

Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption

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I. Rulebook Scope

1. Rulebook Background and Applicability

This “NMEC Rulebook” summarizes California Public Utilities Commission (CPUC or Commission) requirements for NMEC Programs where energy savings are based on normalized metered energy consumption (NMEC). The purpose is to provide a list of the directives and policies that have been established by the Commission for the administration and implementation of such programs.

Note: In certain instances, NMEC-based methods may also be used to calculate savings for non-NMEC programs, subject to the rules and processes established for those program types (examples could include custom programs or opt-out behavioral programs). This rulebook does not apply in those instances – though the rules included here could be looked to for best practice guidance on some NMEC issues.

The rules, terms and definitions contained herein pertain to efficiency activities funded through the following mechanisms:

- The gas public purpose program (PPP) surcharges, as authorized by §890-900.
- Electric procurement rates, as authorized by the Commission.

Unless specifically indicated otherwise, the requirements described herein apply to all the following entities: the investor-owned utilities (IOUs), Community Choice Aggregators (CCA), Regional Energy Networks (RENS) and third-party implementers as per Decision (D.)16-08-019 modified by D.18-01-004 that are funded through the mechanisms above. This manual is not an exhaustive list of all Commission directives relevant to the current portfolio cycle. Commission directives that are not included in this manual still apply.

This manual will be updated periodically, however, changes to existing regulatory requirements may change in between updates. Users of this Rulebook should always follow the most up-to-date adopted Commission requirements if they supersede the requirements herein.

This Rulebook refers to other sections of the CPUC Rolling Portfolio Guidelines Website. Please note that as of the publishing of this Rulebook, some of these sections are still under development. As these sections are developed, they will be added to the website.

These NMEC program rules have been designed for “opt-in” program designs. Future versions of this Rulebook may include specific guidance on applying NMEC methods for programs that employ other customer adoption strategies. Meanwhile, for program designs utilizing NMEC measurement approaches that include an “opt-out” component, the PA must submit the Program-level M&V Plan, with a description of how control groups will be used, in a pre-program advice letter filing with a Tier 2 status, or Tier 1 for existing programs. Advice letters submitted for third-party solicitation contract approval, or other advice letters filed in accordance with these rules, may be used for this purpose. Population-level NMEC program implementation may begin only after the advice letter has been approved.

This Rulebook reflects existing Commission policies applicable in some cases to all NMEC approaches and in other cases to either Site-level or Population-level NMEC only. These program approaches are relatively new and will continue to be developed through the Energy Efficiency proceeding (R.13-11-005) or its subsequent proceeding, and with input from stakeholders. Explanatory text in each section indicates the applicability of each policy to Site-Level and/or Population-Level NMEC approaches.

Each version of this Rulebook applies to new NMEC programs, and programs newly transitioning to NMEC measurement. For third-party programs, subsequent Rulebook versions apply to Program Administrator's Request for Proposal issued *after* the adoption of the revised Rulebook. When new versions of the Rulebook are adopted, PAs (and Implementers) should look to adapt their existing programs to new Rulebook requirements when feasible and appropriate.

2. Assembly Bill (AB) 802

The provisions described in this document arise from California Assembly Bill (AB) 802 (Williams 2015), which modifies California Public Utilities Code § 381.2(b) to “authorize electrical corporations or gas corporations to provide financial incentives, rebates, technical assistance, and support to their customers to increase the energy efficiency of existing buildings based on all estimated energy savings and energy usage reductions, taking into consideration the overall reduction in normalized metered energy consumption as a measure of energy savings. Those programs shall include:

- Energy usage reductions resulting from the adoption of a measure or installation of equipment required for modifications to existing buildings to bring them into conformity with, or exceed, the requirements of Title 24 of the California Code of Regulations, as well as
- Operational, behavioral, and retrocommissioning activities reasonably expected to produce multi-year savings.
- Electrical corporations and gas corporations shall be permitted to recover in rates the reasonable costs of these programs. The commission shall authorize an electrical corporation and gas corporation to count all energy savings achieved through the authorized programs created by this subdivision, unless determined otherwise, toward overall energy efficiency goals or targets established by the commission.”¹

3. Site-Level Versus Population-Level NMEC

- A. Projects and programs are referred to as “**Site-Level NMEC**” where the following conditions hold:
- Programs and projects meet the regulatory and filing requirements described in this document;
 - NMEC methods used to determine savings are customized to the particular site and project to conform to site-specific conditions and adjust for the particular drivers of savings pertinent to the customer site and project;
 - Energy Savings claims and project estimates of savings are submitted for a specific site or project; and
 - NMEC-determined energy savings rely on a project-specific M&V plan, customized to the specific characteristics of the site and project.
- B. Programs are referred to as “**Population-Level NMEC**” where the following conditions apply:
- Programs must meet the Population-level NMEC regulatory and filing requirements described in this document;
 - Energy savings determinations are made using an NMEC approach based on pre and post-intervention energy usage data observed at the meter, rather than a modeled engineering forecast or deemed value; and

¹ Section 381.2(b) (bullets and paragraph breaks added for clarity).

- Measurement methods and calculation software are set before the program starts (and not subsequently changed) and apply to all sites in a uniform fashion, as opposed to Site-level NMEC measurement methods which may differ on a site-by-site basis.

II. Program Level Requirements

1. SITE-LEVEL NMEC

A. Program-level Measurement and Verification (M&V) Plan

- 1) PAs must submit a Program-level M&V Plan for each Site-level NMEC program. For third-party programs, PAs may work with – or task – Implementers to develop parts or all of the Program-level M&V Plan. However, PAs are responsible for authoring and submitting the Program-level M&V Plan for all NMEC programs (third-party and PA-implemented). The Program-level M&V Plan must be included in Implementation Plan filings for the program and must include:
 - a. Methodology, analytical methods and software employed for calculating Normalized Metered Energy Consumption, as well as both gross and net savings, resulting from the energy efficiency measures installed and not influenced by unrelated changes in energy consumption.
 - b. Data collection plan.
 - c. Approach to ensure adequate monitoring and documentation of energy savings for each project over the reporting period.
 - d. A method of identifying and adjusting for non-routine events.
 - e. Method of determining program influence, either through a detailed data collection and analysis plan provided in the M&V Plan or adoption of Commission approved default NTG values.
 - f. Programs targeting savings that comprise less than 10% of annual consumption must provide a rationale and explanation of how savings will be distinguishable from normal variations in consumption.
 - g. A description of the incentive structure, including a) a description of which entity receives compensation at each stage of the project; and b) method(s) and tools utilized in the calculation of incentives and/or compensation;
 - h. Documentation of the expected costs, energy savings, peak impacts, and effective useful life (EUL) of planned measures and intervention strategies. Include supporting documentation, work papers and/or DEER values.
 - i. Describe how the project level EUL will be calculated for purposes of energy savings claims.
 - j. Describe the program target population, and participant eligibility criteria.
 - k. Demonstrate compliance with Decision 17-11-006 Ordering Paragraph 2 for programs targeting to-code savings. Specifically:

“The investor owned utilities shall ensure that all program proposals and program implementation plans, for programs that target (or will claim) to-code savings, describe what program design elements, data collection activities, and/or analyses will be conducted to help lend insight into the following questions as part of the planned implementation of the proposed program:

Where does the to-code savings potential reside? What equipment types, building types, geographical locations, and/or customer segments promise cost-effective to-code savings?

What kinds of barriers are preventing code-compliant equipment replacements?

Why is natural turnover not occurring within certain markets or for certain technologies?

What program interventions would effectively accelerate equipment turnover?”
 - l. A copy of any Bid M&V Plan submitted by third-party implementers in their bid.

- m. Any other item as required by this rulebook and other applicable rules.
- 2) Third-party implementers shall provide an M&V Plan as part of their bid package. The Bid M&V Plan in bid packages must include, at a minimum:
 - a. A description of the program target population and participant eligibility criteria;
 - b. Documentation of the expected costs, energy savings, peak impacts, and effective useful life (EUL) of planned measures and intervention strategies;
 - c. Identification of the method(s) and calculation software that will be used to calculate savings, including required information as outlined elsewhere in this rulebook; and
 - d. Approach to ensure adequate data collection, monitoring and documentation of energy savings for each project over the reporting period.

B. Permissible Project Types

- 1) NMEC projects must occur in existing buildings and should consist primarily of measures suitable to an existing conditions baseline
 - a. The application of dual baseline is not required when using NMEC methods to determine savings for accelerated replacement measures.²
- 2) NMEC is not permissible for industrial operations and maintenance (O&M) or behavior, retrocommissioning, and operations (BROs)-type projects except as a component of Commission defined Strategic Energy Management Programs.³
- 3) 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.⁴
- 4) Normalized metered energy consumption methods are not permissible to calculate savings for new construction projects or where there is no reference operation for existing conditions.^{5, 6}
- 5) Baseline selection should follow direction adopted in Decision D.16-08-019, Resolutions E-4818 and E-4939, and relevant updates.

² Resolution E-4818, at 31: “Note [dual baseline cases] do not apply to NMEC or RCT/experimental design savings determinations.”

³ See Decision 18-01-004 “We clarify that this SEM program is the only program in which NMEC currently may be used to assess savings in industrial facilities from operations and maintenance (O&M) or behavior, retrocommissioning, and operations (BROs)-type activities”.

⁴ See Decision 16-08-019, p. 39 “to the extent there are building-related projects in the industrial sector similar to those in the commercial sector, those types of projects in the industrial sector may also receive an existing conditions baseline, consistent with our approach for the commercial sector”

⁵ Assigned Commissioner and Administrative Law Judge’s Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) Attachment A, at 5.

⁶ See Ordering Paragraph 3 of Resolution E-4818: “We direct the Program Administrators to apply a code baseline in cases where there is no reference operation for existing conditions, including new construction, expansions, added load, and projects that occur concurrently with a change in ownership or a lessee, or a change in the function of the space (e.g., office to laboratory), or a substantial change (i.e., 30% or more) in design occupancy.”

C. Site-level Design Requirements: Expected Impacts as a Fraction of Total Billing

- 1) It is recommended that all NMEC programs and/or projects aim for a minimum expected savings of 10% of annual consumption.⁷
- 2) Programs and/or projects targeting savings that comprise less than 10% of annual consumption must provide a rationale and explanation in the program and project-level M&V Plans of how savings will be distinguishable from normal variations in consumption.

D. Payments and Incentives⁸

- 1) A significant portion of customer and implementer incentives shall be based on NMEC-determined performance.
- 2) It is not permissible for NMEC programs to have an incentive structure that is wholly based on pre-installation savings estimates or use of deemed measures.
- 3) Incentive payment structure shall be designed to mitigate risk that up-front payments could exceed the value of realized savings.⁹
- 4) Incentives should reflect project cost and should not be paid for customer activity that would have happened in the absence of the program intervention (see Qualifying Measures for minimum repairs rules).
- 5) Incentives for behavioral, retrocommissioning, and operational measures shall only be paid once participant commits to a maintenance plan for a minimum of three years (evidence should be made available to Commission staff upon request).
- 6) Programs that use NMEC for savings determination and incentive payments should incorporate a pay-for-performance element that not only provides adequate motivation to pursue metered savings, but also provides such motivation to the market actors that have access to performance information and the ability to improve or affect performance as it evolves.¹⁰
- 7) D.18-05-041 contains guidance with respect to design of incentives to be paid to customers or implementers. This guidance should be considered “best practices” and both program administrators and third parties should strive for consistency with these guidelines – however, the guidelines are not mandatory.¹¹

E. Qualifying Measures

In a program using normalized metered energy consumption to measure gross savings, the following measures are permissible:

- 1) Measures currently allowable through the deemed and calculated energy efficiency programs,
- 2) Other measures where the program documentation and program-level M&V Plan demonstrates that the savings and EUL forecasts are reasonable for these measures; and

⁷ Assigned Commissioner and Administrative Law Judge’s Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015), Attachment A, p. 6.

⁸ Assigned Commissioner and Administrative Law Judge’s Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) , Attachment A, pp. 11-12

⁹ Assigned Commissioner and Administrative Law Judge’s Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015), Attachment A, at 11-12

¹⁰D.18-01-004 at 43

¹¹ D.18-05-041, Conclusions of Law, Item 3, Pages 169-170

- 3) Behavioral, retrocommissioning, operational measures are permissible, including maintenance and repair, per compliance with these requirements:
 - a. The program participant or project owners must commit to a repair and maintenance plan for a minimum of three years via a signed customer agreement under which the repair and maintenance activities will continue;¹²
 - i) Continuous feedback for the building operator (or homeowner) must be provided, to sustain savings;¹³
 - ii) Detailed documentation of the operational interventions;¹⁴ and
 - iii) A detailed data tracking plan pursuant to the signed repair and maintenance plan described above.¹⁵
- 4) Program Administrators (or for third-party programs, Implementers) shall include training components in all repair and maintenance program offerings in order to ensure participants understand the value of preventive maintenance and good operational practices.¹⁶ This requirement should be carried out consistent with statutorily defined or Commission adopted workforce standards.

2. POPULATION-LEVEL NMEC

A. Program-Level Measurement and Verification (M&V) Plan

- 1) PAs must submit a program-level M&V Plan for each Population-level NMEC program. For third-party programs, PAs may work with – or task – implementers to develop parts or all of the Program-level M&V Plan. However, the Program-level M&V Plan is still a PA document that PAs will submit directly to the Commission. The program-level M&V Plan must be included in any Implementation Plan filings for the program and must include:
 - a. Identification of the analytical methods(s) and calculation software that will be used to determine payable and claimable savings, including references to the version and up-to-date documentation for the method(s) and software.
 - b. A description of how the method(s) and software will be used to calculate both gross and net savings and peak impacts, including how they will or will not address the following:
 - i. Normalization for weather and other factors;
 - ii. Determination of net savings: explain if using default net-to-gross values or some other method (e.g. a comparison group and other adjustments); and
 - iii. Outlier site & non-routine event identification and data treatment including filtering and other amelioration.
 - c. Hourly load shape impact calculations
 - d. Data collection plan;

¹² Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) Attachment A, at 9-10.

¹³ *ibid*

¹⁴ *ibid*

¹⁵ *ibid*

¹⁶ Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) at 22-23

- e. Approach to ensure adequate monitoring and documentation of energy savings, including meter mapping for each project over the reporting period;
 - f. A description of plans for the following, in compliance with the rules as outlined in Section II.2. of this rulebook:
 - i. Permissible project types;
 - ii. Program design criteria, including the calculations for forecasted average savings and fractional savings uncertainty (FSU);
 - iii. Payments and incentives, including the schedule and structure for payments to implementers;
 - iv. Qualifying measures;
 - v. Cost effectiveness.
 - g. Description of program participant eligibility criteria, such as the program's approach to participants with non-routine events in their baseline period, participation in other energy efficiency programs and/or other demand side management offerings (electric vehicles, solar PV, storage, tenant turnover, etc.).
 - h. A description of how the project and program-level EULs will be calculated demonstrating compliance with current Technical Guidelines for determining weighted average EUL¹⁷, unless staff approves an alternative method for EUL calculation.
 - i. A full description of the method(s) and calculation software that will be used to determine payable and claimable savings, and the payment terms for any planned payments (to customers, third party implementers, contractors) based on savings measured using Population-level NMEC methods. Describe if/how payable savings may differ from claimable savings, and if so, why is this appropriate and how will the program address risk?
 - j. Demonstrated compliance with Decision 17-11-006 Ordering Paragraph 2 for programs targeting to-code savings.

"The investor owned utilities shall ensure that all program proposals and program implementation plans, for programs that target (or will claim) to-code savings, describe what program design elements, data collection activities, and/or analyses will be conducted to help lend insight into the following questions as part of the planned implementation of the proposed program:

Where does the to-code savings potential reside?

What equipment types, building types, geographical locations, and/or customer segments promise cost-effective to-code savings?

What kinds of barriers are preventing code-compliant equipment replacements?

Why is natural turnover not occurring within certain markets or for certain technologies?

What program interventions would effectively accelerate equipment turnover?"
 - k. A copy of any Bid M&V Plan submitted by third-party implementers in their bid.
- 2) **Bid M&V Plans:** Implementers must develop and submit an M&V Plan as part of their bid. The Bid M&V Plan in bid packages must include at least the following:
- a. A description of the program target population and participant eligibility criteria;
 - b. Documentation of the expected costs, energy savings and effective useful life (EUL) of planned measures and intervention strategies;

¹⁷ For details, please refer to documents posted here: ftp://ftp.cpuc.ca.gov/gopher-data/energy_division/EnergyEfficiency/RollingPortfolioPgmGuidance/Combining_Measures_Claims.DRAFT.xlsm

- c. Identification of the method(s) and calculation software that will be used to calculate savings, including required information as outlined elsewhere in this rulebook.

B. Permissible Project Types

- 1) Site-level rules in this rulebook regarding Permissible Project Types are also applicable to Population-level NMEC Programs.
- 2) Population-level NMEC program sites must have building-type similarity such that:
 - a. The sites can reasonably be expected to have similar types of equipment holdings, as well as drivers and levels of energy consumption.
 - b. There should be a reasonable expectation that the factors that impact both 1) consumption over a 12-month period, as well as 2) energy savings from program interventions, will be similar across all sites in the population.

C. Program Design Criteria

Population-level NMEC program designs must meet or exceed the following threshold. These criteria are based on the best available information we have today but may be adjusted in the future as more is understood regarding their viability.

- 1) At least 90% confidence / 25% range Fractional Savings Uncertainty (FSU) as calculated using ASHRAE methods at the daily level, or using other methods that achieve at least the same levels of certainty.¹⁸
- 2) If this threshold is not met or exceeded in the program design, then the PA must submit the Program-level M&V Plan in a pre-program advice letter filing with a Tier 2 status, or Tier 1 for existing programs. Advice letters submitted for third-party solicitation contract approval, or other advice letters filed in accordance with these rules, may be used for this purpose. Population-level NMEC program implementation may begin only after the advice letter has been approved. The Program-level M&V Plan must contain an explanation of why the above threshold is not possible or unnecessary, and what is being done in its place to ensure that savings is distinguishable from normal variations in consumption, mitigate risk to ratepayers and provide value for resource planning.

D. Payments and Incentives

Payments to Implementer(s) made by PAs must be based on payable savings determinations measured using Population-level NMEC approaches, as described below. There is no requirement for customer incentives to be based on payable savings determinations.

- 1) Ideally, 100% of total PA payments for each population-level program should be made based on payable savings determinations made using NMEC methods. At a minimum, 50% of total PA program payments for each Population-level NMEC Program (not including PA administrative or PA measurement and verification costs) must be based on payable savings determinations made using Population-level NMEC methods.
 - a. For third-party programs, this 50% minimum requirement applies to the total contract amount between the PA and the Implementer.

¹⁸ ASHRAE Guideline 14, "Measurement of Energy, Demand, and Water Savings".

- b. For non third-party programs, this 50% minimum requirement applies to total program payments per program, on an annual basis.
- 2) If the above threshold is not met, then the PA must submit the Program-level M&V Plan in a pre-program advice letter filing with a Tier 2 status, or Tier 1 for existing programs. Advice letters submitted for third-party solicitation contract approval, or other advice letters filed in accordance with these rules, may be used for this purpose. Population-level NMEC program implementation may begin only after the advice letter has been approved. The program-level M&V Plan must detail:
 - a. Why Population-level NMEC is the best fit for the program.
 - b. Why this threshold is not viable for the program, and what, if any, portion of program payments will be based on NMEC payable savings determinations.
 - c. Strategies to manage ratepayer risk, emphasizing plans for leveraging NMEC results to inform future decisions about program modifications.
- 3) With regard to payment schedules and true-ups: PA Payments may occur before payable savings determinations are complete (i.e. after the 12-months post-intervention measurement period), or even before the intervention itself, as long as the total payment amount for the program is trued up after 12-month post-intervention measurement period is complete and final payable savings determinations are made.

E. Qualifying Measures

Measures allowed in Population-level NMEC programs include:

- 1) Measures currently allowable through the deemed and custom energy efficiency programs;
- 2) Other measures where the program documentation and program-level M&V Plan demonstrates that the savings and EUL forecasts are reasonable for these measures; and
- 3) Behavioral, retrocommissioning and operational measures are permissible per the Site-level NMEC requirements outlined in Section II.1.BE.2) of this rulebook.

III. General Requirements

1. Site-Level Programs

A. Commission Review of Site-Level NMEC Projects

- 1) PAs must include an up-to-date program-level M&V Plan, as described in this rulebook, in their Implementation plan filings.
- 2) If the program requires Commission approval via an Advice Letter, this same program-level M&V Plan should also be included in the Advice Letter filing.
- 3) Project Review:

“Project review, as described in the NMEC Rulebook, is necessary for site-specific NMEC custom projects. The objective of Commission staff review of NMEC custom projects is not to approve

project savings claims, but to provide early feedback for implementation and to inform Commission staff-led evaluation.”¹⁹

Commission staff may review Site-Level NMEC project documentation at any stage of the project (see Table 1 below for a summary of Site-Level NMEC project stages). The review will provide feedback to program administrators and implementers and may be referenced during EM&V activities to assess how Commission feedback was incorporated. Commission staff review of NMEC projects does not restrict or delay project development or constitute an approval of related energy savings claims.

B. Project Stages, Site-Level NMEC

Table 1 – Site-Level NMEC Project Stages

Project Feasibility	• Test the feasibility of NMEC approaches on target buildings. See LBNL Option C Technical Guidelines Document for proposed method.
Project Application	• Submission of project documentation to Program Administrator. • Program Administrator submits a list to CPUC as per custom project review rules as modified for NMEC projects and programs in this Rulebook. • Projects should have estimates of energy savings and incentive payments. • Project M&V Plan and demonstration of feasibility of NMEC analytical approach. ○ The Project M&V Plan must account for any normal replacement measures within the scope of the project. • The Commission staff may select a sample of projects for review and input. ○ Commission staff will provide feedback on the project and its documentation including but not limited to the Project M&V Plan, analytical methods, and data collection approaches proposed. • Applications shall document methods and values used to develop project EUL, as well as the planned adjustments for gross-realization rate (GRR) and net-to-gross (NTG) factors.
Project Implementation	• Installation and commissioning of the energy efficient measures and/or the instituting of behavioral, retrocommissioning and operational measures. • The time between the end of the baseline period and the completion of the Project Implementation stage should not exceed 18 months; otherwise the project shall be re-baselined.

¹⁹ Administrative Law Judge’s Ruling on Certain Measurement and Verification Issues, Including for Third Party Programs (01/31/2019). Page 8.

Reporting Period or Post-Implementation Performance Monitoring Period or Performance Period	• The reporting period stage begins once the measures are implemented and/or installed and confirmed to be working and producing savings. • This stage shall last no less than 12 months. • It is recommended that implementers check the data being collected 1 to 2 months into the reporting period to ensure appropriate monitoring is occurring. All adjustments should be documented in the Final M&V Report. • In addition to the review at 1 to 2 months described above, projects should be monitored periodically for deviations from expected savings to identify and adjust for non-routine events. All adjustments should be documented in the Final M&V Report. ○ PAs and implementers are advised to share the details of non-routine events identified during the reporting period with Commission staff, and to updated M&V plans and reports in a timely manner.
Final M&V Report	• The final M&V Report shall document the activities carried out per the M&V Plan. • The final M&V Report documents data collection (pre- and post-installation) adjustment models and all findings related to routine and non-routine events. • The Final M&V Report presents the first year and lifecycle savings claims, final avoided energy use and final normalized energy savings.

C. Baseline Adjustment, Site-Level NMEC

Refer to LBNL Option C Technical Guidelines Document ²⁰for further details of the requirements outlined in this section.

- 1) The baseline adjustment model must span no less than a 12-month period.
- 2) The baseline energy consumption shall be adjusted for non-routine events, as needed. (See LBNL Technical Guidelines.)
- 3) Baseline adjustment model must be assessed for goodness-of-fit. See LBNL Technical Guidelines for proposed thresholds.
- 4) It is strongly suggested that projects be screened for feasibility of proposed methods. See LBNL Technical Guidelines.
- 5) If the time between the end of the baseline period and the completion of implementation phase lasts more than 18 months, the project must be re-baselined to adjust for potential changes in coverage, normalization conditions and consumption.

D. Project Savings Forecast Estimates, Site-Level NMEC

- 1) Avoided energy use is an acceptable metric for forecasted energy savings estimates.
- 2) NMEC project savings forecast estimates may be based either on approved deemed-measure workpapers or may be calculated using engineering or modeling methods consistent with

²⁰ ftp://ftp.cpuc.ca.gov/gopher-data/energy_division/EnergyEfficiency/RollingPortfolioPgmGuidance/LBNL_NMEC_TechGuidance_Draft.pdf

Commission adopted custom project savings-calculation guidelines. Methods should be documented in the Project M&V Plan and should be appropriate to the project type.

- a. Estimates should use DEER or workpaper values wherever possible
 - b. Where DEER or workpapers are not available, assumptions should be documented accordingly.
- 3) Specific sources and rationale substantiating the selection of savings estimation methods must be documented in the program-level M&V Plan, and in the M&V Plans for project-specific information.
- 4) Specific or nearby weather data for baseline model development and avoided energy use calculations are allowed.
- 5) Project savings estimates must reflect measure-level savings to inform expected useful life (EUL) calculations, gross realization rate (GRR) and net-to-gross (NTG) adjustments.
- 6) Project lifecycle savings must be based on a weighted average EUL method, unless staff approves an alternative method for EUL calculation.
 - a. EULs should be based on DEER, workpaper or other Commission adopted values, where available.
 - b. See Technical Guidelines for proposed weighted EUL calculation method.
- 7) Projects that do not have a GRR value approved through a Commission review and related staff disposition, shall use the default GRR for custom projects.^{21, 22}
- 8) Savings estimates will not be used to determine achievement of goals or incentive payments.²³

E. Project Savings Claims, Site-Level NMEC

- 1) Final savings claims must be filed only after the reporting period has ended and the M&V has been completed and finalized.
 - a. Please refer to Qualifying Measures section for instructions for projects containing behavioral, retrocommissioning and operational measures.
- 2) Final savings claims must be normalized by long term weather based upon the most up-to-date weather files (such as CALEE 2018)²⁴.
 - a. Weather and other normalizing adjustments should be applied to the baseline and performance period.
- 3) Final savings claims shall be substantiated by an M&V Report, consistent with the specifications in the Project M&V Plan.
 - a. The project M&V Report should reflect Commission staff review recommendations, if the project was selected for review.
 - b. Any deviations from the proposed M&V Plan should be documented and substantiated in the M&V Report.
- 4) Final savings claims should reflect the same effective useful life, gross realization rate and net-to-gross used to adjust savings estimates.

²¹ DEER 2020 and Revised DEER 2019, Resolution E-4952, at 39: "Decision 11-07-030 set default gross realization rates to apply to all custom projects which do not have an alternate value or specific gross energy savings values set because of an ex ante review process disposition."

²² *ibid* at 42.

²³ Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) Attachment A, at 8

²⁴ CALEE2018 files are available for download on the CALMAC website..

- a. Deviations from methods used to calculate savings estimates should be documented and substantiated in the Final M&V Report.

F. Changing Project Savings Calculation Methods

- 1) It is possible that normalized metered energy consumption may not work in certain projects due to building characteristics or unforeseen events. In such cases where planned NMEC approaches are not feasible, the project must be re-filed to the CMPA with documentation of the revised savings determination methods. All rules for alternative method chosen, i.e. deemed or custom, must be followed when re-calculating savings claims.
- 2) Program and project-level M&V Plans must detail methods for tracking feasibility of the NMEC approach and how NMEC failure will be addressed.

2. Population-level Programs

A. Commission Review of Proposed Population-level NMEC Programs

- 1) PAs must include an up-to-date program-level M&V Plan, as described in this rulebook, in their Implementation Plan filings.
- 2) If the program requires Commission approval via an Advice Letter, this same program-level M&V Plan should also be included in the Advice Letter filing.

B. Program-level Savings Claims

- 1) Savings claims must be made at the program level for Population-level NMEC programs.
- 2) Savings claims must be made using the savings determinations calculated according using the methods and software described in the program-level M&V Plan.
- 3) Final savings claims may be filed only after the 12-month post-intervention monitoring period has ended and the M&V has been completed and finalized.
- 4) Final savings claims shall be substantiated by an M&V Report, consistent with the specifications in the program-level M&V Plan.

3. All NMEC Programs

A. Tools, Methods, Analytical Approaches and Calculation Software

- 1) **Ex-post Evaluation:** All NMEC projects and programs are subject to Commission review of savings measurement methods and estimates, for purposes of program and/or project-level feedback and for purposes of ex-post impact evaluation.²⁵

²⁵ Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) Attachment A, at 7-8

- 2) **Savings Calculations:** All analytical methods, including tools, algorithms and software used in savings and incentive or compensation payment calculations, must be made available to Commission staff and its consultants upon request.^{26, 27}
- 3) **Measurement Period:** Savings determinations must be made by comparing at least 12 months of post-intervention energy consumption to at least 12 months of pre-intervention energy consumption.
- 4) **Transparency:** Data, methods and calculations must be made available to the PAs well as the Commission and its impact evaluators.^{28 29}
- 5) **Documentation and Replicability:** The methods used to calculate savings for NMEC programs must be documented in the program-level M&V Plan sufficiently such that savings calculations are able to be replicated by the PAs well as the Commission and its impact evaluators. Upon request, the underlying participant consumption data and other data inputs must be made available to the PAs well as the Commission and its impact evaluators such that savings calculations can be replicated to reach the same result.
- 6) **Consistent, Pre-Set Method:** For Population-level NMEC programs, the specific measurement method(s) and calculation software must be determined before the program begins and applied uniformly to all sites in the program.
- 7) **Proprietary Methods & Software:** Savings measurement methods and calculation software that is public, and especially those that are open-source, benefit from a stakeholder vetting process that allows experts and practitioners to share their knowledge and use updated information to inform savings estimates. The Commission has supported the development of public, open-source processes to develop NMEC methods (e.g. CALTRACK) and encourages stakeholders to engage in these open-source initiatives. In the future, the Commission may update these rules to identify specific methods required for Population-level programs. For now, PAs proposing NMEC programs with proprietary savings measurement methods and/or calculation software for calculating payable and/or claimable savings must comply with additional requirements, as listed below. Note that PAs may elect to levy additional restrictions on third party implementers using proprietary savings measurement methods and/or calculation software.
 - a. PAs must submit the proprietary method and/or software to the Commission for custom pre-program approval, via the Custom Tools Archive in the Non-DEER Resources website (www.deeresources.info). The submission must detail the proposed proprietary method(s)

²⁶ PU code 585.(a) Except as provided in subdivision (d), every public utility and business specified in subdivision (b) shall in any rate proceeding or proceeding establishing a fact or rule that may influence a rate, provide the commission with access to all computer models, as defined in Section 1821, which are used by that public utility or business to substantiate their showing in the proceeding.

²⁷ It is possible that in the future, protocols and/or certification schemes for evaluating the performance and accuracy of tools may become available. Once these are developed, the Commission will decide if and how to leverage them.

²⁸ PU code 585.(a) Except as provided in subdivision (d), every public utility and business specified in subdivision (b) shall in any rate proceeding or proceeding establishing a fact or rule that may influence a rate, provide the commission with access to all computer models, as defined in Section 1821, which are used by that public utility or business to substantiate their showing in the proceeding.

²⁹ It is possible that in the future, protocols and/or certification schemes for evaluating the performance and accuracy of savings measurement methods and calculation software may become available. Once these are developed, the Commission will decide if and how to leverage them.

and calculation software and their potential application(s), and provide documentation consistent with the program-level M&V Plan requirements in this rulebook, including references to up-to-date independent verification of the method(s) and/or calculation software if available.

- b. The program-level M&V Plan must describe the appropriateness of the method and/or software for the program.

B. Energy Efficiency Savings Performance Incentive (ESPI)

- 1) Savings realized via programs or projects using NMEC approaches to determine gross energy savings will be classified “uncertain”³⁰ and subject to ESPI payments on an ex-post basis.³¹
- 2) For purposes of ESPI, NMEC savings will be included in the “custom” category until such time as it becomes more than ten percent of the portfolio. At that time, the Commission may consider staff and stakeholder proposals for how to treat NMEC savings differently, if warranted.³²
- 3) Programs and Projects must follow required ESPI reporting requirements.
- 4) Methods for reporting lifecycle savings must be consistent with existing policy.^{33, 34}

C. Submetering

Submetering is permissible for all NMEC projects. The table below outlines minimum requirements for submetering equipment accuracy.

Energy Source	Meter Type	Minimum Accuracy³⁵
Electricity	Solid State True Root Mean Square electric meter or watt transducer. ³⁶	+/- 0.5% of reading including current transformer accuracy and corrections for installed conditions.
Natural Gas	Positive displacement.	+/- 2% of reading.

³⁰ [D. 13-09-023](#) Section 7.2, page 41.

³¹ Assigned Commissioner and Administrative Law Judge’s Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) at 13.

³² D.16-08-019 at 88.

³³ Ibid at 28.

³⁴ Assigned Commissioner and Administrative Law Judge’s Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015) at 13.

³⁵ Rated accuracy must be maintained through the baseline and reporting periods. Meters and associated sensors must be calibration according to manufacturer’s instructions.

³⁶ Meters must consider bidirectional power flow when equipment is capable of supplying power to the grid.

Chilled water / hot water	Solid state Btu meter ³⁷ with temperature sensors and flow meter.	Temperature sensors: +/- 0.15F from 32F - 200F. Flow meter: +/- 2% of reading over expected flow range. Calculator accuracy: +/- 0.1% at 30F delta T.
Steam	Solid state Btu meter ³⁸ with a vortex shedding flow meter, pressure and temperature sensors.	Mass flow meter: +/- 2% of mass flow calculation.

Other meter types may be permissible, subject to Energy Division staff approval.

D. Cost-effectiveness:

Existing cost effectiveness policies apply to all NMEC programs and projects.

IV. DEFINITIONS

Avoided Energy Use ³⁹

Avoided Energy Use is the amount of energy (or peak demand) that was not consumed or realized as a result of the energy efficiency project or program intervention. Avoided energy use is the difference between actual energy consumption in the “reporting period” and the consumption that is forecast for the same period using the “baseline energy consumption model,” and where the baseline energy consumption model use is adjusted to reflect reporting period conditions. The Avoided Energy Use approach is used as the basis of customer incentive calculations and embedded M&V reporting of savings.

Baseline Period

The baseline period is the 12-month period leading up to the energy efficiency intervention or retrofit.

Behavioral

Behavioral activities provide energy savings from interventions that result in changes in actions by customers with respect to energy usage in a building. Behavioral activities consist of actions such as manually turning off lights and equipment, adjusting blinds, reducing water use and so on.

³⁷ Continuous integration of flow and temperature difference required to measure delivered energy (Btu). Energy calculations based on Instantaneous measurements of flow and temperature not acceptable.

³⁸ Continuous integration of mass flow, pressure and temperature required to measure delivered energy.

³⁹ Referred to as “Forecast Normalization” in the SEM Guidelines.

Claimable Savings

Claimable Savings (or “claimed savings”, or “savings claims”) is the savings reported by Program Administrators to the Commission prior to formal evaluation, measurement, and verification (EM&V).

Comparison Group

A comparison group is a group constructed after participants have been enrolled in a program, to compare energy consumption changes from program participants against non-participants with otherwise similar usage characteristics. Comparison group analysis can help determine net savings by accounting for externally-driven changes or trends (exogenous factors) that affect energy usage across all customers or all customers within a segment.

Embedded M&V

Refers to the collection of sufficient data to validate the savings claims and document the financial incentives. Implementers must submit an Implementation plan consistent with D.15-10-025 Appendix 4 and include a program-level measurement and verification (M&V) plan that defines the data collection activities. Financial data shall include the amount of financial incentives paid to customers or the amount of compensation offered to implementers or contractors.

Evaluation, Measurement and Verification (EM&V)

EM&V consists of activities that evaluate, monitor, measure and verify performance or other aspects of energy efficiency programs or their market environment. Energy Division has management and contracting responsibilities for all EM&V impact-related studies that will be used to 1) measure and verify energy and peak load savings; 2) generate data for savings estimates, cost-effectiveness inputs, and the Commission’s adopted performance basis; and 3) evaluate whether portfolio goals are met.⁴⁰

Implementation Period

The Implementation period⁴¹ is the period between the baseline period and the reporting period. This period covers the time when the measures are installed, and the project construction is completed. The implementation period may also include time to adjust, fine-tune, or commission the measure as part of the construction process.

Maintenance

Requires a minimum of tools and financial expenditures to adjust equipment components and restore expendable materials (such as fluids and filters) to their agreed-upon condition. Typical examples of such tasks include cleaning, adjusting, tightening, calibration, and lubrication.⁴² Maintenance should follow manufacturer recommended regularly scheduled work necessary to keep the equipment in optimal working condition, and instructing customers on how to carry out maintenance tasks should be a component of this intervention.

Measurement and Verification (M&V)

⁴⁰ California Public Utilities Commission, Energy Efficiency Policy Manual, v. 5 (July 2013).

⁴¹ Sometimes this is also referred to as the “installation” or “construction” period.

⁴² Edited from proposed revision to ASHRAE Standard 180.

The process of using measurement to reliably determine actual savings created within an individual facility by an energy efficiency intervention. Savings cannot be directly measured, since they represent the absence of energy use. Instead, savings are determined by comparing measured use before and after implementation of a project, making appropriate adjustments for changes in conditions⁴³.

NMEC Savings Measurement Methods and Calculation Software

An NMEC savings measurement method (I.e. “method”) is the process (and any associated data collection & preparation needs, requirements and/or other parameters) for determining energy savings from an energy efficiency intervention or set of interventions. NMEC calculation software is the codebase or set of calculations that are used to determine gross savings results for an NMEC program.

Non-Routine Adjustments

Non-routine adjustments are used to account for the effects of non-routine events, where the changes affected by the NRE are not suitable to the baseline or reporting period adjustment models. Non-routine adjustments occur separately from the routine adjustments made using independent variables in the adjustment model. Non-routine adjustments are developed using methods including but not limited to engineering analysis, sub-metering, or other analyses using the metered energy use data.

Methods for identification and tracking of non-routine events and non-routine adjustments must be well substantiated and fully documented in the site M&V report.

Non-Routine Events

A non-routine event (NRE) is an externally-driven (i.e. not related to the energy efficiency intervention) significant change affecting energy use in the baseline or the reporting period and therefore must be accounted for in savings estimations. Typical NREs include changes in facility size, changes in facility activity not affected by the energy efficiency measures (such as addition or removal of a data center) or other modifications to the facility or its operation that alter energy consumption patterns and are unrelated to the program intervention.

Normalized Energy Savings⁴⁴

Normalized energy savings is the reduction in energy consumption or demand that occurs in the reporting period, relative to the baseline period, after both have been adjusted to a common set of normal operating conditions. Normalized Savings are used for the final reporting of energy and demand savings claims that are filed with the CPUC.

Normalized Metered Energy Consumption (NMEC)

NMEC is a method used to measure gross energy savings using metered energy consumption data to compare baseline and reporting period consumption under normal operating conditions. Normalization of energy consumption is achieved using adjustment models that account for routine events, and other adjustments to account for non-routine events so that consumption in baseline and reporting periods can be directly compared, as if all relevant variables were the same in the two periods. Normalized

⁴³ International Measurement and Verification Protocol (IPMVP) Volume 1: Concepts and Options for Determining Energy and Water Savings. Efficiency Valuation Organization, 2010. Available at www.evo-world.org.

⁴⁴ Referred to as “Standard Conditions Normalization” in the SEM Guidelines.

baseline period and/or reporting period energy consumption are calculated using one or more adjustment models.

Normal Operating Conditions

Normal operating conditions should reflect expected operating conditions and occupancy. This includes long-term average weather⁴⁵ conditions for the climate zone corresponding to the building location. Normal production and occupancy should be based on observed pre and post-treatment values.

Operational Activities

Operational activities are control-based; they improve or adjust existing controls to optimize equipment performance. Operational activities include maintaining room temperature set points, revising equipment operating schedules consistent with current building occupancy schedule, and changing equipment set points in response to current weather conditions.

Opt-in & Opt-out

“Opt-in” refers to the method that participants are recruited or placed into a program. In an Opt-in program design programs recruit participants, who make an affirmative decision to be part of the program. This approach contrasts with “Opt-out” programs that use experimental design, in which the program places customers into either a participant group or a randomized control group.

Outlier Site

An outlier site is a site with an atypical response, e.g. significantly higher or lower calculated savings, compared to most sites in the population.

Payable Savings

Payable savings are the savings determined via the method and calculation software described in a program’s M&V Plan which constitute the basis of payments between the Program Administrator and Implementer(s). Payable savings determinations may differ from claimable savings in that payable savings may account differently for net-to-gross determinations, non-routine events and outliers, and/or other similar considerations.

Population-level NMEC

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

⁴⁵ Long term average weather defined in CALEE2018, posted on the CALMAC website:
<http://www.calmac.org/weather.asp>.

Proprietary Methods and Calculation Software

Proprietary NMEC methods and calculation software are methods and calculation software that are not necessarily available to the public for inspection and/or modification.

Randomized Control Group

A randomized control group is a group identified through randomization (and before program interventions begin) that does not experience a program intervention, in a program that uses experimental design to measure savings. The participant group is then compared against the control group to determine savings attributable to the program.

Repairs

Minor Repairs

Activity that requires tools, parts and or/equipment to return a system or system equipment to operating condition. Tools and parts are simple, and costs are minimal.⁴⁶

Major Repairs

Activity requiring substantial expenditures, tools, parts, equipment and material to return a system back to its normative state.⁴⁷

Reporting Period or Post-Implementation Performance Monitoring or Performance Period

The Reporting Period is the period of time over which the savings from energy efficiency interventions and retrofits are measured. The reporting period immediately follows the implementation period.

Retrocommissioning

A systematic process of identifying and implementing operational and maintenance improvements to achieve the design intentions consistent with the current usage of a building. The process is designed to improve the performance of building subsystems as well as optimize the performance of the overall system. Retrocommissioning focuses on operations and maintenance improvements and diagnostic testing, although major repairs and equipment upgrades may be identified and recommended through the process. Minor repairs required to conduct diagnostic testing may also be implemented.

Behavioral, Operational, Maintenance and Repair measures may be identified and carried out during a retrocommissioning project. Behavioral, operational and maintenance activities may also be implemented separately as "operations and maintenance" projects in existing buildings.

Routine Adjustments

Routine adjustments account for regularly fluctuating factors that affect energy use in a predictable manner and are variable in the baseline and/or reporting periods. Routine adjustments typically account for factors such as weather, occupancy and/or production volume. Routine adjustments are made through the inclusion of independent variables in the baseline and reporting period adjustment models.

⁴⁶ Ibid.

⁴⁷ Ibid.

Strategic Energy Management (SEM)

Strategic Energy Management is a holistic, whole-facility approach that focuses on business practice change from senior management through staff, affecting organizational culture to reduce energy waste and improve energy intensity. SEM emphasizes equipping and enabling plant management and staff to impact energy consumption through behavioral and operational change. While SEM does not emphasize a technical or project centric approach, SEM principles and objectives may support capital project implementation.⁴⁸ “Strategic Energy Management” as used by the CPUC refers to specific, standalone programs designed by consultants to the investor owned utilities.⁴⁹

Addendum 1: Matrix of Advice Letter and Other Commission Approval Requirements

This addendum captures the advice letter and custom submission & approval requirements for NMEC Programs that are described in this rulebook. Programs may also be required to submit advice letters and other filings based on other Commission rules not outlined in this matrix.

Condition	Additional Commission Approval Requirement(s)
Population-level program design criteria not met or exceeded per Section II.2.C. of this Rulebook.	Program-level M&V Plan submission by PA in a Tier 2 pre-program advice letter filing, or tier-1 for existing programs.
Population-level payments and incentives criteria not met or exceeded per Section II.2.D. of this Rulebook.	Program-level M&V Plan submission by PA in a Tier 2 pre-program advice letter filing, or tier-1 for existing programs.
Proprietary savings measurement methods and/or calculation tools will be used, as described in Section III.3.A. of this Rulebook.	Submit the proprietary method and/or software to the Commission for pre-program approval, via the Custom Tools Archive on deeresources.info website.
The program includes opt-out components per section I.1. of this Rulebook.	Program-level M&V Plan submission by PA in a Tier 2 pre-program advice letter filing, or Tier 1 for existing programs.

⁴⁸ Based on Consortium for Energy Efficiency Definition, available at https://library.cee1.org/system/files/library/11283/SEM_Minimum_Elements.pdf.

⁴⁹ The “Strategic Energy Management – California Industrial SEM Design Guide” and the “Strategic Energy Management – EM&V Guide” are available at <https://pda.energydataweb.com/> and can be found by entering *Strategic Energy Management* in the search box. The Guides are considered living documents that may be updated during the course of the implementation of the current SEM programs and thereafter. These documents are considered part of the entire NMEC Guidance prepared and maintained by CPUC Staff.