Program Overview

Program Budget and Savings

1. Program Name

SDG&E's Federal Energy Program (FEP)

2. Program ID Number

SDGE4012

3. PROGRAM BUDGET TABLE

Cost Category	2021	2022	2023	2024	Total
Administration & Overhead	$20,000	$170,000	$110,000	$110,000	$410,000
Marketing/Outreach& Media	$30,000	$205,000	$165,000	$165,000	$565,000
Direct Implementation – Non-Incentive	$50,000	$2,475,000	$2,475,000	$2,475,000	$7,475,000
Direct Implementation – Incentive	$0	$2,750,000	$2,750,000	$2,750,000	$8,250,000
Total	**$100,000**	**$5,600,000**	**$5,500,000**	**$5,500,000**	**$16,700,000**

4. PROGRAM GROSS/NET IMPACTS TABLE

FEP Goals	2021	2022	2023	2024	Total
Gross Electric Savings (kWh)	0	10,729,238	10,729,238	10,729,238	32,187,714
Net Electric Savings (kWh)	0	7,682,759	7,682,759	7,682,759	23,048,277
Gross Demand Reduction (kW)	0	954	954	954	2,862
Net Demand Reduction (kW)	0	672	672	672	2016
Gross Gas Savings (therms)	0	237,417	237,417	237,417	712,251
Net Gas Savings (therms)	0	166,856	166,856	166,856	500,568

5. PROGRAM COST EFFECTIVENESS (TRC)

Program Year	TRC
2021	0
2022	1.41
2023	1.74
2024	1.95

6. PROGRAM COST EFFECTIVENESS (PAC)

Program Year	PAC
2021	0
2022	2.15
2023	2.31
2024	2.47

7. TYPE OF PROGRAM IMPLEMENTER

Third-Party Delivered

8. MARKET SECTOR(S)

The Federal sector is defined as Federal Buildings (including hospitals owned and/or operated by the Federal Government), US Postal Service, Military Bases, and Tribal Nations customers.

9. PROGRAM TYPE

Resource

10. MARKET CHANNEL(S) AND INTERVENTION STRATEGIES:

Market Channel: Downstream

Intervention Strategies: Incentive, Finance, Audit, Technical Assistance

Implementation Plan Narrative

1. PROGRAM DESCRIPTION

The Federal Energy Program (FEP) provides end-to-end program implementation services, including marketing, outreach, engineering, operations, customer service, and data management and reporting, to Federal Buildings (including hospitals owned and/or operated by the Federal Government), US Postal Service, Military Bases, and Tribal Nations electric and gas customers on qualifying rates schedules.

Program Rationale

In terms of market size and energy savings opportunities, the Federal sub-sector is a crucial component of SDG&E's energy efficiency portfolio. As a result, this program will be a critical part of SDG&E's efforts to achieve the goals established by the California Long-Term Energy Efficiency Strategic Plan. The program also contributes to SDG&E's efforts to comply with the requirements of the California Public

Utility Commission's (CPUC) Decision 16-08-019, which directed program administrators to transition to a majority of third-party designed and implemented programs.

PROGRAM OBJECTIVES

The FEP was designed to facilitate the achievement of SDG&E's Business Plan objectives and fulfill the CPUC's chief objective of encouraging innovation and producing cost-effective energy savings in the Federal sub-sector. Specific objectives include:

- Engaging customers who have previously had low or no participation in the energy discussion and creating a desire to stay connected through repeat program participation that promotes the journey to Zero Net Energy (ZNE).
- Improving the penetration of energy efficiency in the property management marketplace by overcoming the tenant/landlord split incentive. The Federal government owns and leases properties like other sectors with additional complexities unique to this sector.
- Increasing savings and encouraging program participation by equipping subcontractors and trade professionals with the tools and training needed to promote effective program delivery and ensure customer satisfaction.
- Collaborating with stakeholders to maximize savings and efficiency by executing new approaches that provide customers with a comprehensive energy solution and a holistic approach.

2. PROGRAM DELIVERY AND CUSTOMER SERVICES

Energy savings will be delivered through strategic communication and direct customer outreach of targeted offerings:

- **Deemed –** Offers incentives for the installation of select measures based on approved workpapers.
- **Custom/Custom Express –** Offers customers with unique needs access to incentives that do not align with the Deemed offering.
- **Normalized Metered Energy Consumption (NMEC) –** Offer available to appropriate, eligible customer sites that meet specific site-level criteria.

The implementer's outreach staff will leverage relationships with trade professionals and customers to identify and prioritize applicable measures and retrofit opportunities unique to the Federal sector. The program will also assist customers with creating personalized Energy Plans. The Energy Plans encourage customers to implement comprehensive multi-measure projects through a staged, step-by-step process. The following strategies will support the implementer in reaching program goals:

- Align program incentives with tenants, facility owners and managers, installation team, and energy manager motivations.
- Prime individuals to help influence decisions and equip them with the tools required to help move projects from concept to implementation (staff within a multi-layered organization who advocate for energy projects by navigating through complex decision-making processes, influencing decision makers, and acting as an internal representative for the proposed project).

- Offer program support resources throughout the customer's energy efficiency journey, through every stage of the process.
- Educate financial stakeholders on financing options provided through the Program.

The Federal sub-sector customer base primarily consists of Federal Buildings (including hospitals owned and/or operated by the Federal Government), US Postal Service, Military Bases, and Tribal Nations. The Federal sub-sector will be specifically targeted through the implementer, and the implementer's subcontractors, that have long-standing relationships working closely on Federal energy efficiency projects. In addition to subcontractors, the implementer will work with its network of trade professionals to round out the other segments. The program has a multi-pronged marketing approach for reaching customers:

- **Mass Market –** A broad mass-market approach will drive general awareness of the program to eligible Federal customers in the service territory.
- **Trade Professionals –** A leveraged marketing approach will be aimed at recruiting and equipping trade professionals with program information, to help them promote the program to their customer base.
- **Subcontractors** – By taking advantage of existing relationships with subcontractors, especially those on adjacent energy efficiency projects, the program will reduce lead time introducing potential projects to the project pipeline. The program will also utilize subcontractors to promote incentives and measures by educating them on offerings and sharing scopes of current and future projects.
- **Targeted Sectors –** Targeted marketing campaigns will focus on those facilities and sub-sectors with the Federal sector identified as having the highest savings potential, based on market research and benchmarking data.
- **Procurement Streams** – Utilize and leverage existing Federal Procurement channels; RFPs, current, and awarded contracts, and engage Contracting Officers, Energy Managers, and Installation Managers as needed to ensure every link in the Federal procurement chain is targeted.

Direct and indirect outreach efforts include cold calls, email blasts, leveraging prior participation data, leveraging local trade professionals' relationships, community events, federal contracting solicitation forums, and digital content. In addition, program staff will seek to establish a working relationship with SDG&E's Federal Account Management Team, to leverage their knowledge and experience of Federal customers and points-of-contact in the Federal sub-sector space.

In addition to delivering energy savings through qualifying measures, TRC will offer the following tools and services to SDG&E's Federal customers:

- **Project Management Concierge** – In-house implementation specialists will serve as the customer's single point of contact for all program related matters and offerings.
- **Customized Outreach & Technical Services –** A "trusted advisor" will support the customer to make informed decisions and overcome any technical barriers. Support includes analyzing benchmarking output, identifying energy efficiency opportunities, and assisting with program

applications and project development to improve the customer's access to energy offerings and eliminate confusion. Once the project is approved for implementation, the implementer will provide additional services as required (i.e., vendor selection support) to overcome any additional technical, time, or financial barriers that may exist.

- **Web Portal –** Customers will receive instant access to program literature, a project dashboard linked to real-time project status, and all submitted project documentation through the FEP Program website. This website will host several additional features to support the customer's journey to ZNE such as links to benchmarking and online energy assessment tools, a "Find a Contractor" feature, and a list of program Trade Professionals. A live chat feature will further ensure that customers are helped at the time and in the way needed to act on energy efficiency opportunities.
- **Network of Managed Trade Professionals –** TRC, will actively manage a network of sales reps, contractors, and other firms, providing ongoing training on program offerings and requirements and ensuring that quality of workmanship and certain qualification requirements are met. The program will maintain vendor neutrality, but rather aim to work with the customers preferred contractors. For the customer, this provides continuity of valued relationships with their chosen contractors.
- **Suite of Financing Options –** The program provides a suite of financing options to help address customer capital concerns.

3. PROGRAM DESIGN AND BEST PRACTICES

The FEP is a multi-faceted program, designed to address each of the barriers outlined in SDG&E's Business Plan. The Program is based on best practices and lessons learned from the implementer's seasoned experience and deep understanding of the unique challenges facing businesses today. The strategies and tactics below consist of innovations designed to tackle SDG&E's unique barriers paired with proven methodologies deployed across the nation.

3.1 Split Incentive (Tenant/landlord leasing)

Providing monetary incentives that do not consider the relationship between tenants and landlords have not yielded strong adoption within these spaces. In the Federal space, many facilities are being utilized by entities who are not directly involved with the economics behind their energy usage and have little or no motivation to review policies and incentives of EE. Motivations between a tenant and a landlord typically contrast; for example, energy savings may be irrelevant to landlords due to tenants paying for utilities, while tenants are often hesitant to perform upgrades to a property they do not own. Program innovations such as Flex Incentives and financing options seek to address these barriers. Flex Incentives can be combined with financing options to eliminate upfront cost for tenants to realize non-energy benefits, such as increased comfort, without going out-of-pocket. Flex Incentives may also be used to address the split incentive barrier through a property owner incentive. The design provides a scaling incentive to the property owner based upon the incentive amount the tenant's project receives. It has been proven that rewarding both tenant and landlord directly contributes to reducing the barrier to participation for each party. Achieved energy savings by the tenant will transform into asset value for the landlord through facility benchmarking.

3.2 MULTIPLE LEVELS OF DECISION MAKING

Getting to the correct staff early in the project timeline is critical to a project's success. TRC will create an effective point of entry within the customer's decision-making framework by leveraging existing relationships through program partners and trade professionals. Staff regularly interact and maintain relationships at decision making levels creating an effective point of entry for program sales staff to propose energy efficiency solutions.

The program outreach strategy nurtures projects through the sales process, documenting program influence and ensuring program integrity along the way. Identified project stakeholders are included in the customer journey through project tracking, program updates, and "before and after" project results. This strategy aims to acquire and retain decision makers to maintain a low cost of customer acquisition and increase program cost-effectiveness.

Unique to the Federal sub-sector is a complex multi-layered decision-making process as well as a strict funding cycle. Program outreach staff will be trained to understand how project approvals navigate through the Federal administrative process, funding cycles and timing of funding cycles to ensure program support and offerings better align with customers.

3.3 MISPERCEPTION OF EE VALUE

The FEP program design includes tools and program innovations to help accurately determine project savings before and after project implementation. Custom Express is an innovation which uses program approved tools, documentation, and savings methodologies to calculate proposed project savings quickly and credibly for common complex measures. Project information can be input into the Custom Express calculator to generate estimated savings, validated by Program staff prior to installation approval. Due to this standardized and vetted process, Custom Express brings an accelerated program experience to customers without sacrificing engineering quality and savings calculation rigor.

The FEP program will promote non-energy benefits and greater transparency and control over customer energy usage. Reliance on energy cost savings alone ignores vital co-benefits associated with energy efficiency implementation such as carbon emission reductions, maintenance cost reductions, safety, and improved productivity, among other intangibles. The Program will quantify these co-benefits and integrate them into program support and marketing materials aimed at resonating with relevant project stakeholders. Non-energy benefits are also reinforced by our partners and trade professionals through marketing channels.

Energy savings measures can also be paired with fault detection instrumentation and software. As an example, in federal food related facilities, refrigeration can contain, fault detection which is capable of alerting refrigeration technicians of faulty equipment or unstable temperature readings. Provided that the fault detection feature is well-managed, technicians and facility staff will experience bountiful energy savings with the non-energy benefit of heightened preservation of their valuable merchandise.

Even with decision-maker support of EE initiatives, customers face capital limitations that often stall or inhibit project implementation. To enable participation, the program will leverage available financing tools to support project implementation, including but not limited to utility

sponsored On-Bill Financing (OBF), Utility Energy Service Contracts (UESC), Energy Savings Performance Contracts (ESPC), and federal agency grant and assistance programs.

3.4 PROGRAM COMPLEXITIES DIMINISH VALUE

Customer focused program staff continuously manage customer expectations through customer touch points and create a clear channel of communication as the customer progresses through their energy journey. Both trade professionals and outreach staff are trained to seamlessly document program influence through customer interaction, flag industry standard practice, and insulate program complexities from the customer experience.

A customized Energy Plan is developed for key accounts which directs customers through available program offerings, further reducing confusion caused by multiple options. The program follows an approach which focuses on "quick win", low-cost, simple measures, such as retro commissioning. As customer trust is gained, a collaborative road map is developed to identify and implement measures across the customer's facility achieving deeper energy savings.

3.5 CONTRACTORS ARE OFTEN SINGLE END-USE FOCUSED

During the sales process, a single end-use focused contractor may recognize additional energy savings opportunities, or a customer in need of a comprehensive energy assessment. Trade professionals are encouraged to notify program staff of these opportunities. The program partners will also look for comprehensive energy savings opportunities. The program will offer energy savings plans, which will encourage the adoption of multiple measures. Program staff, partners, trade professionals will all receive training, tools, and support to encourage identification of all EE opportunities, not just the single end use they know/sell. Customers will be armed with program information and training to ask the right questions of the trade professionals.

3.6 FEDERAL STRATEGY

Value Proposition – The Federal sector has traditionally taken a reactionary approach to equipment turnover and facility infrastructure. Typically, the equipment is not replaced until it fails or is on the verge of failure. Often maintenance personnel understand that the aging infrastructure needs attention but cannot adequately assess all the components to present a compelling business case. With non-mission critical investments, the Federal sector generally evaluates these opportunities on financial metrics with little weight in the decision relating to energy efficiency, qualitative and long-term benefits. The TRC team understands the importance of incorporating total project benefits in presentations to Federal facilities' leadership. The inclusion of non-energy benefits (NEBs) in the value proposition is key for an improvement of energy projects' metrics to compete with all the non-energy projects when evaluated. The NEBs improve the overall payback when compared with other competing priorities. Tying the project outcomes to resiliency and mission success can also help support the project's approval and also accelerate the turnover rate. An important component of this effort is to succinctly explain the rationale for and data supporting the NEB savings to allow key decision makers to fully understand the overall project benefits.

The FEP will also utilize Executive Order 13834 as a reference for execution. The latest Federal action is Executive Order 13834 (EO) signed on May 17, 2018, which directs Federal agencies to manage their buildings, vehicles, and overall operations to optimize energy and environmental performance, reduce waste, and cut costs. Specifically, regarding energy efficiency, the EO set a goal to achieve annual cost reductions through energy efficiency. The EO did not provide any funding allocation citing performance contracting as a vehicle for implementation. Additionally, the EO did not direct any technical resources to agencies in support of the identification of the energy efficiency measures. This aligns with the Federal Energy Program (FEP) intervention strategies including financial and technical support.

In addition, the Energy Independence and Security Act of 2007 requires Federal agencies to perform benchmarking of certain facilities. Program staff will encourage this practice for all customers and will assist customers in analyzing the results. As the practice of benchmarking continues to proliferate prospective tenants will begin to consider a building's operating costs and environmental impacts, properties with a high benchmarking score will be more desirable than properties with lower scores, resulting in increased asset value.

Additionally, for the Federal customers, our approach aligns EE with the mission assurance of specific federal agencies and the mandates they are held to.

- Military/DOD: Tie EE to resilience of bases and continuity of mission.
- GSA: Link EE to high-performance green building leadership role and expertise in optimization of building performance.
- USPS: EE improves competitive posture versus private sector alternatives.
- Tribal Nations: EE demonstrates commitment to preservation of natural resources that is important to Tribal heritage.

3.7 STRATEGIC PROGRAM PARTNERSHIPS

TRC formed strategic partnerships to specifically tackle SDG&E's challenges within their federal portfolio. These partnerships allow the program to leverage key players within the region to offer a comprehensive program to specific customer sectors with unique sector-specific obstacles. All our partner firms have worked in San Diego independently and have been involved with EE programs and incentives throughout the state. What makes this approach different is bringing all of us together to leverage the experience, contracting vehicles, financing mechanisms, and other funding sources including EE incentives to make the most compelling program offer to SDG&E's Federal customers – a truly one stop shop.

ABM Technical Services – ABM brings a targeted approach to their existing portfolio of Federal customers within SDG&E service territories as well as the ability to leverage their Energy Services Contract (ESCO) and Utility Energy Service Contract (UESC) vehicles. ABM exercises its unique position in a direct to decision-maker sales process, proposing comprehensive energy solutions while shortening sales cycles. They use a proven development process, efficient cost structure, and comprehensive and integrated whole-building approach to ensure timely project development and delivery. This is a direct result of their self-performance model and the

commissioning-based Design/Build management approach. This strategy, employed by their federal team, results in execution of energy conservation measures (ECM) previously thought of as unattainable.

Davenergy Solutions – provides a wide range of consulting services for facility managers and owners. They specialize in resiliency engineering, mechanical and electrical engineering, energy audits, energy feasibility studies, new building commissioning, retro-commissioning, infrastructure protection, facility condition assessments and construction management consulting. Davenergy is a Center for Veterans Enterprise verified Service-Disabled Veteran Owned Small Business (SDVOSB) and California verified Disabled Veteran Business Enterprise (DVBE). Project experience highlights include energy audits and retro-commissioning for the Veteran Affairs, Navy Medicine, and the Marine Corps; meter installation, retro-commissioning and energy master planning for the Coast Guard; healthcare construction consulting for NAVFAC prime contractors; and resiliency engineering consulting for Army Materiel Command.

Indian Energy – 100% Native American Indian-owned and operated. Indian Energy is committed to identifying and developing opportunities for ensuring tribal energy sovereignty; self-sufficiency and future long-term revenue streams that provide a means to maintain the traditional tribal way of life and provide for our seventh generations. They will be the concierge for the Tribal Nations to participate in the program. Indian Energy also provides "National Energy Security Solutions" to the U.S. Department of Defense and the U.S. Military. They will leverage their existing work, contracts, and relationships to promote program participation and develop EE projects and eligible sites.

kW Engineering – kW is quickly becoming the expert when it comes to NMEC in California. They bring local knowledge, extensive EE experience, and deep understanding of the CA environment. With staff trained in the latest M&V approaches and technology, they will provide NMEC technical services including but not limited to, project pre-screening, NMEC regression and model analysis, and non-routine adjustment analysis.

4. INNOVATION

Customer focus, innovation and purpose are built into the FEP Program. The FEP Program is designed with these key needs in mind: enhanced customer experience, increased attainment of cost-effective energy efficiency savings, and integration of additional demand side technologies. To this end, the FEP Program incorporates several delivery strategy innovations to address observed customer challenges while promoting cost-efficient savings attainment. These innovative delivery strategies not only enhance the customer experience, but also deliver real cost-efficiencies that are realized through increased participation or improved cost-effectiveness over traditional approaches:

4.1 FLEX INCENTIVES

A flexible incentive structure customizes offerings to meet customers' required investment criteria and guarantees receipt of the approved incentive upon project completion. This approach balances customer financial needs within regulatory constraints while enhancing the customer experience and enabling participation. Tailoring incentive offers to customers based

on need rather than fixed rates allow the program to distribute incentive funds to affect higher levels of participation.

4.2 DATA-DRIVEN TARGETING

Analyzing customer data and participation patterns, the program will identify high-potential sectors, measure-specific applications, and stranded opportunities to ultimately reduce customer acquisition costs and improve customer engagement. By creating data-based market personas, tailored and personalized messaging will encourage participation, strengthen program relationships, and drive deeper energy savings. The data-driven targeting innovation aims to deliver tailored program messaging to Federal customers and this unique market sector and to garner interest that program staff can act on to develop into real project opportunities.

4.3 SAVINGS PERSISTENCE MONITORING

The persistence innovation is a multi-track, real-time protocol that more accurately accounts for net savings over equipment life rather than one-and-done Measurement &Verification (M&V) plans focused on first-year savings. Persistence protocol maintains customer engagement for years after initial program participation: providing ongoing guidance and support for project performance, establishing SDG&E and the program team as trusted energy advisors, and offering numerous opportunities to promote repeat program participation. This approach includes ongoing checkups on select projects to ensure equipment is operating as intended throughout the measure life. These checkups may range from phone calls with the customer, review of utility usage data or M&V. The innovation is scalable and is applicable across all sectors.

4.4 NORMALIZED METERED ENERGY CONSUMPTION (NMEC)

The program will incorporate NMEC, a California legislative (AB802) and CPUC-approved method to quantify energy savings. This approach assists customers with deciphering actual energy savings. With NMEC, savings are verified at the meter, are visible to the customer, and are well-aligned with utility bill reductions. NMEC savings receive existing conditions baseline per CPUC (E-4818 and others) and a net to gross (NTG) equal to 0.95 per CPUC proceedings. With these conditions, automated data collection ability and no requirement for M&V equipment, NMEC is a cost-effective M&V method that increases overall claimable savings for no net increase in implementation cost. NMEC is most applicable for customers who achieve enough energy savings to verify at the meter level, often a minimum of 10%-meter savings, have predictable operating patterns, and who have an accessible metering platform. The program will review projects on a case-by-case basis to determine NMEC suitability.

4.5 MEASURE GRADUATION

To accommodate projects with expedited schedules, the program will introduce simplified custom applications, along with approved calculation tools, defined influence documentation, and clear M&V requirements that accelerate the approval process. The Custom Express platform will be utilized to cost-effectively expand proliferation of traditional custom measures beyond large customers, enable data collection for full workpaper development and ultimately, graduate the measure to the deemed platform. This innovation is applicable to all sectors and

segments but will be applied only to select measures with typical operating profiles and system configurations.

4.6 MINIMIZING LOST OPPORTUNITIES

To support IDSM integration, the TRC team will collect information regarding each Federal participant's current and Distributed Energy Resource (DER) usage and location as part of the application process. This information will be used to identify Integrated Demand Side Management (IDSM) program opportunities that can be integrated into EE program delivery, as well as future locational and IDSM opportunities. For any measure with DR capabilities or DER technologies with DR capabilities identified on-site, TRC will provide information about DR program opportunities to the participant and refer the participant to SDG&E for follow-up. Integrated program marketing will encourage cross-cutting of multiple DER programs that can provide additional customer savings and system benefits.

5. METRICS

The implementer will record all project data in their project and customer tracking system and track program performance by capturing the following Key Performance Indicators (KPIs):

- Program Performance
    - Savings to Goal (kWh, kW, therms)
    - TRC Ratio
    - Passed Inspections
- Financials/Savings
    - Savings Claimed
    - Budget Spent
    - Savings/Budget Alignment
- Customer Satisfaction
    - Customer Satisfaction Survey Scores
    - Complaints Received
- Compliance
    - Reporting Accuracy
- Marketing
    - Number of responses to various materials

The program will not claim to-code savings.

7. PILOTS

Pilot projects are not part of the program currently.

8. WORKFORCE EDUCATION AND TRAINING

SDG&E's Workforce Education & Training (WE&T) program is not currently being utilized on this program.

9. WORKFORCE STANDARDS

9.1 HVAC

The availability of competent hourly craft personnel possessing the requisite knowledge, skills, and abilities to perform the installation, modification and maintenance of HVAC measures will support improved program outcomes over time as well as increase the number of qualified and appropriately trained trade professionals. Accurate installation, appropriate maintenance, and operational training ensures energy savings are realized.

Workforce standards incorporated into the program include ensuring HVAC installation technicians obtain one or more of the following: Completed an accredited HVAC apprenticeship; are enrolled in an accredited HVAC apprenticeship; have completed at least five years of work experience at the journey level as defined by the California Department of Industrial Relations (Title 8, Section 205 of the California Code of Regulations), passed a practical and written HVAC system installation competency test, and received credentialed training specific to the installation of the technology being installed; or hold a C-20 HVAC contractor license from the California State Contractor's Licensing Board (CSLB).

These requirements apply to all the individuals that perform the installation, modification, and maintenance work on all HVAC projects, regardless of incentive value. Notification and communication of this requirement will be incorporated into regular marketing and outreach efforts to customers, Trade Professionals, and other program partners. To ensure compliance, this requirement will also be incorporated into all project application Terms & Conditions.

9.2 LIGHTING

The availability of competent hourly craft personnel possessing the requisite knowledge, skills, and abilities to perform the installation of advanced lighting control measures will support improved program outcomes over time as well as increase the number of qualified and appropriately trained trade professionals. Accurate installation, appropriate maintenance, and operational training ensures energy savings are realized.

Workforce standards incorporated into the program include ensuring lighting installation technicians possess certification from the California Advanced Lighting Controls Training Program (CALCTP) as either CALTCP Technical Installer or CALCTP Acceptance Test Technician.

These requirements apply to all the individuals that perform the lighting controls installation work, regardless of incentive value. Notification and communication of this lighting controls requirement will be incorporated into regular marketing and outreach efforts to customers, Trade Professionals and other program partners. To ensure compliance, this requirement will also be incorporated into all project application Terms & Conditions.

10. DISADVANTAGED WORKER PLAN

The DA Worker Plan is not applicable to the current program approach at this time.

11. DISADVANTAGED COMMUNITIES

It is our understanding that all Tribal lands fall into the Disadvantaged Communities (DACs) designation. Our assumption is that we will generate a small volume of projects and savings from Tribes each program year. In reviewing the current "Draft CalEnviroScreen 4.0" tool, other areas within SDG&E territory that may contain facilities eligible to receive program services from the Federal Energy Program include:

- Logan Heights/Barrio Logan/Southcrest neighborhoods south of downtown San Diego
- Select neighborhoods in El Cajon
- Select neighborhoods in Chula Vista

Upon receiving the required customer data to accurately estimate the number of facilities that may be eligible in these areas, we anticipate several additional areas of opportunity, including, at minimum, some Postal Service facilities.

12. NO ADDITIONAL INFORMATION TO PROVIDE.

Supporting Documents

The following documents are attached to the Implementation Plan.

1. PROGRAM MANUALS AND PROGRAM RULES

2. PROGRAM THEORY AND PROGRAM LOGIC MODEL

3. PROCESS FLOW CHART

4. INCENTIVE TABLES, WORKPAPERS, SOFTWARE TOOLS

5. QUANTITATIVE PROGRAM TARGETS

6. DIAGRAM OF PROGRAM

7. EVALUATION, MEASUREMENT & VERIFICATION (EM&V)

Attachment 1

Program Manual

SDG&E®

FEDERAL ENERGY PROGRAM

Program Manual

Table of Contents

Introduction

The Federal Energy Program (FEP) is a Federal retrofit program offering cash incentives to Federal, DoD, and Tribal customers installing energy-efficient equipment at their facilities. Installing energy-efficient equipment can help reduce energy consumption and operating expenses, which leads to reduced costs, and increased productivity and efficiency. Incentives are designed to encourage these installations by offsetting the incremental cost of higher efficiency equipment. Using energy-efficient equipment can positively impact an organization's operating efficiency while helping the environment by reducing air pollution and preserving natural resources. All utility customers benefit because reduced electrical system demand helps keep energy costs down.

About FEP

FEP is administered by SDG&E under the auspices of the CPUC and implemented by TRC. The FEP Program provides end-to-end program implementation services, including marketing, outreach, engineering, operations, customer service, and data management and reporting to qualified customers. The Program leverages TRC's outreach staff, team of subcontractors, and network of trade professionals to provide customers with a single program that addresses all their energy efficiency needs.

FEP runs from January 1, 2022, until December 31, 2024. Incentive applications cannot be submitted prior to January 1, 2022. Project installations must be completed by the date specified in the most current program application terms and conditions. Applications that do not require pre-approval must be submitted within 30 days of the project's installation date or final invoice date, whichever is later, to qualify for an incentive. The program budget is limited, and incentives are paid to qualifying customers on a first-come, first served basis until funds are no longer available or December 31, 2024 — whichever comes first. Priority is determined by the date the complete application, and all required supporting documentation is received by TRC.

Customer Eligibility

The FEP provides services and incentives to all Federal, DoD, and Tribal electric and gas customers in SDG&E territory, excluding commercial customers located in the Port Tidelands and non-residential customers defined as Commercial, Public, Industrial and Agricultural. Rates served by this Program include eligible customers on Schedules AL-TOU, AL-TOU2 and/or Schedule GN-3. Applicant utility accounts and rate codes are verified to ensure the building is on a Public Purpose Program (PPP) paying, qualifying large Federal account.

Incentive Exclusivity

Program offerings will be continually evaluated for potential overlap with other programs. If a customer has received an incentive or services from another statewide or local program, they are ineligible to receive an incentive or services through FEP for the same measure(s). Conversely, if a customer receives an incentive from FEP, they are ineligible to receive incentives from any other statewide or local program for the same measure(s). As a result, all project site and customer participation records will be

tracked and reviewed prior to enrolling a customer in FEP. In addition, all customers must certify that they have not received other incentives or funding related to the application's measure or service to qualify for the program.

Contractor Eligibility

Accurate installation, appropriate maintenance, and operational training ensures customers realize energy savings. To encourage these practices, the program manages a network of qualified, trained trade professionals as a part of the additional services offered to customers. The trade professional network is for companies that provide guidance, products, and services to assist SDG&E large Federal, DoD, and Tribal customers with implementing energy-efficient measures. Use of a network member is not required to qualify for incentives.

To be eligible for the program's trade professional network, trades must:

- Complete a trade professional network application (available on the program website);
- Submit supporting documentation as outlined in the application (including W9, proof of insurance, etc.);
- Attend required program training; and
- Abide by all program rules and regulations as detailed in the trade professional network and customer application Terms & Conditions.

In addition to the above network participation requirements, the following apply to all HVAC and Advanced Lighting projects.

HVAC. HVAC installation technicians must obtain one or more of the following: Completed an accredited HVAC apprenticeship; or are enrolled in an accredited HVAC apprenticeship; or have completed at least five years of work experience at the journey level as defined by the California Department of Industrial Relations (Title 8, Section 205 of the California Code of Regulations), passed a practical and written HVAC system installation competency test, and received credentialed training specific to the installation of the technology being installed; or hold a C-20 HVAC contractor license from the California Contractor's state Licensing Board. These requirements apply to all the individuals that perform the installation, modification, and maintenance work.

LIGHTING. Lighting installation technicians must possess certification from the California Advanced Lighting Controls Training Program (CALCTP) as either CALTCP Technical Installer or CALCTP Acceptance Test Technician. These requirements apply to all the individuals that perform the installation work.

Both the HVAC and Lighting contractor requirements are incorporated into all project application Terms & Conditions to ensure compliance.

Measure Eligibility

The program requires that all measures have strong technical support for claimed energy savings. This technical support may come from the Database for Energy Efficient Resources (DEER) or through new or existing CPUC approved Workpapers. The program utilizes Deemed, Custom, and meter-based savings platforms to influence, calculate, and incentivize customers for energy savings.

Deemed measures, or prescriptive measures with predefined attributes, must have current, approved technical workpapers and be listed in the current DEER or electronic Technical Resource Manual (eTRM).

Deemed measures include, but are not necessarily limited to:

- Pipe Insulation
- Combination Oven/Steamer
- Conveyor Broilers
- Conveyor Oven
- Fryer
- Convection Oven
- Ice Machines
- Pool Heaters
- Rack Oven
- Steam Cooker
- Reach-in Refrigerator/Freezer
- Griddle
- Cogged V-Belt
- Insulated Holding Cabinet
- Laminar Flow Restrictor
- Dishwashers
- Modulating Gas Valve
- On-Demand Hand Wrap Machine
- Coffin Reach-in
- Open Case Refrigeration
- VFD/VSD HVAC Fans
- Instantaneous Water Heater
- NMEC Custom Installation
- Other Customer Installations

Custom measures, or measures developed for a specific project using a site-specific analysis and not identified as a Deemed measure, will follow the Statewide Custom Project Guidance Document and all other statewide documentation and workbooks. All custom measures must save kW, kWh, and/or therms and must adhere to cost-effectiveness thresholds. Custom offerings using a meter-based approach will require pre-screening to determine whether a Normalized Metered Energy Consumption (NMEC) approach is suitable for the customer.

Incentives will not be paid in excess of the installed cost of the measure(s). Installed cost includes material cost, installation labor, sales taxes, and shipping. Customers who self-install may include installation labor cost with proper documentation.

Inspections

Project inspections will be performed for a defined percentage of projects as well as for any project installing "unique" technology solutions or incentive amounts that exceed a defined threshold. By participating in the program, customers are agreeing to allow all inspections required by the program, TRC, and SDG&E to be conducted. Although not all projects will receive inspections, they all are subject to inspection at program discretion. Site inspections involve documenting equipment eligibility and onsite equipment operation information with pictures and/or other documentation. Site inspections can be done either in person or virtually.

Inspection timing:

- Prior to initiation of the efficiency project
- After installation of efficiency measure(s), but prior to payment of incentive
- After installation and payment of incentive

Virtual Inspections

When applicable, a virtual inspection can be performed in lieu of an in-person inspection. In a virtual inspection, the customer participates in the process by gathering and documenting information on behalf of the inspection team. Using the customer's staff eliminates the need to be on-site. It is intended to provide a positive and educational experience for the customer as well as fulfill the program inspection obligations.

The virtual inspection process has four parts:

1. **Planning:** Determine whether the customer is a good candidate; define roles and responsibilities and establish a timeline.
2. **Preparation:** Build a plan to inspect the site for data collection and documentation via videoconference.
3. **Virtual Inspection:** Inspect the site with the customer using videoconference to observe existing conditions and/or confirm installation details.
4. **Analysis:** Use the information collected to fulfill pre- and/or post-installation inspection requirements and documentation.

The decision to use virtual or in person inspection approach will be determined on a case-by-case basis at the sole discretion of the program staff.

Additional Services

In addition to delivering energy savings through qualifying measures, the program also offers the following tools and services to SDG&E's Federal, DoD, and Tribal customers:

PROJECT MANAGEMENT CONCIERGE. A dedicated program representative will serve as the customer's single point of contact for program issues or questions including project status inquiries, program navigation, and application assistance. Even as customers engage Trade Professionals to implement projects, program staff will be ready and available to assist customers with questions and drive any potential issues to resolution. This individualized approach to customers' needs promotes effective program delivery by ensuring customer satisfaction and driving process improvements, where needed, to improve the customer experience.

CUSTOMIZED OUTREACH & TECHNICAL SERVICES. A trusted program advisor will support the customer to make informed decisions and overcome any technical barriers. Support includes:

- Analyzing benchmarking output
- Identifying EE opportunities
- Assisting with program
- Energy auditing and retro-commissioning studies
- Streamlining data collection efforts
- Vendor selection support

WEB PORTAL. Customers will receive instant access to program literature, a project dashboard linked to real-time project status, and all submitted project documentation through the FEP Program website. This website will host several additional features to support the customer's journey to ZNE such as links to benchmarking and online energy assessment tools, a "Find a Contractor" feature, and a Trade Professional rating system. A live chat feature will further ensure that customers are helped at the time and in the way needed to act on energy efficiency opportunities.

TRADE PROFESSIONALS NETWORK. The program will offer a network of trade professionals trained on program offerings and requirements and meeting certain qualification requirements. This provides a network of knowledgeable trades to support customers with their energy efficiency projects.

SUITE OF FINANCING OPTIONS. The program recognizes that capital limitations can severely dampen program participation. To overcome this barrier, the program will offer a suite of financing options including our innovative flexible incentive structure, on-bill financing, and Efficiency-as-a-Service. These financing mechanisms give property owners, managers, and tenants the opportunity to embrace energy efficiency while still allowing for capital improvements normally prioritized above efficiency.

Quality Assurance

The program has a Quality Assurance (QA) team focused on specific parameters that define measure eligibility, energy savings, and required documentation throughout all aspects of the program. The QA team will be comprised of members from the engineering, operations, and outreach teams to ensure holistic program quality. Members of the team bring several accreditations and certifications including LEED AP, PE, CEM, and IPMVP.

The review methodology will be established to examine processes against quality factors, tracking results such that the QA checks and results must be recorded for the project to move to the next stage.

Examples of quality factors for Deemed, Custom Express, and Custom sub-programs are summarized below. QA practices for projects utilizing NMEC are outlined in the program-level M&V plan and will conform to the latest versions of the Meter-Based NMEC Rulebook and the LBNL Site Level Technical Guidance.

Sub-Program	QA Focus	Correctness	Timeliness	Reliability
Deemed	♦ Measure eligibility ♦ Energy savings variations ♦ Required documentation ♦ Alignment with approved Workpaper	The extent to which a deliverable satisfies the requirements and the stated objectives.	The deliverable is provided when required.	The extent to which a deliverable is provided on a consistent basis.
Custom Express	♦ Alignment with CPUC CMPA review protocols ♦ Measure eligibility ♦ Appropriateness of inputs and assumptions ♦ Adherence to M&V activities	The extent to which a deliverable satisfies the requirements and the stated objectives.	The deliverable is provided when required.	The extent to which a deliverable is provided on a consistent basis.
Custom	♦ Compliance with CPUC policies ♦ Baseline operation approach ♦ Confirmation of measure implementation approach ♦ Compliance with Statewide Custom Review Guidelines ♦ Review of energy savings	The extent to which a deliverable satisfies the requirements and the stated objectives.	The deliverable is provided when required.	The extent to which a deliverable is provided on a consistent basis.

For all projects, the program will maintain a clear record of all project documents relevant to the applicable program characteristics. Secondary review of randomly selected projects will periodically check the QA process to ensure that:

- The QA process has been followed, verified by checking that all data and required checks are recorded.
- The project results are reasonable, verified by recalculating results using a secondary methodology such as engineering calculations.
- Project documentation is complete.

Program Metrics

For individual projects, TRC will collect, but not limited to:

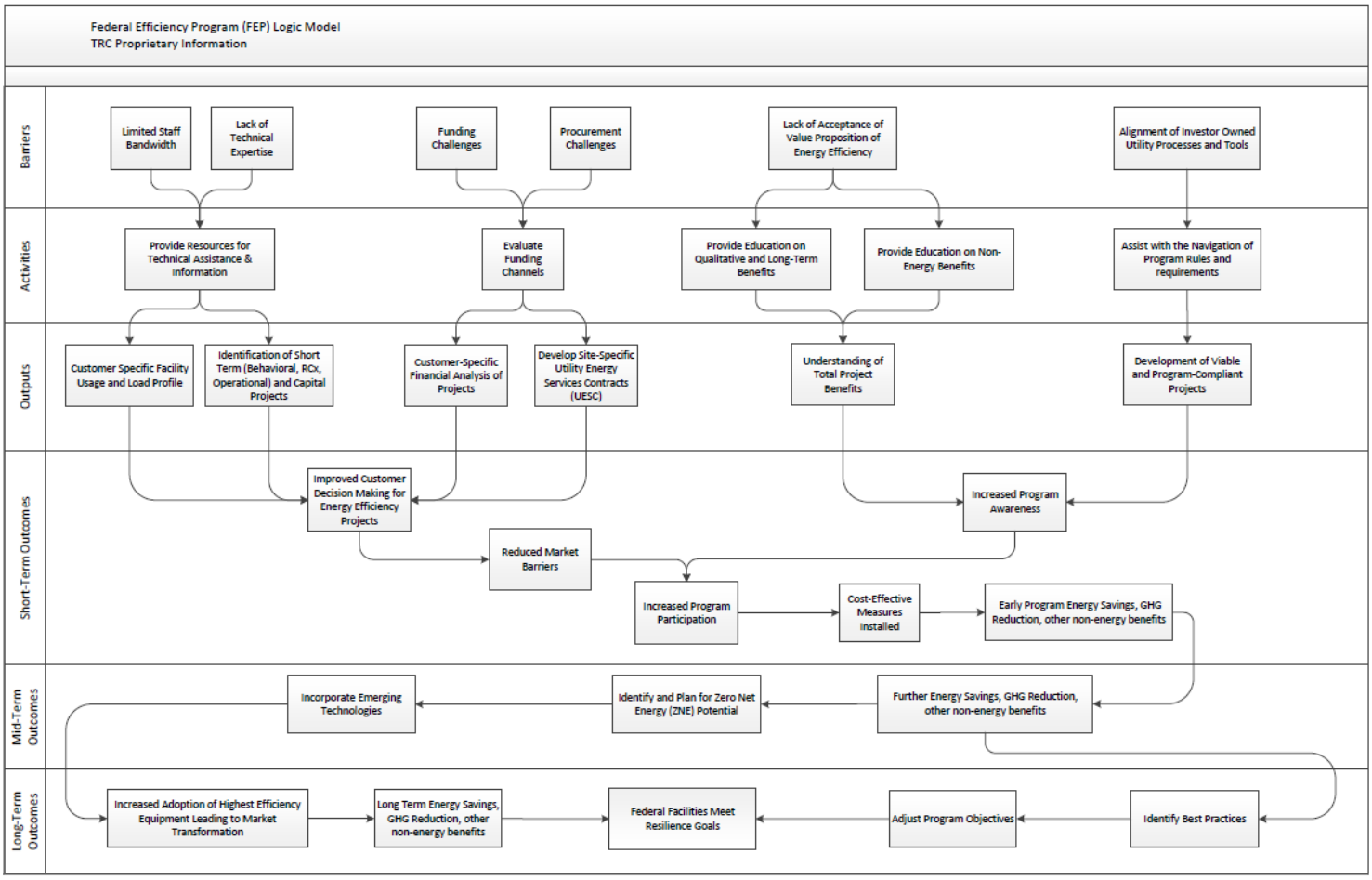
- kWh savings
- kW savings
- Therm savings
- Measures installed
- Delivery type
- Site specific data (climate zone, building type, etc.)

In addition to project-level detail, TRC will collect broader metrics including the following:

- Budget spend
- Total inspections
- Inspections that pass
- Inspections that fail
- Customers reached through specific marketing efforts
- Customer responses to specific marketing efforts
- Customer complaints
- Customers enrolled in program
- Customer Satisfaction
- Historical forecast values
- Forecast variance
- Achieved energy savings against forecasted energy savings
- HTR/DAC participation.

Attachment 2

Program Logic Model


Federal Efficiency Program (FEP) Logic Model
TRC Proprietary Information
Barriers
Activities
Outputs
Short-Term Outcomes
Mid-Term Outcomes
Long-Term Outcomes
Limited Staff Bandwidth
Lack of Technical Expertise
Funding Challenges
Procurement Challenges
Lack of Acceptance of Value Proposition of Energy Efficiency
Alignment of Investor Owned Utility Processes and Tools
Provide Resources for Technical Assistance & Information
Evaluate Funding Channels
Provide Education on Qualitative and Long-Term Benefits
Provide Education on Non-Energy Benefits
Assist with the Navigation of Program Rules and requirements
Customer Specific Facility Usage and Load Profile
Identification of Short Term (Behavioral, RCx, Operational) and Capital Projects
Customer-Specific Financial Analysis of Projects
Develop Site-Specific Utility Energy Services Contracts (UESC)
Understanding of Total Project Benefits
Development of Viable and Program-Compliant Projects
Improved Customer Decision Making for Energy Efficiency Projects
Increased Program Awareness
Reduced Market Barriers
Increased Program Participation
Cost-Effective Measures Installed
Early Program Energy Savings, GHG Reduction, other non-energy benefits
Incorporate Emerging Technologies
Identify and Plan for Zero Net Energy (ZNE) Potential
Further Energy Savings, GHG Reduction, other non-energy benefits
Increased Adoption of Highest Efficiency Equipment Leading to Market Transformation
Long Term Energy Savings, GHG Reduction, other non-energy benefits
Federal Facilities Meet Resilience Goals
Adjust Program Objectives
Identify Best Practices

Attachment 3

Process Flow Chart

Figure 1: TRC Team Process

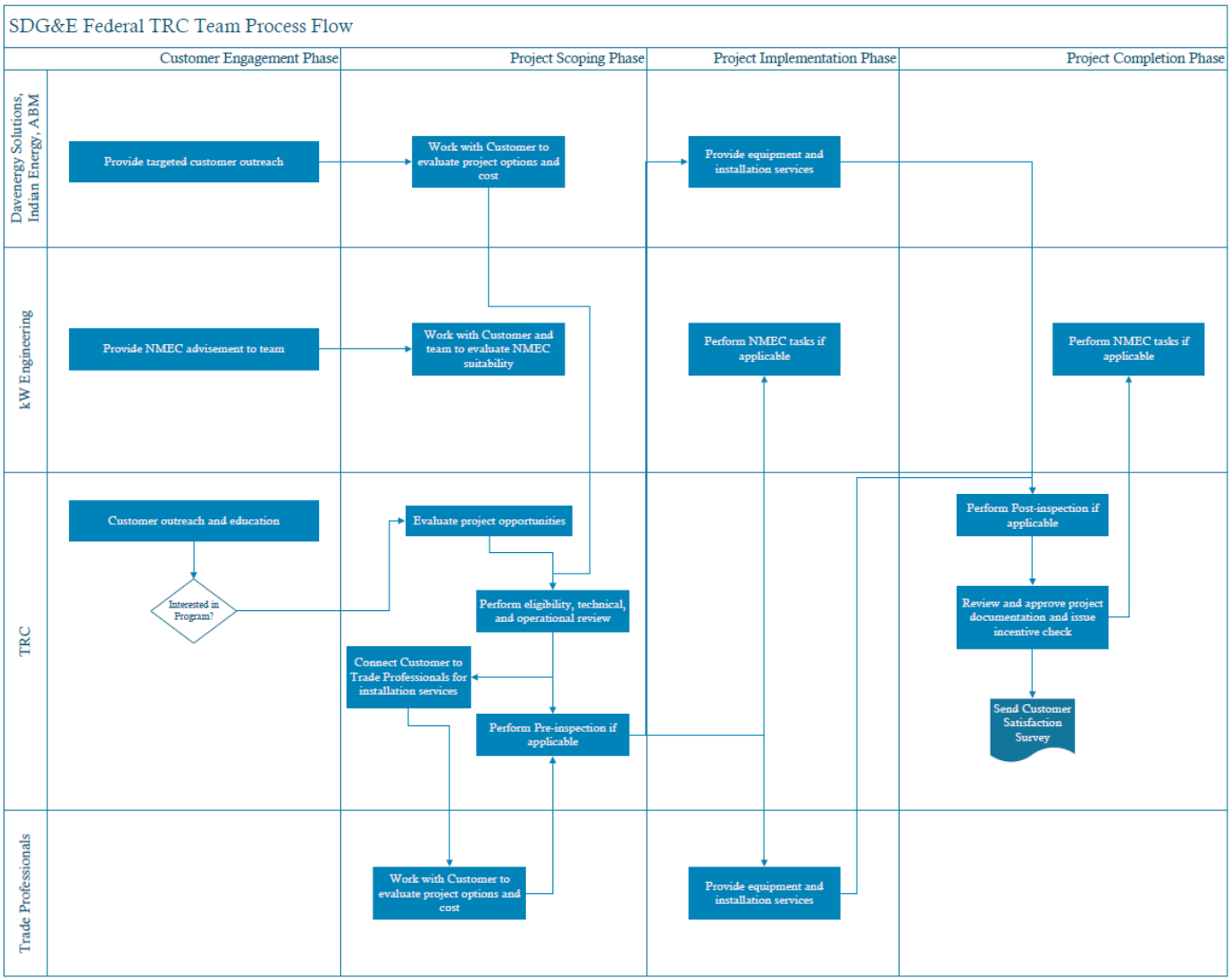


Figure 2: General Overview Process

Figure 3: Custom Process

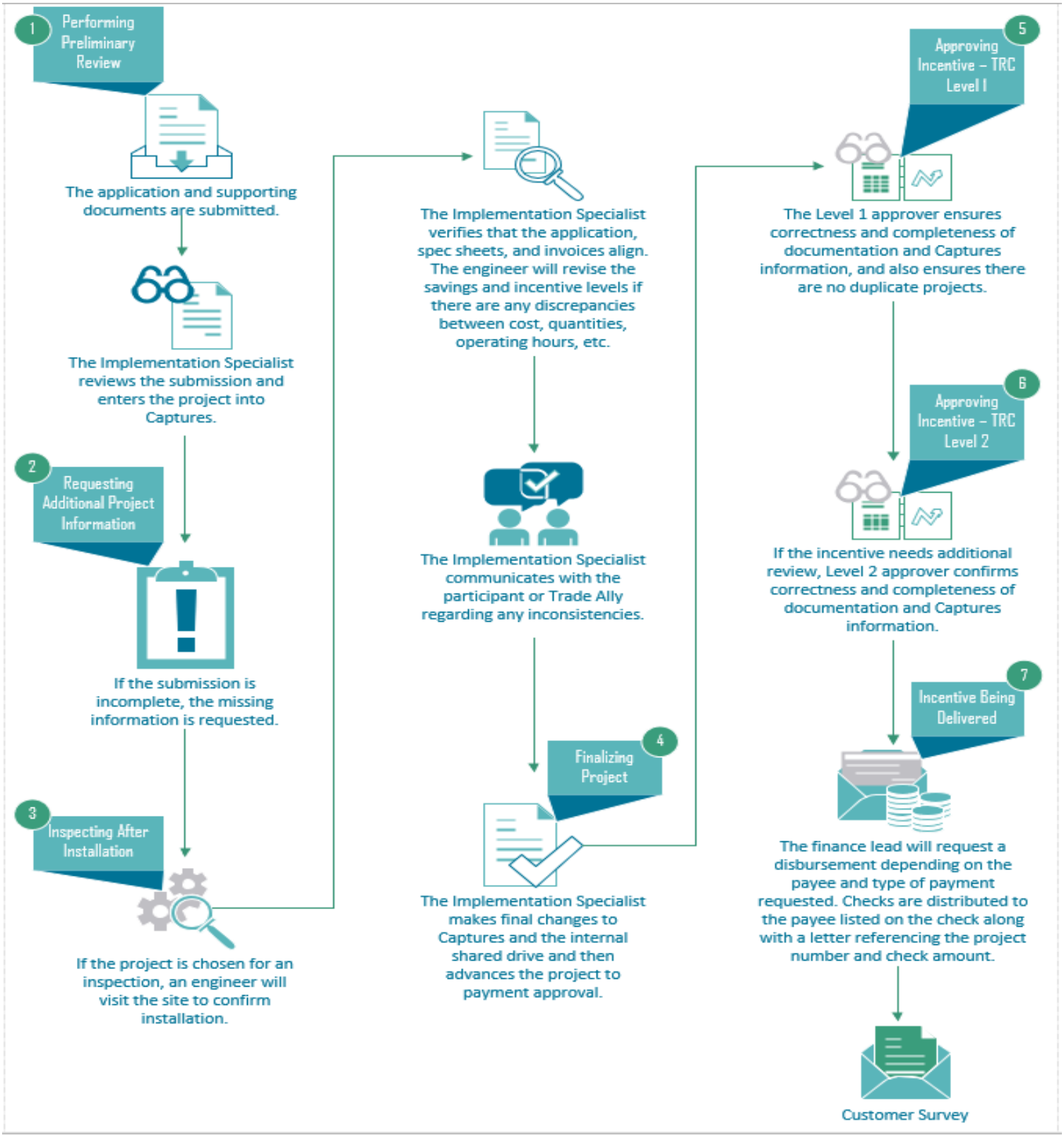
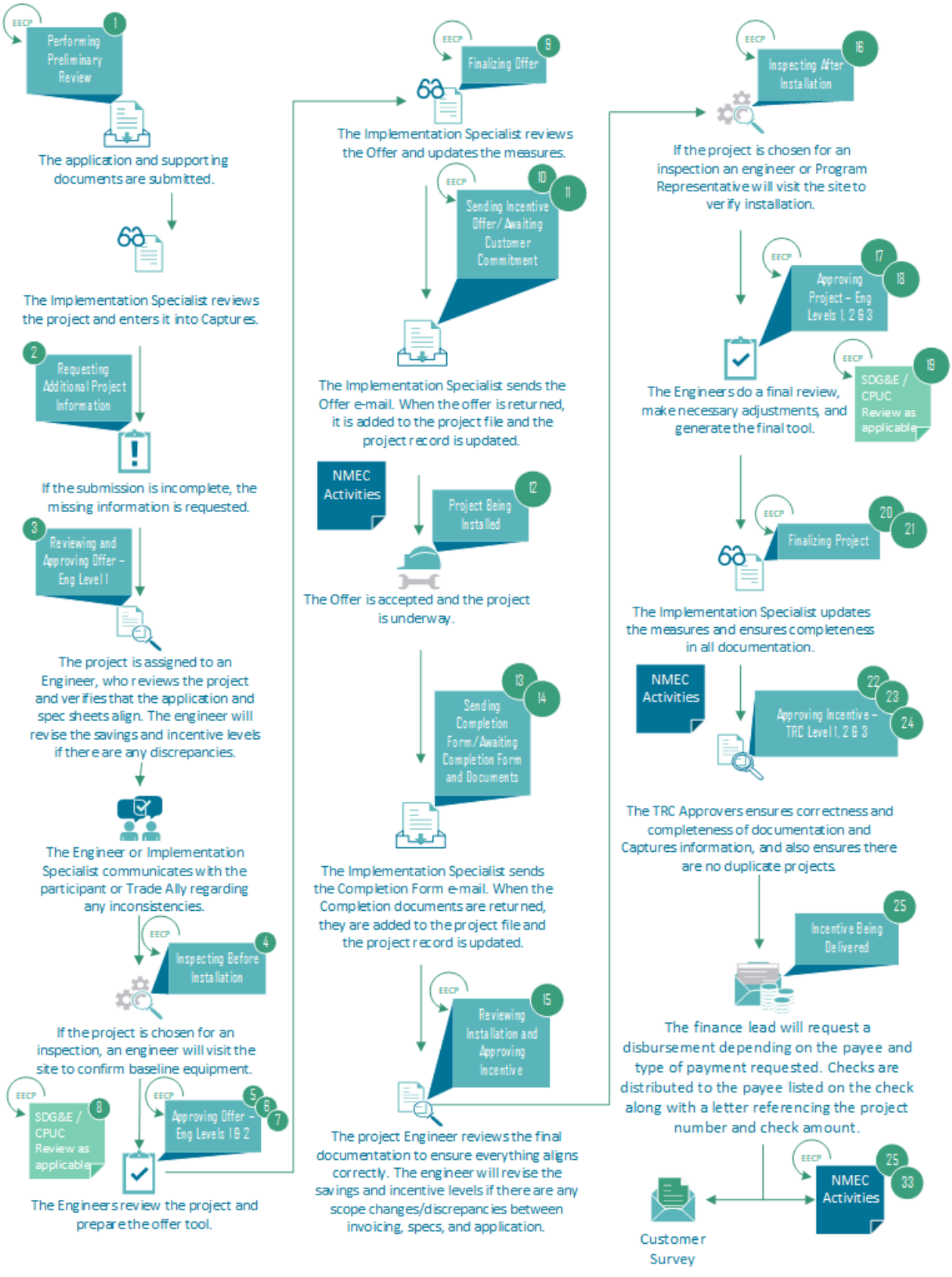


Figure 4: NMEC Process



Attachment 4

Incentive & Workpaper Table

Incentive and Workpapers Table

The following table provides a summary of the deemed measure offerings and associated workpapers. The enclosed table mirrors offerings from the Comprehensive Energy Management Solutions (CEMS) program and will be updated throughout the program with relevant measures. Custom offerings include any cost-effective measures not eligible under the deemed platform. Custom offerings using a meter-based savings approach will require pre-screening to determine whether a Normalized Metered Energy Consumption (NMEC) approach is suitable for the customer.

Measure	Workpaper
Auto Closer for Refrigerated Storage Door	SWCR005
Automatic Conveyor Broiler	SWFS017
Anti-Sweat Heater Controls	SWCR001
Bare Suction Line Insulation	SWCR010
Cogged V-Belt for HVAC Fan	SWHC024
Combination Oven	SWFS003
Convection Oven	SWFS001
Conveyor Oven	SWFS008
Conveyor Toaster	SWFS023
Circulating Block Heater	SWPR004
Door-Type Dishwasher	SWFS002
ECM Retrofit for a Refrigerated Display Case	SWCR003
ECM Retrofit for a Walk-in Cooler or Freezer	SWCR004
Floating Head Pressure Controls	SWCR007
Fryer	SWFS011
Griddle	SWFS004
Hand Wrap Machine	SWFS010

Measure	Workpaper
Hot Water Boiler	SWWH005
Hot Water Tank Insulation	SWWH018
Ice Machine	SWFS006
Laminar Flow Restrictor	SWWH004
LED, High-or Low-Bay	SWLG011
LED, Tube	SWLG009
LED, Type B or Type C Lamp	SWLG018
Low-Flow Pre-rinse Spray Valve	SWFS013
Low-Temperature Coffin to Reach-In Display Case Conversion	SWCR019
Medium-Temperature Case Doors	SWCR015
Medium-Temperature Open Display Case Retrofit	SWCR020
Medium or Low-Temperature Display Case With Doors	SWCR021
Ozone Laundry System	SWAP005
Package Terminal Air Conditioner or Heat Pump	SWHC027
Pool Cover	SWRE001
Process Boiler	SWWH008
Reach-in Refrigerator or Freezer	SWCR018
Recirculation Pump Timer	SWWH021
Software-controlled Switch Reluctance Motor	SWHC041
Steamer	SWFS005

Measure	Workpaper
Storage Water Heater	**SWWH007**
Supply Fan Controls	**SWHC009**
Tankless Water Heater	**SWWH006**
Ultra-Low Temperature Freezer	**SWCR017**
Undercounter Dishwasher	**SWFS018**
Underfired Broiler	**SWFS019**
VSD for HVAC Fan Controls	**SWHC018**
VSD for Pool Pump	**SWRE002**

Incentive amounts will vary depending on a variety of factors, such as the measure application type and its associated cost basis (i.e., Incremental Measure Cost (IMC) and Full Measure Cost (FMC)), as well as the measure's cost effectiveness and payback period.

Attachment 5

Quantitative Program Targets

Quantitative Program Targets

The following table provides the quantitative program targets.

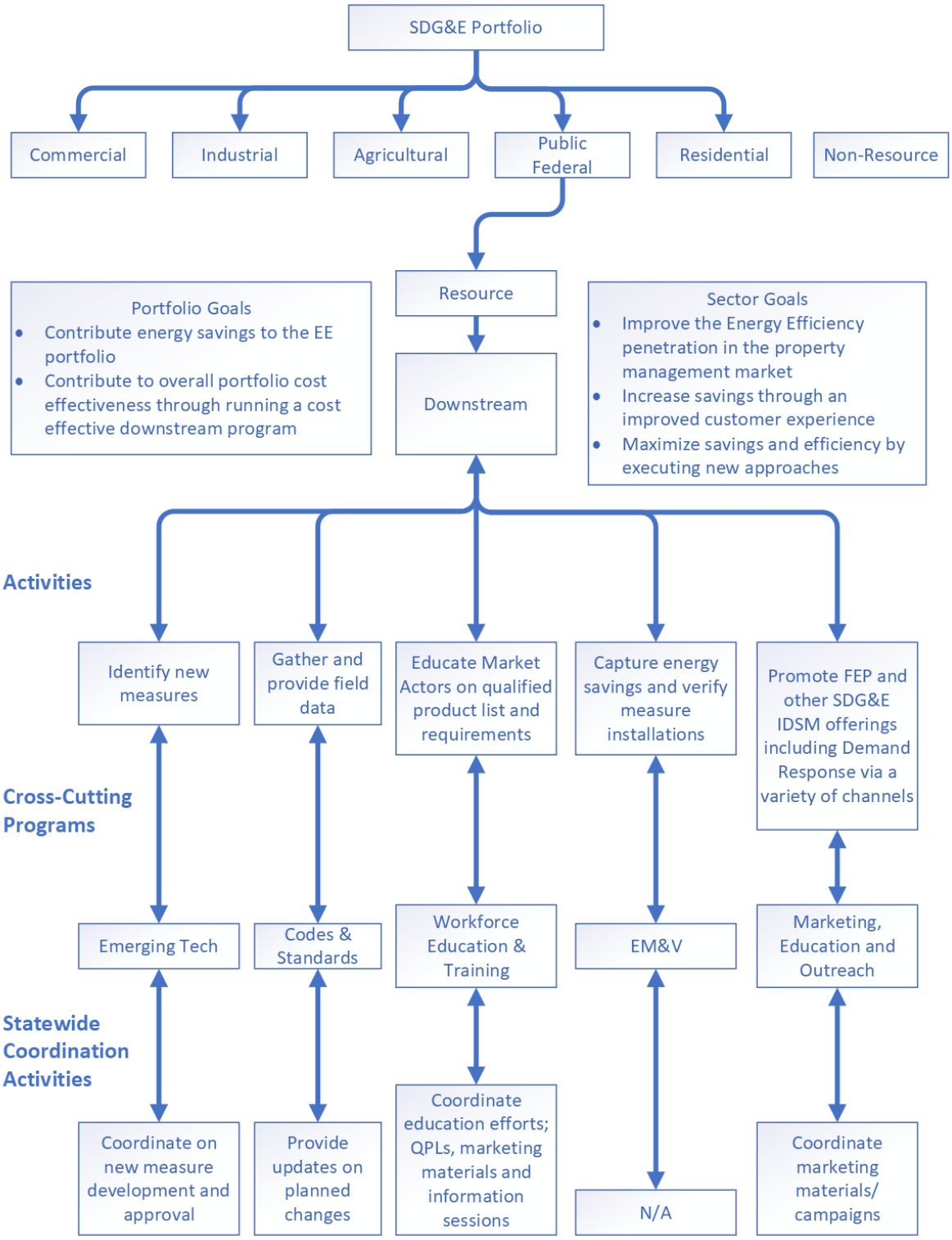
Target	2021	2022	2023
Total Customers Served	420	420	420
Hard-to-Reach (HTR) Customers Served	70	70	70
Disadvantaged Community (DAC) Projects	56	56	56
Unique Marketing Impressions	896	896	896

Attachment 6

Diagram of Program

Program Diagram

The program diagram for FEP appears below:



Attachment 7

Evaluation, Measurement & Verification

Normalized Metered Energy Savings (NMEC) Program M&V Plan

Appropriateness of Meter-Based Platform

Pursuant to the CPUC guidance issued on January 31, 2019, NMEC is approved for use in the commercial sector and TRC's Federal Energy Program (FEP) will use a site-level NMEC approach as applicable and will conform to the latest versions of the Meter-Based NMEC Rulebook 2.0 (January 7, 2020), and the LBNL Site Level Technical Guidance, version 2.0 (December 14, 2019)[1]. In the site-level NMEC approach, savings are determined for each program participant after measures are installed, based on an analysis of pre- and post-installation meter data. In this approach, the post-installation energy use data provides important feedback to assure savings are achieved. This aligns the goals of customers and ratepayers, who both require assurance of the return on their investments.

Site-level NMEC follows the well-known International Performance Measurement and Verification Protocol (IPMVP) Option C[2] approach. Traditionally applied with billing data, this approach has been updated with advanced modelling methods applied to short-time interval data from California's advanced metering infrastructure (AMI data), enabling much more accurate savings analysis. Our approach allows multiple advanced modeling algorithms and independent variables to be assessed, to find the best fitting model for any NMEC project. This enables the methodology to be applied over a much wider range of building use types.

Several attributes of our site-level NMEC approach make it a robust and appropriate methodology for both the program and its customers:

- The savings methodology aligns with how customers think of their savings investments: at the meter.
- The short-time interval data and savings analysis provides fast feedback on a project's performance, enabling timely identification and resolution of issues that prevent savings.
- The approach focusses on achieving savings and verifying the return on the customer's and the program's investment.
- The method is scalable because it is applicable across multiple commercial & Federal building types and its uniform approach enables more participation by customers, implementers, and contractors.

Methodology

The NMEC M&V Plan describes the requirements for each participating customer. Below we first describe the overall site-level NMEC process that governs a customer's NMEC journey. This provides the context upon which the overall program M&V is based. While specific M&V plans for each participating customer are required and provide more project level details, the program M&V Plan has a broader scope with additional elements including customer pre-screening, measure savings analysis, and lifecycle cost requirements. This section describes the site-level NMEC M&V Plan.

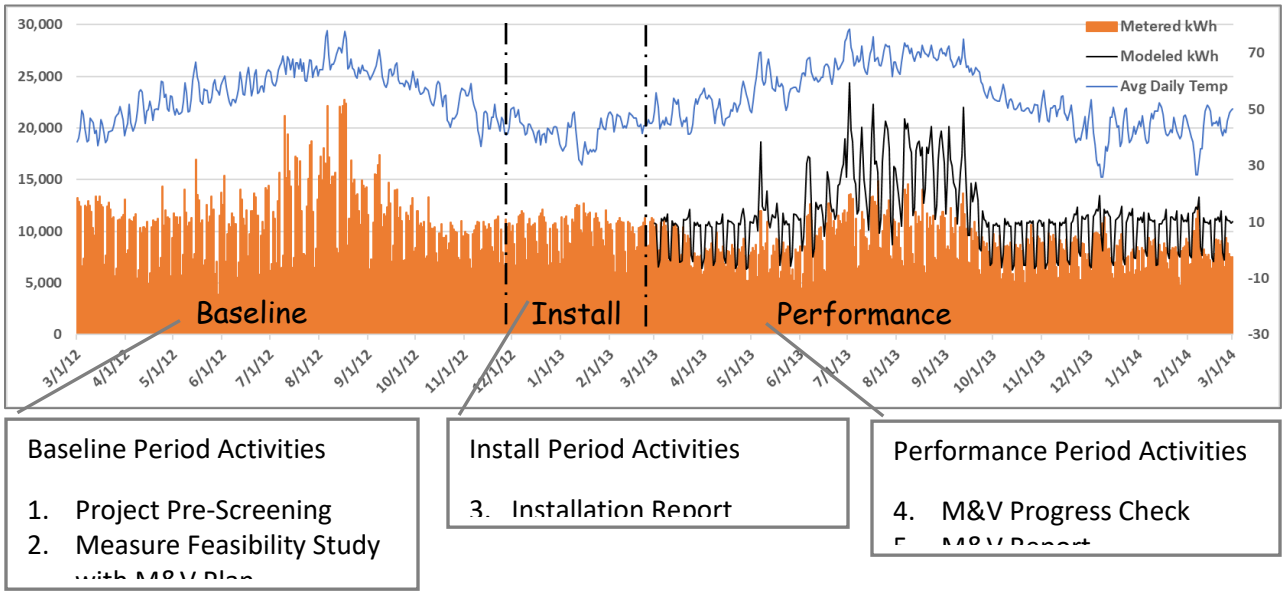
[1] https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463695

[2] International Performance Measurement and Verification Protocol (IPMVP), Efficiency Valuation Organization, ***www.evo-world.org***

Our approach to each site-level NMEC project has been designed following the guidance on measurement and verification (M&V) plans LBNL provided to the CPUC[3] (LBNL Guidance), while integrating requirements set forth in A.17-01-013 for measure cost-effectiveness, estimated useful life, measure verification, and BRO measure maintenance plans. Our approach assesses each potential NMEC project prior to acceptance, collects the necessary information at key milestones of the process, and manages the inherent risks with meter-based methods. Figure 5 provides an illustration of our site-level NMEC project process, showing how customer engagement, measure development, and verification is integrated with the overall M&V process. This approach has been successfully implemented in several projects.

The chart shows how baseline use was adjusted to performance period conditions (black line) and how much daily energy use was reduced (gap between black line and orange bars). In each phase, several reports document key project requirements and milestones. Each program report is based on a template to assure all the required information is collected.

Figure 5. NMEC Project Process



Baseline Period

Project Pre-Screening. For each potential NMEC Program participant, the NMEC M&V Plan requires an initial site visit and discussion with the building owner to assess the facility baseline condition including the presence of non-IOU energy sources, the efficiency measure opportunities and their savings potential, and to ascertain the potential for non-routine events (described below) occurring in the baseline period or planned in the future. A year of building energy use, weather data, and any other relevant variables is collected, and an analysis completed to determine whether an energy model may

[3] Guidance for Program Level M&V Plans: Normalized Metered Energy Consumption Savings Estimation in Commercial Buildings, version 1.0, March 1, 2018, available at: *ftp://ftp.cpuc.ca.gov/gopher-data/energy_division/EnergyEfficiency/RollingPortfolioPgmGuidance/LBNL_NMEC_TechGuidance_Draft.pdf*.

be developed to meet the program's goodness of fit and accuracy requirements.[4] In the case of a building with on-site generation, the building energy use includes the energy supplied by SDG&E and the generation. This generation data is included in the data analysis which provides a mechanism to establish a baseline for the overall building energy use. This procedure would establish the baseline for the overall grid consumption of the building. The pre-screening activity is used to determine whether the project is an acceptable site-level NMEC candidate.

Project Feasibility Study. A more in-depth assessment of potential energy efficiency measures is provided in the measure feasibility study. This step may include an ASHRAE level I or II energy audit. Individual measure savings and costs are provided and estimated useful life (EUL) is determined for each measure. Per the NMEC Rulebook 2.0, each normal replacement measure will be listed in the feasibility report and its to-code adjustment to the final normalized savings shown. The feasibility study provides a description of the baseline systems and equipment, their operations, energy use, and the list of measures, with their savings, costs, and EULs. A weighted average EUL for the group of measures is determined based on CPUC guidance. The study is submitted to SDG&E for approval and includes documentation of program influence and references the M&V Plan for the project.

The Site-Level M&V plan documents how savings will be determined. Following the LBNL Guidance and the NMEC Savings Procedures Manual,[5] it describes the building, the potential savings, the meters and data required for NMEC analysis, what modeling algorithms were chosen to develop baseline energy models, their acceptance criteria, expected savings uncertainties, how Non-Routine Events (NREs) will be identified and their impacts determined, how savings will be reported, and how often. The NMEC Savings Procedures Manual provides a template for the M&V Plan, which will be followed to capture all required information and provide complete descriptions of the savings analysis. General sections included in the templates are

- Project Description including Energy Conservation Measures,
- M&V Boundary,
- Baseline Model Development,
- Normalized Savings Calculation,
- Non-Routine Adjustments,
- Normalized Savings Determination,
- Energy Prices,
- Roles and Responsibilities,
- Savings Report Format, and
- Quality Assurance.

[4] Per the "Guidance for Program Level M&V Plans: Normalized Metered Energy Consumption Savings Estimation in Commercial Buildings" guidance document provided CPUC by LBNL for the NMEC rulings, these criteria are: CV(RMSE) < 25%, NMBE < 0.5%, and $R^2 > 0.7$, where CV(RMSE) is the coefficient of variation of the root mean squared error (a measure of model random error), NMBE is the net mean bias error (a measure of model bias error), and R^2 is the coefficient of determination (an indication of how well the independent variables, e.g. temperature, 'explains' the dependent variable, e.g. energy use).

[5] Normalized Metered Energy Consumption Savings Procedures Manual. SCE Emerging Technology Project ET15SCE1130, available at: ***https://www.etcc-ca.com/reports/normalized-metered-energy-consumption-savings-procedures-manual***.

Data, spreadsheets, and analysis code will be provided for technical reviewers and evaluators to understand how models were developed and assessed.

Installation Period

Installation Report. The NMEC M&V Plan requires measures to be verified as installed. Verification methods will include visual inspection with photos, receipt of contractor invoices and other cost information, and analysis of trend data from periods before and after measure installation, as available. Trend analysis provides direct evidence of the improvement in energy efficiency of building systems and equipment. These techniques for documenting measure performance may be used by building operators over time to demonstrate persistence. The installation report is submitted to SDG&E for review and approval.

Performance Period

M&V Progress Check. Periodic checks will be made throughout the performance period at a frequency determined by individual projects to ensure that energy savings are accumulating. To complete the check, energy use data will be collected, and a savings-to-date analysis conducted. This task is very short in duration but provides valuable project insight. The analysis will show whether the savings are accruing as expected and identify the presence of any NREs that must be addressed. This is an internal TRC team activity. Any savings adjustments seen from this effort will be included in Captures to provide an accurate program reporting forecast.

M&V Report. The M&V report will document the raw data collected, preparations for its analysis, and analysis to determine savings, as described in the project's M&V plan. It will be based on the savings report template provided in the NMEC Savings Procedures Manual. Specific content of the Savings Report template from the NMEC Procedures Manual includes:

- Project Description,
- Deviations from Planned M&V Activities,
- Verification of Measure Installation,
- Reporting Period Model Development,
- Performance and Savings, and
- Quality Control Activities.

Additionally, the report shall discuss the "Goodness of Fit" statistics, model uncertainty, NREs, missing data and or "zeros", as well as relationships between weather data and net savings claims including any on-site generation analysis performed. The potential interactive effects, and possibility of fuel switching at the measure level should also be included.

All data, spreadsheets, and analysis code used in the analysis will be provided for technical review and evaluation. Savings reports will be issued at the end of the NMEC M&V period and will document program-claimed savings.

Software/Tools Employed

The TRC Team has developed an integrated suite of peer-reviewed and publicly available statistical data modeling algorithms to quantify savings achieved by energy efficiency projects following the NMEC approach. The suite enables the use of multiple modeling algorithms and quick assessment of their applicability and validity to determine the algorithm best-suited for each site. The diverse number of modeling algorithms available allow their application to a variety of building types. Moreover, the suite is extensible, designed to accommodate new modelling algorithms and other developments in the application of NMEC, including new capabilities based on kW Engineering's own experience and research efforts.

The public-domain R programming environment is the NMEC analysis platform. R is a programming language and free software environment for statistical computing and graphics. It is supported by the R Foundation for Statistical Computing.[6] Along with its integrated development environment RStudio, R is widely used by statisticians and data analysts in academic and professional environments. As an alternative to Microsoft Excel's limitations with large volumes of data and advanced regression analysis, kW Engineering selected R and RStudio because of its focus on statistics, its wide use and support, no-cost and ready availability, and most importantly its transparency to anyone tasked with reviewing the analysis methods in NMEC programs. Use of the R code has streamlined all the analysis required by site-level NMEC projects. With every project, the data and R code used for pre-screening and savings analysis is provided for technical review, along with instructions for setting up R, RStudio, and running the analysis. This process has been successful in multiple technical reviews to date.

The following are the key features of our M&V analysis portfolio:

1. **Transparency**: The algorithms are coded in the R programming language (an open-source programming language), making them transparent and reviewable.
2. **Model Applicability Assessment**: All site data and models are assessed, visually and statistically, to ensure that data integrity is upheld, and the underlying regression modeling assumptions are met. These include:
    a. Linearity of data: The relationship between the predictor (e.g., temperature) and the predicted (energy use) is assumed to be linear.
    b. Normality of residuals: The residuals are assumed to be normally distributed. Residuals are the difference between the predictor and predicted values.
    c. Homoscedasticity: (homogeneity of residual variance): The residuals are assumed to have a constant variance.
    d. Independence of residuals: The residuals are assumed to be independent of each other.
3. **Quantification of the time value of energy saved**: The analysis is performed on SDG&E AMI data or submetering (with short time intervals: 15 min or 1 hour), enabling time dependent valuation of savings.
4. **Timely feedback, reduced labor costs and improved accuracy**: The data-driven modeling algorithms are scripted in R and have run times in seconds. This upgrade from point-and-click M&V software reduces analysis time and provides detailed feedback on savings as they accrue. Moreover, scripting of the M&V data analytics provides a high level of computational accuracy while reducing the associated labor costs.

[6] R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

5. **Risk Quantification**: Data-driven modeling enables quantification of the uncertainty and risk associated with the savings projections and is calculated in accordance with the formulations provided in ASHRAE Guideline 14.

Analytical Methods

The following modeling algorithms are available in our analysis portfolio:

Time-of-Week and Temperature (TOWT) Model: The TOWT model[7,8] is a linear regression-based load prediction method that has a time-of-week variable to characterize the load of each interval within a week, and a piecewise linear and continuous outdoor air temperature variable to describe the temperature dependency of the load. LBNL provided R code for the model in its GitHub Repository[9] that included a weighting factor useful in demand analysis. Our team adapted the code to allow users to 'disable' the weighting factor and provide equal weight to all data points to remain in compliance with guidance provided by LBNL to the CPUC for NMEC programs.

Time Only Model: The Time Only model is a subset of the TOWT model, with the time-of-week variable as its sole predictor. As in the TOWT model, the time-of-week variable is developed to characterize the load for each interval within a week.

Simple Linear Regressions with Outside Air Temperature and Change-Point Models: The simple linear regressions and multi-parameter change-point models are based on the ASHRAE Research Project 1050-RP Inverse Modeling Toolkit[10,11]. It includes 2-parameter (linear regression), and 3-, 4-, and 5-parameter models.

Heating and Cooling Degree Day Models: Modeling algorithms based on heating degree days and cooling degree days are well known within the industry and have most widely been used in daily and monthly electric consumption/demand data analysis.[12]

Key Data Points

The following data are required for site-level NMEC analysis:

1. ***Energy Consumption Data***: This can be sourced from a whole-building meter or a submeter, and should ideally be short interval data, i.e., 15-minute or hourly. The customer is requested to authorize access for our Program via SDG&E's 'Green Button Connect My Data.' Data from a

[7] Mathieu, J.L., Price, P.N., Kiliccote, S. and Piette, M.A., 2011. Quantifying changes in building electricity use, with application to demand response. IEEE Transactions on Smart Grid, 2(3), pp.507-518.

[8] Price, P., 2010. Methods for analyzing electric load shape and its variability. Lawrence Berkeley National Laboratory Report LBNL-3713E.

[9] Touzani, S., RMV2.0 (2018), Github repository, ***https://github.com/LBNL-ETA/RMV2.0***

[10] Kissock, J. K., Haberl J.S., Claridge, D.E., 2002. Development of a Toolkit for Calculating Linear, Change-point Linear and Multiple-Linear Inverse Building Energy Analysis Models.

[11] Killick, R. and Eckley, I., 2014. changepoint: An R package for changepoint analysis. Journal of Statistical Software, 58(3), pp.1-19.

[12] Multiple websites describe the methodology, for example: ***https://www.degreedays.net/calculate-energy-savings***

facility owner's submeters, along with calibration documentation, may also be requested to access energy consumption data.

2. ***Outside Air Temperature Data***: This can be sourced from the facility's nearby weather station through National Oceanic and Atmospheric Administration (NOOA) or other similar weather data websites.
3. ***Normalized Weather Data***: This data can be sourced from the California Energy Commission's CZ 2010 weather datasets, defined for 16 California climate zones, or the CZ 2018 weather dataset when it becomes available.
4. ***Operating Schedule Information***: If a building has more than one operating mode, this information will be needed to model the separate operating modes appropriately. Examples of operating modes include school's holidays and summer sessions, different occupancy periods in office buildings, and so on.
5. ***Additional Predictor Variables' Data***: For certain buildings, additional predictor variables, such as customers served, production rate, etc., may be essential to modeling the building's energy use. In light of the impacts of COVID-19, we must ensure inclusion of key variables and minimize the risk due to the low-occupancy COVID-19 period by identifying what building-specific data are available to develop baseline models. Since changes in occupancy during the COVID-19 stay at home period may prove to be a significant influence on energy use, occupancy loads will be included as an independent variable where appropriate, to ensure that baseline models are accurate over the ranges of occupancy expected in the performance period as buildings re-occupy. For these cases, we will determine the appropriate predictor variables (through interviews with building owners) and request data access for modeling.

Data Collection Plan

As part of the participation requirement, customers must provide access to their utility data, or provide a year (minimum) of energy use data from their submeters. The program data collection plan is similar for each participant and includes the key data described above. For sites with on-site generation, this data would include generation data to understand the building's overall energy needs informing the data analysis of the net grid impacts. For individual projects, data parameters are determined based on the site-specific M&V plan. All data for estimating measure savings and measure verification analysis will be requested though a data request process. Conformance to the CPUC publication: Energy Efficiency Savings Eligibility at Sites with non-IOU Supplied Energy Sources—Guidance Document[13]; (current version 1.1, and with exceptions and examples) will be evaluated and each project (with on-site generation) will be shown to comply.

The NMEC process requires data from multiple sources, and there are always challenges in obtaining reliable data for analysis. Metering and network connectivity issues may result in sporadic loss or erroneous energy data. Weather data files are notoriously 'gappy' over a few time intervals or may be missing weeks of data. Often data sets have repeated values for many time instances.

Customer-owned energy meters may have resolution issues, requiring use of longer time interval models. Additional independent variables beyond weather must be collected from the participant.

[13] https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11610

These data sources must be reliable throughout the project. Their forms and recording time intervals must be coincident with the energy data to be made useful for the M&V analysis.

Depending on the duration, the missing data may be ignored, interpolated from adjoining data points, filled-in using data from nearby weather stations, or the monitoring period may be extended. Each data cleaning step will be reported.

Good modeling practice requires that models be developed from a dataset that includes the maximum range of energy and independent variable values. Models should not be used for predictions more than 10% beyond the range (max – min) of independent variables used in the baseline period. Weather coverage factors, which describe how much of the range of baseline period temperature data includes the range of normalized conditions temperatures, will be part of the model assessment.

We will use the most complete and representative weather dataset for each savings quantification.

Precision of Program Savings Measurement

LBNL provided the "Guidance for Program Level M&V Plans: Normalized Metered Energy Consumption Savings Estimation in Commercial Buildings" document to the CPUC for the NMEC rulings. In section 3, a scenario analysis is recommended to demonstrate that the proposed modeling approach will produce results with acceptable levels of precision. The scenario analysis requires monthly billing data from a population of sites to proceed. Such a data request is not permitted in this solicitation. We note that research by LBNL under a PG&E Emerging Technology Project concluded that uncertainty estimation formulations for hourly and daily models underestimated the actual savings uncertainty, however they reliably estimated uncertainty for models developed from monthly data.

To assure that the TRC NMEC Program will provide savings estimates within the maximum allowable precision of 50% (90% confidence level), for each site-level NMEC project, we will estimate savings using monthly models by rolling up the energy consumption data to calendar months and performing the same analysis as we described above for daily or hourly models. We will do this only because the ASHRAE formula for savings uncertainty was shown to be valid for monthly models. Our process is to exclude projects that do not meet this 50% threshold from the NMEC program. As we complete more site-level NMEC projects, we will report the total program savings and savings uncertainty. The saving uncertainty will be reduced quickly at the program level as we add projects to the NMEC program, roughly by the inverse of the square root of the number of projects in the program.

We expect each site-level NMEC project in the program to generate savings at much lower levels of uncertainty than 50% and anticipate numerous participants in the program. Each of these factors will lead to an acceptably low program savings uncertainty, on the order of 10% or less.

The industry does need an accurate method to estimate individual site savings uncertainty with daily and hourly models. The collected data, modeling, and savings analysis in this program will enable further research in this area.

Approach to Ensure Adequate Monitoring in Reporting Period

Monitoring in the reporting period is critical for two reasons: 1) to assure savings are accumulating as expected, and 2) to periodically check for the occurrence of NREs, determine their cause, and remove

their impacts from the final savings analysis. For each project, the TRC NMEC Program will run simple savings checks every two to three months during the performance period, as described earlier. Requests for participating customer energy data will be made, and the progress checks will be completed quickly using the R code. Customers find the progress checks helpful and useful for reporting energy savings successes to management.

Approach to Determining EUL Values

The feasibility study will identify and recommend energy efficiency measures for each NMEC project. Each measure's estimated useful life (EUL) will be determined or approximated from Database for Energy Efficient Resources (DEER) records. The feasibility study will determine a weighted useful life for the recommended measures. After installation, this weighted useful life will be updated based on the actual measures installed and reported with the final savings report. Additionally, the simple payback period will be compared to the weighted EUL for "measure" eligibility (SPP must be less than EUL).

Adjusting for Non-Routine Events (NREs)

NREs can be short term, long term, or permanent changes in building energy use. They may be additions or subtractions of constant or variable loads. NREs occurring in the post-installation period are risks to the savings estimation. Savings progress checks will be used to identify the occurrence of NREs in the performance period. The following techniques to identify NREs with the metered energy use data will be used:

1. Visual Checks
2. Changepoint Analysis in R[14,15]
3. Breakout Analysis in R[16]
4. Anomaly Detection in R[17]

Once identified, the facility owner will be contacted to determine the cause of the NRE. The facility owner will also be required to communicate the presence of an NRE, which will then be identified and verified in the meter data.

Techniques for addressing NREs vary depending on their significance and characteristics. If the NREs are found to last a short duration, such as a day, they will be removed from the dataset. Impacts of significant NREs lasting weeks or months will be quantified and project savings will be adjusted. To manage costs, meter data analysis will first be used to resolve NRE impacts, followed by engineering

[14] Killick, R., Fearnhead, P. and Eckley, I.A., 2012. Optimal detection of changepoints with a linear computational cost. Journal of the American Statistical Association, 107(500), pp. 1590-1598

[15] Killick, R. and Eckley, I., 2014. changepoint: An R package for changepoint analysis. Journal of Statistical Software, 58(3), pp.1-19.

[16] James, N.A., Kejariwal, A., Matteson, D.S., 2014. Breakout Detection via Robust E-Statistics, Github repository, ***https://github.com/twitter/BreakoutDetection***

[17] Vallis, O.S., Hochenbaum, J., Kejariwal, A., 2014. Anomaly Detection Using Season Hybrid Extreme Studentized Deviate Test, Github repository, ***https://github.com/twitter/AnomalyDetection***

calculations based on assumptions or based on data collected from the building through trends or data logging.

A short example of quantifying NREs with meter data is to develop a model using all data, except the data from the period in which the NRE occurred. We will use this model to estimate the 'usual' energy consumption in the period in which the NRE occurred. We will quantify the NRE by differencing the actual energy consumption and the estimated 'usual' energy consumption during the NRE period. Other methods we may employ are provided by BPA[18] and LBNL.[19]

Method of Determining Program Influence and Net-To-Gross

Program influence is determined and documented similar to any other custom measure. We believe that diligence in documentation and asking the right questions throughout the entire project development process is key to minimizing program free ridership. While there can be single showstoppers with a project, usually, free ridership is determined by examining several different attributes surrounding the project development and the customer's decision to move forward.

Early screening for free ridership is extremely important. This reduces program costs by not developing ineligible projects but perhaps, more important, manages the customer's expectations and program experience. The longer the development, the more time the customer has invested in program support. The earlier that a project can be identified as a free rider and cease development, the less negative impact on the customer. Free ridership screening is about understanding "what would have happened in the absence of the program" by asking open-ended questions to assess the state of the project at intervention and the customer's motivations. Typical questions include:

- Timing of funding/budget allocation,
- Understanding the customer decision-making process,
- Current energy efficiency goals,
- Customer standard practice,
- Non-energy Benefits,
- Code requirements, and
- Equipment functionality and service.

The TRC NMEC Program will use the net-to-gross (NTG) ratio of 0.95 per CPUC Resolution E-4952. Should SDG&E desire, we may also implement the self-report method to estimate the program NTG ratio, using the standard NTG question battery and analysis instrument used in the evaluation of the 2013-2015 nonresidential programs.[20]

[18] SBW Consulting, April 30, 2018, Potential Analytics for Non-Routine Adjustments. Prepared for Bonneville Power Administration

[19] ***https://github.com/LBNL-ETA/nre***

[20] 2013-2015 Program Performance Assessment of the Nonresidential Downstream Programs. Submitted to CPUC by Itron, December 2017.

Savings vs. Normal Variations in Consumption

Screening projects to assure savings can be determined with reasonable uncertainties is good practice to ensure individual projects generate valid savings estimates. Since savings uncertainty is inversely proportional to the amount of savings achieved, the higher the savings, the less the savings uncertainty. The TRC NMEC Program will seek projects with a high level of savings but will not turn away projects with low savings if the savings can be determined with uncertainties that meet accepted statistical requirements, lower than 50% (of savings) at a 90% confidence interval. As described earlier, monthly models will be developed, and ASHRAE's fractional savings uncertainty formulation[21] used to estimate the uncertainty for each project's estimated savings. The analysis will also yield the minimum detectable amount of savings, which will help assess how low savings can be and still meet the precision requirement. Each savings check will describe how savings are distinguishable from consumption variations, as based on this statistical analysis.

Entity Conducting M&V Activities

Most M&V analysis for the TRC NMEC program will be performed by our NMEC partner, kW Engineering. TRC internal engineers and engineering consultants will also conduct NMEC M&V activities as needed to support program goals.

Entities Receiving Compensation at Each Project Stage

The following major project milestones will be used to trigger customer incentive payment and contractor compensation. In terms of the customer incentive payment, presented below is a general payment structure. However, we understand that customer specifics and dynamics may require alterations to this general payment alignment

1. **Project Feasibility Study** –
    - TRC receives of a performance payment upon SDG&E review and approval of the feasibility study. Savings will be estimated as described in the "Methodology" section and payment terms will be subject to contract negotiation. Other program documentation (SW Custom Projects Guidance) located on the CPUC website[22] including Project Review Summary Report will be included, as applicable, with this submittal.
2. **Installation Report** –
    - TRC receives of a second performance payment upon SDG&E review and approval of the installation report. Savings will be estimated as described in the "Methodology" section and payment terms, including true-up provisions, will be subject to contract negotiation.
    - TRC will distribute an installment of the customer incentives upon SDG&E review and approval of the installation report.
3. **M&V Report –**
    - TRC receives a final performance payment upon SDG&E acceptance of final project savings verification. Claimed savings will be estimated as described in the

[21] ASHRAE Guideline 14-2002, Appendix B. Fractional savings uncertainty for models with uncorrelated and correlated residuals.

[22] ***https://www.cpuc.ca.gov/General.aspx?id=4133***

"Methodology" section and payment terms, including true-up provisions, will be subject to contract negotiation.

- TRC will distribute an installment of the customer incentives upon SDG&E review of the project's final measured and verified savings.

Method(s) and tools utilized in the calculation of incentives and/or compensation at each stage of compensation

Methods and tools are described in "Analytical Methods" Section of this document.

The customer incentive will be calculated with the Flex Incentive which is the same manner as other custom measures. The Flex Incentive utilizes the customer payback requirement to adjust the incentive such that the incentive is "just enough" to reach the funding approval criteria. A minimum incentive level will be employed to keep the customer engaged throughout the process.

Eligibility Criteria and Target Population

All customers with building types eligible for FEP are eligible for the NMEC savings platform. The target population includes those customers that would likely meet the pre-screening criteria. Examples of customer segments that tend to have consistent operation with expected savings exceeding the normal variation include casinos, large offices, hospitals, and other Federal buildings. While large Federal bases may have a low number of SDG&E meters, they are required to have submetering by Federal law. This infrastructure allows for buildings within a large base to qualify for NMEC.

Quality Assurance Practices

Several quality assurance and quality control steps will be taken to assure savings estimations are reliable, transparent, and repeatable. These have been described above. In addition, other steps have been included in the process to assure the savings are due to the measures and not NREs. These include:

- Measure verification, based on site inspections, photos and trend analysis,
- Periodic tracking of savings progress throughout the reporting period
- Check-ins with building owners and operators when anomalous energy use is detected.

Report templates will be used throughout the NMEC project process, to assure the correct information is collected and analysis is properly explained.

Data quality checks are used to assure data integrity for each project. These include graphical checks for outliers, gaps, and repeated values, logical checks to assure the data makes sense, and statistical checks on distributions of data.

Each model will be evaluated by checking the assumptions underlying the modeling algorithm, such as normal distributions of points and patterns in the residual plots

Providing raw data, prepared data, and R code as part of M&V Plans and Savings Reports to assure all data and analysis is completely transparent and reviewable. To date, this process has been successfully

implemented in two NMEC projects, where reviewers were able to set up the R environment and run our analysis on the prepared data sets to get the same results.

We will provide internal quality assurance by requiring each report be reviewed by an engineer not involved in the project. Comments will be addressed, and corrections made to each report prior to their delivery. All data and analysis R code for the specific project will be provided with each savings check. The TRC team will support every technical review and evaluation process.

To be noted, that no referenced document herein is to be construed as to supersede the CPUC NMEC Rulebook (latest version), but only to inform and enhance the project savings claims.