration curves for its DSM potential planning. When possible or needed, Navigant will compare the calculated bottom up achievable savings scenarios to the goals or previously estimated top down energy savings for each key driver.

Task 2-5 Deliverables and Schedule: An interim report on the market potential of each key market driver under "high", "medium", and "low" scenarios. Report will compare scenarios to relevant goals when possible.

Task 2-6: Identify HIM and Secondary Measures

It is expected that a few core technologies will account for the majority of the savings for each key driver. Navigant will focus on identifying these core technologies (high impact measures) and package(s) of secondary savings measures. The analysis will be conducted (as needed) to disaggregate the total key driver savings to its component measures. Navigant will compile a list of the high impact and secondary measures, as appropriate), document their energy savings under each scenario, and attribute their savings to an appropriate sector or subsector. It is possible that a few cross cutting high impact measures appear across various drivers. If so, these will be identified and their Total Statewide Market Potential will be reported.

Task 2-6 Deliverables and Schedule: A matrix of core technologies (HIMs) that are responsible for the energy savings from the KMDs including the quantified energy savings specifically from the HIMs and a unified package of relevant residual or secondary measures associated with each KMD.

Task 2-7: Calculate Total Statewide Market Savings from Key Market Drivers

Navigant will develop estimates of individual and Total Statewide Market Savings expected over the study period to be captured by KMDs. These estimates will incorporate the high, medium and low scenarios as previously described. This analysis will include the total and sector level potential energy savings (electric and natural gas) for each of Key Market Driver with accompanying percentage breakdown of the potential contribution to Total Statewide Market Potential.

Task 2-7 Deliverables and Schedule: A report on the Total Statewide Market Savings expected over the study period to be captured by the KMDs.

Task 2-8: Develop CPUC Goals and Targets Strategic Planning Framework

Navigant will use the results of the above analysis to create a four component/element *CPUC Goals and Targets Strategic Planning Framework.* The four proposed Framework elements will include: (1) a *Total*

Statewide Market Potential Table of Savings (TSMP-TS) that provides an overall estimate of Total Statewide Market Potential utilizing the "medium" scenario of savings from the "achievable" savings scenario modeling undertaken in Task 5. An appendix with tables representing "high" and "low" achievable savings will be provided; (2) a *Key Market Driver Matrix of Existing and Possible Deliver Mechanisms and (High-level) Best Practices Analysis.* We plan to evaluate each of the Key Market Drivers from the point of view of market delivery of the savings and list all "players" within each KMD, their role and approximate percentage impact on market savings associated with each market delivery entity and then screen, where relevant, "best practice" delivery approaches currently in use in the California KMD and those from the rest of North America that may also enhance the delivery structure that operates within the identified KMD; (3) A *Simplified Total Statewide Market Potential Scenarios "What if" Calculator* (TSMP-C) that will incorporated the results of previous Track 2 analyses and simplified switches within the spreadsheet that will allow planners the ability to Turn "on" and "off" certain drivers, adjust overall economic factors; and switch between the high, medium, and low scenarios; (4) a *Strategic Plan Initiative Classification and Performance Measurement Framework* that incorporates the key elements of our strategic plan initiatives analyses, including a formal categorization framework from which to consistently identify for evaluation each initiative, and a Navigant developed Performance Framework that may be used by the Commission to inform its evaluation policy and decision making.

Task 2-8 Deliverables and Schedule: A planning document that incorporates results from the previous task and includes the four key elements described above, including: (1) A *Total Statewide Market Potential Table of Savings;* (2) A *Key Market Driver Matrix of Existing and Possible Deliver Mechanisms; (3)* A *Simplified Strategic Policy Scenarios Calculator; and, (4) A Strategic Plan Initiative Classification and Performance Measurement Framework.*

Task 2-9: Draft and Final Reports

As requested by the RFP, the Navigant team will provide draft and final reports clearly detailing the steps taken to support the potential, goals, and targets estimates, with a series of tables and charts to supply as input to the goals study. We will also provide various scenario analyses based on discussions with ED and project management staff. All software models will be delivered to the ED and will include all input and supplemental material used to develop the final work products. All analysis material will be functional, clearly documented, and transparent.

Track 2 Collaboration and Stakeholder Input Activity

Similar to track one, the Navigant team proposes to conduct ongoing outreach to other study groups. Table 7 provides a list of pending 2010 – 2012 evaluations studies defined by ED[27] that will be of interest in collaboration with the Track 2 work effort.

Table 7. Planned 2010 – 2012 EM&V Studies Relevant to Track 2

Study Name	EM&V Plan Study Reference Number	Study Manager

[27] 2010-2012 Energy Efficiency Evaluation, Measurement and Verification Work Plan, Version 1 December 20, 2010, California Public Utilities Commission.

Comprehensive Process Evaluation and Market Assessment of BCE and HEER Program	11	IOU
Whole House Process Evaluation and Market Assessment	14	IOU
Residential New Construction Process Evaluation and Market Characterization	16	IOU
Nonresidential New Construction Process Evaluation and Market Characterization	21	IOU
Lighting Programs Process Evaluation and Market Characterization	22	TBD
HVAC Programs Process Evaluation and Market Characterization	23	TBD
ETP Process Evaluation and Market Assessment	27	ED
C&S Market Assessment and Process Evaluation	29	TBD
ZNE Market and Process Assessment	31	IOU
Adoption Effectiveness Assessment	37	ED
Overarching Study on Integration Effectiveness	38	ED
Macro Consumption White Papers	45	ED
Macro Consumption Pilot Studies	46	ED
Residential On-Site/Metering Survey	47	ED
Residential Appliance Saturation Survey (RASS)	48	ED
Industrial Customer Surveys	49	ED
Industrial End Use Saturation Study (IEUS, pre 20102012)	50	ED
Commercial Saturation Survey	51	ED
Residential Market Share Tracking	52	ED
Commercial Market Share Tracking	52	ED
Industrial and Agricultural Market Share Tracking	54	ED
Overarching Residential Sector Market Assessment	55	ED
Overarching Nonresidential Sector Market Assessment	56	ED
Industrial Sector Market Characterization Study	57	IOU
Agricultural Sector Market Characterization and Potential Study	58	IOU
Building/Facility Renovation/Remodel Rates Study	59	IOU
Consumer Preference Research to Support Lighting Programs	60	IOU
Measurement and Reporting on AKA-B Metrics	61	ED
CEE Energy Star Awareness Survey	62	IOU
EE Goals Integration Study	72	ED
Zero Net Energy Potential, Costs, and Goals Sub-Study	73	ED
T24/T20 and "Reach Codes" Compliance Study	74	ED
Strategic Plan Feasibility and Cost-Effectiveness Study	75	ED
Plug Loads Potential Study	76	ED
New Construction Energy Efficiency Potential	77	ED
Integrated Energy Efficiency Potential Study	78	ED
Customer Adoption Behavior Study	79	ED
Information and Services to Support Update to CPUC EE	80	ED
Other Strategic Plan Support	82	ED
Market Effects and Transformation Research	43	TBD

Track 2 Timeline

The Navigant team understands that the Potential Study is due to be complete on December 31, 2011 and Figure 22 provides a block schedule outlining the timeline for the various tasks outlined in the budget.

Figure 23: Track 2 Activity Block Schedule

Track 2 - Goals and Targets Study	April	May	June	July	August	September	October	November	December
Task 2-0: Project Scoping Meeting									
Task 2-1: Identify Market Drivers									
Task 2-2: Assess Attribution Assumptions to Avoid Double Counting									
Task 2-3: Evaluate Driver Savings - Technical Potential									
Task 2-4: Initial Planning Screen - Identify Key Market Drivers									
Task 2-5: Evaluate Key Driver Savings - Achievable Savings Scenarios									
Task 2-6: Identify HIM and Secondary Measures									
Task 2-7: Calculate Total Statewide Market Savings from Key Market Drivers									
Task 2-8: Develop CPUC Goals and Targets Strategic Planning Framework									
Task 2-9: Draft and Final Reports									

5 Project Team Experience and Qualifications

As requested in the RFP, the following sections provide a summary of the experience and qualifications of the proposed prime contractor firm, project manager, management team and team members including our partners, the Heschong Mahone Group (HMG) and the Waypoint Building Group.

5.1 Project Team Description and Member Background

Staff and Organizational Structure

Figure 24 shows Navigant's proposed organizational structure and the firm employing each team member. The organization is structured in the following way;

- The Senior Project Management Team is responsible for the oversight of all cost, quality, and schedule of all evaluation products and coordinating with the prime contractor on all planning and reporting topics. This team consists of Floyd Keneipp, who will be the primary point of contact on all project matters, and Kevin Cooney, who will be the senior Navigant representative on the project. Floyd and Kevin will also be involved in interacting with various stakeholders throughout the project.
- Senior Project Advisors who will provide strategic and tactical guidance on a range of topics, provide QC oversight on various aspect of the project, and also interact with various stakeholders throughout the project. This staff includes Diane Vrkic and Doug Mahone who will advise on Strategic Plan and legislative initiatives, respectively, and Cory Welch and Randy Gunn who will advise on modeling uncertainty and potential study quality control.
- Track 1 and Track 2 Leads will have core responsibility developing the economic potential study and goals and targets studies, including implementing the agreed to strategy and scope and managing the day to day operations of the team. Gary Cullen will lead the Track 1 effort while Jay Luboff will lead the Track 2 engagement.
- Topic Specialist and Production Staff will be responsible for understanding all aspects of their assigned initiatives, and will be the frontline resources conducting research and producing focused results.

Member Background

As requested in the RFP, Table 8 provides a summary of the roles the team members including team member's tenure working with the contracting firm and Academic Degrees and Credentials. The following section then provides a narrative summary of the qualification of each of the partner firms, and a brief bios on each team member outlining their experience and capabilities. Full resumes for each staff member are included in the supplemental data submitted with this proposal

Figure 24: Proposed Navigant Team Organization Chart

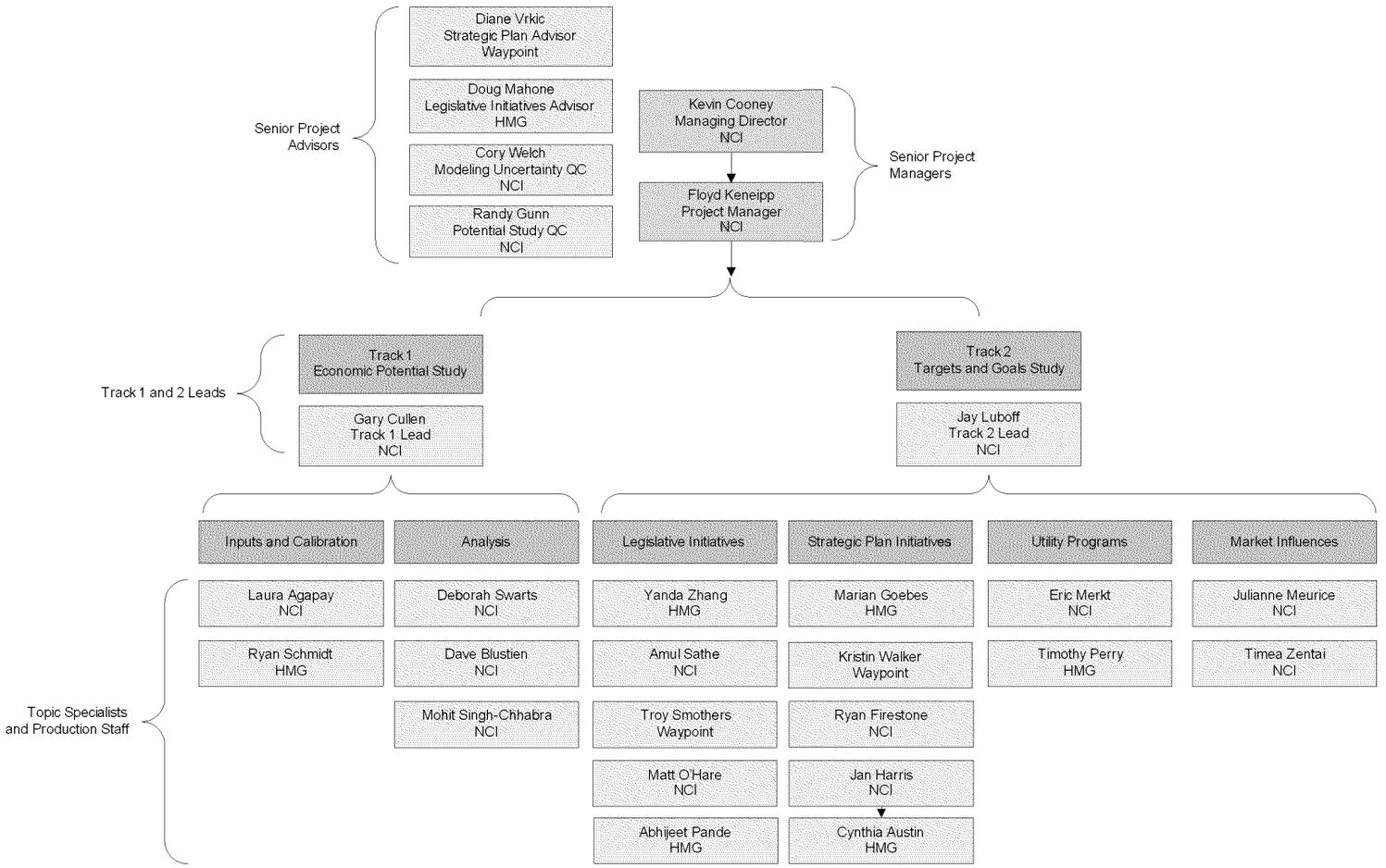


Table 8. Summary of Staff Assignments and Credentials

Team Member Name	Team Member Firm	Team Member Firm Title	Proposed Assignment	Years with Firm	Academic Degrees	Credentials
Kevin Cooney	Navigant Consulting	Managing Director	Senior Managing Project Director	6	BS, University of Colorado; MS, Civil Engineering, University of Colorado; Advanced Management College, Stanford University Executive Education	PE
Randy Gunn	Navigant Consulting	Managing Director	Potential Study Quality Control	10	MA in Planning, University of Minnesota; BA, Physics, Carleton College	
Floyd Keneipp	Navigant Consulting	Director	Project Manager	8	BS, Montana State; MBA, University of San Diego	PE (exp.)
Gary Cullen	Navigant Consulting	Associate Director	Track 1 Project Lead	6	BS, University of Oregon; MS, Public Administration, University of Missouri, Columbia	
Jay Luboff	Navigant Consulting	Associate Director	Track 2 Project Lead	6	BA, University of New Mexico; MA, University of Washington	
Cory Welch	Navigant Consulting	Associate Director	Advisor - Modeling Uncertainty	3	BS, Cornell University; MBA & MS, Mechanical Engineering, Massachusetts Institute of Technology	
Ryan Firestone	Navigant Consulting	Associate Director	Strategic Plan Analysis Support	3	BS, Brown University; MS, Mechanical Engineering, University of Texas; PhD, Mechanical Engineering, University of California	
Julianne Meurice	Navigant Consulting	Associate Director	Market Influences Lead	3	MBA, Amos Tuck School at Dartmouth College; AB Psychology, Stanford University	
Eric Merkt	Navigant Consulting	Managing Consultant	Utility Program Research and Data Sources Lead	3	BS, University of Virginia; MS, Mechanical Engineering, University of Colorado	
Deborah Swarts	Navigant Consulting	Managing Consultant	Task 1 Analytics	3	BS, Harvey Mudd College; MS, Electrical Engineering, Cornell University	PE (electrical): CA, MA, OR & WA

Amul Sathe	Navigant Consulting	Managing Consultant	Legislative Initiative Analysis and Task 2 Modeling Support		B.S.E. ,Mechanical Engineering, University of Michigan; M.S., Mechanical Engineering, Stanford University	
Jan Harris	Navigant Consulting	Managing Consultant	Strategic Plan Analysis Support - Behavioral	4	BS, Evergreen State College; MBA, Boston University	LEED AP
Mohit Singh-Chhabra	Navigant Consulting	Senior Consultant	Task 1 Analytics	4	MS, Civil, Architectural and Environmental Engineering, University of Colorado; BE, Mechanical Engineering, University of Pune, India	
David Blustein	Navigant Consulting	Senior Consultant	Task 1 Analytics	5	BA, Portland State University	
Matt O'Hare	Navigant Consulting	Senior Consultant	Legislative Initiative Analysis and Task 2 Modeling Support	6	BS, Mechanical Engineering, Virginia Polytechnic Institute and State University, 2007	
Timea Zentai	Navigant Consulting	Senior Consultant	Market Influences Analysis	6	BA, University of California, Davis; MA, University of California, San Diego	
Doug Mahone	Heschong Mahone	Principal/Exec Officer	Senior Advisor	18	BS & M. Arch, Massachusetts Institute of Technology	Licensed Architect
Abhijeet Pande	Heschong-Mahone	Associate Director	Title 24 and codes advisor	10	B. Arch., College of Architecture, Nashik, India; MS, Building Design, Arizona State University	
Yande Zhang	Heschong Mahone	Associate Director	Title 24 and codes advisor	5	BS, Tsinghua University, Beijing, China; PhD, Mechanical Engineering, University of California	
Cyntia Austin	Heschong Mahone	Senior Project Mgr	Strategic plan and legislative initiatives	12	BA, University of Chicago; Certificate of Advanced Study in Evaluation, Claremont Graduate University	
Marian Goebes	Heschong Mahone	Project Mgr	Strategic plan and legislative initiatives	1	BS, Carnegie Mellon University; MS & PhD, Civil Engineering, Stanford University	
Ryan Schmidt	Heschong Mahone	Research Project Mgr	Analyst	3	BS, Santa Clara University; MS, Environmental Studies, San Jose State University	
Timothy Perry	Heschong Mahone	Technical Analysis Mgr	Analyst	3	BS, California Polytechnic State University; MS, Geography, Oregon State University	

Joshua Rasin	Heschong Mahone	Associate Mgr	Analyst	4	BA, Binghamton University	
Diane Vrkic	Waypoint Advisors	President	Senior Advisor	2	BS, Fordham University; MBA, Stanford University	
Troy Smothers	Waypoint Advisors	Director	C&I Market advisor	1	BS, Iowa State University; MBA, Stanford University	
Kristin Walker	Waypoint Advisors	Associate	Analyst	1	BS and MBA, University of Oregon	LEED

Firm Member Background

The following provides a brief discussion of each partner firm.

Navigant Consulting is a leading specialized consulting firm providing dispute, financial, regulatory and operational advisory services primarily to companies in regulated industries, government agencies and legal counsel. Navigant has offices located in more than 40 cities around the world, including California offices in San Francisco, Walnut Creek, Sacramento, Los Angeles, and Irvine. Navigant has extensive expertise in DSM (including energy efficiency, demand response, and clean distributed generation) program design, policy, evaluation, and market analysis, and has more than 120 full time staff dedicated to these service areas.

In January 2010, *Summit Blue Consulting,* a leading energy industry consulting firm specializing in energy efficiency, demand-side management, Smart Grid, and renewable energy as well as utility consulting related to planning, regulation, pricing and rates, was acquired by Navigant. Summit Blue was formed in 2000 by experienced utility industry professionals. Summit Blue focused on assessing markets for demand-side management, designing and implementing effective program delivery mechanisms, and evaluating programs and markets for their energy savings impacts, potential to save energy, market effects, and administrative efficiency.

The Heschong Mahone Group, Inc. (HMG) is an established firm providing professional consulting services in the field of building energy efficiency since 1994. HMG specializes in applying our knowledge of building design, construction technology, policy development and program design to the problem of making buildings more energy efficient. We have a motivated technical staff with diverse and complementary skills in education, architecture, engineering, construction and economics, along with data collection and analysis, market research, communication, and project management skills.

HMG is a woman-owned small business, legally organized as incorporation. The firm offers direct, personal service to its clients. Broad experience with both utility and government clients allows HMG to provide customized, expert consulting services tailored to the needs of the project, its budget and schedule.

Waypoint Building Group Inc. is an advisory firm specializing in portfolio sustainability and energy efficiency program development and implementation. Waypoint's energy sustainability programs address our client's goals of maximizing returns from all building improvement investments. Our service offerings are built upon a strong building science foundation. We provide our clients with sophisticated building and portfolio programs by providing advanced analytics to buildings as they transform from simple retrofits to more sophisticated real-time simulation and optimization. Waypoint's proprietary building modeling technology supports a unique data driven approach that provides whole building optimization including life-cycle financial and performance projections.

Attachment 1 – Proposer / Bidder Certification Sheet

Submitted as a separate file

Attachment 2 - State of California Contractor Certification Clauses

Submitted as a separate file

Attachment 3 – Conflict of Interest Disclosure

Submitted as a separate file

Attachment 4 - Noncollusion Affidavit C. Proposal Evaluation Process

Submitted as a separate file

Attachment 5 – Exceptions to KEMA subagreement

Submitted as a separate file

Appendix - Resumes

Submitted as a separate file