Cascade Energy®

# Implementation Plan

Industrial STAR

July 2023

SoCalGas™

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# 1 Program Overview

The Industrial Savings, Training, Assistance, and Rebates (Industrial STAR) program offers a suite of energy efficiency services to SoCalGas®' industrial-sector customers, tailored to their business type, size, and financial needs. It serves small, medium, large, and hard-to-reach customers in the Food and Beverage Manufacturing sector across the entire SoCalGas territory. The program includes strategic energy management concepts, training for customers and vendors, high-quality energy engineering support, and an innovative incentive and financing structure.

# 2 Program Budget and Savings

## 2.1 Program Name

Industrial Savings, Training, Assistance, and Rebates (Industrial STAR)

## 2.2 Program ID Number

SCG3942

## 2.3 Program Budget Table

Please refer to the California Energy Data Reporting System (CEDARS) for Program Budget, Gross Impact Table, and Cost Effectiveness details.

## 2.4 Program Gross Impacts Table

Please refer to the California Energy Data Reporting System (CEDARS) for Program Budget, Gross Impact Table, and Cost Effectiveness details.

## 2.5 Program Cost Effectiveness (TRC)

Total Resource Benefit-Cost Ratio (TRCRatio): 2.96

## 2.6 Program Cost Effectiveness (PAC)

Program Administration Benefit Cost Ratio (PAC): 3.74

## 2.7 Type of Program Implementer

A. ___ Core
B. _X_ Third Party
C. ___ Partnership

### 2.8 Market Sector

A. ___ Residential
B. ___ Commercial
C. _X_ Industrial
D. ___ Agricultural

### 2.9 Program Type

A. _X_ Resource Acquisition
B. ___ Emerging Technology Assessment
C. ___ Equity (category added by SDG&E)
D. ___ Market Support (category added by SDG&E)

### 2.10 Market Channel

A. ___ Upstream
B. ___ Midstream
C. _X_ Downstream

### 2.11 Intervention Strategies

A. ___ Direct Install
B. _X_ Incentive
C. _X_ Financing
D. ___ Audit
E. _X_ Technical Assistance

## 3 Implementation Plan Narrative

### 3.1 Program Description

The Industrial STAR program offers a suite of energy efficiency services to SoCalGas industrial sector food and beverage customers, tailored to business type, size, and financial needs. Industrial STAR leverages training for customers and vendors, high-quality engineering support, attractive incentives and financing options. Industrial STAR serves small, medium, large, and hard-to-reach (HTR) customers across the entire SoCalGas territory with an emphasis on Disadvantaged Communities (DAC).

Industrial STAR incorporates the following key innovations: training, at no cost to participants, from industrial systems experts on topics relevant to their operations as well as a single point-of-contact energy coach so technical expertise is always readily available; energy management best practices such as performance tracking, site-specific NMEC, and Cascade's collaborative energy management software Energy SENSEI™; tiered incentive paths; and flexible financing options.

The objectives of the Industrial STAR program include:

- Secure participation through program outreach approaches that appeal to the unique interests and needs of industrial-sector customers.
- Increase industrial-sector customer awareness of energy efficiency opportunities.
- Decrease financial and other participation barriers for vendors and industrial-sector customers, especially HTR customers and those in DACs.

## 3.2 Program Delivery and Customer Services

Industrial STAR will use a combination of strategies to deliver program offerings. Smaller customers will be reached using conventional mass marketing approaches, including email marketing, search engine optimization, and geo-targeted paid social media advertising. Larger customers will be reached by partnering with SoCalGas major account executives, delivering presentations at selected conferences and trade shows, and working with equipment suppliers.

Once contact has been made, tailored pathways will be activated:

- **Smaller customers** will be encouraged to access the program's dedicated website, which contains information and instructions on the program offering and links to application forms. Customers will also have the opportunity to view informative videos, increasing awareness and interest in the program. Smaller customers comprise Medium, Small, and Very Small customer segments, consuming less than 50,000 therms per year.
- **Larger customers** will be offered attendance slots at regular live Training Initiated Engagement (TIE) Workshops, which will provide technical training on relevant energy efficiency measures by qualified professionals. Larger customers comprise Large and Very Large customer segments, consuming more than 50,000 therms per year.

The following recruiting activities will be used to reach HTR customers and those meeting DAC:

- **Language**: Develop program-specific collateral in English and Spanish.
- **Location**: Use a combination of GIS software and publicly available business data to identify HTR customers and customers located in DACs.

Industrial STAR offers the following customer services and tools:

- **Technical Training**: TIE workshops will be a key strategic tool to engage participants early. Workshops will also provide a platform to exchange information on baseline operations, communicate best practices, and help program staff better understand each participant's energy demand and usage.
- **Energy Coach**: Participants are assigned a long-term, single-point-of-contact Energy Coach to facilitate the program process and help each customer identify and advance energy-saving projects. Energy Coaches have strong interpersonal relationship and communication skills in addition to technical and industry-specific expertise, enabling them to build trusting, long-term relationships with customers.
- **Scoping Studies**: Energy Coaches conduct scoping studies at high-potential sites to populate an opportunity register. The resulting Scoping Study provides early program influence data.

- **Financial Incentives**: The program offers thoughtfully structured, multi-tier financial incentives to drive deeper energy savings from a wide variety of projects, reduce market and customer barriers, and scale with lifetime savings.
- **Financing Options**: The program will address customer capital concerns and enable Program participation by offering financing to customers, or directly to vendors and contractors.
- **Site-Specific NMEC**: Through site-specific NMEC where applicable, Industrial STAR will improve the participant experience by streamlining the participation process and allowing more energy and utility bill savings. Per NMEC Rulebook[1] guidance, NMEC projects undertaken for this industrial program will be limited to building-related projects similar to those in the commercial sector.
- **Energy SENSEI™**: Energy SENSEI™ is an interactive, energy tracking platform that will be available for Industrial STAR participants who participate in NMEC projects.

### 3.3 Program Design and Best Practices

The program is designed to overcome specific barriers to increased energy efficiency adoption within California's industrial sector:

- **Lack of in-house technical expertise**: Mid-large industrial manufacturing and food processing customers value no-cost, relevant technical assistance and often prefer getting value through incremental system optimization before pursuing capital intensive energy efficiency projects. In response, the program targets this traditionally underserved segment (mid-large industrial manufacturing and food processing facilities without in-house, dedicated energy staff) and offers a long-term, technically knowledgeable single point of contact to simplify customer participation and identify, promote, and advance projects.
- **Approval complexity**: All but the largest manufacturing and food processing customers typically lack the resources to employ energy management staff, and thereby lack the experience and bandwidth to understand the rules associated with the implementation of energy efficiency measures in California. The program offers expertise to help customers of all sizes navigate California's rules and regulations relating to energy efficiency incentives and rebates.
- **Locally uneconomic projects**: The program's incentive and rebate design helps customers implement projects that would otherwise be uneconomic.
- **Absence of reliable information to support implementation**: Larger manufacturing and food processing customers can struggle with layers of decision-makers with different motivations, and the internal capital allocation process can be highly competitive. For select customers, Energy SENSEI™ energy management and collaboration software makes energy information visible to staff and leaders within the organization to promote engagement around energy management. Energy SENSEI™ provides access to actionable energy data, helps prioritize opportunities, ties actions to results and provides a means of documenting program influence.
- **Lack of internal business processes specific to energy**: Through TIE workshops, Energy Project Manager co-funding, and energy coaching, Industrial STAR can provide staff with strategies and support for

[1] Statewide NMEC Rulebook, v2 (1/7/2020), p.8

identifying and cultivating energy champions, quantifying opportunities, and obtaining buy-in for energy efficiency projects.

- **Weak networks**: By deploying Energy Coaches experienced in the manufacturing and food processing industrial subsectors, the program builds strong relationships at the plant manager, maintenance manager and corporate energy manager levels. This simplified, single point of contact approach ensures a responsive and focused program interaction that helps build long-term customer relationships, increases project activity, and allows program team members to dig ever deeper into each site's potential across multiple sub-systems and processes. Seeking first to understand, building trust incrementally, becoming a trusted advisor, and consistently delivering on promises are best practices that enable a more effective program.

## 3.4 Innovation

### 3.4.1 Energy SENSEI™

Cascade will use Energy SENSEI™, our in-house, cloud-based energy management and collaboration software, to manage participant-specific opportunity registers, track savings persistence, and document influence. Cascade Energy expects a boost in net savings (higher NTG) from Energy SENSEI™'s ability to offer actionable energy data, document project influence, and generate savings persistence documentation. Figure 1 illustrates Energy SENSEI™'s capabilities.


*Figure 1 Energy SENSEI™ Offerings*

### 3.4.2 Self-serve, Online Video Modules

Online video modules help reach SMB customers cost effectively and ensure additional program resources are spent only on engaged and interested customers.

### 3.4.3 Intelligent Outreach Through Trusted Market Actors

The size of the industrial sector creates the need to engage participants through existing and trusted channels. Cascade Energy will coordinate with trade associations, equipment vendors, and contractors to create new participant acquisition channels through resources already influencing customer decisions.

### 3.4.4 Long-term Single-Point-of-Contact Industry Experts

Large customers are assigned a single-point-of-contact energy coach to provide technically-competent service, reducing participation barriers. Energy coaches are industry-sector experts. They handle all energy efficiency inquiries from their participants and proactively touch base to review and implement energy projects.

## 3.5 Metrics

Metrics are provided in Table 1.

*Table 1: Key Performance Indicators*

| % | SoCalGas Metric | KPI | KPI Definition | Scoring | Continuous Monitoring Mechanisms |
|---|---|---|---|---|---|
| 20 | Energy Savings | Net First Year Energy Savings Delivered | To date % achieved of energy savings goal based on planned acquisition rate[1] | 0: less than 70%<br>1: 70 – 89%<br>2: 90 – 100%<br>3: 100 – 110%<br>4: greater than 110% | Annual |
| 20 | Energy Savings | Lifecycle Energy Savings Delivered | To date % achieved of lifecycle energy savings goal based on planned acquisition rate[2] | 0: less than 70%<br>1: 70 – 89%<br>2: 90 – 100%<br>3: 100 – 110%<br>4: greater than 110% | Monthly |

[1] Cascade Energy will be held accountable to the associated annual therm goal starting in 2024.

[2] Cascade Energy will be held accountable to the associated annual therm goal startingin in 2024.

| % | SoCalGas Metric | KPI | KPI Definition | Scoring | Continuous Monitoring Mechanisms |
|---|---|---|---|---|---|
| 10 | Program Performance | Goals/Expenditure Alignment | To date % of energy savings goal achieved/ to date % of budget spent based on planned acquisition rate | 0: less than 60%<br>1: 60 to 69%<br>2: 70 to 79%<br>3: 80 to 89%<br>4: 90 to 100% | Monthly |
| 10 | Program Performance | Cost Effectiveness Alignment | Actual TRC Ratio/Pre-Program Approved TRC Ratio | 0: less than 59%<br>1: 60% – 79%<br>2: 80% – 99%<br>3: 100%<br>4: greater than 100% | Annual |
| 10 | Supply Chain Responsibility | Diverse Business Enterprise Spend* | To date % DBE spend/DBE commitment %[1] | 0: less than 70%<br>1: 70% – 89%<br>2: 90% – 99%<br>3: 100% – 129%<br>4: greater than 130% | Monthly |
| 10 | N/A | Program Administration and Implementation | Based on Contractor's reporting/data quality, timeliness, invoicing issues, meeting expectations<br>Criteria:<br>• Timely Response for out-of-scope requests<br>• Proactive in continuous program delivery<br>• On-time invoice and Monthly report<br>• Quality of Deliverables<br>• Willingness to partner<br>• Communication | 0 : Meets 2 out of 6 Criteria<br>1 : Meets 3 out of 6 Criteria<br>2 : Meets 4 out of 6 Criteria<br>3 : Meets 5 out of 6 Criteria<br>4 : Meets 6 out of 6 Criteria | Monthly |

[1] Cascade Energy will be held accountable to the DBE percent spend commitment starting in 2024.

| % | SoCalGas Metric | KPI | KPI Definition | Scoring | Continuous Monitoring Mechanisms |
|---|---|---|---|---|---|
| 10 | Penetration of EE programs | Performance: Disadvantaged Communities | Percentage of program participants from disadvantaged communities across SoCalGas territory. | Achievement as a % of DAC goal<br>0: < 49%<br>1: ≥ 50 and < 69%<br>2: ≥ 70 and < 89%<br>3: ≥ 90 and < 99%<br>4: ≥ 100% | Monthly, with report data pulled from EECP |
| 10 | Penetration of EE Programs | Number of Customers meeting HTR Definition participating in program across SoCalGas territory | Percentage of program participants defined as HTR. | Achievement as a % of HTR goal<br>0: < 49%<br>1: ≥ 50 and < 69%<br>2: ≥ 70 and < 89%<br>3: ≥ 90 and < 99%<br>4: ≥ 100% | Monthly |

## 3.6 For Programs Claiming To-Code Savings

To-code (and to-industry standard practice, or "to-ISP") savings potential is widely present in the industrial sector. Many industrial sites have old, grandfathered equipment and systems that operate below code (or below ISP).

Changes to any portion of these systems or equipment can trigger additional upgrades to ensure compliance with current codes and standards. It is common for participants in this situation to avoid such changes as the costs of bringing equipment up to code can outweigh the benefits. California Assembly Bill 802 and other policies have explicitly recognized and sought to capture this stranded potential, but the industrial sector continues to face unique challenges to cost-effective project scoping and implementation.

To influence these potential projects, measures that capture to-code savings will be part of Industrial STAR. To-code projects will be eligible for incentives and savings claims via NMEC[1] or custom platforms.

## 3.7 Pilots

Not applicable.

[1] Refer Statewide NMEC Rulebook, v2 (1/7/2020), p.8 "building-related projects in the industrial sector similar to those in the commercial sector" are allowable.

## 3.8 Workforce Education and Training

Not applicable.

## 3.9 Workforce Standards

HVAC workforce standards for the installation, modification, or maintenance of non-residential HVAC measures with an incentive of $3,000 or more apply to the program per D.18-10-008.

Lighting workforce standards are not applicable to Industrial STAR

## 3.10 Disadvantaged Worker Plan

Cascade recognizes the importance of working at the program level to expand job access to disadvantaged workers. The program will recruit for workforce diversity, ensuring the language in our job posts is designed to attract a broad, qualified candidate pool.

# 4 Supporting Documents

The following supporting documents are attached to this Implementation Plan:

- Program Manuals and Program Rules
- Program Theory
- Process Flow Chart
- Incentive Tables and Workpapers
- Quantitative Program Targets
- Diagram of Program
- Measurement & Verification (M&V)
- Program Level NMEC M&V Plan

Cascade Energy®

# Implementation Plan Attachments

Industrial STAR

July 2023

SoCalGas™

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# 1 Program Theory and Logic Model

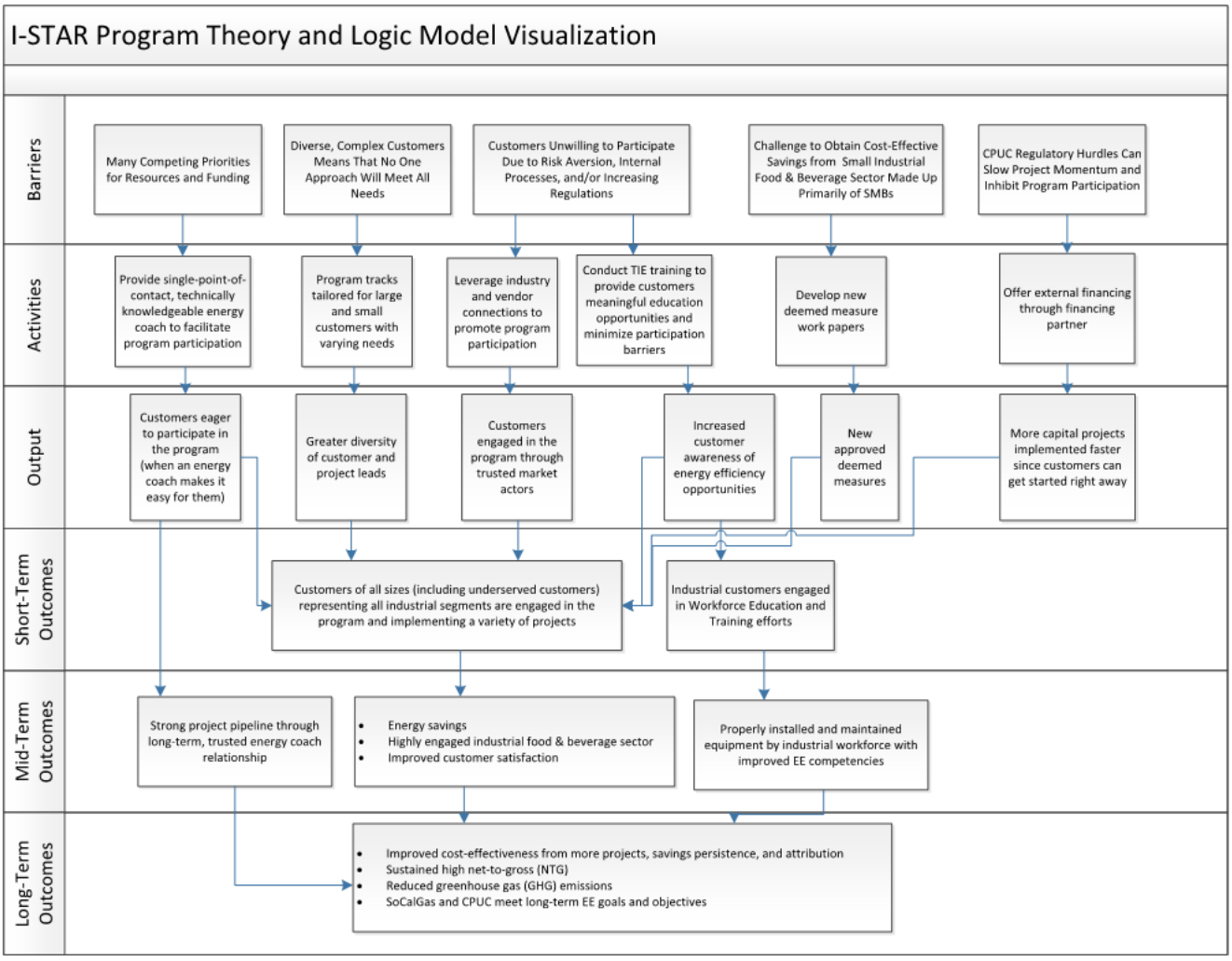


Figure 1: Industrial STAR Program Theory and Logic Model

# 2 Process Flow Chart

Figure 2 illustrates program flow for customers enrolled in Industrial STAR.

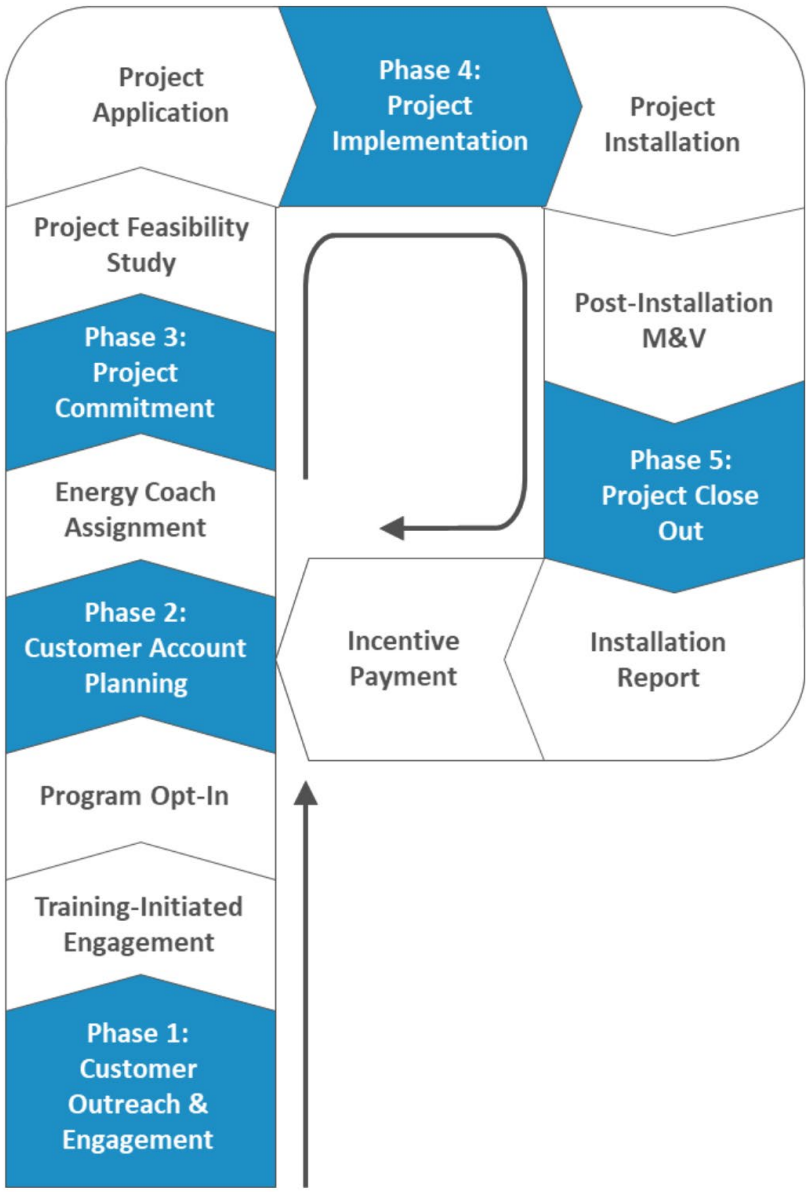


*Figure 2 Industrial STAR Process Flow Chart Incentive Structure*

# 3 Incentive Tables, Workpapers, Software Tools

*Table 1 Industrial STAR Base Incentive Levels*

| Industrial STAR Incentives | Incentive Levels (paid per Gross therm) | | | | |
|---|---|---|---|---|---|
| | Tier 1[6] | Tier 2[7] | Tier 3[8] | NMEC | Deemed |
| $/therm | $ 0.50 | $ 1.25 | $ 2.00 | $ 0.60 | varies |
| Incentive Cost Cap | Final incentives are capped 50% of the project cost or 100% of incentive per verified gross therm, whichever is less | | | | N/A |

Industrial STAR offers on-bill financing through SoCalGas (for eligible accounts and measures), coupled with incentives. On-Bill Financing (OBF) can drive energy-efficiency projects that do not meet a customer's rate of return threshold with incentives or rebates alone, and the combination of OBF with incentives and rebates has the potential to accelerate projects with faster payback periods. Third party financing is also available for eligible customers through a program partner.

# 4 Quantitative Program Targets

Refer to Section 2.4 of Implementation Plan.

[6] Tier 1 includes Custom Behavioral Retro-commissioning and Operational (BRO) measures. Mega Projects will also be incented at this level. A mega project is any project where the energy savings are > 250,000 therms.

[7] Tier 2 includes Add-On Equipment (AOE) measures.

[8] Tier 3 includes Normal Replacement (NR) and Accelerated Replacement (AR) measures.

# 5 Diagram of Program

Figure 3 summarizes how Industrial STAR fits within the SoCalGas customer program portfolio and the statewide energy efficiency landscape, including connections with marketing and outreach, workforce training and emerging technologies.

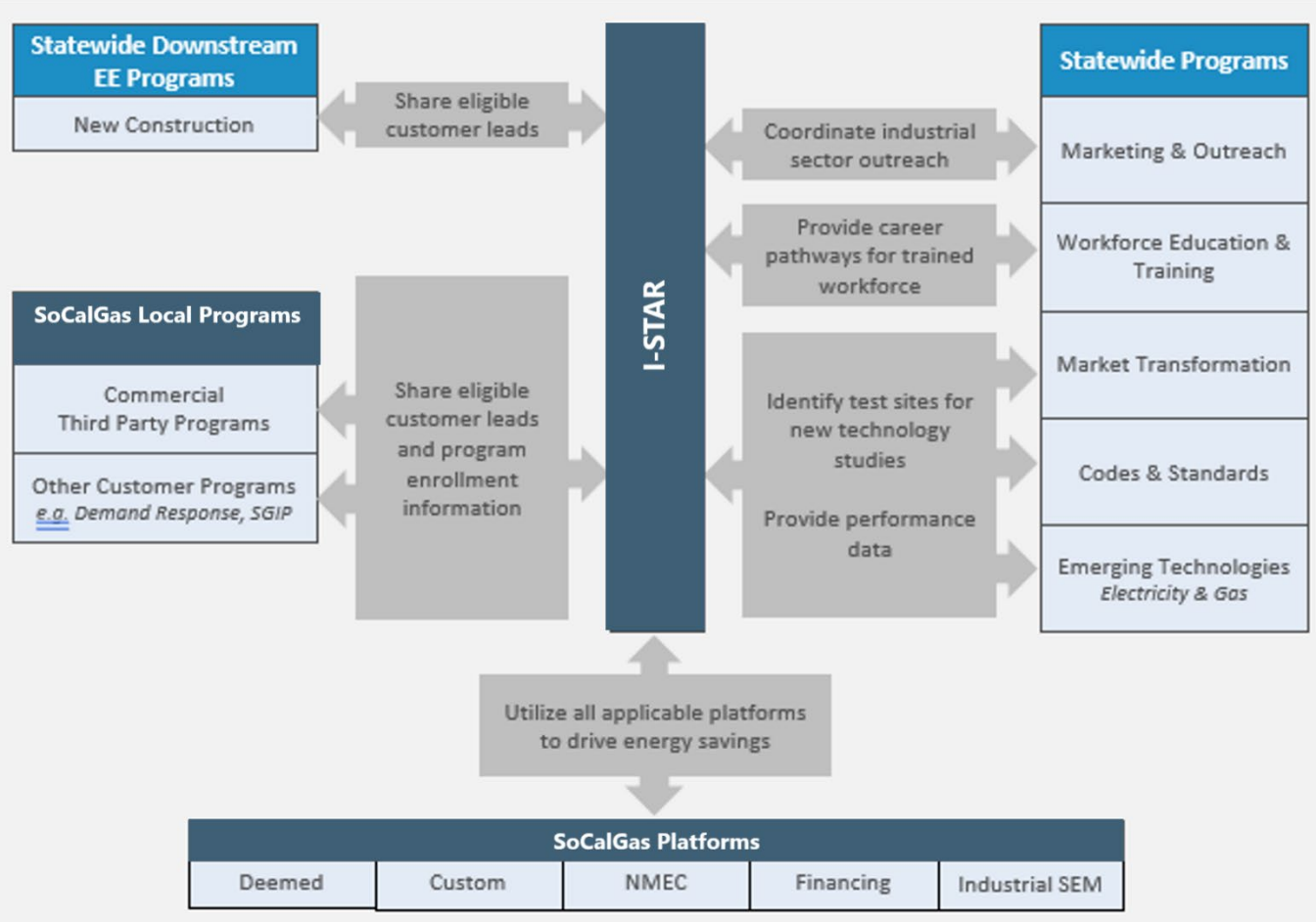


*Figure 3: Industrial STAR Program Diagram*

# Program-Level NMEC M&V Plan

## Industrial STAR


May 2023

Revision 0

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# 1 Background Information

## 1.1 Document Purpose

The Industrial Savings, Training, Assistance and Rebates (Industrial STAR) is a third-party designed and implemented energy efficiency program. I-STAR uses an opt-in, single-point-of contact program delivery regression for industrial food processing customers to motivate energy savings through SoCalGas®' deemed, custom, and normalized metered energy consumption (NMEC) platforms.

Industrial STAR NMEC projects will calculate savings using site-level NMEC methodology; NMEC methods used to determine savings for each project conform to site-specific conditions and savings drivers and are used to develop energy savings claims specific to a participating site.

CPUC and SoCalGas administrative guidance, including the CPUC NMEC Rulebook[9], specify the following measure and verification (M&V) structure for NMEC savings claims:

- **Program-Level NMEC M&V Plan:** A Program-Level NMEC M&V Plan is required for Programs that intend to offer incentives on the NMEC platform. The plan is to be included in Implementation Plan filings and must address a list of topics specified in the CPUC NMEC Rulebook. *This document is the I-STAR Program-Level NMEC M&V Plan.*
- **Site-Level NMEC M&V Plan:** NMEC-determined energy savings rely on a site-specific M&V plan, customized to the specific characteristics of the site and project. Each site-level M&V plan shall include the proposed data collection, analysis methodologies, and documentation for an individual project, including project pre-screening, savings determination, and reporting. Site-level M&V plans will be submitted for each I-STAR NMEC project. This document describes the requirements for site-level M&V plans.

## 1.2 NMEC Approach

The quantification of achieved energy and demand savings after the installation of Energy Efficiency Measures (EEMs) is based on the analysis of pre- and post-installation metered energy data. The savings methodology follows the established Option C Whole Building approach as documented in the International Performance Measurement and Verification Protocol (IPMVP).[10]

[9] CPUC, "Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption", version 2.0. Updated 1/7/2020. Available at https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463694.
[10] International Performance Measurement and Verification Protocol (IPMVP), Efficiency Valuation Organization, www.evo-world.org.

# 2 Project Timeline and Reporting

## 2.1 Eligibility Determination and Project Influence

Projects will adhere to SoCalGas and CPUC requirements regarding eligible facility and project types, as specified in Section 4.10.

Measures will be eligible for I-STAR incentives using NMEC if they are currently allowable through the deemed or calculated energy efficiency programs.

## 2.2 Maintenance Plan for BRO Projects

Per NMEC Rulebook guidance[11], for all BRO projects, the program participant will commit to a repair and maintenance plan for a minimum of three years via a signed customer agreement under which repair and maintenance activities will continue. All interventions will be documented by I-STAR staff.

## 2.3 Project Time Periods

### 2.3.1 Baseline Period

The length of the baseline period shall be 12 consecutive months (1 year) to account for variations in operations and seasonality. If valid adjustment regressions cannot be created and it is suspected that the 12-month baseline period is a limiting issue, a 24-month baseline period may be used.

The customer and implementer shall work together to establish the start and end date of the baseline period so that it is as recent as practical to the time of the I-STAR energy efficiency project's implementation.

### 2.3.2 Implementation Period

Installation may begin at any point following the end of the baseline period, as the customer begins to implement changes in response to I-STAR recommendations.[12] The participant must inform SoCalGas (via I-STAR) once all energy efficiency measures (EEMs) have been installed. Each installed measure must be verified by either the participant or the implementer. While installation of most EEMs should be completed within the implementation period, EEMs may continue to be identified and implemented – supported by applicable documentation in installation and savings reports – following the conclusion of the implementation period as outlined in Section 2.3.3.

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[11] CPUC NMEC Rulebook, p10

[12] As further discussed in Section 4.5, I-STAR influence will be provided via a combination of strategic energy management (SEM-like) approaches including education via training workshops, remote customer consultation with I-STAR technical experts, multi-day on-site Optimization Events, EEM business case analysis, and/or financial incentives. I-STAR's program design calls for immediate implementation of low-cost measures (such as pressure setpoint or equipment staging controls) to encourage customer engagement and begin capturing savings without undue delay as soon as measures are identified. All EEMs will be submitted for SoCalGas review and approval via the Project Application per Section 2.3.1.

### 2.3.3 Performance Period

The performance period begins at I-STAR staff's discretion following significant progress or completion of EEM installation or implementation; the start date will be recorded in the Initial Savings Report. The duration of the performance period must be at least 12 months, with the performance period end date no more than 18 months following the end of the baseline period.

To obtain an interim first-year energy savings value for the purposes of program savings claims and program payments, avoided energy will be calculated and annualized from a representative period (typically 90 days) within the performance period as described in Section 3.4.3. If meter-based analysis cannot be accurately projected to an annual value, bottom-up savings estimates may be used. These savings will be recorded in the Initial Savings Report. Savings claims will be subsequently adjusted following completion of the 12 month Performance Period.

Customers may identify additional measures following the implementation period, which they may choose to implement during the performance period. This will be handled in one of three ways, depending on timing (i.e., how much of the performance period has elapsed), size of the expected incremental savings, and project-level M&V considerations:

- The performance period may continue as scheduled. The NMEC analysis will only capture a partial year of full savings.
- The performance period may be restarted
- The performance period may be extended for a second year, providing an additional 12 months of performance monitoring. A second-year savings claim would quantify achievement of incremental savings relative to an updated baseline.

## 2.4 Documentation and Reporting

### 2.4.1 Project Application

The Project Application will be submitted to SoCalGas for review and approval prior to customer incentive eligibility commitment or I-STAR energy savings claims. The Project Application will include:

- **Project Feasibility Study (PFS):** The PFS will assess potential EEMs and provide information to meet the requirements set forth by the CPUC. The feasibility study shall use the custom project feasibility template
- **Project-Level M&V Plan.** The M&V plan will comprise a section of the PFS

### 2.4.2 Initial Savings Report

Following at least 90 days of the performance period, I-STAR will prepare and submit an Initial Savings Report, which will generally serve as the basis for provisional savings claims and include the following sections:

- **Annualized Savings Projection.** As recommended in the CPUC Rulebook, the Initial Savings Report provides a snapshot of performance, including assessment of any Non-routine events (NREs) identified

to date. As described in Section 3.4.3, the Initial Savings Report will extrapolate an annualized 12-month savings projection based on an Avoided Energy methodology. The report will document data quality issues, NRE adjustments, and regression goodness of fit metrics.

- **Installation Verification**. The measure verification section will document the list of installed EEMs and any available cost updates for each EEM.

### 2.4.3 Final Savings Report

The Final Savings Report will be delivered after 12 months of the performance period has been completed. The Final Savings Report will include:

- Identification of baseline and performance periods.
- Documentation of regression algorithms used.
- Regression goodness of fit metrics.
- Normalized energy savings analysis, including documentation of any adjustments for NREs or concurrent incentive projects.
- Where applicable, true-up calculations for any preliminary annualized savings and cost estimates provided in the Project Application and/or Initial Savings Report. Full measure cost information (labor and materials) will be supported by receipts, contractor invoices, and the customer's own labor and materials accounting system.

### 2.4.4 Second Year Savings Report

As part of multiyear participation in I-STAR, some facilities may continue installing EEMs after the initial implementation period, per Section 2.2.3. In such cases, I-STAR may elect to perform an additional 12 months of performance monitoring to document energy savings incremental to the initial claim.

In such cases, a Second Year Savings Report will be provided to document incremental savings following the conclusion of the second 12-month period. Incremental savings would be calculated as the difference between total savings at the end of the second year and first year savings, relative to the original baseline.

I-STAR will request SoCalGas approval via a revised project-level M&V plan for any projects with multi-year performance periods.

# 3 Regression Development and Savings Determination

## 3.1 Facility Characterization

### 3.1.1 Facility Boundaries

A consistent project boundary shall be used for the baseline period and performance period. I-STAR project boundaries may include either:

- **Whole Facility:** All systems and processes, and all energy usage (and generation, if applicable) at the facility, would be within the

measurement boundary for the NMEC project. Energy usage would typically be measured by one or more utility meters.

- **Select Systems:** The boundary would delineate certain end-uses from others, allowing more focused efficiency efforts. Detailed documentation of energy end-uses and energy sources for specific systems including measurement/sub-metering locations would be required.

### 3.1.2 Energy-Consuming Processes

A list of in-boundary energy-consuming processes will be developed through facility assessments and coordination with facility staff.

### 3.1.3 Determination of Independent Variables

Based on the system inventory and process characteristics, a hypothesis of likely energy drivers will be developed. Drivers may include, but will not be limited to:

- Ambient conditions (dry-bulb and wet-bulb temperatures).
- Facility operational modes (weekend/day) or occupancy levels.
- Production levels, including shipments to and from the facility.
- Other production-related variables such as raw material properties, etc.

Each hypothesis variable will be documented in the feasibility study along with the following criteria:

- **Data Source:** Meter or measurement type and related relevant information (including serial numbers or account numbers for utility meters). If energy data from submeters is used, submeter types and accuracy will comply with NMEC Rulebook guidance.[13]
- **Time Resolution of Data:** Energy and relevant variable data shall be collected at least monthly.
- **Statistical Significance:** Descriptive statistics will be reviewed to establish the most appropriate combination of variables.

## 3.2 Baseline Data Preparation

Baseline data readiness details will be documented in the project-level M&V plan. All data (in raw and cleaned forms) will be available for review by SoCalGas and CPUC staff.

[13] Per the 2020 CPUC NMEC Rulebook (p19), electricity submeters must use Solid State True Root Mean Square electric meter or watt transducers with +/- 0.5% accuracy. Gas submeters must be positive displacement type with +/- 2% accuracy.

### 3.2.1 Specification of Baseline Period

Data for all hypothesis variables must be available for the entire duration of the baseline period. Per NMEC Rulebook[14] guidance and as described in Section 2.2.1, the baseline period will satisfy the following requirements:

- The baseline period must span no less than a 12-month period.
- The baseline energy consumption shall be adjusted for NREs, as needed, as further described below in Section 3.2.2.
- If the time between the end of the baseline period and the completion of implementation phase lasts more than 18 months, the project will be re-baselined to adjust for potential changes in coverage, normalization conditions, and consumption.

### 3.2.2 Baseline Adjustments for Outlier Data

An initial review for outliers will be conducted by plotting each variable independently in a time series format. Apparently erroneous entries will be identified and flagged. Control limits of three standard deviations, ±3 sigma (σ), from the mean are often useful for identifying outliers in normally distributed data.

Missing or outlier data points will be reviewed with facility staff and verified or corrected if possible. If this is not possible, select data points may be removed from the data set.

### 3.2.3 Baseline Adjustments for Non-Routine Events (NREs)

Baseline data shall be analyzed to determine the presence of unusual energy use patterns that may be caused by NREs. All suspected NREs will be documented in the PFS, with a clear description of how their impacts will be addressed.

NREs may be removed from the baseline data set only if they affect less than 25% of the data.

The project-level M&V plan will describe any NREs that occurred during the baseline period along with how they were treated.

## 3.3 Baseline Regression

Regression equations and statistical fitness criteria will be documented in the project-level M&V plan.

### 3.3.1 Regression Approach

A single baseline regression equation will be developed to predict energy usage using standard statistical techniques. In special cases, a second regression may be required to account for cases with distinct processes and operating modes that vary throughout the year (e.g., high and low production periods or extreme seasonal variation).

[14] CPUC NMEC Rulebook, p15.

### 3.3.2 Statistical Criteria for Regression Fitness

As specified in CPUC's NMEC Technical Guidance[15], the final regression must meet the following criteria:

- Coefficient of Variation of the Root Mean Squared Error: $CV(RMSE)$ < 25%
- Net Mean Bias Error: $NMBE$ < 0.5%
- Coefficient of Determination: $R^2$ > 0.7 (recommendation only)
- Fractional Savings Uncertainty: $FSU$ < 50% uncertainty at 90% confidence

## 3.4 Monitoring Savings and Adjusting for Non-Routine Events (NREs)

### 3.4.1 Monitoring Performance

During the performance period, data will be collected per the data collection plan. Performance data will be reviewed to detect anomalous values and to ensure that the independent variables fall within the ranges specified for the regression. The generally acceptable values for each variable will be the maximum of ±3σ or the range used in the regression.[16] Outlier data may be reviewed with the customer and may be removed from the data series if determined to be erroneous. All excluded data will be documented in the Final Savings Report.

During the performance period, I-STAR will maintain a list of all potentially relevant changes to the facility, including schedule changes, equipment installations, or production changes.

### 3.4.2 NRE Adjustments

NREs will be identified via visual inspection of the metered energy use data and discussions with site staff. Time-series charts of energy use data may be used to identify shifts in energy use patterns that may be caused by NREs. If energy use data begins trending significantly outside expected values as determined by the regression, an NRE may be present. A situation in which an independent variable departs its baseline mean by ±3σ will serve as a flag of a potential NRE.

Quantification of performance period NRE impacts will be documented in applicable savings reports. Methodologies to quantify NRE impacts include:

- Removing data from the short period of time during which the NRE occurred, developing a performance period regression with the remaining data, and using it to quantify savings for the project. The NRE impact may be determined from the difference in actual energy use and the performance period regression prediction during the time the NRE occurred.
- Using an indicator variable in the savings regression for the time period when the NRE occurred. A simple indicator variable may be appropriate for an NRE that creates a constant addition or removal of energy. More sophisticated variables may be used when the NRE has variable energy use impacts.

[15] LBNL/CPUC NMEC Technical Guidance, p7.
[16] BPA MT&R Guidelines, p18.

- I-STAR will cite the BPA MT&R Guidelines for specific methodologies regarding implementation of Static Change Adjustments, Minor Process Adjustments, and/or Major Process Adjustments.[17]

Updates to the regression equation used to calculate savings will be documented in the M&V section of the Final Savings Report.

### 3.4.3 Avoided Energy Calculation

For the Initial Savings Report, energy savings will be reported using an avoided energy methodology. Adjusted baseline energy consumption is determined by inputting the performance period independent variable values into the baseline energy regression equation. The avoided energy use is the difference between adjusted baseline energy consumption and performance period energy consumption to that point in time. The avoided energy calculated from the performance period to date will be extrapolated to provide an annual savings estimate in the Initial Savings Report.

## 3.5 Finalizing Energy Savings Claims

### 3.5.1 Calculation of Gross Energy Savings

Following completion of the performance period, a regression based on performance period data will be developed so that normalized performance period energy consumption may be determined. Performance period regressions will use the same strategies as were used for the baseline regression development. Energy savings within the project boundary will be calculated by applying the following equation:

*Energy Savings = Normalized Baseline Period Energy Use – Normalized Performance Period Energy Use*

Where:

- Normalized Baseline Period Energy Use = energy consumption calculated using the Baseline Regression and normalized data for each independent variable. Normalized weather data will use a Typical Meteorological Year dataset, which aligns with the applicable CPUC-approved Avoided Cost Calculator.[18]
- Normalized Performance Period Energy Use = energy consumption calculated for the performance period using the performance period regression, adjusted for non-routine events as necessary.

### 3.5.2 Adjustments for Other Incentivized Projects

If the end user is participating in other SoCalGas or Statewide program offerings, gross energy savings adjustments will be applied to gross savings results. Utility-approved project savings values associated with any projects will be used, prorated as necessary for the performance period.

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[17] BPA MT&R Guidelines, p23-25.

[18] As of this I-STAR M&V Plan publication, the applicable weather files are CALEE 2018 typical weather year data for each climate zone available at www.calmac.org/weather.asp.

### 3.5.3 Reportable Savings

Savings claims will be reported with supporting documentation in the Final Savings Report. Per NMEC Rulebook[19] guidance, reported savings will satisfy all applicable following requirements including:

- Final savings claims will be filed only after the reporting period has ended and the M&V has been completed and finalized.
- Final savings claims will be normalized by long term weather based upon the most up-to-date weather files. Weather and other normalizing adjustments will be applied to the baseline and performance period.
- Final savings claims shall be substantiated in the M&V section of the Final Savings Report, consistent with the specifications in the project-level M&V plan. All revisions to the M&V plan as a result of SoCalGas and CPUC feedback, as well as other deviations from the proposed M&V plan will be documented and substantiated in the Final Savings Report.
- Final savings claims will reflect the same effective useful life, gross realization rate and net-to-gross used to adjust savings estimates.

# 4 Specific NMEC Rulebook Topics

The subsections below address specific M&V topics listed in Section II.1.A.1.a-m of the NMEC Rulebook (*Program-Level M&V Plans for Site-Level NMEC Programs*).

## 4.1 Methodology, Analytical Methods, and Software Employed

See Chapter 3 above for detailed methodology description.

I-STAR will manage development and documentation of regression and savings quantification within Excel. Spreadsheets will use industry standards for multivariate linear regression analyses, such as Microsoft Excel's 'linest' function.

## 4.2 Data Collection Plan

Analysis will incorporate data of several types:

- **Weather data** is aggregated from best-available public sources and integrated into energy sensei via a high-quality and gap-free feed aggregation service called VisualCrossing (www.visualcrossing.com) which takes data from multiple NOAA sources and converts the values into a regular hourly data stream for a specific location based on latitude and longitude. The aggregation uses an advanced algorithm that pulls data from multiple surrounding weather stations, giving greater weight to those that are closer in distance or more reliable in quality, while also accounting for geographic features. The result is a data

[19] CPUC NMEC Rulebook, p16.

stream with better accuracy and no gaps, even when a station goes offline. However, the data stream may not match any one weather station 100%, especially one that has significant gaps. The weather data in energy sensei is available for inspection and use by regulators and authorized utility staff.

- **Utility meter data**. Meter or service agreement numbers will be recorded for each utility data stream. Data will be captured from Green Button connect if possible.
- **Submetered energy data**. Participant-owned submeters must be identified and their accuracy specifications documented. Recent calibration documentation must be provided for meters that require periodic calibration. Minimum accuracy requirements must adhere to CPUC specifications. Meters undergoing in-situ calibration must describe the process and equipment used to calibrate the meter and how results were used to update meter readings.
- **Other customer data**, such as facility schedules, production levels, or occupancy. Data collection will be specific to the needs of each participating facility.

Sources of data and processes for collection will be documented in the project-level M&V plan. The data plan will specify how often data will be collected and prepared for analysis and summarize any data quality issues identified and their resolution.

## 4.3 Approach to Ensure Adequate Monitoring in Reporting Period

Project-level M&V plans will describe how often energy use and independent variable data in the performance period will be collected and avoided energy use calculated.

Monitoring shall include the collection of data for each dependent and independent variable used in the baseline regression.

## 4.4 Identifying and Adjusting for Non-Routine Events (NREs)

Methodology details for addressing NREs in regression results and savings reports are described in Section 3.4.2.

## 4.5 Determining Project Influence

Only projects which have been actively influenced by I-STAR will be eligible for savings claims and incentives.

Project influence will be demonstrated within the feasibility study section of the Project Application (see Section 2.3.1). The following factors may be relevant to the influence demonstration: project developer's engagement and communications with the customer, the customer's decision-making criteria, the project timeline, how the project was initiated, how the measure was identified, the alternative viable options that also meet the customer's needs, and the energy and non- energy benefits. Documentation, with time stamps if applicable, may include marketing materials, audits or site visit results, savings or financial calculations shown to customers, email correspondence, meeting minutes, customer internal policies or investment criteria, and/or relevant internal customer communications.[20]

[20] Adapted from R.09-11-014 EE Policy Manual v5

I-STAR will use a net-to-gross (NTG) ratio of 0.95 for all NMEC projects per CPUC Resolution E-4952.

## 4.6 Rationale for Confidence in Savings If Less than 10% of Baseline Consumption

Pre-screening will assess the project's ability to detect a minimum 10% savings. After measures have been identified and their expected savings quantified, the uncertainty for the expected savings may be determined using the CVRMSE formula. To be detectable, the uncertainty cannot be more than 50% of expected savings at the 90% confidence level (Fractional Savings Uncertainty).

## 4.7 Costs, Energy Savings, and Expected Useful Life of Planned Measures

Each site-level NMEC project requires a list of EEMs with their estimated savings, measure costs, and expected useful life (EUL). This information will be provided in the PFS.

### 4.7.1 Measure Costs

The full measure cost, as well as incremental cost if applicable, for each EEM will be estimated prior to implementation using appropriate sources. Actual costs for each EEM will be documented in the Final Savings Report.

### 4.7.2 Measure Energy Savings

Energy savings will ultimately be determined as described in Section 3.5.

For the purposes of pre-project CPUC and SoCalGas review, savings forecasts may be derived from either of the following approaches, with key assumptions documented in the Feasibility Study:

- **Approved deemed values**: where deemed measures are applicable and applicable to existing conditions baseline.
- **Engineering estimates**: based on rated equipment usage, typical operational profiles, and engineering judgment, in alignment with NMEC Rulebook guidance.

### 4.7.3 Measure Effective Useful Life (EUL)

EUL for each EEM will be specified prior to project implementation and documented in the Feasibility Study. EULs will be based on DEER, workpaper or other Commission-adopted values, where available based on measure type.

- **BRO Projects:** Behavioral measures in non-residential settings may use an EUL of up to two years, while retro-commissioning and operational measures are permitted to use an EUL of up to three years for ex ante savings claims.
- **Capital Projects**: A DEER EUL value will be used when applicable. If not, EULs based on technology type will be consistent with statewide custom program standards.

## 4.8 Project-Level EUL Calculation

A weighted average EUL will be calculated by adding together the product of each EEM's EUL multiplied by its expected savings and dividing by the total expected savings.

## 4.9 Program Target Population and Eligibility

Participation will be limited to eligible facilities, as classified by the NAICS codes listed in the Implementation Plan. I-STAR serves industrial facilities. Per the 2020 NMEC Rulebook, "Site-level NMEC projects in industrial buildings are permissible, to the extent they are similar to one that would be carried out in a commercial building."[21] The NMEC Rulebook further states that "NMEC is not permissible for industrial [O&M] or [BRO]-type projects."[22] In light of these requirements, I-STAR NMEC projects in industrial facilities will be limited to loads and processes that are substantially similar to those found in commercial buildings. Eligible industrial NMEC measures could be BRO or O&M projects on non-industrial equipment. EEMs, including BRO projects, addressing industrial processes will not be eligible.

Potential participants will be subjected to additional qualitative eligibility screens based on influence, expected project cost-effectiveness, and likelihood of achieving 10% or greater energy savings.

Eligibility will be assessed in the feasibility study.

## 4.10 To-Code Savings Targeting

EEMs that capture To-Code (or To Standard Practice) savings will be a key focus of I-STAR and eligible for NMEC savings calculations. One of I-STAR's fundamental objectives is to enroll participants in comprehensive efforts to identify and capture energy savings from underperforming equipment, which includes replacing operational existing equipment with newer, more efficient regressions. Apparently straight forward upgrades often go uncaptured indefinitely at large commercial and industrial sites due to barriers such as a customer's lack of energy efficiency knowledge, reluctance to change the status quo, complex organizational structures, and competition for limited capital.

When To-Code EEMs are identified, the operability (or probability of repair) of existing equipment will be documented as described in Section 2.1.1 and consistent with SoCalGas guidance for Normal Replacement or Add-On Equipment measure application types.[23]

All NMEC EEMs, including To-Code projects, will use an existing conditions baseline. Individual EEM savings estimates will not separately quantify to-code and above-code portions of savings.

[21] CPUC NMEC Rulebook, p8.
[22] CPUC NMEC Rulebook, p8.
[23] SoCalGas Resource Savings Rulebook, p27-32.

# 5 References


1. "California Industrial SEM M&V Guide," version 1.0. 2/8/2017. Sergio Dias Consulting for SoCalGas, SDG&E, SCE, and SCG. https://neep.org/sites/default/files/CA_Industrial_SEM_MV_Guide_v1.0.pdf

2. "I-STAR Implementation Plan," version 1.0. Cascade Energy. Finalized December 2020. To be published.

3. "MT&R Guidelines", Revision 8.0. 11/15/2019. Energy Smart Industrial Energy Performance Tracking Team. Bonneville Power Administration. https://www.bpa.gov/EE/Policy/IManual/Documents/MTR-Reference-Guide-Rev8.pdf

4. "NMEC Rulebook," version 2.0. Revised 1/7/2020. CPUC. https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463694

5. "Normalized Metered Energy Consumption Savings Procedures Manual," version 1.01. Southern California Edison via ETCC. https://www.etcc-ca.com/reports/normalized-metered-energy-consumption-savings-procedures-manual

6. "SoCalGas M&V Requirements for Site-Level NMEC." Revised 12/6/2019. https://www.pge.com/pge_global/common/pdfs/save-energy-money/facility-improvements/custom-retrofit/PGE-Site-NMEC-MV-Requirements.pdf. [Note: this document serves as the Program-Level M&V Plan for SoCalGas's Public Sector NMEC and Commercial Whole Building NMEC offerings].

7. "SoCalGas Resource Savings Rulebook," version 1.0. 3/27/2020. https://www.pge.com/pge_global/common/pdfs/for-our-business-partners/energy-efficiency-solicitations/PGE%20Platform%20Rulebook%20V1.0%20Final_PC2%20(2).pdf

8. "Site-Level NMEC Technical Guidance," version 2.0. Published 12/15/19. LBNL for CPUC. https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463695

9. "Superior Energy Performance Measurement and Verification Protocol for Industry." Written under contract by The Regents of the University of California for the United States Department of Energy. March 8, 2017.

Cascade Energy®

# Program Manual and Program Rules

Industrial STAR

July 2023

SoCalGas™

# Table of Contents

# 1 Eligible Measures

## 1.1 Deemed Measures

Examples of some deemed measures which are eligible:

- Tank insulation
- Pipe insulation
- Process Boiler: Steam
- Process Boiler: Hot Water
- Boiler Economizer: Feedwater
- Boiler Economizer: Condensing
- Tankless Water Heater
- Commercial Storage Water Heater
- Space heating Boiler

Deemed measures details are available in CPUC-approved Statewide Workpapers listed on eTRM[24] and in SoCalGas rebate catalogs.

Unless otherwise specified, equipment must be within relevant size limits, and must be new, fully installed and commissioned, and operational.

The program may propose new or updated deemed measure workpapers to SoCalGas.

## 1.2 Custom Projects

All custom measures for which industrial food processing customers are eligible are applicable to this program. Eligible custom measures must comply with SoCalGas and CPUC guidance, as specified in most recent versions of the "Statewide Custom Project Guidance Document" and "Investor Owned Utility Customized Offering Procedures Manual for Business".

## 1.3 Site-Level NMEC

All custom and approved deemed measures listed above are eligible for Site-Specific NMEC[25] projects.

# 2 Customer Eligibility Requirements

Customers allocated the following NAICS codes by SoCalGas are eligible:

- 311: Food Processing Sector

[24] https://www.caetrm.com/

[25] Refer Statewide NMEC Rulebook, v2 (1/7/2020), p.8 "building-related projects in the industrial sector similar to those in the commercial sector" are allowable

- 312: Beverage and Tobacco Product Manufacturing

Customers with NAICS codes that do not fall within the list above may be included on a case by case basis by agreement.

All savings claims must be associated with an active SoCalGas account. The bill associated with the meter used to calculate savings claims must demonstrate recurring payment of a Public Purpose Program (PPP) charge.

## 3 Contractor Eligibility Requirements

Program scope does not include direct installation of equipment. Notwithstanding the requirements of D.18-10-008, customers are not subject to eligibility requirements with respect to their selection of installation contractor.

## 4 Participating Contractors, Manufacturers, Retailers, Distributors, and Partners

Not applicable.

## 5 Additional Services

Please refer to Section 3.2 (Program Delivery and Customers Services) of the Implementation Plan.

## 6 Audits

Not applicable.

## 7 Quality Assurance Provisions

Provisions are in place to assure that program outcomes meet the required quality standards. A quality control system has been developed and all relevant team members either have received or will receive appropriate training in its use. Primary methods of quality control and assurance include:

- Implementation of a written document control system to manage version control, including peer review of all program-generated documentation by qualified staff prior to document issue.
- Use of checklists and similar tools to detect common non-conformances.
- Use of approved tools, including Energy SENSEI™, to carry out engineering calculations.
- Review of all documentation and other information received from external sources by qualified staff prior to use.

- Review of Non-Conformance Reports (NCRs), with periodic evaluation of NCRs to identify trends and corrective action plans.
- Periodic review of business processes to identify areas for improvement.

# 8 Other Program Metrics

The primary sources of data used to calculate Program Metrics will be contained in:

- Project Feasibility Studies.
- Customer physical data (e.g. address).
- Program reports and invoices.
- Customer Relationship Management software.
- Project tracking software.
- Staff contact lists.