2013-2015 Regional Energy Networks
DRAFT Impact Evaluation Research Plan



Prepared for the Energy Division of the California Public Utilities Commission

Prepared by Apex Analytics LLC, Itron Inc, and DNV-GL

July 15, 2016

**Table of Contents**

[1. Introduction 1](#_Toc456174329)

[1.1 Evaluation Goals and Objectives 1](#_Toc456174330)

[1.2 Program Overviews 1](#_Toc456174331)

[2. Evaluation Approach 4](#_Toc456174332)

[2.1 Gross Savings 5](#_Toc456174333)

[2.1.1 Multifamily Program 5](#_Toc456174334)

[2.1.2 Single Family 8](#_Toc456174335)

[2.2 Net Savings 10](#_Toc456174336)

[3. Data Sources 11](#_Toc456174337)

[4. Work Plan, Budget, and Schedule 12](#_Toc456174338)

[4.1 Work Plan 12](#_Toc456174339)

[4.2 Budget 16](#_Toc456174340)

[4.3 Timeline 17](#_Toc456174341)

[4.5 Team Contacts 18](#_Toc456174342)

# Introduction

## Evaluation Goals and Objectives

This document presents the Research Plan for the evaluation of the single family and multifamily (MF) whole building energy efficiency programs offered by Bay Area Regional Energy Network (BayREN) and Southern California Regional Energy Network (SoCalRen) for the 2013-2015 program years. This research builds upon the findings from the 2013-2014 Regional Energy Network (REN) Impact Assessment[[1]](#footnote-2), and will result in gross and net savings impacts for the first three years of REN program implementation.

The 2013-2014 REN Impact Assessment provided a high level assessment of the ex ante savings assumptions, including a comparison between REN and Invester Owned Utility (IOUs) impact assumptions. The objective of this previous research was to identify if there were any obvious over- or understatements of claimed impacts and provide input to the RENs on what data should be collected and available to facilitate future impact evaluations. The 2013-2014 assessement provided the RENs insight on how to prepare for this full impact evaluation while their programs are scaling up.

This impact evaluation aims to answer the following research questions for the 2013-2015 BayREN and SoCalREN single family and multifamily whole building programs:

1. What are the gross energy and demand savings (therms, kWh, kW) achieved by the BayREN and SoCalREN programs?
2. What are the net energy and demand savings achieved by the programs?
3. How can the RENs improve their ex ante savings claims so that they align with ex post values?

Planned methods to answer these research questions are provided in Section 2.

## Program Overviews

Both the single family and multifamily whole building programs implemented by Bay Area Regional Energy Network (BayREN)[[2]](#footnote-3) and Southern California Regional Energy Network (SoCalREN)[[3]](#footnote-4) will be evaluated under this research plan. These programs are detailed below

* **Single Family Home Upgrade** service is available to owners of single family detached homes in the BayREN and SoCalREN territories,[[4]](#footnote-5)[[5]](#footnote-6) marketed as the Home Upgrade program.[[6]](#footnote-7) Participants of the Home Upgrade program choose a minimum of three upgrade measures. up to a maximum of $3,000.[[7]](#footnote-8) SoCalREN also offered a $150 CAS Test-in Bonus from 4/1/2014 to 7/22/2015. By lowering logistical costs and overcoming technological and education barriers for participants, as well as by reducing costs for participating contractors through streamlined program design and implementation, Home Upgrade is poised to broaden participation of skilled, specialty contractors and deliver a highly accessible upgrade product to market. Key program elements include the addition of alternative and multiple upgrade package incentives, enhanced marketing efforts, development of targeted audit incentives, streamlined enrollment and reporting systems, integration of improvements related to the water-energy nexus, and the implementation of the Home Upgrade Advisor service to support homeowners and contractors through the process.
* The **Multifamily Whole Building** service conducts targeted outreach to multifamily property owners to promote participation. It is marketed under Energy Upgrade California®. This service allows property owners to receive free technical assistance designed to lower barriers to multiple measure upgrades through technical and financing assistance. Property owners receive customized scopes of work designed to reduce building energy use. SoCalREN relies on participant raters to work with property owners to achieve their project goals; the costs of the rater services are then offset by the assessment incentive. Building owners are eligible for a per unit rebate upon completing the energy efficiency improvements identified in the scope of work.
	+ Table A outlines some of the features of multifamily program implementation between the two program administrators.

Table A. Multifamily Program Elements, by Program Administrator[[8]](#footnote-9)

|  |  |  |
| --- | --- | --- |
| **Program Element** | **SoCalREN** | **BayREN** |
| **Service Territory** | Joint SCE/SCG territory, minus municipal service territories (e.g. LADWP) | 9-County Bay Area |
| **Eligibility Requirements** | 3+ units; SCE & SCG service; 3+ measures; work with Participating Rater | 5+ units; 9-county Bay Area; PG&E gas and/or electric; 2+ measures |
| **Rater Delivery Model** | Open Rater | Tech Assist. direct delivery by AEA |
| **Audit Requirement** | ASHRAE Level 2 | Clipboard audit |
| **CAS Testing** | MF HERCC Protocols | MF HERCC protocols |
| **Energy Modeling Software** | EnergyPro | EnergyPro Lite |
| **Assessment Incentive** | **# Units** | **Incentive** | Free site visit and technical assistance up to $5000 value |
| 3-49 | $5,000  |
| 50-100 | $10,000  |
| 100+ | $20/Unit Increment |
| **Improvement Incentive** | **Improvement** | **$/Unit** | **Improvement** | **$/Unit** |
| 10% | $550  | 10% | $750  |
| 15% | $625  |   |
| 20% | $800  |   |
| 25% | $1,000  |   |
| \_> 30% | $1,200  |   |
| **Verification** | Participating Rater | Tech. Assist. (AEA) |
| **Competition** | Direct from SCE/SCG pilot | No direct competition |

Cumulatively, these programs have claimed 3,181 kW, 9,380,425 kWh, and 763,043 therms during the 2013-2015 program years. The majority of these savings have come from the BayREN Multifamily program, contributing over 69% of the kWh savings and 59% of the therm savings (Table B).

 Table B. 2013-2015 Ex Ante Gross Savings, by Program[[9]](#footnote-10)

|  |  |
| --- | --- |
|  | **Ex Ante Savings** |
| **kWh** | **% of Total** | **kW** | **% of Total** | **Therms** | **% of Total** |
| **BayREN** |   |   |   |   |   |   |
|  | **Single Family Program** | 937,692 | 10% | 1,350 | 42% | 212,575 | 28% |
|  | **Multifamily Program** | 6,441,432 | 69% | 629 | 20% | 452,862 | 59% |
| **SoCalREN** |  |  |  |  |  |  |   |
|  | **Single Family Program** | 373,630 | 4% | 610 | 19% | 37,987 | 5% |
|  | **Multifamily Program** | 1,627,671 | 17% | 592 | 19% | 59,619 | 8% |
|  | ***Total*** | ***9,380,425*** | ***100%*** | ***3,181*** | ***100%*** | ***763,043*** | ***100%*** |

# Evaluation Approach

The evaluation of the REN single and multifamily programs will consist of both net and gross impact assessments. Net savings differ from gross savings as net savings removes savings from measures that would have been installed without program intervention (freeriders). In this manner, net savings represents savings that can be attributed to the program, or net of free ridership (NFR). Because the two housing types and programs differ dramatically in project size and scope, the single and multifamily programs are evaluated through different methods. Activities and outcomes for the multifamily program evaluation are illustrated in Figure A, and discussed in more depth in the sections that follow.

Figure A. Multifamily Evaluation Activities and Outcomes



## Gross Savings

### Multifamily Program

The **multifamily program** gross impacts will be evaluated through calibrated engineering models, using inputs verified onsite. This method requires four distinct evaluation activities: (1) telephone surveys, (2) site visits, (3) consumption analysis, and (4) simulation modeling.

* Activity 1 – Telephone Survey and Recruitment: During the telephone recruitment for site visits, the Evaluation Team will conduct a survey with property managers and owners that participated in the 2013-2015 REN multifamily programs. This survey will be used to supplement the 2013-2014 surveys of the same type for those participants that were not contacted during the previous effort. While the primary objective of these calls is to recruit for site visits, the Evaluation Team has the opportunity to expand the measured sample and survey results for little incremental cost, and will do so to the extent possible. To retain consistency across evaluation efforts, the survey instrument will remain the same.[[10]](#footnote-11) Topics included the following:
* Confirmation/verification of installed measures
* Anticipated actions in absence of program intervention
* Importance of program education and incentives on the decision to install high efficiency equipment
* Working status and estimated age of replaced units
* Timing for building maintenance/upgrades
* Activity 2 - Site Visits: Site visits will be conducted with a sample of 2013-2015 completed multifamily projects. Projects will be randomly sampled, however, the team may use a stratified random sampling methodology if there is a logical delineation between large and small projects. In an effort to reduce nonresponse bias and encourage participation, the site visit participants will be offered an incentive[[11]](#footnote-12) to assist in this effort. The objectives of these visits are twofold: (a) to verify inputs used to calculate ex ante savings, such as the quantity and type of measures installed, as well as building characteristics, and (b) to collect meter numbers to access utility consumption data for the entire building.
* When on site, field staff will verify installation and key characteristics of high priority measures installed at the property. This approach allows a compromise between the labor intensive process of assessing all installed measures at a property, while still verifying installation and capturing characteristics of measures that most contribute to savings at the project level.[[12]](#footnote-13) Any updates to building or measure attributes will be applied to the evaluated energy simulation models and resulting ex post savings estimates.
* Field technicians will also collect meter numbers while on site. During the 2013-2014 REN Impact Assessment, the Evaluation Team found that tenant account numbers were not a reliable link to full property consumption data.[[13]](#footnote-14) At the same time, the DNV GL team contracted to store and process participant consumption information determined that meter numbers may be a more reliable way to capture consumption information at a building or property level, as the meter numbers do not change as utility accounts change hands. REN multifamily program administrators have been directed to capture comprehensive property meter numbers for projects starting in 2015; however, this evaluation captures projects prior to that directive. As such, field technicians will collect meter numbers during their on-site visits.
* Activity 3 - Consumption Analysis: The third step in the multifamily gross impact evaluation is to evaluate the completeness and reasonableness of the property level consumption data. From the meter numbers obtained in Activity 2, the Evaluation Team will request consumption data from the appropriate IOU through the ED contracted data management team. As mentioned above, the 2013-2014 REN Impact Assessment found uncertainty around the completeness of consumption data accessed through property account numbers. The Evaluation Team will perform a thorough assessment of the consumption data obtained through meter numbers to ensure it contains a comprehensive report of energy usage at the participant site. For example, during the 2013-2014 assessment, the team evaluated the completeness of the pre-program billing data to ensure that the number of units associated with the consumption data met or exceeded the reported number of units in a project. The result of this consumption analysis will be comprehensive pre-program energy use at the participant property, which will feed into the simulation model (Activity 4).[[14]](#footnote-15)
* Activity 4 – Simulation Modeling: The final step in assessing gross savings is to model the sites where measures were verified onsite and where the team received complete billing information (results of Activities 2 and 3). This task will involve modelling participants’ building energy usage using EnergyPro simulation modelling software[[15]](#footnote-16), using site specific inputs verified onsite, and pre-program billing consumption data (from meter numbers collected onsite). Additionally, the modeling team will incorporate findings from the baseline assessment (from the telephone surveys in Activity 1) into the baseline assignments within the model (i.e., the models can be run as early replacement or replace on burnout). These models will result in the development of site specific ex post savings estimates.

The results of these four activities will provide the necessary inputs for the Evaluation Team to develop gross realization rates (GRR). Gross realization rates will be calculated as the modeled savings divided by the ex ante savings, or:

$$Realization Rate\_{Gross}=^{Savings\_{Modeled}}/\_{Savings\_{ex ante}}$$

These gross realization rates will be applied to the participant population to estimate ex post gross energy and demand savings for the BayREN and SoCalREN multifamily programs. Table C, provides an overview of the sample sizes and target sites for the data collection activities.

**Table C. 2013-2015 Multifamily Data Collection Targets**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2013-2014 Completes** | **2015 Target Completes** | **Total** |
|
| Total Participant Projects = 248 |   |   |   |
| Telephone Surveys | 43 | 27 | 70 |
| Site Visits  | - | 22 | 22 |

\*Note that the participant project quantity is based off CPUC tracking and will be refined or verified from the REN tracking data

In addition to the activities above, the evaluation team will assess the ratepayer costs associated with the program, on a per MMBTU basis, and compare the planned costs and energy savings to program targets. The evaluation team will also report and analyze participant costs, to the extent they are available from the implementers.

### Single Family

The **single family program** gross impacts for 2013-2015 will be estimated through a billing analysis conducted under the Home Upgrade impact evaluation.[[16]](#footnote-17) To assess changes in energy usage and aid in comparison across years, the billing analysis will follow an approach similar to the one developed for the 2013-2014 REN home upgrade impact evaluation. This billing analysis will compare a treatment group (participants) with a comparison group (non-participants). This method is consistent with the recommended International Performance Measurement and Verification Protocol (IPMVP) option Method C, Whole Facility and the CPUC evaluation protocols. There are several approaches to conducting a billing analysis however.

For this evaluation we will use a “pooled” fixed effects approach[[17]](#footnote-18) as the primary method of analysis. The pooled approach is appropriate given the small size of the program population relative to the general population. In addition, this approach is recommended where there is no valid control or comparison group (i.e. not available, not random or developed “after the fact”) or there are many gaps in the data for individual sites and the goal is to estimate average savings across program years.

#### Pooled fixed-effects approach

The pooled approach combines all participants and time intervals into a single regression analysis. This is also referred to as a “time-series cross-sectional analysis” because observations vary both across time and across individual dwellings.

In this model, participants who received a home upgrade during a certain time interval serve as a steady-state comparison for other participants in each other time interval. Almost all observations include premises that are still in their pre-installation period ***and*** premises in that are in their post-installation period. This approach helps isolate the effects of natural changes in energy usage, such as weather, general economic conditions, disruptions in service and other effects that are external to the program.

To maximize the diversity and size of the sample the analysis of 2013-2015 will require participant billing data starting from 2012 and ending as late as possible in 2016. For the electric component DNV GL will issue special data requests to the IOUs for 60-minute interval data and monthly 2016 gas data.

While annual electric savings are aggregated and modelled at the daily level (monthly for gas), kW reductions are modelled at the hourly level. The definition of peak kW is defined as,

“…the average grid impact for the measure from 2 pm to 5 pm during the three consecutive weekday period containing the weekday with the hottest temperature of the year.”[[18]](#footnote-19)

Results are reported by PA, but the resulting peak day and time values can be different for each PA and climate zone. If a new definition of peak is adopted we will use that definition for the analysis.

#### Multi-program adjustment

Participants that simultaneously participate in efficiency programs outside of home upgrade will be identified through the tracking data review. This will be reported along with other descriptive statistics. Adjusting savings for these participants effectively involves two steps. First we will develop the weather normalized savings estimate for the home. Then we will subtract any savings claimed by other programs for that premise. The difference will be the savings assigned to the premise and attributed to the home upgrade programs.

#### Analysis data set

We will use a final dataset that combines the tracking data and the billing data (using the account numbers in the two datasets) with weather data. Weather data will be attached to each consumption interval, based on the days in a read interval. The combined data have a sum of the daily degree-days (DD) for each unique read interval, based on start date and duration. Using a variable degree-day base approach, this process must be repeated over the range of heating and cooling DD bases. Cooling DD, heating DD, and humidity DD (heat index or dew point[[19]](#footnote-20)) are calculated based on average hourly temperature for that day.

Participation in REN programs more than doubled in 2015 from prior years. For this evaluation we anticipate a sufficient number of participants to support savings estimates. The number of REN home upgrade participants is shown in Table D.

Table D. Number of REN single family projects reported in program tracking data

|  |  |  |  |
| --- | --- | --- | --- |
| PA | Total | 2013-2014 | 2015 |
| BayREN | 2,100 | 684 | 1,416 |
| SoCalREN | 514 | 118 | 396 |
| Total | 2,614 | 802 | 1,812 |

## Net Savings

Mutlifamily program net of free-ridership (NFR) estimates will result from two survey efforts: (1) telephone surveys previously conducted as part of the 2013-2014 assessment and, (2) surveys conducted during the 2013-2015 telephone survey and site visit recruitment calls. The same NFR algorithm used in the 2013-2014 study will be applied for both activities. In this manner, additional 2015 completed projects that are contacted for the site visits will contribute to the final 2013-2015 NFR estimates. The survey targets property managers, owners, or other primary decision makers involved in executing the program at the property level and is based on the CPUC Self-Report Net-to-Gross Framework.[[20]](#footnote-21) Note that this study will focus exclusively on free-ridership and not account for potential spillover. Spillover is assessed and applied through a separate, statewide effort.[[21]](#footnote-22)

Table E, below, shows the sample and completed surveys conducted during the 2013-2014 assessment. These surveys will be supplimented through the 2013-2015 site visit recruitments among site visit participants whome have not yet taken the survey.

**Table E. 2013-2014 Completed NFR Surveys**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PA** | **Program** | **Number of Applicants** | **Target Sample** | **Completed Surveys** |
|
| **BayREN** | **Multifamily** |  125  |  20  |  43  |

The NFRs estimated for both survey efforts (cumulatively) will be applied to the ex post gross savings values to estimate ex post net energy and demand savings.

The **single family program** net impacts will be evaluated through self-report surveys of participants. Surveys will be conducted among participants to inform the following:

* Calibrate the pool of participants to be used in the billing analysis
* NTG adjustment of savings estimates
* Identify energy usage patterns observed as a function of dwelling characteristics, demographics, and behavior

The proposed sample size for the survey is approximately 60 households total.[[22]](#footnote-23) The sample will be split between BayREN and SoCalREN. In the aggregate this sample size will yield results reported at the 95% confidence with a 5% margin of error. If necessary, we will oversample any strata/subgroup of interest to ensure representation.

The analysis will assess free riders by scoring responses to a battery of questions. The specific instrument will be refined through comments received from the residential PCG.

# Data Sources

The multifamily and single family evaluations will rely on both primary and secondary data sources, including:

* CPUC tracking data,
* Program administrator project details,
* Property level consumption data,
* Program administrator EnergyPro Models,
* Interval meter electric billing data,
* Monthly gas meter data,
* 2013-2014 Impact Assessment survey results, and
* 2015 site visit and telephone survey results.

The **CPUC tracking data** will be used as ex ante savings claimed for each program and administrator. This includes first year net and gross savings. These data will be used as the basis for the evaluated realization rates and will be obtained through the CPUC contracted data managers.

**Program administrator project details**, including measure, project, and site specific information, will be used during both the telephone and onsite data collection activities. Specifically, the telephone surveys will verify installation, and ask the NFR and baseline batteries of questions on identified measures, and site visits will be verifying key measure and building characteristics while on site. Additionally, these details will allow the Evaluation Team to link project characteristics and contact information to the CPUC tracking data. These project details will be requested from BayREN and SoCalREN for all completed 2013-2015 projects at the onset of this evaluation.

**Property level consumption data** will be requested through the the CPUC contracted data managers for the subset of properties visited during the onsite visits. Consumption data will be linked to the meter numbers found onsite and used to calibrate adjusted EnergyPro models.

The **program administrator EnergyPro Models** will be utilized as a basis for the ex post savings models. These EnergyPro models will be modified with values onsite, as necessary, and calibrated to actual consumption values for the final ex post savings estimates. These models will be requested for the subset of participants that are chosen for onsite visits.

Net to gross and baseline assessment survey results from the **2013-2014 REN Impact Assessment** will be utilized for this evaluation. In this manner, the Evaluation Team can avoid survey fatigue among participants that have already been contacted for the previous assessment, and mitigate any recall bias associated with calling properties that participated several years back.

As mentioned earlier, the Evaluation Team will be conducting **on site visits** to a sample of 20 to 25 2013-2015 multifamily participants to collect meter numbers and verify measure details for key project measures. Due to the custom nature of the multifamily whole building projects, key measures will be defined on an individual project basis. Generally speaking, key measures will be those that are expected to contribute most to the energy consumption and/or savings at a given property. Additionally, the results of the baseline assessment (asked during site visit recruitment) will allow the EnergyPro models to adjust savings for measures identified as replace on burnout (ROB) or early replacement (ER).

# Work Plan, Budget, and Schedule

The five evalution tasks discussed in Section 2 are spread throughout six tasks for invoicing and tracking purposes. The following sections present these tasks, assigned budgets, and target schedule.

## Work Plan

This section presents the tasks that will be conducted as part of this evaluation. These tasks are the same as outlined in the CPUC Work Order[[23]](#footnote-24) and will be used to invoice and track the evaluation activities.

*Task 1 – Prime Contractor Project Management and Coordination*

The objective of this task is to provide all necessary coordination and communication across the Evaluation Team, CPUC staff and its consultants, and other related work order teams. The Evaluation Team will ensure that the CPUC staff and its consultants are kept fully informed of the project status through a combination of regularly scheduled telephone calls, meetings, and written project status reports to document status and results. Monthly progress reports will be submitted with invoices. Bi-monthly spending reports will be posted to Basecamp. Project Team meetings consisting of the Evaluation Team and Energy Division (ED) staff and its agents will be held on a regular basis, and an agenda will be provided in advance summarizing project status.

*Task 2 – Stakeholder Engagement*

The Evaluation Team will attend any relevant Stakeholder Advisory Group (StAG) and Program Coordination Group (PCG) meetings, and provide a status update on this project. A webinar will also be hosted to present the research plan at the beginning of the project. A second webinar will hosted to present the draft report when it has been approved by ED staff.

*Task 3 – Develop Detailed Research Plan*

This task covers all contractor study team work related to the development and approval of the detailed Research Plan and its component. This task includes the development of the Research Plan and any ongoing revisions to the plan during the implementation phase.

An internal draft of the research plan was provided to CPUC on June 30, 2016. A public draft research plan will be distributed to the StAG and PCG for review and comment during a two week comment period. Should the IOUs decline to exercise this option, an advance review draft will not be provided to the IOUs via basecamp.

As part of Task 2 above -- during the comment period -- a public webinar will conducted by the Evaluation Team to present the draft research plan, answer questions, and receive comments from the StAG and PCG. Upon close of the comment period, the Evaluation Team will compile the public comments received in a matrix that will have draft responses prepared by the Evaluation Team. The Evaluation Team will provide ED staff and its agents an opportunity to improve and inform the responses. The completed matrix will then be posted to the web as appropriate for public sharing.

Following the webinar and response to comments process, the Evaluation Team will fully revise the draft research plan to the extent necessary to appropriately respond to ED and public comments. This revised draft research plan will be distributed to ED staff and their advisors for review and approval. Once the revised draft research plan is approved by the CPUC project manager, a final research plan will be posted to the Public Documents Area (PDA) of the CPUC website to be made available to the public.

*Task 4 – Multifamily Whole Building Program Impact Evaluation*

This task will perform both a gross and net impact analysis of the BayREN and SoCalREN Multifamily Whole Building Programs. The gross analysis will utilize on-site visits to collect data to support a calibrated engineering analysis.

Task 4.1 Develop Data Collection Instruments, Data Development and Sample Pull

This task is composed of developing all data collection instruments for telephone surveys and on-sites. The telephone survey will be based on the instrument used for 2013-2014 REN Impact Assessment. This task will also include all relevant data management activities with the participant tracking system in order to pull the telephone and on-site samples.

Task 4.2 Data Collection

This task is composed of implementing the telephone survey and 20-25 site visits. This task will contribute to the baseline assessment, NFR estimates, consumption analysis, and simulation models.

Task 4.3 Calibrated Simulation Modeling

This task will involve modelling participants’ buildings using EnergyPro simulation modelling software, using site specific inputs verified on site, and pre-program billing consumption data (from meter numbers collected onsite). These models will allow for the development of site specific ex post savings estimates.

Task 4.4 Gross and Net Analysis

The results of the calibrated simulation modeling will provide the inputs for developing gross realization rates that can be applied to the participant population to estimate ex post gross energy and demand savings. This task involves pulling together the various evaluation components and will result in program level:

* Ex post NFR estimates
* Ex post gross savings values (first year)
* Ex post net savings values (first year)
* Ex post gross realization rates
* Ex post net realization rates
* Recommendations for program administrators to more closely align ex ante savings estimates to ex post values in future program cycles.

Program level NFR estimates will be calculated based on the telephone survey results from Task 4.2, and from those conducted during the 2013-2014 REN Impact Assessment. The NTGRs will be applied to the ex post gross savings values to estimate ex post net energy and demand savings.

*Task 5 – Single Family Home Upgrade Program Impact Evaluation*

This task will develop gross and net first year and lifecycle savings values for the BayREN and SoCalREN Single Family Home Upgrade Programs by applying NTGRs developed from the Single Family Whole Building Impact Evaluation study currently being managed by DNVGL, and applying gross savings results from the CPUC Focused Impact Evaluation of the 2013-2014 Home Upgrade Program.

The deliverable for this task will be a report chapter that is integrated into the overall report developed in Task 6 that summarizes the NTGR approach and results, the method for applying NTGRs and gross realization rates to develop ex post savings values, and presents the resulting first year and lifecycles ex post savings values for the BayREN and SoCalREN Single Family Home Upgrade Programs.

This task will also support the webinars discussed in Task 2, 3 and 6, regarding the research plan and draft report presentations.

*Task 6 – Reporting and Comment Response*

This task will involve the development of the draft and final reports, which would sections addressing a problem statement; description of prior work to date in this areas and precedent studies; approach to work, methodology, and stakeholder engagement campaign; and findings, conclusions and recommendations.

The task would include fielding and addressing stakeholder comments on the draft project SOW along with those directed at the proposed study questions shared at the kick off webinar, fully responding to all public comments on the draft report, and assembling a Response to Recommendations (RTR) appendix.

It is expected than an internal draft of the study report will be developed no later than May 1, 2017. Once the ED project manager approves an internal draft of the report, a draft report will be distributed to the StAG and PCG for review and comment during a two week comment period.

As part of Task 2 above, during the draft report comment period, a public webinar will conducted by the Evaluation Team to present the draft report, answer questions, and receive comments from the StAG and PCG. Upon close of the comment period, the Evaluation Team will compile the public comments received in a matrix that will have draft responses prepared by the Evaluation Team. The Evaluation Team will provide ED staff and its agents an opportunity to improve and inform the responses. The completed matrix will then be posted to the web as appropriate for public sharing.

Following the webinar and response to comments process, the Evaluation Team will fully revise the draft report to the extent necessary to appropriately respond to ED and public comments. This revised draft report will be distributed to ED staff and their advisors for review and approval. Once the revised draft report is approved by the CPUC project manager, a final report will be posted to the Public Documents Area (PDA) of the CPUC website to be made available to the public.

## Budget

The budget to complete the work outlined in this research plan is provided below. The budget allocated for these tasks is not to exceed $215,000.

**Table F. Evaluation Budget, By Task**

|  |  |
| --- | --- |
| **Invoicing Task** | **Budget** |
|
| Task 1 – Project Management | $20,000  |
| Task 2 – Stakeholder Engagement | $7,000  |
| Task 3 – Research Plan | $15,000  |
| Task 4 – MF Whole Building Impact Evaluation |   |
|  Task 4.1 – Instrument and Sample Development | $8,000  |
|  Task 4.2 – Data Collection | $72,500  |
|  Task 4.3 – Calibrated Simulation Modeling | $40,000  |
|  Task 4.4 - Analysis | $20,000  |
| Task 5 – SF Home Upgrade Impact Evaluation | $10,000  |
| Task 6 – Reporting and Comment Response | $22,500  |
| Total | $215,000  |

##

## Timeline

**Figure B. 2013-2015 REN Impact Evaluation Timeline, By Milestone**



## Team Contacts

California Public Utilities Commission – Energy Division
Jeremy Battis, jeremy.battis@cpuc.ca.gov
(415) 703-3041
505 Van Ness Avenue, San Francisco, Calif. 94102

Itron, Inc. – Prime Contractor
Aaiysha Khursheed, Aaiysha.khursheed@itron.com
(858) 724-2628
12348 High Bluff Drive, San Diego, CA 92130

Apex Analytics, LLC – Multifamily Evaluation Lead
Katie Parkinson, katiep@apexanalyticsllc.com
(303) 590-9888
1525 Spruce Street, Suite 200, Boulder, CO 80304

DNV GL – Single Family Evaluation Lead
Jon Vencil, jon.vencil@dnvgl.com
(619) 929-3232 x75110
3605 5th Ave, Suite A, San Diego, CA 92103

1. Itron, Inc., Apex Analytics, LLC & DNV\_GL. January, 2016. *2013-2014 Regional Energy Networks and Community Choice Aggregator Programs Impact Assessment Final Report.* [↑](#footnote-ref-2)
2. The BayREN program implementation plan can be retrieved using the following url: http://eestats.cpuc.ca.gov/EEGA2010Files/BayREN/PIP/2013/Clean/A.12-07-001%20Supp%2002\_Appendix\_A\_BayREN\_PIP\_Revised%20091813%20clean.pdf [↑](#footnote-ref-3)
3. The SoCalREN program implementation plan can be retrieved using the following url: http://eestats.cpuc.ca.gov/EEGA2010Files/SoCalREN/PIP/Clean/2014%2002%2014\_Amended%20SoCalREN%20PIP\_Clean%20Final.pdf [↑](#footnote-ref-4)
4. BayREN offers the programs for PG&E customers; SoCalREN offers the programs to Southern California Edison and Southern California Gas customers. [↑](#footnote-ref-5)
5. SoCalREN administers Home Upgrade in joint SCE/SoCalGas territory within Los Angeles County. SCE/SoCalGas operate Advance Home Upgrade throughout their entire territory and Home Upgrade outside Los Angeles County and in SoCalGas/MOU territory within Los Angeles County. [↑](#footnote-ref-6)
6. BayREN does not implement the Advanced Home Upgrade program, but does provide rebates of up to a maximum of $300 to customers that have completed an Advanced Home Upgrade project with PG&E. PG&E pays the incentive. [↑](#footnote-ref-7)
7. BayREN began to offer an additional $150 rebate to offset the cost of the requisite combustion appliance zone (CAZ) test beginning in February of 2014. [↑](#footnote-ref-8)
8. Table and program details provided by SoCalREN via basecamp on 7/14/16 [↑](#footnote-ref-9)
9. Ex Ante MF savings taken from 2013-2015 program tracking data, accessed 6/20/16; SF data taken from eestats “2013-2015 Monthly Energy Efficiency Program Report” as of December, 2015. Note that these values are not considered final. [↑](#footnote-ref-10)
10. See the *2013-2014 Regional Energy Networks and Community Choice Aggregator Programs Impact Assessment Final Report.* for discussion on the net of free ridership and baseline survey batteries, analysis, and survey instrument. [↑](#footnote-ref-11)
11. The amount of the incentive is currently under discussion. [↑](#footnote-ref-12)
12. Data from the 2013-2014 assessment indicate there are properties with hundreds of measures installed at a given site. [↑](#footnote-ref-13)
13. This is due to tenant turnover and associated account changes, as well as the uncertainty around fully capturing all tenant and common areas at a given property. For full details, see Itron, Inc & Apex Analytics, LLC. January, 2016. *2013-2014 Regional Energy Networks and Community Choice Aggregator Programs Impact Assessment Final Report.* [↑](#footnote-ref-14)
14. In projects where (a) all measures qualify for early replacement (no evidence of replace on burnout) and (b) we have full 12 months of pre and post consumption information, the team will attempt a pre/post billing analysis in lieu of the simulation model. However, the team believes it is unlikely that both these requirements will be met for most projects. [↑](#footnote-ref-15)
15. Different EnergyPro versions, including EnergyPro Lite, will be considered for use in this activity. The evaluation team will determine and use the version most appropriate for these properties. [↑](#footnote-ref-16)
16. Impact Evaluation of 2013-2015 Home Upgrade Programs will be conducted simultaneously, and in coordination with, this evaluation. [↑](#footnote-ref-17)
17. For a discussion of approaches see, Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol, The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures NREL/SR-7A30-53827 April 2013. [↑](#footnote-ref-18)
18. This definition is consistent with the definition used in the 2005 Database for Energy Efficiency Resources (DEER), but may be changed if the CalTRACK team produces a new and different definition before December 2016. [↑](#footnote-ref-19)
19. The higher the dew point, the more moisture there is in the air. [↑](#footnote-ref-20)
20. CPUC Energy Division. Methodological Framework for Using the Self-Report Approach to Estimating Net-to-Gross Ratios for Nonresidential Customers. Prepared by the Nonresidential Net-To-Gross Ratio Working Group. October 16, 2012. [↑](#footnote-ref-21)
21. A 5% adder applied to statewide programs to account for spillover. ESPI Decision (D.13-09-023), September 5, 2013, pages 27 and 36. [↑](#footnote-ref-22)
22. REN projects represent 15% of all home upgrade projects statewide. This sample is part of a larger Home Upgrade sample that includes IOU projects and a total sample size of approximately 400 households. [↑](#footnote-ref-23)
23. This text adopted from Work Order Number ED\_I\_LnR\_3, dated May, 2016. [↑](#footnote-ref-24)