



MCE

Residential Efficiency Market Program

Implementation Plan

Program Manual

Measurement & Verification Plan

MCE01d

August 8, 2022

Version 1.2

Table of Contents

MCE Residential Efficiency Market Program Implementation Plan	4
Program Overview	5
Program Budget and Savings	5
Implementation Plan Narrative	6
Program Description	6
Program Delivery and Customer Services	7
Program Design and Best Practices	8
Innovation	11
Metrics	14
To-Code Savings	14
Pilots	14
Workforce Education and Training	15
Workforce Standards	15
Disadvantaged Worker Plan	15
Additional information	15
Supporting Documents	16
Program Manuals and Program Rules	16
Program Theory and Program Logic Model	16
Process Flow Chart	17
Incentive Tables, Workpapers, Software Tools	18
Quantitative Program Targets	18
Diagram of Program	18
Evaluation, Measurement & Verification (EM&V)	19
Normalized Metered Energy Consumption (NMEC)	19
MCE Residential Efficiency Market Program Manual	20
How the MCE Residential Efficiency Market Works	20
Eligibility Requirements	21
Aggregator Eligibility	21
Project and Customer Eligibility	21
Qualifying Measures	22
Project Enrollment Process	22
Pre-Enrollment	22
Enrollment	23
Approval	24
Incentive Payments	24
How Incentives are Calculated	24
How Payments Are Made	24

Invoicing and Payment	26
Additional Services	26
Co-Branding	26
Exploring Project Value: How much is your project worth?	26
Estimating and Forecasting Value	26
Customer Optimization to Maximize Value	27
Understanding Avoided Cost	28
Audits	28
Sub-Program Quality Assurance Provisions	28
Quality Assurance Plan	28
Aggregator Roles and Responsibilities	28
Selecting Completed Projects for Inspection	29
Field Inspections Process and Scope	29
Photo Inspections	30
QA Inspection Report	30
Other Program Metrics	30
Population-level NMEC M&V Plan	31
Summary	31
Analytical Methods and Calculation Software Selection	31
Payable Savings	32
Claimable Savings	34
Calculation of Gross and Net Savings	34
Gross Savings	34
Baseline Calculation	35
Normalization for Weather and Other Factors	35
Adjusted Gross and Net Savings	35
Participation in Both the Residential Efficiency Market and Peak FLEXmarket	38
Demand Response Disaggregation	38
Outlier Site & Non-Routine Event Identification	40
Hourly Load Shape and Peak Impact Calculations	42
Data Collection	43
Data Security	43
Data Collection	43
Monitoring and Documentation QA/QC Over Reporting Period	43
M&V Related Plans for Project Types, Design, Payments, Measures and Cost Effectiveness	44
Permissible Project Types	44
Program Design Criteria and Fractional Savings Uncertainty (FSU)	44
Program Design Criteria	44
Fractional Savings Uncertainty	45

Payments and Incentives	46
Qualifying Measures	50
Cost Effectiveness	51
Eligibility Criteria	51
Effective Useful Life (EUL)	53
Methods, Payment Terms, and Risk	55
Methods for Payable and Claimable Savings	55
Payment Terms	55
Risk Mitigation	55
To Code Savings Compliance	56
Bid M&V Plan	57
ATTACHMENT A. Tools, Methods, Analytical Approaches and Software Criteria	58

MCE Residential Efficiency Market Program

Implementation Plan

The following program details about MCE's Residential Efficiency Market program is geared at all program stakeholders and is being housed on the California Energy Data and Reporting System (CEDARS) in accordance with California Public Utilities Commission (CPUC) decisions and Staff guidance.¹

Program Overview

Program Budget and Savings

1. Program and/or Sub-Program Name: **Residential Efficiency Market**
2. Program / Sub-Program ID number: **MCE01d**
3. Program / Sub-program Budget Table:

Program ID Budget Category	2022 Budget	2023 Budget	Total
General and Administrative (G&A) Overhead	\$84,000	\$156,000	\$240,000
Direct Implementation Non-Incentive (DINI)	\$63,000	\$117,000	\$180,000
Measurement and Verification (M&V)	\$315,000	\$585,000	\$900,000
Marketing, Education and Outreach (ME&O)	\$63,000	\$117,000	\$180,000
Total Non-Incentive	\$525,000	\$975,000	\$1,500,00
Incentives	\$1,575,000	\$2,925,000	\$4,500,000
Total	\$2,100,000	\$3,900,000	\$6,000,000

4. Program / Sub-program Gross Impacts Table:

Metric	2022	2023	Cumulative Annual Impacts
Peak Demand Savings (kW) (Net)	406	716	1,122
Net Peak Demand Savings (kW) (Net)	491	866	1,357
Annual kWh Savings (Gross)	1,659,741	2,928,118	4,587,859

¹ D.15-10-028 at 43.

Annual kWh Savings (Net)	1,410,780	2,488,900	3,899,680
Program Total System Benefits (TSB) (\$)	\$2,100,00	\$3,900,000	\$6,000,000

5. Program / Sub-Program Cost Effectiveness (TRC)²: **N/A**
6. Program / Sub-Program Cost Effectiveness (PAC): **N/A**
7. Type of Program / Sub-Program Implementer: **Third Party Delivered**
8. Market Sector(s): **Residential**
9. Program / Sub-program Type: **Resource Acquisition**
10. Market channel(s): **Downstream**

Implementation Plan Narrative

1. Program Description

The MCE Residential Efficiency Market Access program, referred to as Residential Efficiency Market, operating on the Demand FLEXmarket platform, will offer a flexible path for aggregators³ of residential customers to bridge the gap of customer needs, MCE's energy efficiency (EE) resource needs, and grid reliability. A price-based population Normalized Metered Energy Consumption (NMEC) program design will support delivery of cost-effective savings (and potential decarbonization) to help meet MCE's goals and optimize energy usage for residential customers. Performance incentives and peak kickers will push aggregators to deliver maximum savings and optimized load shapes that maximize system benefits, particularly during summer peak and net peak periods.

The Residential Efficiency Market will mirror MCE's Commercial Efficiency Market⁴ program design and complements MCE's Peak FLEXmarket⁵ program. The Peak FLEXmarket program uses the same participation and measurement and verification (M&V) framework but focuses on summer peak hours to incentivize load shifting and event-driven demand response (DR). Collectively these three programs make up MCE's "Marketplace" programs.

MCE will contract with a single third party, Recurve, as an implementation partner. Recurve is tasked with relationship management and enrollment of aggregators, determining customer eligibility, processing project submittals, analytics, determining payments to aggregators, M&V and more.

Under the program, all aggregator payments are tied to the delivery of savings. Aggregators will leverage capital up front to deliver the savings and the program will only pay minimal market management costs in the form of an administrative fee and monthly project completion payments based on the expected

² Cost-effectiveness requirements were waived for program years 2022 and 2023. See D.21-12-011 OP 7 at 55.

³ Aggregators - referred to as implementers in D-21-12-011 - are participating vendors or program partners who generate energy efficiency and/or demand savings for an aggregated group of customers.

⁴ <https://cedars-staging.sound-data.com/programs/MCE02d/details/>

⁵ MCE's Peak FLEXmarket program implementation plan will be available by the end of April 2022.

benefits from forecasted projects. Aggregators will be compensated for total system benefit delivered, net of the marketplace management fees for their projects. Marketplace management costs include general and administrative (G&A) overhead, direct implementation non-incentive (DINI), M&V, and marketing, education and outreach. These management costs are forecasted at 25% of the total program budget.

The Residential Efficiency Market program is designed to scale up quickly with an open market of qualified aggregators delivering energy efficiency and demand flexibility solutions designed to target peak and net peak demand windows. The goal of the program is rapid deployment of projects that will result in peak and net peak demand savings through the summer months of 2022/23 and beyond in support of grid reliability.

As the implementation partner, Recurve will recruit and contract with multiple qualified aggregators and will support them directly with eligibility and prioritization analytics to identify and engage the highest value customers based on the aggregators' business model. Aggregators recruit customers and install projects. Recurve will then track the NMEC verified impacts in the Recurve Platform. MCE will pay aggregators quarterly, based on the impacts achieved and the auditable record of performance for each aggregator's portfolio.

The core objectives of this program are as follows:

- Pay aggregators on measured savings performance and total system benefit (TSB) delivered (after peak kicker adjustment detailed in the accompanied M&V plan), incentivizing aggregators to pursue projects and measures that produce the most savings, particularly during summer peak periods.
- Ensuring that program spending does not exceed TSB delivered (after peak kicker adjustment detailed in the accompanied M&V plan).
- Reducing transaction costs for aggregators, MCE, and end customers.
- Improving diversity in the vendor pool that provides demand flexibility services.
- Customer prioritization to drive outsized impacts during peak and net peak periods.

See flow diagram in Supporting Documents Section 3. Process Flow for more detail

Pricing, payments and incentives are included in Supporting Documents Section 4.

2. Program Delivery and Customer Services

The core strategy of this program is simplification and flexibility to quickly reduce peak energy demand to

address the emergency 3.5 GW shortfall.⁶ Qualified aggregators will have the flexibility to meet residential customers where they're at in terms of energy needs, technology fit, and project cost. Rather than a prescriptive set of program offerings, aggregators will develop their offerings around a core set of targeted solutions (e.g., HVAC, Lighting, Heat Pumps, Water Heaters, Building Shell, Refrigeration, and controls) and optimize the meter-based performance to maximize benefits to MCE, the grid and the customer.

The range of services, products and tools that are provided by the aggregators to customers is diverse. They will have full flexibility to propose services, tools, or interventions (as defined in the "Eligibility" and "Qualifying Measures" section in the attached M&V plan) to customers to encourage adoption, effectuate consumption changes, and manage energy. Recurve will provide core services and tools to MCE and aggregators in the form of an operational platform to identify, enroll, track, and settle the energy efficiency resources delivered through this program.

This program is not specifically designed to address hard-to-reach customer segments, but it is flexible and is a viable program concept for doing so. If aggregators have a business model that can serve hard-to-reach customers effectively, they will be highly valuable participants in the Marketplace.

3. Program Design and Best Practices

The key program strategies and tactics to reduce barriers for program participation for targeted customers are:

- Reduce technical and administrative barriers associated with traditional deemed, custom, and site-specific NMEC project development pathways. These delivery pathways are not only burdensome for aggregators and contractors, but also for customers.
- Matching customers with aggregators who are best-equipped to meet their needs and tying those needs to grid-optimized solutions (as valued in the avoided cost calculator (ACC) adopted by the Commission).
- Leveraging a key benefit of population-level NMEC programs - the inclusion of to-code savings opportunities and thereby reducing so-called "stranded" savings opportunities, while simultaneously removing the administrative challenges of excluding to-code impacts.

The program anticipates that a specific set of technologies will be best suited to maximizing the avoided costs, but their adoption (and appropriate incentive levels) will be a function of the customer needs, financing requirements, and other funding mechanisms available to the aggregator to promote adoption through financing options or shared costs.

The Residential Efficiency Market is adopting three key best practices. The first is focusing on market design rather than program or project design to draw in the maximum number of solutions from

⁶ California Proclamation of a State of Emergency - July 30th, 2021 <https://www.gov.ca.gov/wp-content/uploads/2021/07/Energy-Emergency-Proc-7-30-21.pdf>

aggregators. The second is setting the price for energy savings based on total program value delivered net of marketplace management cost. And third, managing risk by only paying aggregators for the value delivered. Program value is defined as TSB after programmatic adjustments such as peak and net peak kickers. This strategy protects the rate-payer risk of investing in programs that may not deliver value and creates the proper incentives for aggregators to mobilize and deliver the maximum benefit possible.

The Recurve platform is critical to the strategy, administration and implementation of the Residential Efficiency Market program. It provides the necessary analytic tools to bridge the flow of information between MCE, aggregators, and evaluators. The primary elements of Recurve's platform to be leveraged are outlined below.

The **Resource Planner** module will help identify end customers with the highest potential for savings. Using Resource Planner, Recurve computes a suite of customer usage characteristics or "features", based exclusively on pre-program consumption data. These features are calculated for every customer and range from simple summations (e.g. total annual MWh usage) to normalized metrics (e.g. the percentage of usage from cooling) to more complex load characteristics (e.g. baseload, evening ramp).

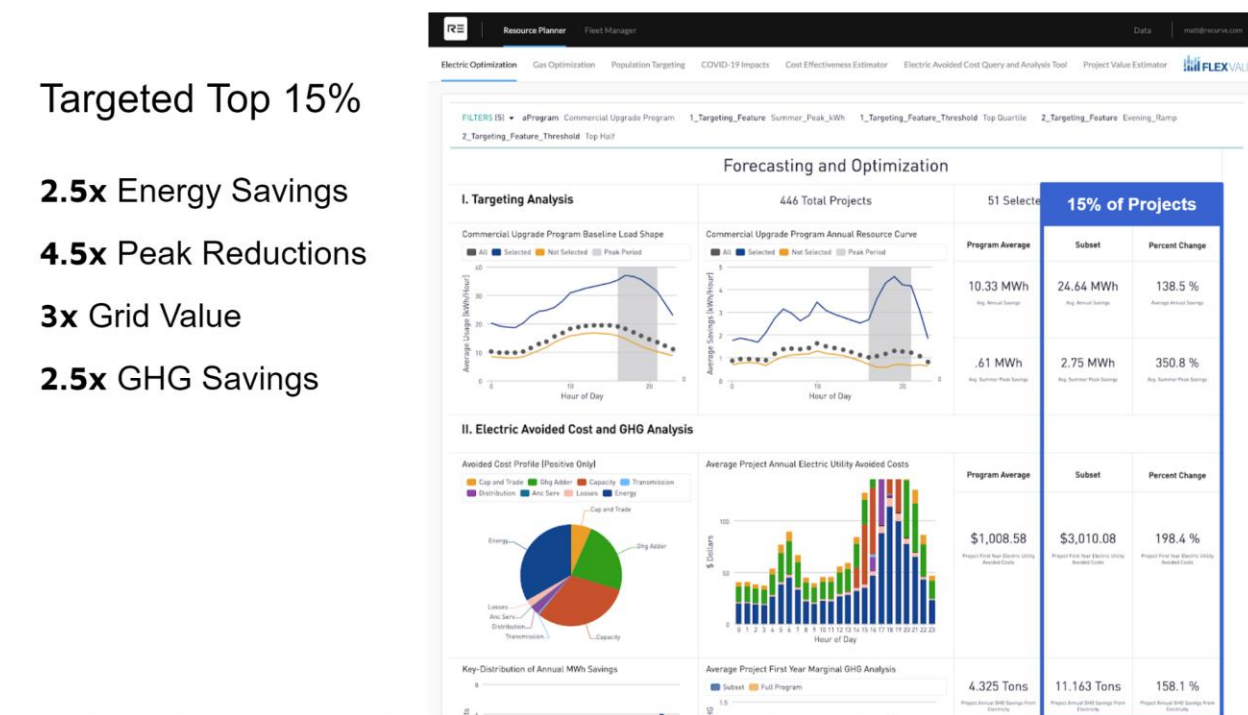


Figure 1: Resource Planner Module – Prioritization Analysis

Recurve will segment the MCE service area by load shape and develop a customer and usage analysis. Some customers may have little potential for peak savings from a particular measure, while others present a significant opportunity. Recurve will work with aggregators to identify high priority customers within the segments they serve and the solutions they are capable of providing.

Recurve may also provide an analysis to qualified aggregators of projects they implemented within MCE's service area in previous program years. This analysis would generate the information required for aggregators to know which of their interventions at specific customer types deliver maximum grid benefits.

The **Fleet Manager** module provides ongoing tracking of building-level energy savings and is the foundation of automated M&V. Each demand-side asset (e.g. energy efficiency participant) is tracked for savings using open-source, replicable methods. Savings will be updated on a monthly basis as new data is ingested.

Fleet Manager provides some key features including:

- [CalTRACK](#) savings tracking for the duration of the program term
- Continually updated savings values for electric kWh values
- Tracking and access to all of the data and savings results at an individual meter/project level
- The ability to define and assess relevant cohorts⁷ for which data are available
- The ability to view savings performance at a portfolio, cohort, and individual project level
- API functionality to allow for accessing data for any desired additional analysis

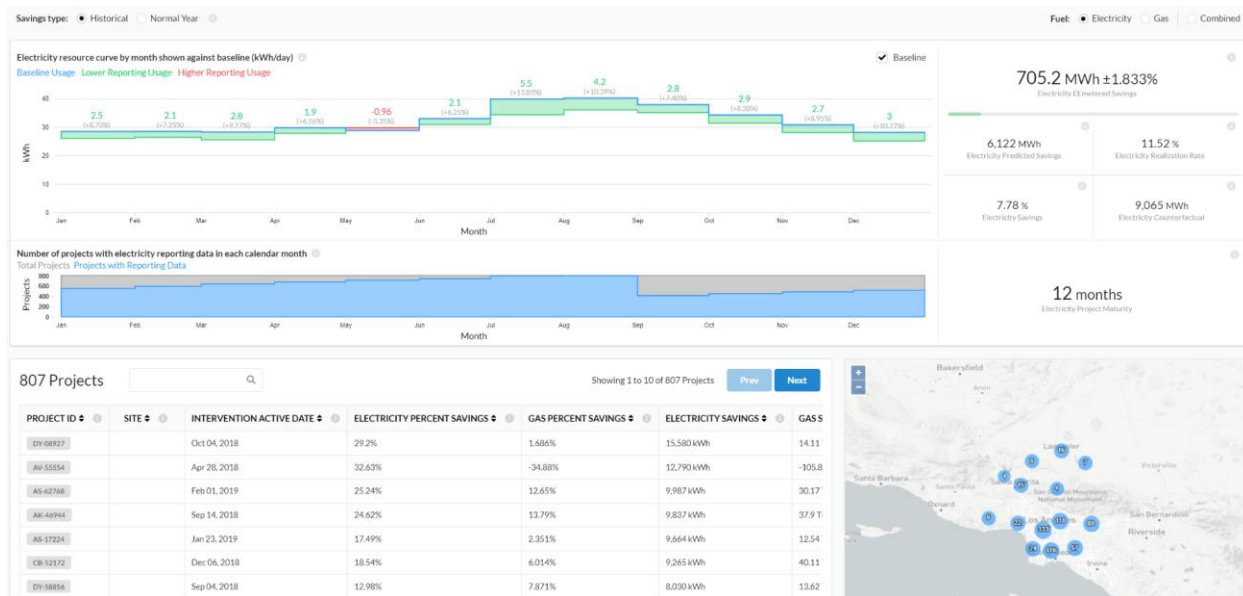


Figure 2: Program and Portfolio Savings Tracking in Fleet Manager

The **Flex Ledger** module turns metered savings into transactions. With the savings calculations serving as a basis of payment for aggregators, a system of record is needed to record savings and payments to third parties in an auditable, transparent fashion. The Ledger supports payment invoicing and regulatory filings backed by a full audit trail of all historical transactions as visualized in Figure 3 below.

⁷ Cohorts are defined as portfolios of projects grouped by various metadata (such as aggregator, measure type, installation month, etc.)

The Flex Ledger provides for:

- Custom Portfolio Valuation Functions
- Custom Eligibility Rules
- Custom Configurations
- Non-Routine Event Tracking
- Full Auditability of Transaction Records
- Regulatory Reporting

Account - Demo P4P

March 21st, 2020

Create New Payment

99
Projects

164
Meter Assets

\$8,234.55
Base Value

\$0.00
Kicker Value

\$64.10
Assigned Value

\$8,298.65
Total Value

\$4,220.00
Upfront Credit

\$12,518.65
Total Value + Upfront Credit

\$6,265.74
Previous Payments

\$6,252.91
Balance

164 Meter Assets

Show filters

Showing 1 to 10 of 164 Meter Assets

Prev

Next

METER ID	METER TYPE	PROJECT ID	PROJECT MATURITY	STATUS	DISQUALIFICATION REASON	BASE VALUE	KICKER VALUE	ASSIGNED VALUE	TOTAL VALUE	
M127-gas	gas	PROJ123127	13 months	ACTIVE		\$389.82	\$0.00		\$389.82	
M190-gas	gas	PROJ123190	13 months	ACTIVE		-\$212.69	\$0.00		-\$212.69	
M208-gas	gas	PROJ123208	13 months	ACTIVE		\$228.30	\$0.00		\$228.30	
M255-gas	gas	PROJ123255	13 months	ACTIVE		\$1.20	\$0.00		\$1.20	
M33-gas	gas	PROJ12333	13 months	ACTIVE		-\$226.00	\$0.00		-\$226.00	
M74-gas	gas	PROJ12374	13 months	ACTIVE		\$3.03	\$0.00		\$3.03	
M87-gas	gas	PROJ12387	13 months	ACTIVE		-\$647.43	\$0.00		-\$647.43	

Figure 3: Flex Ledger Module Tracking Incentive Payments Owed and Due

4. Innovation

The primary objective of this program is to simplify the path for MCE to translate allocated budgets for energy efficiency into actual results in the most streamlined and scalable manner possible - by combining pay-for-performance with an aggregator marketplace designed to deliver savings impacts with an upfront price signal, consistent, transparent meter-based quantification of impacts, and an auditable performance payment structure. The program is inherently designed to be incremental to MCE's main EE portfolio and be rapidly scalable for delivering peak impacts in time for summer 2022 and 2023 to support grid reliability.

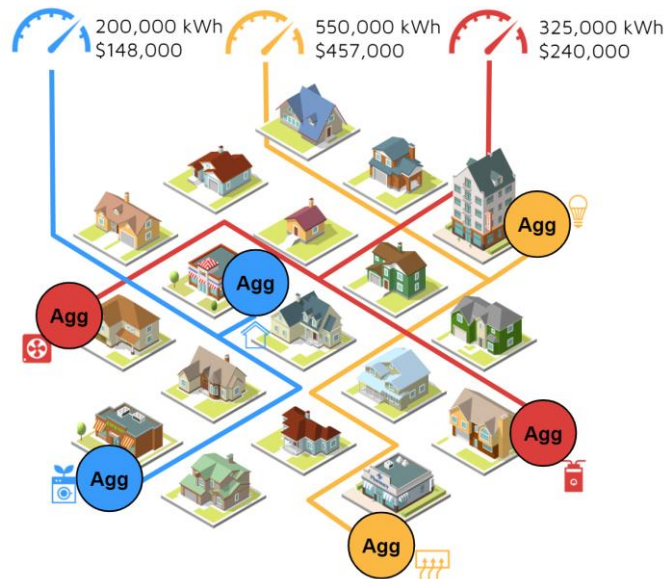


Figure 4: Residential Market Concept

The innovation in this model involves overcoming the barriers of entry for qualified aggregators, ensuring that the program pays only for grid benefits delivered, and validating the impacts for both customers and the grid. This will enable a tighter connection of energy efficiency program investments with the grid impacts that drive significant value in increasing summer reliability, meeting climate goals, and improving the lives and livelihoods in the communities they serve.

The core innovation principles of the Residential Efficiency Market program are **simplification**, **flexibility** and **scale** and have been designed specifically to rapidly deploy resources in this grid reliability emergency.

The program brings **simplification** by reducing or eliminating common technical and administrative barriers associated with traditional prescriptive EE programs. These delivery pathways are not only burdensome for aggregators, but also for end customers. With the Residential Efficiency Market delivery model, project and customer enrollment are streamlined while still retaining the necessary quality assurance/ quality control (QA/QC) checks on paperwork. The program reduces transaction costs and administrative burden by measuring savings at the meter after project installation and paying only for delivered value, rather than burdening aggregators with administrative bottlenecks and extensive reviews up front to receive a rebate.

Market Access

Aggregator / Trade Ally

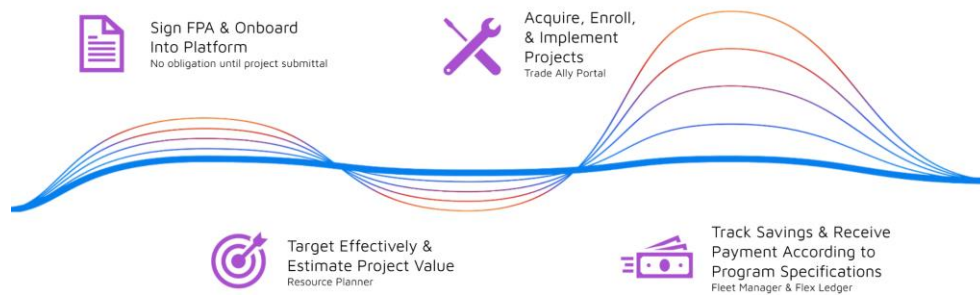


Figure 5: General Aggregator Process for Demand FLEXmarket

The Residential Efficiency Market program brings **flexibility** by allowing qualified aggregators to meet the individual needs of end customers in terms of energy savings, comfort, technology fit, and project cost. Rather than a prescriptive set of program offerings, aggregators will deliver solutions oriented around peak savings and TSB delivered. By leaving the solution set open-ended but fixing the price to savings delivered and providing consistency in tracking impacts, the range of possible solutions is determined by optimizing between cost and benefits, rather than prescribing a fixed program solution to a customer.

Scale is achieved by leveraging the growing number of aggregators participating in the Marketplace. Qualified aggregators can join any Marketplace after signing a Flexibility Purchase Agreement and agreeing to program rules. This increases competition and vendor diversity that will create scale in the marketplace to ensure that stranded opportunities are addressed and efficiency potential is realized.

The other key innovation is that payments to aggregators will be based on the TSB of the portfolio of projects they deliver, net of the marketplace management costs. Marketplace management costs include general and administrative (G&A) overhead, direct implementation non-incentive (DINI), M&V, and marketing, education and outreach. These management costs are forecasted at 25% of the total program budget. Aggregators will target customers and optimize their budget by increasing savings impacts and finding the right shared cost point for customers to "say yes" to a project. It is in the hands of the aggregator to maximize their performance payments across their portfolio by achieving the greatest benefits (savings and demand impacts).

By focusing on the TSB delivered (both as presented through analytics and motivated through price), aggregators will have the tools and resources to improve their portfolio over time, manage risk, and be paid for the actual value delivered to MCE. Underperformance by an aggregator will likewise signal either modifications to their delivery model or exit from the Marketplace with no additional risk to ratepayers.

5. Metrics

The primary metrics for tracking program progress will be the energy and demand savings achieved (kWh and kW, respectively), as well as time valuation of these savings. The achieved cost effectiveness of the portfolio and the actual load shapes delivered will be part of the metrics that are monitored and valued using FLEXvalue.

MCE proposes the tracking of the following program metrics in the monthly or quarterly reports for completed projects:

- Program Savings to date (kWh)
- Forecasted Program Savings (kWh)
- Peak demand savings and net peak demand savings to date (kW)
- Forecasted average peak demand and net peak demand savings (kW)
- Program TSB to date (\$)
- Forecasted Program TSB (\$)
- Payments to Aggregators to date
- Forecasted Payments to Aggregators
- Total Budget Reserved
- Number of enrolled projects per month
- Number of completed projects per month

These metrics may be modified based on Commission staff input and final program reporting requirements⁸.

6. To-Code Savings

The Residential Efficiency Market program is a population-level NMEC program. All savings will be demonstrated against an existing conditions baseline including to-code savings.

Capturing to-code savings may be part of any given project that is implemented as part of this program, for any number of technologies. SB350 has authorized programs to capture below code savings to limit stranded potential. Meeting customers "where they are at" is how aggregators will be able to identify and accelerate equipment turnover and overall adoption of solutions to achieve energy savings and decarbonization.

7. Pilots

This section is not applicable to this program.

⁸ See D.21-12-011 at p.58

8. Workforce Education and Training

The Residential Efficiency Market program does not have a direct component for workforce education and training.

9. Workforce Standards

Aggregators that join the Residential Efficiency Market program will adhere to all requirements for workforce standards established by the Commission⁹. As part of the intake and review process, aggregators will provide all necessary qualifications and licensure to perform the proposed work.

10. Disadvantaged Worker Plan

The Residential Efficiency Market program does not have a direct component for targeting disadvantaged workers.

11. Additional information

This section is not applicable.

⁹ D.18-10-008

Supporting Documents

1. Program Manuals and Program Rules

A program manual containing rules for participation is provided with this implementation plan and is also integrated into the **Residential Efficiency Market** web page, found at www.demandflexmarket.com.

2. Program Theory and Program Logic Model

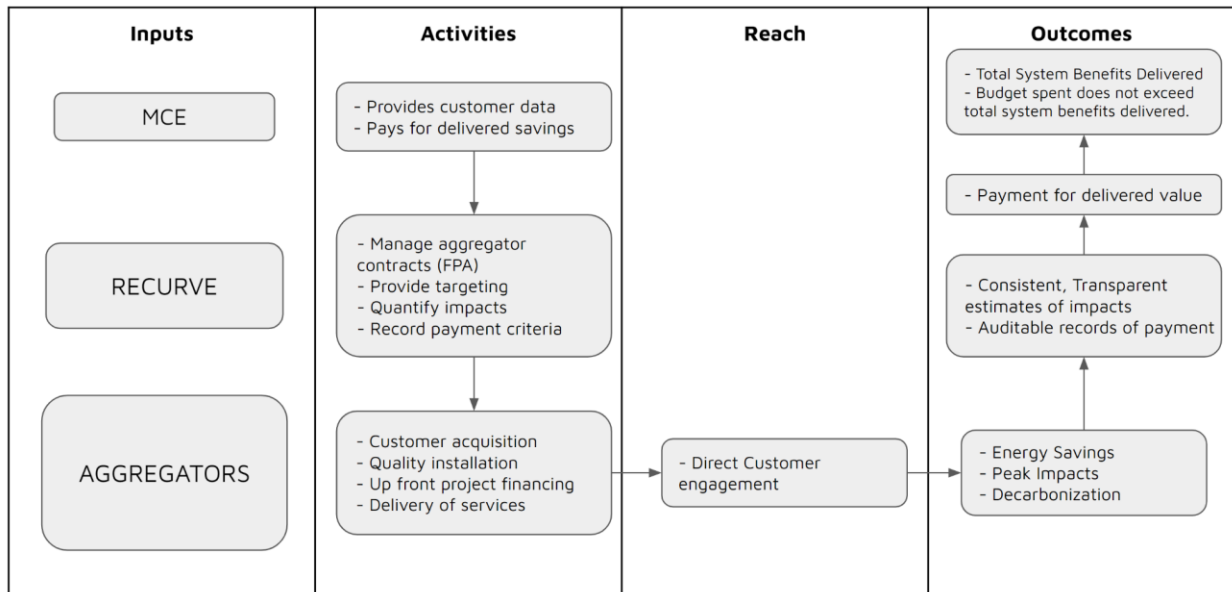
The essence of the program theory for the **Residential Efficiency Market** program is price signaling. The program establishes a flexible structure (i.e., a market design) by which aggregators can offer direct value from energy efficiency investments, and MCE can then purchase that value directly.

Unlike a traditional program, MCE is not buying the service, but the commodity - a stream of net benefits - from the aggregator. Historic barriers to program implementation have included rigid program designs with fixed technology incentives and pre-payment for program services which risked program savings delivered. In the **Marketplace** model, the program theory holds that the aggregators will act to optimize the value they can deliver, based on the price offered.

Aggregators are typically already familiar with the barriers for their targeted customer groups and have the flexibility to devise solutions to address those barriers for the customer groups that are likely to adopt the similar technologies offered by the aggregators.

MCE gets the benefit of the value delivered at a price aligned with the Commission's Avoided Costs Calculator and with a protection against exceeding spending thresholds by only paying for value delivered above and beyond the Marketplace management costs.

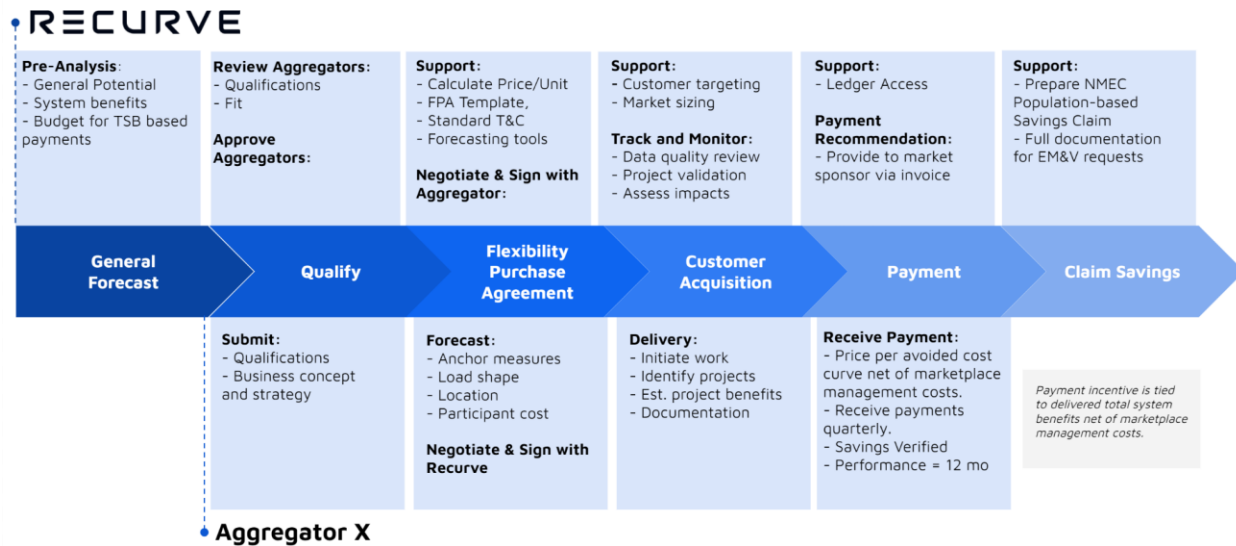
Marketplace Logic Model



3. Process Flow Chart

The following graphic illustrates the process flow for Residential Efficiency Market projects and portfolios.

General Aggregator / Project Flow



4. Incentive Tables, Workpapers, Software Tools

The Residential Efficiency Market program is a population-level NMEC program and does not have fixed measures or incentives. Workpapers are not part of the program plan. The program's M&V plan describes the approach and associated software tools for calculating actual payable and claimable savings.

Savings estimates from aggregators will be reviewed by Recurve. Since savings forecasts are not foundational to the Aggregator payments, review is focused on ensuring customers are getting reasonable estimates of savings potential, aggregators are appropriately applying EULs, and that MCE can have confidence in forecasted impacts and manage performance payment budgets.

For payable savings, the value per unit for electricity is grounded in the climate zone of the project, the metered load shape, the ACC adjustments such as peak and net peak kickers, and the Effective Useful Life appropriate for the primary measure (based on historic savings claims).

Incentives and costs presented to the customer are at the discretion of the aggregator. Energy project costs and incentives provided to the customer will be documented and reported to Recurve by the aggregators for each project, although they are not integral to payment.

5. Quantitative Program Targets

During program years 2022 and 2023, MCE anticipates this program will deliver a total savings of 3,899,680 in net kWh. The estimated incentives for the program are \$4,500,000, and MCE projects that over 10 aggregators will be active by the end of 2022. The program has a goal of 1,122 kW in cumulative peak impact and 1,357 kW in cumulative net peak impact during the 2022-2023 June-September, 4-9PM peak window.

6. Diagram of Program

Program Lifecycle Flow

	Eligibility	Qualification	Enrollment		Performance Tracking	Quality Assurance
			Pre-Intervention	Post-Intervention		
Program Implementer	Identify eligible customers for program. Engage customers to participate in the program.	Review baseline analysis for eligible customers to determine appropriate measures. Make notes on project. Group projects by contractor cohort	Review recently scheduled projects	Review recently completed projects	Monitor ongoing portfolio performance after update to ensure on track to meet savings goals. Download KPIs for reporting.	Periodically examine disqualified projects and look for outliers which may negatively effect portfolio performance.
Recurve Platform	Pull authorized customer, site and historical meter data into platform. Verify eligibility w/meta data.	Create placeholder-project for each eligible customer. Batch customers and ETL to complete baseline analysis for each.	Update project intervention date and status to scheduled. Remove customer from eligibility table.	Update project intervention date and status to completed.	Batch completed projects/new data to ETL and run meters at set frequency e.g. monthly.	Use portfolio settings to detect NRE's and identify outliers.
Program Channel		View cohort of eligible projects to see suggested measures and info for each customer. Use list for customer outreach.	Sell intervention to customer. Use enrollment form to update project with scheduled intervention date and set status to scheduled. Upload required contracts & info.	Complete intervention. Use enrollment form to update project with actual intervention date and set status to completed.	Examine program performance to see if projects performed as expected.	Identify outliers and examine their meta data to understand how to improve performance.

7. Evaluation, Measurement & Verification (EM&V)

At this time, there are no plans for implementing a process evaluation or other evaluation effort for this program. This program employs a robust embedded M&V strategy (as described in the M&V plan below).

8. Normalized Metered Energy Consumption (NMEC)

The Residential Efficiency Market Population NMEC M&V Plan is provided with this implementation plan.

MCE Residential Efficiency Market Program Manual

How the MCE Residential Efficiency Market Works

Any aggregator¹⁰ who has agreed to the Terms and Conditions as detailed in the Flexibility Purchase Agreement (FPA) provided by Recurve is allowed to participate in MCE's Residential Efficiency Market. The MCE Residential Efficiency Market is built on the success of the MCE Commercial Efficiency Market program and is designed to operate nearly identically to its sister program.

The MCE Residential Efficiency Market enrolls projects in a single-stage process. Through the FLEXmarket portal,¹¹ project information is collected from aggregators along with an estimated incentive value, as well as various permissions and acknowledgments to complete a formal project enrollment. Submissions will be checked for eligibility and completion prior to official enrollment into the Residential Efficiency Market and can be subject to additional documentation and review (as per the terms in the "Engineering Review Trigger" section).

Once projects are officially approved and enrolled into the Residential Efficiency Market, a "Project Completion Confirmation Letter" will be issued for the project. The letter represents MCE's commitment to paying the aggregator for the grid value to be delivered by a project. The Project Reservation is calculated at 120% of the estimated incentive value (submitted through the enrollment process) from the program budget to account for the possibility of the project exceeding its savings forecast.

Residential Efficiency Market incentive payments are paid based on performance of an aggregator's portfolio of projects and occur on a quarterly basis. As soon as a project generates enough value to account for associated Marketplace management costs (assigned as a percentage of TSB value) it becomes "active for payment" and its performance begins to be attributable to the larger portfolio of aggregator projects. **Accurate forecasting is inherent to the program design: over forecasting may lead to unnecessarily high Marketplace management costs being attributed to the project. Under forecasting may result in an insufficient budget reservation.** Each project within a portfolio will have its performance calculated quarterly, for the previous quarter, and an aggregator's collective portfolio performance for that quarter will be paid out. To prevent under- or over-performance due to seasonality, 10% will be withheld from each quarterly payment and will be returned if performance holds. If a project performs as expected, 100% of its estimated incentive value will be paid out. The reservation of 120% of the forecasted project value ensures that incentive funding will be available for installed projects. Savings that accrue in excess of this amount will be paid based on program funds availability.

¹⁰ Aggregators - referred to as implementers in D-21-12-011 - are participating vendors or program partners who generate energy efficiency and/or demand savings for an aggregated group of customers.

¹¹ The FLEXmarket portal can be found at <https://www.demandflexmarket.com>

Projects can increase their value by increasing savings volume and delivering load shape impacts that are more valuable than the CPUC's deemed average resource cost curve (greater \$/kWh saved), especially during summer peak and net peak hours. The Residential Efficiency Market is agnostic to measures and business models, however, the expected useful life of the measures being implemented will affect the magnitude of the incentive.

Recurve will enroll projects and track savings for every project in an aggregator's portfolio and provide aggregators M&V for all projects through the **Fleet Manager** portal. Recurve will also track payment recommendations through the **Flex Ledger**. Both of these tools are available to aggregators that have successfully enrolled a project in the Residential Efficiency Market to monitor their portfolios.

Eligibility Requirements

Aggregator Eligibility

Any organization that can meet the requirements as listed in the FPA can participate in the MCE Residential Efficiency Market. Aggregators are participating vendors or program partners who generate energy efficiency and/or demand savings for an aggregated group of customers.

If an organization can meet these listed requirements, it must [sign the Flexibility Purchase Agreement](#) to officially submit and enroll projects.

Project and Customer Eligibility

Recurve will utilize CalTRACK modeling to qualify customers based on data sufficiency and baseline model fit in addition to other usage characteristics.¹²

General customer eligibility requirements include but are not limited to:

- Residential customer (single-family, multifamily on a case-by-case basis);
- Project site must be located in MCE's service area;¹³
- Bundled (i.e., receiving electric generation service from the utility) or unbundled (i.e., receiving electric generation service from MCE) customer;
- Site is not currently participating, and has not participated in the past 12 months, in a CPUC ratepayer-funded energy efficiency program;
- 12 consecutive months of energy usage data is available;
- Model fit needs to be < 1.0 Coefficient of the Variation of the Root Mean Square Error (CVRMSE) and site must pass CalTRACK data sufficiency analysis (Recurve will conduct analysis at intake);
- If the customer has onsite solar system, installation of the system must have been completed at least 12 months prior to the EE intervention.

¹² Project qualifications based on data sufficiency and model fit may only apply to the type of savings being measured (electric or gas).

¹³ <https://www.mcecaneenergy.org/member-communities/>

- Projects must demonstrate an effective useful life (EUL) of longer than 1 year;¹⁴ and
- Projects must be installed by no later than August 1, 2023.

More requirements for eligible customers are detailed in the program M&V plan.

Qualifying Measures

The Residential Market will promote a wide range of measures including, but is not limited to, the following interventions: lighting, HVAC, water heating, building envelope, refrigeration, and controls-based technologies. The types of measures that are installed will be documented in the course of program deployment and be included in the metadata (see Data Collection section). Registration of projects with gas-only savings will not be permitted as this program is focused on maximizing electric summer peak reductions.

The program has used deemed measures as a starting point for forecasting key cost-effectiveness parameters and qualifying measures anticipated to be the focus of the program. Projects with a primary measure (as defined in the M&V plan) of controls or behavioral interventions with a 1-year EUL may be routed to the Peak FLEXmarket program unless otherwise supported with documentation such as work papers or eTRM data (see the “Effective Useful Life” section of the M&V plan for more detail). Solar PV and other electricity generation are not eligible for incentives from the Residential Market.

Project Enrollment Process

Pre-Enrollment

Prior to enrolling a customer, the program recommends that aggregators use the “Data Sufficiency and Eligibility Tool”¹⁵ to check if a customer is eligible for program enrollment. To operate this tool, an aggregator must receive the SAID (Service Agreement Identifier) for a customer. Please note, this is different from the Account ID and Service Point ID numbers. Once an aggregator has a SAID, they simply enter it into the Data Sufficiency and Eligibility Tool. Outputs include but are not limited to:

1. If there is sufficient baseline data (12 months consecutively)
2. CalTRACK model fit (< 1.0 CVRMSE for eligibility)
3. Address

Customers with SAIDs that do not pass the data sufficiency check are not eligible to participate in the Residential Efficiency Market. Customers that have other factors contributing to ineligibility will have those listed in the Tool. For a full list of eligibility criteria, please see the [Eligibility Requirements](#) section

¹⁴ Projects with a Primary Measure (as defined in the “Effective Useful Life” section M&V plan) with an EUL of 1 year or less may be enrolled in MCE’s Peak FLEXmarket program, which is designed specifically to incentivize NMEC-verified demand management solutions.

¹⁵ The Data Sufficiency and Eligibility tool can be found at <https://www.demandflexmarket.com>

above. Only aggregators that have signed the Flexibility Purchase Agreement are given access to the Data Sufficiency Tool.

Enrollment

Aggregators enroll projects under the Residential Efficiency Market via the FLEXMarket Portal¹⁶. Bulk enrollment of multiple projects at once may be considered on a case-by-case basis with approval from the Program Administrator. Aggregators submitting projects must include the following:

1. Contact information for their company;
2. Contact information for the customer being enrolled;
3. Project information (such as forecasted savings) for electric and gas (if applicable).
 - a. Savings Calculations
 - b. Confirmation of incentive payments passed on to the customer.
4. Signed scope of work;
5. Project invoice;
6. Customer signed Data Authorization forms.

Upon completion of the project enrollment form, Recurve will review and verify that the enrollment is complete. The review is focused on ensuring that customers are receiving reasonable estimates of savings potential, aggregators are appropriately applying EULs, and that MCE can have confidence in forecasted impacts and manage performance payment budgets. If the review is not passed, Recurve will review the results with the Aggregator to resolve any issues identified.

Projects will also be reviewed to see if a Third-Party Engineering Review is required. While the table below outlines the general parameters for a Third-Party Engineering Review, Recurve and MCE maintain the right to subject any project to additional engineering review.

Engineering Review Thresholds

Category	Threshold
% Savings (Annual Usage)	> 20%

Once installed, projects may be inspected on-site per the terms of the program's Quality Assurance Plan found in the program M&V plan. If an installed project does not pass a QA inspection, the Aggregator will be alerted by a program representative and will be expected to rectify the issue as specified in the Flexibility Purchase Agreement.

¹⁶ The FLEXmarket portal can be found at <https://www.demandflexmarket.com>

Approval

Projects approved by the program will be issued a “Project Completion Confirmation Letter”. Aggregators will be alerted when projects are rejected or are subject to additional review.

Approved projects will have 120% of their estimated incentive value reserved from the program budget for aggregator payments for the delivered value.

Approved projects will be added to the submitting aggregator’s portfolio of projects within their Recurve Platform Instance, where project performance will be monitored (using the Fleet Manager tool) and incentive tracking will be calculated (using the Flex Ledger tool).

Incentive Payments

How Incentives are Calculated

Incentives are calculated based on the measured hourly savings in an Aggregator’s portfolio multiplied by the hourly grid value as defined by the Adjusted Avoided Cost Curve (which includes capacity smoothing and peak kicker adjustments), net of associated marketplace management costs (25% of the forecasted value). Projects will be measured for 12 months, but will receive the full benefit of the effective useful life (EUL) of the project (i.e. 12 years).



Projects in an aggregator's portfolio do not become “active for payment” until they have generated enough value to exceed the associated marketplace management costs upon project enrollment. Further detail on this process can be found in the “Payments and Incentives” section of the M&V plan. A project value estimation tool and further detail on the Avoided Cost Curve can be found at <https://www.demandflexmarket.com>.

How Payments Are Made

Aggregator incentive payments for this population-level program will be made based on payable savings determinations using NMEC methods described in the gross and net sections of the M&V plan. Payments for the program will be made quarterly during the 12-month measurement period for active projects in the aggregator portfolio.

The quarterly measurement periods are:

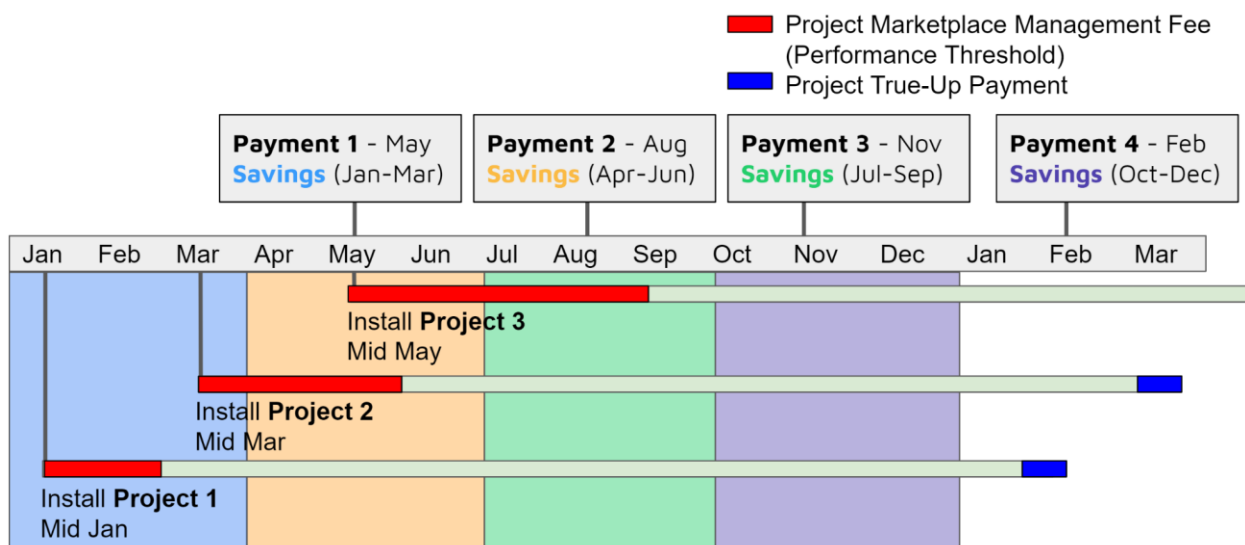
- January-March

- April-June
- July-September
- October-December

Payments are expected to be made within 60 days from the end of the previous measurement period. For example, payments for Q1 (January through March) will be made by May 30. Aggregators will be alerted if there's a deviation from this timeline.

The incentive payment is based on the total program value (adjusted avoided cost benefits) net of program management costs of projects in the portfolio. Aggregators will be paid for their portfolio value achieved based on metered savings from active projects achieved during the most recent measurement quarter. Aggregators are not eligible for an incentive payment if the net benefits from their projects do not exceed the corresponding market management costs. In other words, projects become active for payment after the value generated exceeds marketplace management costs for the project associated with the forecasted savings. Marketplace management costs include general and administrative (G&A) overhead, direct implementation non-incentive (DINI), M&V, and marketing, education and outreach. These management costs are forecasted at 25% of the total program budget.

In addition, 10% of measured project value will be withheld each quarter to provide a safety factor in regards to seasonality. As projects complete the full 12 month measurement period, aggregators will be compensated with a "true-up" payment in the following quarterly payment cycle that will release owed funds. A visualization of payment cadences is shown in the figure below.



The reservation of 120% of the forecasted project value ensures that incentive funding will be available for installed projects. Savings that accrue in excess of this amount will be paid based on program funds availability. If a project completes the measurement period with negative savings or has not generated enough program value to surpass associated Marketplace management costs, the leftover Marketplace

management costs and/or negative program value generated will be released into the aggregator portfolio and accounted for in the next payment period.

Recurve will document in an electronic, revenue-grade, auditable ledger the recommended payments to support aggregator invoices to MCE after each quarterly measurement period. The electronic ledger will track all stages of a project, including non-routine adjustments. Invoice payment recommendations will be based on CalTRACK payable savings results. Claimable results to the CPUC will be derived from the ledger for compliance with reporting requirements.

Invoicing and Payment

Recurve's Flex Ledger tracks all stages of the project and converts it into value, including non-routine adjustments. Invoice payment recommendations will be provided to MCE based on CalTRACK payable savings results. MCE will issue payments based on Recurve's payment recommendation.

Please see the Measurement & Verification Plan for the details of payment calculations, timelines, and non-routine event adjustments.

Additional Services

Co-Branding

MCE offers co-branded marketing as a free service to aggregators as an opportunity to showcase their organization's offerings and benefits to their potential residential customers within MCE's service area. MCE must approve in advance any use of MCE's logo.

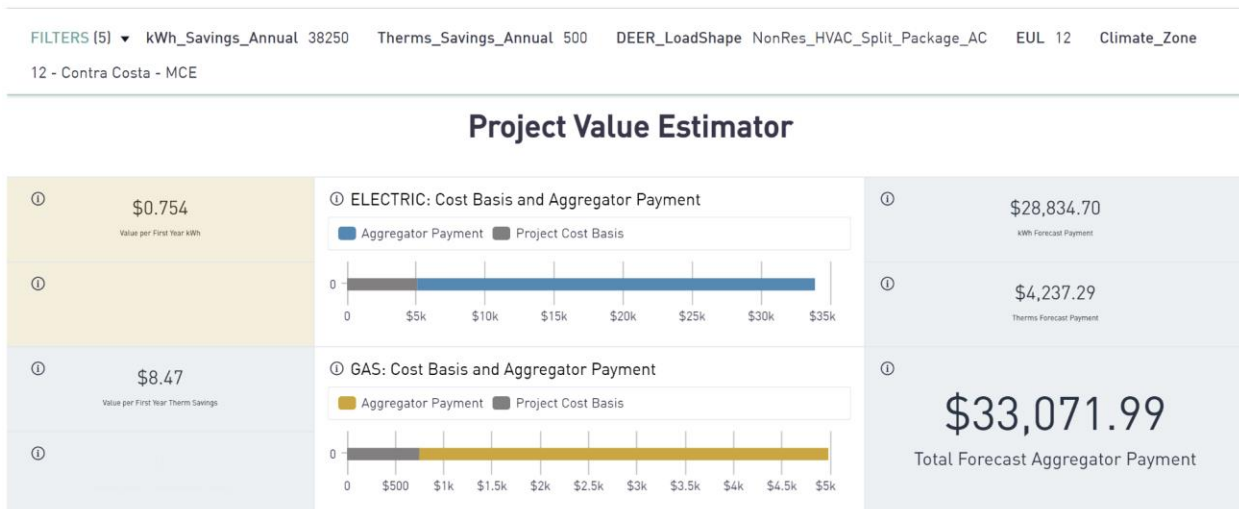
Exploring Project Value: How much is your project worth?

As program incentives shift from deemed rebates or fixed performance rates to meter-based incentives that pay for grid value delivered, it can be difficult to understand how to estimate how a particular project earns value. As incentives begin to value temporal benefits over sheer volume of installations, understanding how load shapes impact performance is crucial.

Estimating and Forecasting Value

Aggregators have access to a Project Value Estimator and FLEXvalue¹⁷ tools via the program webpage. These tools give aggregators the ability to estimate their projects' value through the MCE Residential Efficiency Market. The Project Value Estimator dashboard requires basic project inputs to estimate the available Aggregator Incentive Payment value.

¹⁷ <https://colab.research.google.com/github/recurve-methods/flexvalue/blob/master/notebooks/colab.ipynb#scrollTo=7da3bd62>



Customer Optimization to Maximize Value

Aggregators have an incentive to both increase the volume of total savings and maximize the value of the resource curve (savings load shape) to maximize project value. We encourage all aggregators to take time using the Project Value Calculator to understand these interactive effects to develop a model that maximizes grid impacts and customer offerings.

One primary tactic in the Residential Efficiency Market is the ability to work with Recurve tools to identify customers with the highest potential for savings. Aggregators are encouraged to pursue opportunities with customers whose consumption profiles suggest greater savings potential, especially those with high usage during the summer peak and net peak hours.

Program tools can also be used to identify the buildings that offer flexibility opportunities during summer evening ramp, leading to much more valuable avoided cost savings. Recurve will work with aggregators to identify the attributes of high-potential customers. These attributes are then used to identify targeted groups that are the most likely to have cost-effective outcomes for all parties involved.

For example, an aggregator targeting small business Air Conditioner savings would have the greatest potential impact by focusing on the customers with the greatest AC usage during the grid peak periods when savings are worth the most. These customers are most likely in need of help, and will have dramatically higher bill savings and grid benefits.

Aggregators also have the freedom to optimize their offerings toward the most beneficial mixes of technologies, develop innovative customer engagement strategies, or explore automation. Aggregators will be given maximum flexibility to determine their own business models, and customer value propositions.

Understanding Avoided Cost

The cost of energy is not static and fluctuates based on the time of use. The CPUC Avoided Cost Calculator (ACC) provides a set of 8760 marginal hourly values for the California grid, forecasting the cost of energy for each hour of the day. For the purpose of this program, the ACC has been adjusted, as outlined in the M&V plan, to provide a more stable compensation structure and adequately value summer peak hours. This data set is used to value energy savings or demand flexibility in the Marketplace. This data feeds into the Project Value Estimator that is used to derive incentives in the MCE Residential Efficiency Market.

Recurve provides aggregators access to several tools that can be used to identify value and forecast the value of projects and portfolios. The **Avoided Cost Tool** will allow detailed analysis of the Avoided Cost price signal. The Avoided Cost Calculations can then be downloaded as a CSV. These values are used in conjunction with modeled or actual past hourly resource curves (savings load shapes) in the Project Value Estimator to estimate the avoided cost value of the project in order to forecast potential cash flows.

Audits

No pre-or post-on-site audits are required. MCE may, as part of the quality assurance framework, select a random sample of projects to confirm technologies were installed. Audit of data quality and eligibility of participants will be conducted by Recurve.

Sub-Program Quality Assurance Provisions

Quality Assurance Plan

MCE maintains the integrity of the Residential Efficiency Market through an independent Standards and Quality Assurance Team who manages the quality assurance system for the Market.

The quality assurance (QA) system has several components, including a review of qualifications and credentials, paperwork audits, the establishment of program standards, and field and photo inspections. QA inspections involve verification of the contracted scope of work, accuracy of site analysis, comparison of installation to submitted designs. Recurve, MCE, or its representatives may make a reasonable number of visits to the customer site before, during, and/or after installation of efficiency measures to assess overall compliance.

Aggregator Roles and Responsibilities

The program relies on aggregators to provide complete turnkey services for qualified energy efficiency improvements to customers. Aggregator roles and responsibilities include:

- Aggregator and/or their subcontractors hold the agreement (contract) with the customer
- Responsible for performance, including subcontractors
- Receives incentive payments and determines customer incentives
- Agrees to terms of the Flexibility Purchase Agreement

- Agrees to MCE's terms and conditions
- Agrees to terms of the M&V agreement
- Accountable for resolution of customer complaints
- Responsible for installation, warranties, and product guarantees

Selecting Completed Projects for Inspection

The purpose of the QA inspection is to provide MCE an opportunity to evaluate the accuracy of the site analysis and design documents and verify that building components and equipment are installed according to Program requirements. The QA inspection also includes selected health and safety and performance items.

MCE reserves the right to select any project for inspection. Selections may include consideration of the following criteria:

- Low savings realization rates
- High CVRMSE or CVRMSE change
- High variance

MCE reserves the right to conduct field inspections, phone screenings, and photo inspections based on the following sampling rates:

- 10% photographic/phone screening
- 2-4% onsite inspection

MCE may select any completed project for inspection based upon customer complaints, warranty-related issues, or as part of the review of a contractor under status review or Program disciplinary action.

Phone Screenings

The purpose of a phone screening is to confirm measures are installed as outlined by the project documentation provided by the aggregator to Recurve. Phone screenings will be scheduled without prearrangement and in the event that a customer cannot confirm installation of the proposed measure(s) via phone a field inspection may be conducted.

Photo Inspections

The contractor is required to take construction photos for each measure installed, which describe the existing conditions as well as the replacement product or measure. MCE expects contractors to take photos throughout the installation process to ensure that each measure completed is supported with photographic documentation. MCE may request construction photos for purposes of conducting a photo inspection at any time, and failure to provide the requested photos may result in higher onsite inspection rates. Taking multiple pictures of each installed measure will help ensure a smooth photo inspection process.

Alternatives to project photos may be considered on a case-by-case basis with approval from the Program Administrator.

Field Inspections Process and Scope

The purpose of a field inspection is to confirm measures are installed per manufacturer instructions and as outlined by the aggregator in the customer agreement, and in the project documentation provided to Recurve. QA field inspections are scheduled at the customer's convenience. Customers are encouraged to allow the contractor to attend the inspection to answer questions. If the customer agrees, the contractor will be notified by email between 5 to 14 days before the inspection. Every effort will be made to accommodate the contractor's schedule, but the customer's convenience takes precedence.

Customers have the right to request that the contractor not attend the QA field inspection. In these situations, the contractor will not be notified of the scheduled inspection but will receive the report from the QA team within 15 business days of the inspection.

QA Inspection Report

The QA inspection report will provide a summary of all evaluated elements of the project and list any non-conformances identified during the inspection. The report will provide an overall score of the project and identify it as a pass or fail. Scoring criteria is further described below in the program M&V plan.

The report will be provided to the contractor approximately 15 days after the inspection, following an internal review and scoring by the QA Team. The report will be made available to the customer upon a direct request to MCE.

Other Program Metrics

N/A

Population-level NMEC M&V Plan

Program Name: MCE Residential Efficiency Market

Program Administrator: MCE

Market Implementer: Recurve

Summary

This is a Program-Level Measurement and Verification (M&V) Plan for the MCE Residential Market Access program (MAP), referred to as the Residential Efficiency Market. The program is eligible for, and complies with, the population-level Normalized Meter Energy Consumption (NMEC) requirements defined in the CPUC NMEC Rulebook v.2.¹⁸ Based on the definitions provided by the CPUC, population-level NMEC is used when savings claims are made for a portfolio of projects using fixed, standardized, verifiable measurement methods established before the program starts and that are uniformly applied to all sites in the group.¹⁹ All NMEC approaches are based on pre- and post-intervention energy usage data observed at the meter.

The program implementation plan²⁰ for the Residential Efficiency Market provides the details for how the program shall be implemented. The population-level NMEC M&V approach is appropriate for this program because it meets all required program design criteria, including those related to expected savings and permissible project types related to building-type similarity.

The Residential Efficiency Market, implemented by Recurve will utilize independent, transparent measurement and continual tracking of changes in pre- and post-intervention energy usage observed at the meter. Standardized, open-source methods and tools are the foundation of this M&V plan. The remainder of this document details compliance with the CPUC NMEC Rulebook 2.0 requirements for the program-level M&V Plan for Population NMEC, which must be included in any implementation plan.

A. Analytical Methods and Calculation Software Selection

This Residential Efficiency Market is designed for the residential sector within MCE's service area. Targeted building types, including consumption trends, existing equipment, and likely impact of the interventions, will be reasonably consistent for each aggregator within the program. Qualified aggregators

¹⁸ Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption, January 7, 2020
<https://www.cpuc.ca.gov/General.aspx?id=6442456320>

¹⁹ CPUC's full definition: "Population-level NMEC is an energy savings calculation approach in which results are based on pre- and post-intervention energy usage data observed at the meter and calculated across a group of sites, rather than a modeled engineering forecast or deemed value (or a Site-level metered savings calculation). For Population-level NMEC, measurement methods are fixed before the program starts and apply to all sites in the group in a uniform fashion, as opposed to Site-level NMEC measurement methods which may differ on a site-by-site basis." Rulebook p. 24

²⁰ Templates for implementation plans can be found here: <https://www.caeec.org/implementation-plan-guidance>

will mostly focus on installing a primary technology across a similar sub-section of the market, but the implementation plan does not pre-define the measures nor the targeted sub-set of the market.

Initial savings forecasts from aggregators will be reviewed and validated by Recurve. Since aggregator payments are based on metered impacts, not calculated estimates, reviews are utilized to ensure estimates are reasonable and based on industry best practice. This review process will help ensure customers receive reliable estimates of savings potential, aggregators are appropriately applying EULs, and that MCE can have confidence in forecasted impacts and effectively manage performance payment budgets.

Approach	Project Documentation from Aggregator
Actuarial <i>Meter-based past performance</i>	Past evaluation report, third party evaluation or engineering assessment of a similar projects' past performance utilizing whole building IPMVP Option C methods; e.g. CalTRACK/OpenEEmeter or ECam
Modeled <i>Building simulation projection</i>	Results of a building simulation model like Energy Plus, EQuest, or other similar IPMVP Option D modeling tool. Models calibrated with actual usage data are preferred.
Deemed <i>Pre-approved standardized measure-specific savings</i>	Citation of a CPUC-approved or archived work paper, or other DEER value. Measure-specific savings estimates from CalTF via the eTRM may also be appropriate but should be calibrated for to and through code performance.
Bottom-Up <i>Multiple approved and standardized measure-specific savings</i>	Citation of a suite of deemed values (see above) combined to estimate the whole impacts of a project. Interactions between measures should be considered in the estimate.

Figure 1: Pre-Installation Verification of Savings Estimation Options if Engineering Review Threshold Exceeded

Payable Savings

Payable savings constitute the basis of payments between MCE and aggregator(s). The public, open-source CalTRACK 2.0 methods,²¹ executed via the OpenEEmeter²² for the calculation of baseline models and counterfactuals, GRIDmeter for comparison group sampling and savings adjustment, and FLEXvalue for the calculation of grid value based on the measured hourly savings impact and the CPUC's avoided cost calculator have been chosen as the analytical method(s) and calculation software for payable savings for this program. A wide range of building types may be part of the program and a threshold baseline model fit will be a precursor for project acceptance. The open-source methods and codebase can

²¹ The current v. 2.0 CalTRACK methods documentation and technical appendix are available at <http://docs.caltrack.org/en/latest/methods.html>

²² The python code base for the OpenEEmeter (eemeter and eeweather) can be downloaded from Github at: <https://github.com/openeemeter>; Code and methods to accommodate special cases like PV, EV, and batteries may be included in updates to openEEmeter.

collectively be called the [FLEXmeter](#). The FLEXmeter methods and code will be used for quantifying energy efficiency and demand response impacts and can be used to disaggregate EE and DR impacts as applicable. Background on development of CalTRACK and the OpenEEmeter can be accessed through www.caltrack.org. The GRIDmeter methods and code are available publicly at gridmeter.recurve.com and FLEXmeter tools and code are found at flexvalue.recurve.com. References to technical specifics are provided throughout this M&V plan.

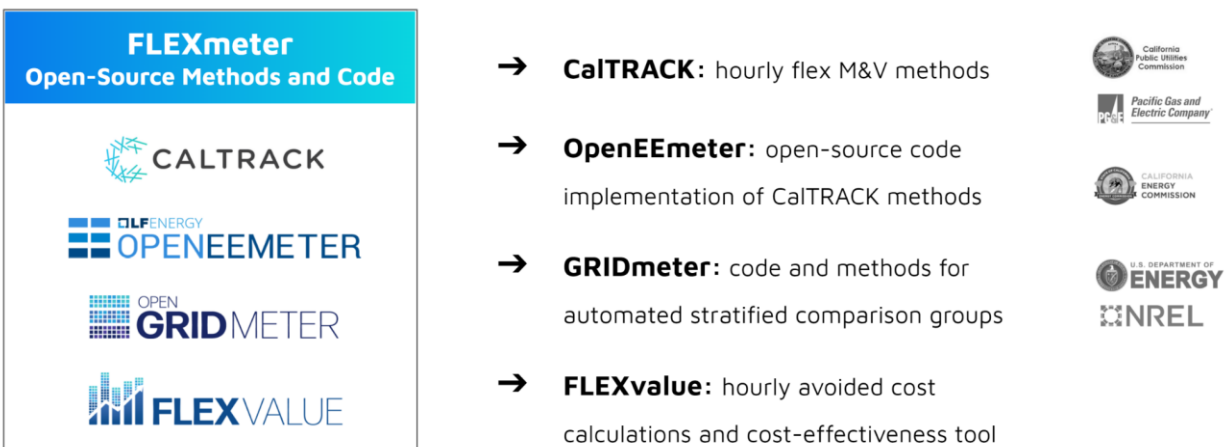


Figure 2: FLEXmeter Methods and Codebase

The CalTRACK methods are based on industry guidelines established by The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE Guideline 14)²³ and the Uniform Methods Project (Chapter 8 - Whole Building Methods)²⁴ and meet all International Performance Measurement and Verification Protocol (IPMVP Option C²⁵) requirements. These methods are an appropriate match for this program given it is targeting a range of residential buildings and combination of interventions. Hourly methods have demonstrated appropriate fit based on historic applications and technical review, and discrete project baseline fit review. Additionally, tests conducted by the Efficiency Valuation Organization (EVO) demonstrate that the OpenEEmeter 2.6.0 CalTRACK hourly methods, performs on par with the LBNL Time of Week Temperature (TOWT) model, and comparably with all other models tested, including more complex machine learning models that are based on decision trees and genetic programming.²⁶

²³ ASHRAE Guideline 14-2014 –Published guideline. Supersedes ASHRAE Guideline 14-2002. Measurement of Energy, Demand and Water Savings <https://www.ashrae.org/technical-resources/standards-and-guidelines/titles-purposes-and-scopes>

²⁴ *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*, National Renewable Energy Laboratory, <https://www.energy.gov/eere/about-us/ump-protocols>

²⁵ International Performance Measurement & Verification Protocol: Concepts and Options for Determining Energy and Water Savings, Volume I, Revised March 2002 DOE/GO-102002-1554, International Performance Measurement & Verification Protocol Committee <https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp>

²⁶ EVO's testing portal <<http://mvportal.evo-world.org/>> allows users to compare Advanced M&V implementations and methods against each other using a single standardized dataset comprised of one year of hourly electricity data and outdoor temperature from 367 buildings from different regions in North America.

Payable savings will be adjusted for free ridership using the approved deemed net to gross ratio of 0.85 for Residential Single-Family NMEC and 0.55 for Residential Multi-Family NMEC. Payable savings will also be adjusted via a comparison group adhering to the protocols and recommendations described in the report *Comparison Groups for the COVID Era and Beyond*.²⁷ The GRIDmeter methods were developed in partnership with the United States Department of Energy and in consultation with a working group of industry experts. Comparison groups are described further below.

The CPUC has specified criteria for “Tools, Methods, Analytical Approaches, and Calculation Software” in the NMEC 2.0 rulebook. FLEXmeter compliance with each of the criteria is provided in Attachment A in table format.

Claimable Savings

Residential Efficiency Market claimable savings will be based on the payable savings (calculated with CalTRACK and the OpenEEmeter), including adjustment for free ridership using the approved deemed net to gross ratio of 0.85 for Single-Family Residential NMEC and 0.55 for Multi-Family Residential NMEC. The October 12, 2019 DEER Resolution allows for alternative approaches for net adjustment, but for this program the traditional application of the net to gross ratio will be combined with the comparison group adjustment to gross savings impacts.²⁸

Other fields required for claimed savings include the estimated useful life (EUL), load shape, and costs. These parameters of claimed savings will be handled in accordance with CPUC reporting requirements. Aggregator portfolios of reasonably consistent measures will utilize an EUL matching the primary measure or technology installed in accordance with the requirement outlined in in accordance with the requirement outlined in the “Effective Useful Life” section. Savings will be claimed using the actual measured load shape. Actual project costs, including participant contributions and information on the key value drivers, will be collected during program implementation to support savings claims to the CPUC. However, given that cost-effectiveness is waived for Market Access programs per D.21-12-011²⁹, participant contributions and cost-effectiveness calculations will be informational only.

B. Calculation of Gross and Net Savings

Gross Savings

The basic calculation process for gross savings is conducted in four parts using the FLEXmeter calculation methods after data collection and sufficiency checks (see Data Plan section D. for more detail). The first is

²⁷ Report available at: https://gridmeter.recurve.com/uploads/8/6/5/0/8650231/doe_sampling_v2.pdf

²⁸ Resolution E-4952. Approval of the Database for Energy-Efficient Resources updates for 2020 and revised version 2019 in Compliance with D.15-10-028, D.16-08-019, and Resolution E-4818. See p. A-45 for table of NMEC NTG ratios. <http://docs.cpuc.ca.gov/publisheddocs/published/g000/m232/k459/232459122.pdf>

²⁹ Cost-effectiveness requirements were waived for program years 2022 and 2023. See D.21-12-011 OP 7 at 55.

establishing the baseline calculation or model fit (see CalTRACK Section 3(b): Modeling - Hourly Methods). The second is normalization of weather and occupancy (section 3.8 and 3.9). The third is computing the results of the avoided energy use (sections 3.10-3.12) and the fourth is the formation of comparison groups and adjustment to savings via the difference of differences calculation (Chapters 3 and 4 of *Comparison Groups for the COVID Era and Beyond*).

Baseline Calculation

The CalTRACK Hourly model draws from 365 days of pre-intervention data in order to deliver a fully specified baseline model for a weather-normalized savings calculation. Customer AMI data for a full year prior to program enrollment, customer location (address or latitude/longitude coordinates), initial project intervention date, and blackout period that encompasses the duration of project installation are minimal requirements to fully specify the CalTRACK model and assess savings. Aggregators will report project installation and completion dates in addition to various project metadata, which will enable Recurve to assign baseline, blackout, and reporting periods and to create project cohorts that can be tracked separately.

Normalization for Weather and Other Factors

The CalTRACK Hourly methods normalize for weather and occupancy, as described in detail in section 3.8 and 3.9 of CalTRACK technical documentation.

For occupancy, the sensitivity of building energy use to temperature may vary depending on the “occupancy” status. This is handled by segmenting the hours-of-week into periods of high load and low load (also referred to as occupied/unoccupied, although the states may not necessarily correspond to specific occupancy changes). The segmentation is accomplished using the residuals of a linear HDD-CDD model fit at an earlier stage.

For weather normalization, for each data point (hour) in the baseline dataset, the outdoor dry bulb air temperature is used to calculate up to 7 temperature bins (<30, 30-45, 45-55, 55-65, 65-75, 75-90, >90). These bin endpoints are validated for each model by counting the number of hours with temperatures within these bins. Bins with fewer than 20 hours are combined with the next closest bin by dropping the larger bin endpoint, except for the largest bin, where the lower endpoint is dropped. The N valid bin endpoints are then used to develop the binned temperature features.

These methods have been tested and demonstrate that they yield appropriate model fit for most building types in California (as measured by the coefficient of variation of the root-mean-squared error, CVRMSE).

Adjusted Gross and Net Savings

For the Residential Efficiency Market, the site-specific gross savings will be adjusted to quantify the relative grid impacts of the program interventions using a comparison group and adjusted for free ridership using a fixed net to gross value. For sites participating in Peak FLEXmarket demand response events, adjustments may be made in accordance with the “Demand Response Disaggregation” section.

More detail can be found in the demand response disaggregation section. All adjustments will be reflected in the payable savings to aggregators and in the claimable savings to the CPUC.

Comparison groups will be maintained for gross savings adjustments. The same savings calculation as described in the "gross savings" section including method and software will be applied to understand participant and comparison group changes in energy consumption. The calculated incremental impact of the program over the non-participant population will adjust both payable and claimable savings for the portfolio. The adjusted gross savings³⁰ will be the difference of differences, calculated on a percentage basis and then applied to the treatment group counterfactual.

Comparison groups used in meter-based programs have the unique challenge of needing to quantify impacts in the midst of implementation as well as address dissimilar responses to exogenous factors, unpredictable exogenous events, and limited data for assigning buildings to cohorts. As such, the comparison group selection process in meter-based programs needs to utilize a more standardized and consistent methodology than what might be found in traditional impact evaluations.

The methodological approach that will be used for establishing comparison groups in the Residential Efficiency Market was developed in an intensive, collaborative research project led by Recurve and funded by DOE in the summer of 2020. More detail on the research informing this method is described in a comprehensive working group report funded by the Department of Energy and peer-reviewed by industry leaders.³¹ The comparison group analytic approach comports with best practices in the Department of Energy Uniform Methods Project on Estimating Net Savings³², and is an evolution of standardized approaches for developing matched comparison groups documented by the Energy Trust of Oregon.³³ This method has been expanded to Demand Response applications and is compliant with the FERC-approved tariff for comparison group settlement used by the California Independent System Operator.³⁴

Comparison Group Method Synopsis

Comparison group selection can be summarized as follows:

- 1. Identify program-eligible participants**

- a. The eligibility rules for this program are included in the program plans. These classifications will guide the classification of comparable customers.

³⁰ "adjusted gross" is, in this context, net of other activity on the grid, whereas the final "net" adjustment is considering free ridership alone.

³¹ *Comparison Groups for the COVID Era and Beyond*, Recurve, 2020

https://gridmeter.recurve.com/uploads/8/6/5/0/8650231/doe_sampling_v2.pdf

³² *Chapter 21: Estimating Net Savings – Common Practices* <https://www.nrel.gov/docs/fy17osti/68578.pdf>

³³ *Comparison Group Identification for Impact Evaluation*, OpenEE, for Energy Trust of Oregon, 10/2018

<https://www.energytrust.org/documents/open-ee-technical-report-comparison-group-identification-for-impact-evaluation/open-ee-technical-report-comparison-group-identification-methods-final-wsr/>

³⁴ See *Demand Response Advanced Measurement Methodology: Analysis of Open-Source Baseline and Comparison Group Methods to Enable CAISO Demand Response Resource Performance Evaluation*, CAISO -Recurve, 2021

<http://www.caiso.com/Documents/DemandResponseAdvancedMeasurementMethodology.pdf>

2. **Limit comparison pool to eligible non-participating customers that meet program requirements.**
 - a. Fit a CalTRACK 2.0 model on all eligible program participants prior to program launch. This model will uncover incomplete or missing data as well as erratic energy consumption patterns.
 - b. Remove customers with insufficient baseline data, defined in the CalTRACK methods to be < 328 days for the specification of annual baselines. For the measurement of demand response or seasonal savings shorter baseline periods may be utilized if needed.
 - c. Remove customers with CalTRACK Daily baseline CVRMSE values in excess of 1.0³⁵.
 - d. Remove any remaining customers failing to meet program eligibility criteria
3. **Selection of Comparison Group from within Sample of Sub-Population**
 - a. Segment treatment customers by climate zone, solar status, and sector. For the measurement of efficiency savings in the commercial sector also segment customers by business type using NAICS Group mapping as was done in the GRIDmeter report as applicable.
 - b. For a comparison pool meter to be sampled into the comparison group for a specific categorical segment of the treatment group, the customer must share all criteria listed in 3.a.
 - c. With categorical segmentation completed, conduct individual meter selection on the basis of Euclidean distance (least sum of squares) matching with each treatment meter on the basis of seasonal hour-of-week baseline modeled consumption as described in Chapter 3 of the GRIDmeter report. For shorter-term baselines such as those used to gauge demand response impacts, the Euclidean distance matching may be performed on a single (non-seasonal) modeled hour-of-week basis as described in the CAISO report³⁶. For non-residential programs that serve a small number of customers or serve very large customers, the stratified sampling methods also described in chapter 3 of the GRIDmeter report may be more appropriate and thus utilized as applicable.
4. **Creation of Comparison Group Vintages and Difference of Differences**
 - a. Once a comparison group has been created, the baseline period of the comparison group must be aligned temporally with the baseline period of the participating customers.

³⁵ Given the focus on peak savings that can only be measured with an hourly model, there may be a recommendation to incorporate an hourly CVRMSE threshold.

³⁶ See *Demand Response Advanced Measurement Methodology: Analysis of Open-Source Baseline and Comparison Group Methods to Enable CAISO Demand Response Resource Performance Evaluation*, CAISO -Recurve, 2021 <http://www.caiso.com/Documents/DemandResponseAdvancedMeasurementMethodology.pdf>

- b. Where programs enroll customers over a period of time longer than 30 days, the comparison group savings calculation must be rebaselined for each month of enrollment and a new vintage created that is assigned to a monthly cohort of enrolled participants.
- c. For each monthly cohort of participants, calculate a difference of differences of percentage savings between the treated customers and the associated vintage of the comparison group.
- d. The fractional difference of differences is then multiplied by the treatment group counterfactual on an aggregated basis for each segment established in 3a. More detail is provided in Chapter 4 of the GRIDmeter³⁷ report on conducting the difference of differences savings calculations as well as in the CAISO report.

For payable and claimable net savings, Recurve will apply 0.85 default net to gross ratio for Single-Family Residential NMEC programs and 0.55 for Multi-Family NMEC programs as specified in the October 12, 2019 DEER Resolution³⁸ to account for free ridership.

Participation in Both the Residential Efficiency Market and Peak FLEXmarket

Participants in the Residential Efficiency Market are eligible to participate in the “Event Only” pathway of the Peak FLEXmarket program. They are not eligible to participate in the “full participation” pathway under the Peak FLEXmarket program. Upon enrollment, the aggregator must specify if the site is participating in Peak FLEXmarket demand response events. For all sites participating in MCE EE Marketplaces, the “Demand Response Disaggregation” section below applies.

Demand Response Disaggregation

In order to increase speed to market, disaggregation of Energy Efficiency (Residential Efficiency Market program) impacts from Demand Response event day impacts will utilize a phased approach as the MCE Residential, Commercial and Peak FLEXmarket programs scales up. Phase I will be the initial method for handling simultaneous participation in program year 2022, with Phase II being utilized in program year 2023 (or earlier if possible). Aggregators will be notified when the Residential Efficiency Market program moves from Phase I to Phase II.

Phase I: Load changes occurring during Peak FLEXmarket DR event days will be blacked out from M&V of MCE’s EE Marketplace programs. Savings and value recorded from event participation will be measured and compensated through Peak FLEXmarket. No compensation will be paid under the Efficiency Market programs for these event days.

³⁷ *Comparison Groups for the COVID Era and Beyond*, Recurve, 2020
https://gridmeter.recurve.com/uploads/8/6/5/0/8650231/doe_sampling_v2.pdf

³⁸ Resolution E-4952. Approval of the Database for Energy-Efficient Resources updates for 2020 and revised version 2019 in Compliance with D.15-10-028, D.16-08-019, and Resolution E-4818. See p. A-45 for table of NMEC NTG ratios. <http://docs.cpuc.ca.gov/publisheddocs/published/g000/m232/k459/232459122.pdf>

Phase II: During Peak FLEXmarket’s DR event days, DR impacts (achieved under the Peak FLEXmarket) will be disaggregated from EE impacts (achieved under one of the Efficiency Market programs) via one of the following methods, dependent on factors such as the efficiency intervention date. In both scenarios, Recurve will develop comparison group selection, meter-level “EE” baselines, and adjusted counterfactuals in the same way as would be done for energy efficiency-only projects:

1. Average hourly peak efficiency savings are determined for non-event hours. This average savings value is then assigned as the energy efficiency savings component of event hours. The additional difference between the EE counterfactual and the event period observed hourly usage is taken as the DR load reduction.
2. Recurve will develop comparison group selection, meter level “EE” baselines, and adjusted counterfactuals in the same way as would be done for energy efficiency-only projects. A separate DR counterfactual is generated via the [FLEXmeter](#) methods (using the 45-day pre-event and 15-day post-event data with blacked out event days). In this approach, hourly efficiency savings are determined as the difference between the EE counterfactual and the DR counterfactual. The load reduction assigned to the DR intervention is then the difference between the DR counterfactual and observed usage. The disaggregation method selected will be based on factors such as energy efficiency intervention start dates relative to demand response event periods and the timeline for supporting software development.

The figure below provides a schematic to delineate the components of a combined EE/DR saving calculation.

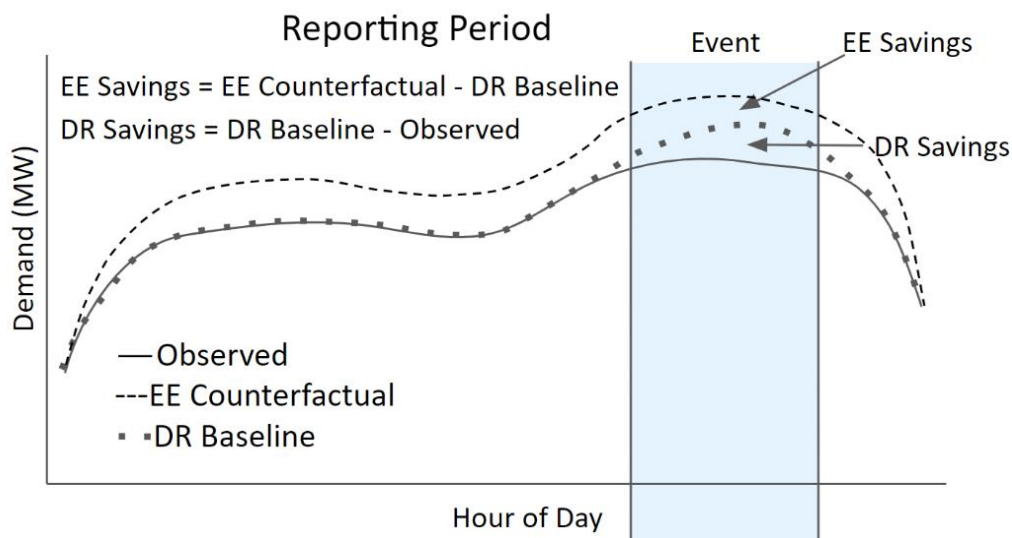


Figure 3: Disaggregating EE and DR impacts

Should additional Program Administrators be able to reliably provide consistent event participation data regarding their demand response programs, further disaggregation would become possible.

Outlier Site & Non-Routine Event Identification

This section of the M&V plan augments generic qualification criteria for participants with specific considerations regarding project eligibility criteria, screening, and handling of non-routine events to ensure that the savings from the program are reflective of the impacts of the program intervention.³⁹ The process includes pre-screening, event detection, and handling adjustments as described in the sections below. The following diagram illustrates the 4 step process:

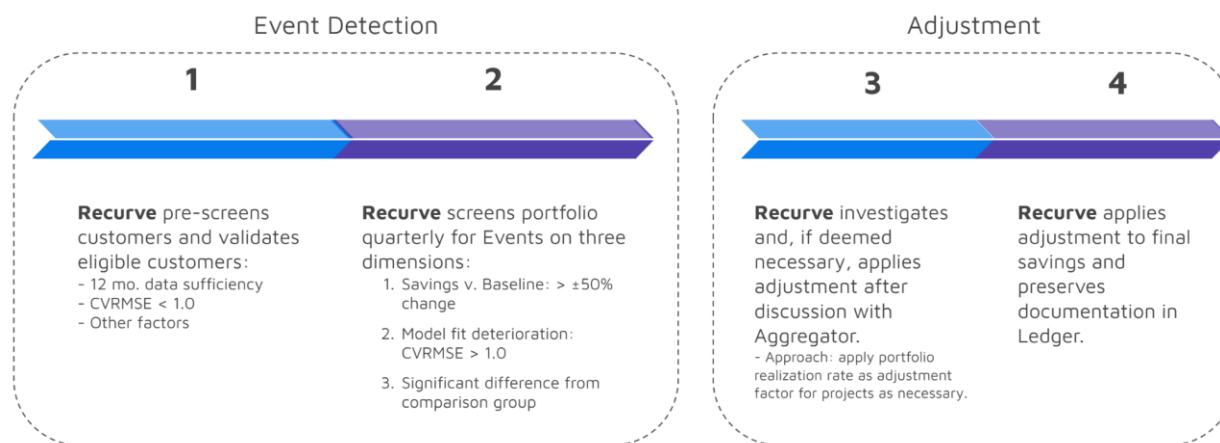


Figure 4: Eligibility Criteria and Screening

Eligibility Criteria and Screening

STEP 1. As described above, Recurve will utilize CalTRACK modeling to pre-screen the population to identify qualifying customers that have data sufficiency and baseline model fit, which will ensure savings are measurable in the performance period. Customers who experience a baseline non-routine event or erratic energy consumption that exceeds the prescribed threshold during the baseline period may be excluded from the program. Some scenarios in which they may remain include:

- (i) the impacted metered consumption can be excluded from the analysis without violating minimum data sufficiency standards.
- (ii) the NRE can be adequately controlled by comparing customer energy consumption to a matched nonparticipant comparison group. Aggregators will be able to check potential projects against this pre-screened list.
- (iii) the NRE is determined to not materially impact the project and portfolio savings.

In the process of customer acquisition, aggregators will verify with customers that they do not plan to install major new load additions or subtractions, solar PV, or EV charging in the reporting year (post-program implementation). In addition, aggregators will work with Recurve and MCE to ensure that

³⁹ This approach is preliminary and any adjustment to it will be made in consultation with the Market Sponsor (Program Administrator)

customers are not participating in another energy efficiency program, have not installed an EV charging system, or solar PV or battery storage within the baseline year. Aggregators will also identify if customers are participating in an MCE demand response program in order to comply with conditions specified in the “Participation in Both the Residential Efficiency Market and Peak FLEXmarket” section. MCE will be responsible for providing past energy efficiency program participation data to ensure accurate monthly program forecasting and reporting, per reporting requirements in D.21-12-011⁴⁰, if data is not provided in a timely fashion and sites are enrolled that have participated within the previous year, project reservations, tracking, and payments to aggregators will be maintained.

Non-Routine Events and Treatment

STEP 2. Once projects have been initiated, Recurve shall regularly conduct screening of all projects in the aggregators’ portfolios for possible non-routine events in three dimensions:

- **Savings relative to comparison group-adjusted counterfactual consumption:** Recalculate savings as a percentage of comparison group-adjusted counterfactual consumption for all participating projects on a quarterly basis. Flag any projects with savings exceeding ± 50 percent annual savings.
- **Deterioration in normalization model goodness of fit:** Fit CalTRACK model to the Year 1 post-retrofit consumption data and recalculate CVRMSE at the end of Year 1, prior to a savings claim. If the Year 1 model has a CVRMSE of greater than 1.0, then the Project will be flagged as a non-routine event.
- **Significant difference from comparison group:** If a treatment site does not have a sufficient comparison group to adjust for exogenous impacts, the Project will be flagged as a non-routine event.

STEP 3 & 4. If it has been determined that metered savings results are invalid, for instance due to the project being flagged as a savings outlier, insufficient reporting period data, or poor (CVRMSE > 1) reporting period CalTRACK daily model fit, the project savings will be estimated using a consistent adjustment applied uniformly to all disqualified projects. Assigned savings values will be based on the average savings or realization rate for the other qualified projects in the aggregators’ portfolio.⁴¹ Payments for the project will not be made until the aggregator has a portfolio of projects that have finished the 12-month measurement period and a realization rate has been established.

$$\text{Estimated Savings} = \text{Realization Rate} * \text{Predicted Annual Project Savings}$$

Where:

Estimated Savings = Annual non-routine-adjusted savings to calculate performance payments

⁴⁰ See D.21-12-011 at p.58

⁴¹ If an entire aggregator's portfolio is subject to an NRE, the aggregator’s portfolio will receive the program’s realization rate and the aggregator's participation will be reviewed.

Realization Rate = Aggregators total portfolio actual savings divided by total predicted portfolio savings;

$$\sum S / \sum P$$

Where:

S = Actual annual project savings in kWh or therms as calculated in Recurve platform

P = Predicted annual project savings in kWh or therms as reported by the Aggregator during Project submission to Recurve, aligned with the load shape forecasted for the purposes of determining project value.

This standard approach for the identification and treatment of non-routine events will be included as part of an aggregator's contract with Recurve. Systematic and predictable treatment of non-routine events tied to overall portfolio performance to manage risk comports with the Population-NMEC expectation of consistent calculations and treatment of projects across the portfolio. Any custom calculations for non-routine adjustments will be reviewed and approved in collaboration with the market sponsor for this program.

C. Hourly Load Shape and Peak Impact Calculations

CalTRACK V.2.0 hourly methods quantify savings for each hour in the reporting period. The GRIDmeter methods adjust these results for exogenous factors also at an hourly level. The hourly tracking of savings enables valuation of savings and marginal greenhouse gas (GHG) impacts.^{42,43} For gas savings, if applicable, the CalTRACK V.2.0 Daily methods will be used and comparison adjustments and non-routine event tracking and adjustments will be made as described above.⁴⁴

At this time, actual load shape impacts cannot be reported to the CPUC via CEDARS - Cost-Effectiveness Tool.⁴⁵ Deemed load shapes or proportional deemed load shapes are used to mirror the impacts of meter-based programs. For the Residential Market, actual load shapes will be submitted through FLEXvalue. If actual load shapes are not accepted, a proportional multi-deemed load shape that is the closest reflection of the actual load shape achieved by the program may be used.

In D.21-12-011, the Commission specifically defined peak and net peak impacts as 4:00 p.m. - 9:00 p.m. and 7:00 p.m. to 9:00 p.m. respectively from June 1 to September 30. As such peak impacts will be reported for those time periods utilizing hourly performance data. The traditional energy efficiency

⁴² A careful study of the CPUC's 2019 Avoided Cost Calculator reveals that over-generation and renewables curtailment is forecast for 25% of all hours in 2025 with the majority of these hours occurring during mid-day time periods and mild shoulder months.

⁴³ Golden, M., A. Scheer and C. Best. 2019. "Decarbonization of Electricity Requires Market-Based Demand Flexibility". The Electricity Journal. Vol 32. Issue 7 (August-September).

⁴⁴ Gas data is generally available but hourly gas data is only available in part of the state.

⁴⁵ Recurve is hopeful functionality to submit actual load shapes will be available by the time savings can be reported for this program.

program definition which estimates the peak impacts achieved by the program during the peak periods defined in the October 11, 2019, DEER Resolution⁴⁶ will not be used.

D. Data Collection

Data Security

Data security and customer privacy are paramount for effective, trustworthy customer programs. Recurve has implemented rigorous data security procedures and protocols at every step of data transfer, analysis, and reporting for handling AMI data and customer information. Recurve data tools and systems are built on modern industry standards and have undergone the auditing process to achieve SOC 2 compliance, which ensures best in class security and data management practices that meet the required “trust service principles” as defined by the AICPA. Security agreements with MCE and aggregators are available to the CPUC upon request.

Data Collection

The availability and quality of hourly consumption data for proper baselines is fundamental to identifying and qualifying NMEC program participants. CalTRACK details necessary data and sufficiency requirements for the establishment of appropriate baselines in [Section 2. Data Management](#).

Aggregators will collect the site and meter information required for proper weather station matching project start and end dates needed for identification of baseline, blackout, and reporting periods to meet the CalTRACK with the specification. Aggregators will collect relevant project and site metadata as specified in the aggregator’s Flexibility Purchase Agreement. These data will include participant, location, meter id, date of installation, technology installed, and project costs. Any or all of these data will be utilized for more granular cohort (program subgroup) tracking and management and could be used to facilitate future EM&V studies.

For developing a comparison group, a sample of non-participant customers will be identified to perform accurate matching and comprise a reliable comparison group from non-participant data.

If sites are also participating in a demand response program, event data must be provided as outlined in the “Participation in Both the Residential Efficiency Market and Peak FLEXmarket” section.

Data must be delivered in a clean readable format. Any duplicated data will be thrown out. Any overlaps in meter datasets will resolve to the dataset with the largest time period.

E. Monitoring and Documentation QA/QC Over Reporting Period

The CalTRACK modeling process specifies quality assurance and quality control procedures. Recurve will maintain quality data management and monitoring throughout the program life to ensure the reporting

⁴⁶ <http://docs.cpuc.ca.gov/publisheddocs/published/g000/m232/k459/232459122.pdf>

period results generate an accurate representation of the savings impacts. As part of this M&V plan, Recurve will provide a fully auditable and verifiable record to track each meter that is modeled and its fate over the course of the program.

F. M&V Related Plans for Project Types, Design, Payments, Measures and Cost Effectiveness

Permissible Project Types

As noted in the implementation plan, the Residential Market may consist of several aggregators targeting a range of measures. For any given aggregator, participating customers are reasonably expected to have similar types of equipment and drivers in energy consumption. During the aggregator qualification process, Recurve will ensure that factors that impact consumption and energy savings will be relatively similar across the population.

In addition, the Residential Market will leverage insights from multiple recent studies^{47,48,49,50} which have shown that recruiting customers based on insights from AMI data analytics can effectively identify stranded potential and substantially enhance the metered savings and cost-effectiveness of energy efficiency programs. These analyses will be conducted by Recurve in partnership with qualified aggregators to find populations that may have similar characteristics of usage prior to intervention and that will be predictive of impacts of the intervention.

Program Design Criteria and Fractional Savings Uncertainty (FSU)

Program Design Criteria

The Residential Market has been designed to meet the CPUC criteria for population-level NMEC programs. Recurve is currently forecasting over 5,000 projects in MCE's service area that encompass lighting, HVAC, water heating, building envelope, controls, and refrigeration. The program will be measuring FSU for this program portfolio, and based on past program experience with this number of projects and savings depth, the program does not foresee any issue in remaining below the 25% guideline for Population NMEC.

⁴⁷ *Customer Targeting for Residential Energy Efficiency Programs: Enhancing Electricity Savings at the Meter*, A.M. Scheer, S. Borgeson, K. Rosendo, 2017

⁴⁸ *Energy Efficiency Program Targeting: Using AMI Data Analysis to Improve At-the-Meter Savings for Small and Medium Businesses*, S. Borgeson, A.M. Scheer, R. Kasman et. al. 2018

⁴⁹ *Customer Targeting via Usage Data Analytics to Enhance Metered Savings*, 2018 ACEEE Summer Study, A.M. Scheer, S. Borgeson, R. Kasman et al.

⁵⁰ PG&E's Energy Efficiency Business Plan 2018 – 2025, Residential Appendix D

Fractional Savings Uncertainty

Calculation of FSU used in this plan complies with industry best practice and specifically reflects Section 4.3 of the CalTRACK methods. The two key metrics for uncertainty are the Coefficient of Variation of the Root Mean Square Error (CVRMSE) and Fractional Savings Uncertainty (FSU). The FSU depends on a number of interactive factors, several of which have non-linear dependencies. In general, driving deeper savings, recruiting customers with good model fit, and serving a large number of customers will improve FSU at a given confidence interval. FSU at an individual site level is defined by the following equation:

$$FSU_i = \frac{\Delta U_{save,Qi}}{U_{save,Qi}} = \frac{t(aM^2 + bM + d)CV(RMSE) * \sqrt{\frac{P}{P'}(1 + \frac{2}{P'})\frac{1}{Q}}}{F}$$

where

t is the t-statistic and a, b, and d are empirical coefficients described further in the online CalTRACK documentation

M is the number of months in the reporting period

Q is the number of periods in the reporting period (days or billing periods for example)

F is the savings fraction defined as the savings divided by the counterfactual baseline usage

CVRMSE is the coefficient of variation of the root-mean-squared error and provides a measurement of the quality of model fit (lower CVRMSE equates to better model fit) and is defined as follows:

$$CV(RMSE) = \frac{\sqrt{\frac{\sum_{p=1}^P (U_p - \hat{U}_p)^2}{P-c}}}{\bar{U}}$$

where

U_p is the total energy use during period P

\hat{U}_p is the predicted energy use during period p

\bar{U} is the mean energy use during the baseline period

P is the total number of periods

c is the number of explanatory variables in the model

Fractional savings uncertainty at an aggregated (portfolio) level is calculated via the following equation:

$$FSU_{portfolio} = \frac{\sqrt{\sum_{i=1}^N (\Delta U_{save, Qi})^2}}{\sum_{i=1}^N U_{save, Qi}}$$

For the Residential Market, the CalTRACK methods described above were applied to a sample of buildings similar to those that are likely to be targeted as part of the program. Assumptions about the forecasted average savings and savings depth as a percentage of the baseline were derived from past project experience and combinations of DEER technology savings and load shapes (lighting, HVAC, water heating, building envelope, controls, and refrigeration) that will be deployed as part of the program. Recurve has estimated the rough number of projects needed to capture savings under projected budgets; and discrete business plans from Aggregators will further refine these estimates.

The CalTRACK methods model each site individually before aggregating to the portfolio level with savings uncertainty reported as a first-class output. Savings uncertainty, as opposed to savings depth, is the ultimate parameter of concern (e.g. savings of 4+/-1% may be acceptable, but savings of 10+/-3% may be unacceptable). Aggregating results to a portfolio mitigates issues related to model noise and increases confidence in savings estimates. An extensive discussion of model uncertainty is included in CalTRACK documentation and was leveraged for this analysis.⁵¹

Based on assumptions, if the Residential Market is able to achieve the forecasted installations of the planned technologies, and achieve the forecasted average savings, FSU will fall well within the bounds of the CPUC requirements. Recurve expects to achieve the CPUC's stated desired FSU of +/- 25% at the 90% confidence level by recruiting a sufficient number of projects, supporting aggregators in recruiting customers with a reasonable CVRMSE (generally less than 0.75), monitoring savings for a sufficient number of days (FSU will be calculated with the CalTRACK daily model), and delivering a reasonable savings depth measured from existing conditions baseline.

Payments and Incentives

Aggregators will be eligible for an incentive payment depending on the performance of their portfolio. There are no predetermined customer payments or rebates set by the program- customer rebates are determined by participating aggregators, and are expected to be variable depending on business models, cost of service etc. Aggregators will be required to report any incentive payments passed on to the customer. This payment structure is designed to incentivize maximum performance around net benefits, as well as peak and net-peak impacts. The incentive payment is designed to pay directly on the value of delivered metered net savings.

In calculating the net benefits (i.e., avoided costs), Recurve will take the full measured 8,760 electric savings resource curve and multiply it by the adjusted hourly avoided cost profile of the CPUC's Electric

⁵¹ See CalTRACK issue: <https://github.com/energy-market-methods/caltrack/issues/71>.

Avoided Cost Calculator for the duration of the Effective Useful Life of the measure. For this program, the hourly avoided cost profile will be adjusted as described below to provide a more consistent price signal while incentivizing peak impacts.

Although the avoided cost curve is restructured, the “total 8760 value” of the cost curve remains completely constant throughout the process. Hence, the purpose of the adjustments is to shift value into peak periods while reducing value in off-peak periods, to operationalize direction in D.21-12-011 to “encourage net peak demand reductions” and “apply a “kicker” for peak and net peak times from June 1 through September 30 in 2022 and 2023.”⁵² This will be accomplished through the following two-step process.

1. Smooth avoided cost values for generation capacity, transmission, and distribution values as follows:
 - a. Evenly distribute the average peak values across peak hours (4-7 PM)
 - b. Evenly distribute the average net peak values across net peak hours (7-9 PM)
 - c. Evenly distribute the average off-peak values across the off-peak hours.
2. Apply a kicker as follows for June-September in ACC years 2022/2023:
 - a. Peak hours of 4-7 PM: \$150 kicker/MWh
 - b. Net Peak hours of 7-9 PM: \$500 kicker/MWh
 - c. Reduce the value of all off-peak hours by a proportionate amount for each year in the ACC to maintain a constant “total 8760 value.”

The purpose of step 1 is to account for sporadic capacity peaks distributed throughout the original avoided cost curve. As illustrated in the figure below, the majority of capacity value is concentrated in a small number of days throughout the year. While this may be logical to facilitate simulations, it creates enormous risk to aggregators and creates the potential for gaming. Since actual critical peak demand days are unknown ahead of time, the programmatic approach is to take the peak and net peak capacity value and distribute it evenly across peak and net peak hours. This provides a more consistent price curve and value signal for program participants to plan around while staying anchored within the original avoided cost curve.

⁵² See D.21-12-011 at p 29.

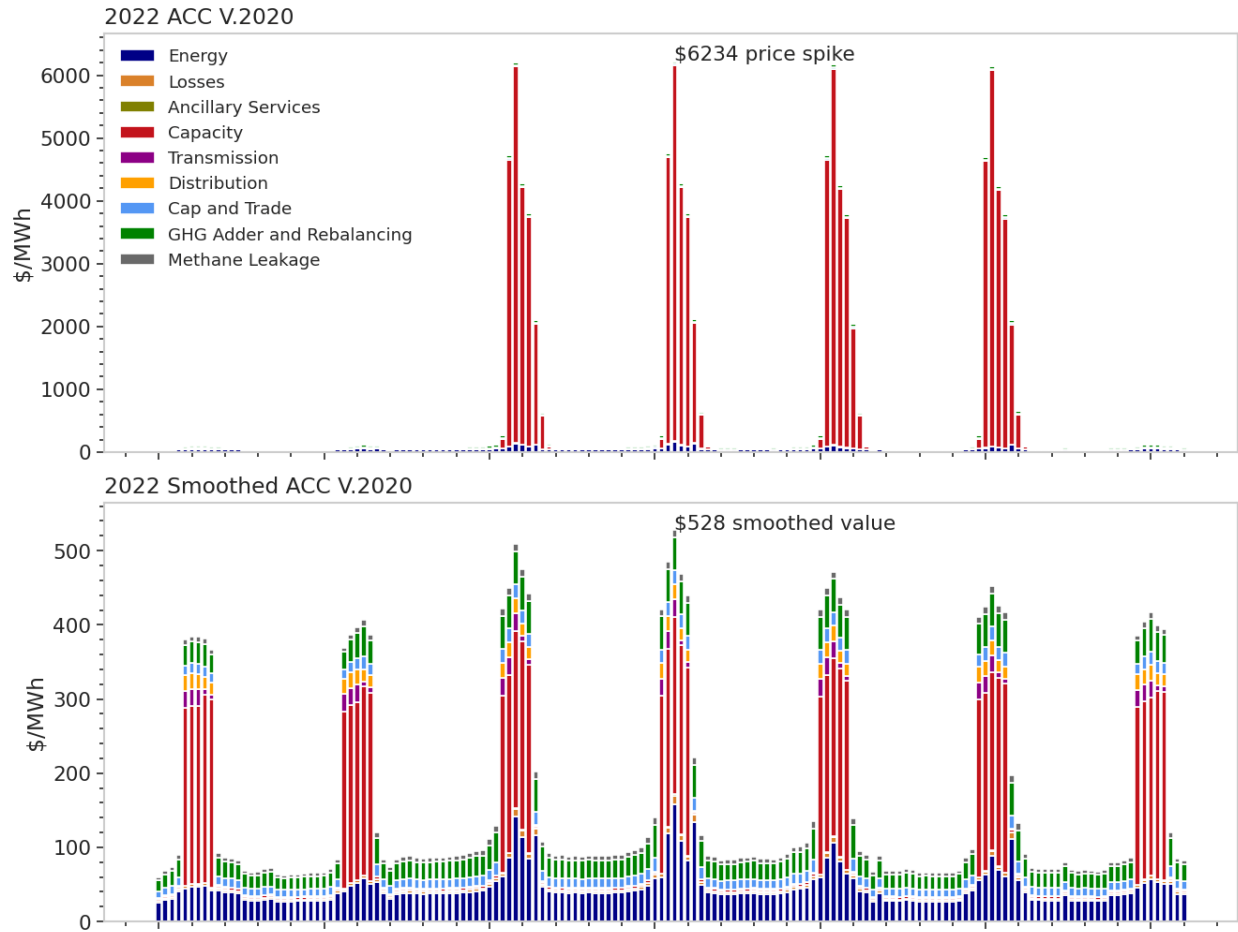


Figure 5: Step 1 - Smoothing Capacity Value

Step 2 further incentivizes peak impacts by adding an hourly kicker (\$150/MWh and \$500/MWh for 4-7 PM and 7-9 PM, respectively). This structure ensures that program priorities are clearly communicated to aggregators via value signaling. Net peak and peak impacts are the clear priorities for this program and are valued accordingly. In order to ensure that the “total 8760 value” of the avoided cost curve remains consistent, the off-peak hours throughout 2022/23 are reduced proportionately to account for the kicker values, resulting in a decrease in off-peak value for 2022/23 in the ACC. Based on scenario analysis, MCE has chosen these hourly kicker values because it provides enough value to peak hours to encourage short-term load shifting/shedding and long-term peak efficiency impacts while limiting the off-peak value reduction that is critical for long term efficiency measures.

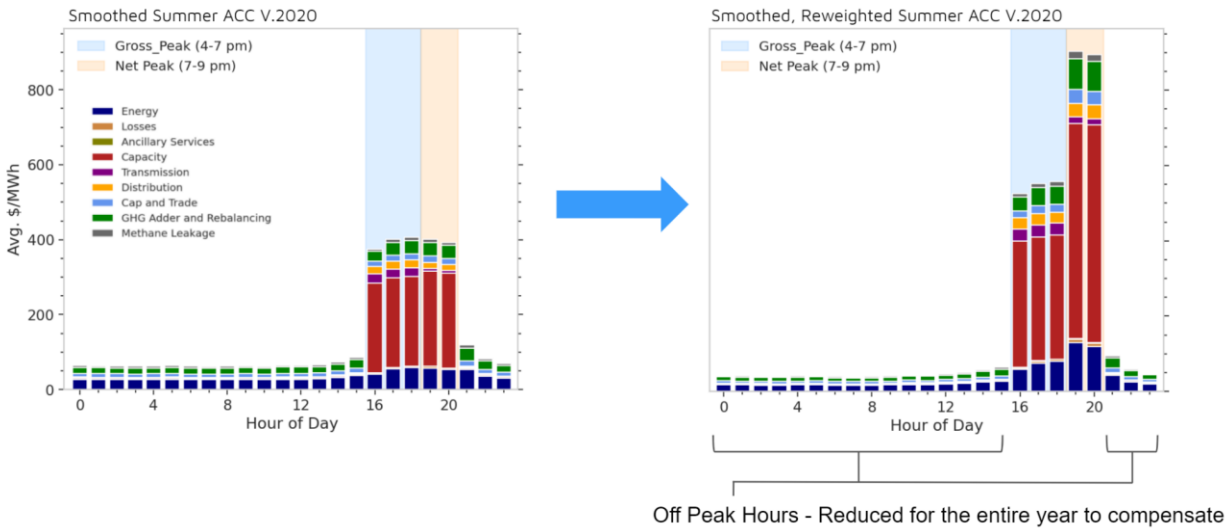


Figure 6: Step 2 - Applying Kicker and Reducing Off-Peak Value (2022 Example Year)

Throughout this two-step process, the “total 8760 value” of the avoided cost curve is kept completely consistent, while distributing value to peak and net peak hours to incentivize the impacts needed for summer reliability. As such, it helps limit payments to the total system benefit as prescribed by the Commission in D.21-12-011⁵³.

Gas benefits will only be compensated for as a by-product of an electric primary measure. Any gas benefits will be paid based on the lifetime therm savings based on the measured annual savings, effective useful life, and the forecasted value per therm. The forecasted therms value is derived from the CPUC’s Gas Avoided Cost Calculator.

MCE payments for this population-level program will be made based on payable savings determinations using NMEC methods described in the gross and net sections of this plan. Payments for the program will be made quarterly during the 12-month measurement period for active projects in the aggregator portfolio. The quarterly measurement periods are fixed before program start, and aggregators will be paid based on portfolio savings for active projects during the measurement period.

The incentive payment is based on the total program value (adjusted avoided cost benefits as described above) net of program management costs. Marketplace management costs include general and administrative (G&A) overhead, direct implementation non-incentive (DINI), M&V, and marketing, education and outreach. These management costs are forecasted at 25% of the total program budget. Aggregators will be paid for their portfolio value achieved based on metered savings from active projects achieved during the most recent measurement quarter. The Aggregator is not eligible for an incentive payment if the net benefits from their projects do not exceed the corresponding market management costs. Projects become “active for payment” after the value generated exceeds marketplace management costs for the project associated with the forecasted savings. Payments will be made at fixed quarterly

⁵³ D.21-12-011 at p. 53.

intervals established in the program manual and are based on each aggregator’s project portfolio that is “active for payment”. Payments will be made based on the latest data received at the time of measurement, and payment for missing time periods of data will move to the following payment cycle.

In addition, 10% of measured project value will be withheld each quarter to provide a safety factor in regard to seasonality and/or portfolio performance. As projects complete the full 12 month measurement period, aggregators will be compensated with a “true-up” payment in the following quarterly payment cycle that will release owed funds. A visualization of payment cadences is shown in the figure below.

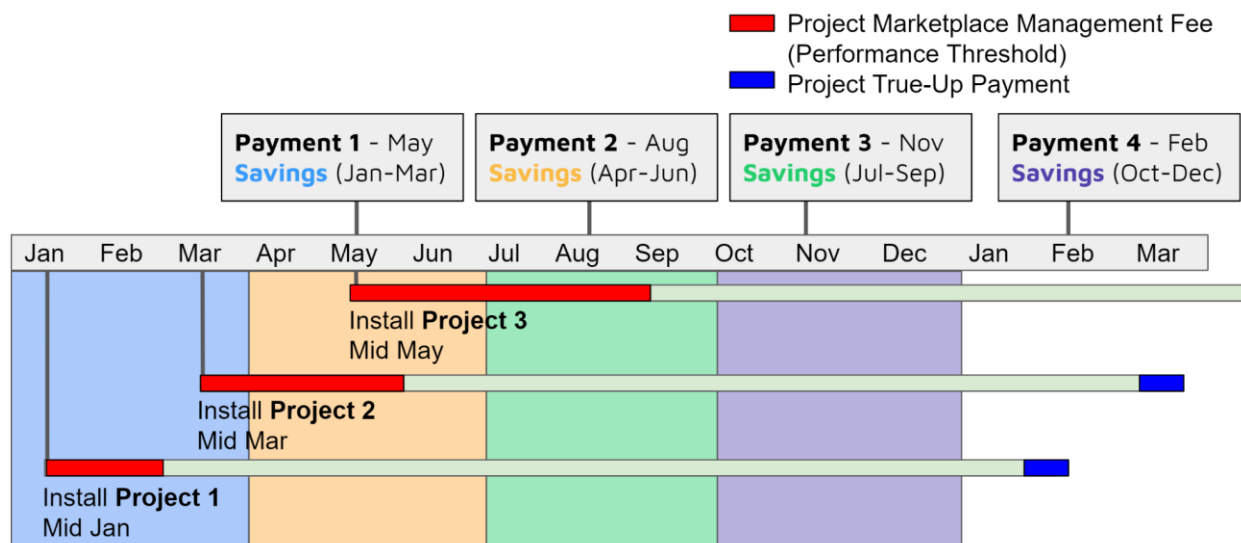


Figure 7: Aggregator Payments Based on Active Projects within the Measurement Period

If a project completes the measurement period with negative savings or has not generated enough program value to surpass associated marketplace management costs, the leftover marketplace management costs and/or negative program value generated will be released into the aggregator portfolio and accounted for in the next payment period.

Recurve will document in an electronic, revenue-grade, auditable ledger the recommended payments to support aggregator invoices to MCE after each quarterly measurement period. The electronic ledger will track all stages of an NMEC project in a program, including non-routine adjustments. Invoice payment recommendations will be based on CalTRACK payable savings results. Claimable results to the CPUC will be derived from the ledger for compliance with reporting requirements.

Payments for eligible projects involving solar in the baseline or reporting year will only be eligible for annual payment, further described in the eligibility section below.

Qualifying Measures

The Residential Market will promote a wide range of measures including, but is not limited to, the following interventions: lighting, HVAC, water heating, building envelope, refrigeration, and controls-

based technologies. The types of measures that are installed will be documented in the course of program deployment and be included in the metadata (see Data Collection section).

As aggregators will be recruited as part of this plan, the program will use deemed measures as a starting point for forecasting key cost-effectiveness parameters and qualifying measures anticipated to be the focus of the program. Projects with a primary anchor measure of controls or behavioral interventions with a 1-year EUL may be routed to the Peak FLEXmarket program unless otherwise supported with documentation such as work papers or eTRM data (see the “Effective Useful Life” section of the M&V plan for more detail). Solar PV and other electricity generation are not eligible for incentives from the Residential Market.

Cost Effectiveness

As directed in D.21-12-011 and the corresponding advice letter for this program, the required cost-effectiveness threshold will be temporarily waived for this program through the end of 2023⁵⁴. However, all program expenditures will be limited to measured and achieved Total Systems Benefits based on the adjusted hourly avoided cost curve.

G. Eligibility Criteria

See Section b. Calculation of Gross and Net Savings/Eligibility Criteria and Screening

Recurve will utilize CalTRACK modeling to qualify customers based on data sufficiency and baseline model fit in addition to other usage characteristics.⁵⁵

General eligibility requirements include but are not limited to:

- Residential customer (single-family, multifamily on a case-by-case basis);
- Project site must be located in MCE’s service area;⁵⁶
- Bundled (i.e., receiving electric generation service from the utility) or unbundled (i.e., receiving electric generation service from MCE) customer;
- Site is not currently participating, and has not participated in the past 12 months, in a CPUC ratepayer-funded energy efficiency program;
- 12 consecutive months of energy usage data is available;
- Model fit needs to be < 1.0 Coefficient of the Variation of the Root Mean Square Error (CVRMSE) and site must pass CalTRACK data sufficiency analysis (Recurve will conduct analysis at intake);
- If the customer has onsite solar system, installation of the system must have been completed at least 12 months prior to the EE intervention;

⁵⁴ Cost-effectiveness requirements were waived for program years 2022 and 2023. See D.21-12-011 OP 7 at 55.

⁵⁵ Project qualifications based on data sufficiency and model fit may only apply to the type of savings being measured (electric or gas).

⁵⁶ <https://www.mcecaneenergy.org/member-communities/>

- Projects must demonstrate an effective useful life (EUL) of longer than 1 year;⁵⁷ and
- Projects must be installed by no later than August 1, 2023.

Aggregators will verify with customers that they do not plan to install major new load additions or subtractions, solar PV, or EV charging in the reporting year (post program implementation). In addition, Recurve will assess if a site has participated in another energy efficiency program, installed an EV charging system, or installed solar PV or battery storage within the baseline year. Past program participation data will be used as received to ensure that savings claims will not be duplicated for measures by cross-referencing known participants in other programs and not allowing them to participate. If data is not provided in a timely fashion and sites are enrolled that have participated within the previous year, project reservations, tracking, and payments to aggregators will be maintained. **Further, registration of projects with gas-only savings will not be permitted as this program is focused on maximizing electric summer peak reductions.**

Customer sites with existing solar installations within the baseline period are ineligible for participation in the Market due to solar generation's temperature independence. However, in this emergency, the Market will allow aggregators to enroll sites in the program at a future date to be announced with 30 days of notice to aggregators, and provided certain minimum criteria are met, including but not exclusive to:

1. Aggregator will take the risk of site eligibility until after the project is paid and the impacts analyzed.
2. Aggregator must provide submeter from the PV system for the baseline and reporting years in the format the Market specifies to assess impacts.
3. The Residential Market aggregator completes the onboarding process for submeter data submittal, demonstrating ability to provide the Residential Market program with submeter data required in the specified format. This must be completed before any sites with solar installations are enrolled.

Sites with PV generation will only be eligible for an annual payment within four months of final data receipt from both the meter data from MCE and the PV submeter data from the Aggregator in the specified format.

In addition, solar PV and other electricity generation are not eligible for incentives from the Residential Market. If a PV system or other generation capacity is installed/activated as part of an on-site intervention, the aggregator must adhere to the conditions listed above and must include a peak load reduction component, such as battery storage or efficiency upgrades.

Projects consisting solely of 1-year EUL controls or behavioral measures may be routed to the Peak FLEXmarket program and will not be enrolled into the Residential Market.

⁵⁷ Projects with an EUL of 1 year or less may be enrolled in MCE's Peak FLEXmarket program, which is designed specifically to incentivize NMEC-verified demand management solutions.

H. Effective Useful Life (EUL)

The Residential Efficiency Market includes, but is not limited to, the following interventions: lighting, HVAC, water heating, building envelope, refrigeration, and controls-based technologies. The measures listed in the following table will be utilized to assign EUL values to primary and secondary measures for each project as applicable. The EULs listed combined with the default DEER load shapes (based on past program claims) will be used to calculate the Forecasted Program Value for submitted interventions and for savings claims. The program is technology agnostic and a wide array of measures may be installed to meet the savings and demand impact targets. Primary and secondary anchor measures are identified and appropriate EULs will be applied as part of the final claimable savings calculations. This table is the list of EULs and savings load shapes that are used for primary and secondary anchor measures for this program. This table is based on best available research from eTRM measure packages and 2020 program claims. Default load shapes are used for forecasting purposes only. The tables below shall be referenced for all primary and secondary measure EULs. If the proposed primary or secondary measure does not conform into one of the categories listed, then a justification for another EUL or Load Shapes may be submitted to the program for review in the form of CPUC-approved work papers or eTRM data. All EULs will be reviewed and confirmed by Recurve during project enrollment.

Technology / Intervention	Sector	Effective Useful Life	Default DEER Load Shape for Forecasting
Lighting	Res	12	DEER:Res_Indoor_CFL_Ltg
HVAC Retrofit	Res	15	DEER:Res_HVAC_Eff_AC
Heat Pump Retrofit	Res	15	DEER:Res_HVAC_Eff_HP
HVAC Maintenance	Res	3	DEER:Res_HVAC_Eff_AC
Refrigeration	Res	12	DEER:Res_RefgFrzr_HighEff
Building Envelope	Res	20	DEER:Res_BldgShell_Ins
Pumps/Motors/Drives	Res	10	DEER:Res_RefgFrzr_HighEff
Smart Thermostat (New Install Only)	Res	9	DEER:Res_HVAC_Eff_AC
Heat Pump Water Heater	Res	10	DEER:Res_ClothesDishWasher
Controls or Behavior Based Interventions (Including Storage)	Res	Default is 1-year EUL unless otherwise supported through work papers or eTRM data and approved by market sponsor.	By default match the anchor measure load shape that controls are influencing.

In the case of an add-on equipment measure, the guidelines outlined in Resolution E-4818 will be followed. Retrofit add-on equipment measures will have an EUL that is “equal to the lower of the RUL of the modified system or equipment or the EUL of the add-on component.”⁵⁸ In such cases, the program will apply the ⅓ rule for the EUL of the parent system as described in the EE policy manual.⁵⁹ The program requires aggregators to attest if their measure is an add-on to an existing system and works to provide consistent messaging on which measures are likely to be considered add-ons: pipe insulation being an example measure type.

The list of add-on measures for this program (including but not limited to Table 9 of E-4952) is shown in the table below. Engineering reviews are required for any primary or secondary anchor measures in this add-on table to ensure that the proper EUL/RUL is applied to the measure.

Technology / Intervention	Sector	EUL	Host RUL	Default DEER Load Shape for Forecasting
(Add On) Floor Insulation	Res	20	10	DEER:Res_Indoor_CFL_Ltg
(Add On) Pipe Insulation	Res	11	3.67	DEER:Res_HVAC_Eff_AC
(Add On) Ceiling / Wall Insulation	Res	20	6.7	DEER:Res_HVAC_Eff_HP

The EUL and Add-On measure tables are reviewed on an annual basis, prior to the launch of the upcoming program year, to incorporate any relevant changes, feedback, or guidance.

In preparing savings claims, this program will develop combined measure claims in accordance with the CPUC’s guidance on “Weighted Average Expected Useful Life/Net to Gross Method.”⁶⁰ Since the outputs of the calculator are dependent on the savings achieved, the projected EUL for this program is not yet known. The forecasted savings utilize the EULs of the primary measures, assuming single measure installations by site.

⁵⁸ https://www.caetrm.com/media/reference-documents/CPUC_Resolution_E-4807_December_2016.PDF

⁵⁹ <https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/e/6442465683-ee-policy-manual-revised-march-20-2020-b.pdf>

⁶⁰ Rolling Portfolio Program Guidance; Weighted Average Expected Useful Life/Net to Gross Method. Excel Spreadsheet titled “Combining_Measures_Claims-DRAFT”. The spreadsheet calculator has not been updated to reflect new DEER values; so can only be used with respect to the proposed method.
<https://www.cpuc.ca.gov/General.aspx?id=6442456320>

I. Methods, Payment Terms, and Risk

Methods for Payable and Claimable Savings

See section a. *Analytical Methods and Calculation Software Selection* and section b. *Calculation of Gross and Net Savings* for detail on methods and the expected difference between payable and claimable savings.

Payment Terms

Recurve and qualified aggregators will establish the payment terms in their contract based on the net metered savings in the portfolio and corresponding project EULs, net of marketplace management costs. Value is directly related to the benefit stream in the adjusted hourly avoided cost calculator for the service area and climate zone.

These payment terms are designed in accordance with the NMEC Rulebook 2.0 guidance and all known Commission directives related to terms and conditions. Compliance on payment terms for this M&V plan is described in Section f. *Payments and Incentives*.

Risk Mitigation

The Residential Market has a fundamentally different risk profile from the rest of the energy efficiency portfolio. The Commission noted the limited risk to ratepayers of this program model in D.21-12-011 in their justification to suspend the cost-effectiveness rules:

" . . . this type of program is very low risk to ratepayers regardless of cost-effectiveness score, because actual energy savings are measures based on NMEC methods, payments to aggregators are made based on performance, and spending is limited by the TSB actually achieved. Therefore, it is reasonable to suspend cost-effectiveness rules for this purpose for this unforeseen emergency situation in response to the Governor's Proclamation." ⁶¹

One-hundred percent of the payment to the aggregator is based on the annual net savings achieved at the meter. The aggregator takes on the upfront risk, and arranges financing, to deliver impacts. This risk is within their power to mitigate with successful program implementation, innovative financing, insurance, and with general support provided by the program administrator. The Residential Market represents minimal risk for MCE or ratepayers, especially when compared to deemed program models given that the program administrator will only pay for savings achieved at the meter and by design will meet minimum cost effectiveness criteria.

The Residential Market will further mitigate risk of settlement dispute by using a consistent, transparent means of tracking the impacts for settling payable savings as described in this M&V plan. In addition, factors affecting aggregator payment (such as EUL) shall be maintained after issue of the "Project

⁶¹ See D.21-12-011 at p. 26

Completion Confirmation” letter. Payment to the aggregator is completely based on savings delivered at the meter and will be made on a quarterly basis.

The Residential Market is designed to minimize risk to program administrators, moderate risk for project developers with a portfolio pricing scheme, and decouple interest in the savings from the entity calculating the savings. MCE makes incremental payments by portfolio rather than committing to full project or program costs. The majority of payments to external entities are dependent on identifying projects and the performance of those projects. In the worst-case scenario: MCE pays its administrative cost (internal and/or external staff); no projects come forward, and no savings are achieved, which would still represent a very small portion of the total allocated budget.

An easy way to visualize the risk is looking at a three point table as has been done in other papers on understanding risk in pay for performance programs:⁶²

(Market Sponsor) MCE / RATEPAYERS	
Upfront: Administrative cost If projects materialize: Portion of the forecasted benefits for monitoring and tracking If savings materialize: Payment for kWh or therms, net of marketplace management costs	
CUSTOMERS / PARTICIPANTS	PROJECT DEVELOPERS / AGGREGATORS
Upfront: Contribution to project If savings materialize: Enough savings to generate value for the customer in addition to other value provided by the project.	Upfront: Forecasting, business plans, customer recruitment, project development, financing, etc. If projects materialize: Payment needs to be enough to cover costs and generate margin. If savings materialize: Ineligibility risk will fall on developers (manage risk with portfolio), that installations will deliver expected savings and load shapes.

J. To Code Savings Compliance

The Residential Market is targeting to-code savings as described in the implementation plan. Compliance with [D. 17-11-006 Ordering Paragraph 2](#) is met in Section 6 of the implementation plan.

The M&V plan described herein will quantify the savings achieved compared to an existing conditions baseline as authorized in AB802, SB350, and detailed in the methods sections of this M&V plan.

⁶² [Where's the Risk with Pay for Performance? Rob Hansen, ACEEE paper 2018](#)

K. Bid M&V Plan

The Residential Market will not conduct a bidding process for this program. It will utilize an aggregator qualification approach that reduces barriers to entry. Bid M&V plans will not exist.

ATTACHMENT A. Tools, Methods, Analytical Approaches and Software Criteria

In the NMEC Rulebook V. 2.0 (p. 17) the CPUC outlines specific criteria for the approaches and calculation software allowable and preferable for NMEC population-level M&V. The following table itemizes the criteria in the left hand column and how the proposed tools, methods, analytical approaches, and calculation software in this M&V plan meet these criteria.

<i>Tools, Methods, Analytical Approaches and Calculation Software - CPUC Criteria</i>	Compliance demonstrated in this M&V plan
<i>Savings Calculations:</i> All analytical methods, including tools, algorithms and software used in savings and incentive or compensation payment calculations, must be made available to Commission staff and its consultants upon request.	<p>The proposed analytical methods (FLEXmeter) (CalTRACK) and calculation software (OpenEEmeter) are open source and publicly available.</p> <p>Comparison group methods (GRIDMeter) are publicly available.</p> <p>A certificate of compliance with the CalTRACK methods will be provided to the PA, CPUC, and Evaluators.</p> <p>All data will be readily accessible and made available upon request.</p>
<i>Measurement Period:</i> Savings determinations must be made by comparing at least 12 months of post-intervention energy consumption to at least 12 months of pre-intervention energy consumption.	<p>CalTRACK data handling (see Section 2 of the technical specification) will be followed which screens for pre-intervention baseline data criteria: “2.2.1.1. Consumption and temperature data should be sufficient to allow for a 365-day baseline period”</p> <p>Interim savings determinations will be assessed on an ongoing basis but reported annually and based on the Commission guidelines.</p>
<i>Transparency:</i> Data, methods and calculations must be made available to the PAs well as the Commission and its impact evaluators.	<p>The proposed analytical methods (FLEXmeter) (CalTRACK) (GRIDMeter) and calculation software (OpenEEmeter) are open source and publicly available.</p> <p>Certification of compliance will be provided to PAs, the CPUC and impact evaluators in addition to access to all data methods and calculations.</p>
<i>Documentation and Replicability:</i> The methods	The methods used to calculate savings are

<p><i>used to calculate savings for NMEC programs must be documented in the program-level M&V Plan sufficiently such that savings calculations are able to be replicated by the PAs as well as the Commission and its impact evaluators. Upon request, the underlying participant consumption data and other data inputs must be made available to the PAs well as the Commission and its impact evaluators such that savings calculations can be replicated to reach the same result.</i></p>	<p>referenced in the program-level M&V plan and the details for savings calculation, including data handling, and weather station selection are documented in the CalTRACK 2.0 Technical Specification.</p> <p>Comparison group methods for quantifying net impacts to the grid are documented in GRIDMeter.</p> <p>The OpenEEmeter is a Python code base which enables replication of the CalTRACK methods.</p> <p>The FLEXmeter methods and code base documents demand response savings calculations.</p> <p>All data will be made available. In addition, documentation of data handling, and calculations will be documented and provided to PA, CPUC and evaluators to quickly isolate any differences in results using the same data.</p>
<p>Consistent, Pre-Set Method: <i>For Population-level NMEC programs, the specific measurement method(s) and calculation software must be determined before the program begins and applied uniformly to all sites in the program.</i></p>	<p>The FLEXmeter, CalTRACK, and GRIDMeter methods and OpenEEmeter code base have been pre-determined for this program; and will be applied uniformly to all sites in the program.</p> <p>Certification of compliance and documentation of data handling will validate uniform application to all sites in the program.</p>