## Change Log

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description</th>
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<tr>
<td>V0.99F</td>
<td>2/25/20</td>
<td>Starting from Alison's edits</td>
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<tr>
<td></td>
<td>2/15/20</td>
<td>Starting from John and Paul's reorg in v.0.99E and added new meter-based chapter content</td>
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<tr>
<td>V0.99c</td>
<td>03/25/19</td>
<td>Notable changes as of 3/25/19 for public view:</td>
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<tr>
<td></td>
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<td>1. Updated disadvantaged communities’ definition.</td>
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<td>2. Updated MAT categories names and definitions.</td>
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<td>3. Updated HTR definition and criteria.</td>
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<td>4. Updated High and Low Bay LED Baseline Selection CPUC Requirement.</td>
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<td>5. Updated Chiller CPUC Requirements.</td>
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<td>6. Updated Pump Overhaul CPUC Requirement.</td>
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<td>7. Updated Meter-Based Chapter to reflect 2019 CPUC NMEC ruling.</td>
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<td>8. Updated Financing maximum loan amount.</td>
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<tr>
<td>V0.99b</td>
<td>07/09/18</td>
<td>Final first public version.</td>
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<tr>
<td>v0.99</td>
<td>05/09/18</td>
<td>Near final first public version.</td>
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<tr>
<td>v0.9</td>
<td>12/12/17</td>
<td>Draft sent for second management review.</td>
</tr>
<tr>
<td>v0.5</td>
<td>10/31/17</td>
<td>Draft sent for management review.</td>
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<tr>
<td>Accelerated Replacement (AR)</td>
<td>See Measure Application Type.</td>
</tr>
<tr>
<td>Accelerated Replacement Cost (ARC)</td>
<td>The full measure cost incurred to install the new high-efficiency measure, reduced by the net present value of the full measure cost that would have been incurred to install the standard efficiency equipment at the end of the remaining useful life period. See Section 2.3.3.1.4 for more information.</td>
</tr>
<tr>
<td>Add-On Equipment (AOE)</td>
<td>See Measure Application Type.</td>
</tr>
<tr>
<td>Baseline Cost</td>
<td>The total amount that would be paid by the customer to implement the baseline solution.</td>
</tr>
<tr>
<td>Behavioral, Retro-commissioning, and Operational (BRO)</td>
<td>See Measure Application Type.</td>
</tr>
<tr>
<td>Bill Neutrality</td>
<td>Monthly bill payments that do not exceed the projected monthly energy cost savings following the installation of an energy efficiency project using an OBF loan.</td>
</tr>
<tr>
<td>California Public Utilities Commission (CPUC)</td>
<td>Regulates investor-owned electric and natural gas utilities operating in California. Regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies, in addition to authorizing video franchises.a</td>
</tr>
<tr>
<td>California Statewide Qualified LED Product List</td>
<td>Source for determining eligibility of non-residential LED fixtures for energy efficiency incentives and rebates offered by Pacific Gas &amp; Electric Company. b</td>
</tr>
<tr>
<td>California Energy Commission (CEC)</td>
<td>California’s primary energy policy and planning agency. The CEC has responsibility for activities that include maintaining the California Energy Code, promoting energy efficiency through appliance and building standards, and supporting renewable energy technologies.</td>
</tr>
<tr>
<td>Code</td>
<td>In California energy efficiency context, generally refers to Title 20 (appliance energy efficiency) and Title 24 (building energy efficiency) of the California Code of Regulations but can be any codes and regulations enacted by federal and local governments and regulatory agencies that mandate a particular technology to be utilized. c</td>
</tr>
<tr>
<td>Community Choice Aggregators (CCA)</td>
<td>Organizations created by local governments pursuant to Assembly Bill 117 for the purpose of procuring power and administering energy efficiency programs on behalf of local citizens. d</td>
</tr>
<tr>
<td>Comparison Group</td>
<td>A group of non-participating customers who are as similar as possible to participants in a quasi-experimental design energy efficiency program. Comparison group members’ energy consumption is compared to that of program participants in order to assess participants’ energy savings resulting from the program.</td>
</tr>
<tr>
<td>Control Group</td>
<td>A group of customers eligible for a randomized controlled trial energy efficiency program, who were randomly assigned not to receive the program intervention (in contrast with the Treatment Group customers who were randomly assigned to receive the intervention). Control Group members’ energy consumption is compared to that of the treatment group in order to assess the Treatment Group’s energy savings resulting from the program.</td>
</tr>
<tr>
<td>Coverage Factor</td>
<td>The range in observed values of independent variables during the baseline period in a site-level meter-based analysis.</td>
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<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Custom Measures and Projects</td>
<td>Custom measures and projects are energy efficiency efforts where the customer financial incentive and the ex ante energy savings are determined using a site-specific analysis and are finalized at project completion. An agreement is made with the customer wherein the financial incentive is paid upon the completion and verification of the installation.</td>
</tr>
<tr>
<td>Custom Project Review (CPR)</td>
<td>The CPUC review process that occurs before a custom or NMEC measure or project savings claim is &quot;frozen&quot;; undertaken to verify that the ex ante values used to calculate the reported savings are reasonable and based on best available information. For RCT and QED designs, the program implementer must submit for review a procedural work paper that outlines the method to be used to determine savings, rather than specific values. For deemed measures and previously for custom measures, this process is referred to as Ex Ante Review (EAR).</td>
</tr>
<tr>
<td>Customer</td>
<td>An account holder who receives delivered energy from PG&amp;E. The parent company of the account holder and any of its subsidiaries are considered one PG&amp;E customer.</td>
</tr>
<tr>
<td>Database of Energy Efficiency Resources (DEER)</td>
<td>Database located at: <a href="http://www.deeresources.com">http://www.deeresources.com</a> that contains information on energy efficiency technologies and measures, including estimates of energy savings potential and measure costs for these technologies in residential and non-residential applications.</td>
</tr>
<tr>
<td>Deemed Measure</td>
<td>A prescriptive energy efficiency measure. Energy efficiency measures with predefined savings calculations, cost, eligibility, and other measure attributes.</td>
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| DEER Peak Demand Savings (new definition as of 1/1/20) | The average demand impact as would be "seen" at the electric grid level for a measure averaged across 15 hours from 4 p.m. to 9 p.m. during the three consecutive weekday periods containing the highest algebraic sum of:  
  - The average temperature over the three-day period,  
  - The average temperature from 4:00 pm to 9:00 pm over the three-day period, and  
  - The peak temperature within the three-day period.  
The Peak Period shall fall within the dates of June 1 through September 30, inclusive. The three Peak Period days shall not include a holiday. Holidays within this window of dates include July 4th, or the nearest weekday to July 4th, and Labor Day. |
<p>| Delivery Channel | The target of an EE program activity is known as the delivery channel, usually described as upstream (directed at manufacturers of EE measures), midstream (directed at distributors of EE measures), downstream (directed at retailers of EE measures or at retail locations where EE measures are sold), or direct install (directed at and provided directly to the customer). Otherwise known as &quot;channel&quot;. |
| Direct Access (DA) Customer | Customer category originally established by California Assembly Bill 1890, <em>Electric Utility Industry Restructuring Act</em>. Customers who are authorized to purchase electricity or gas from an Electricity Service Provider, instead of from a regulated electric utility. Currently governed by SB 695. |
| Direct Energy Savings | The primary energy and demand impacts that result directly from a measure such as the savings that result from the equipment involved in a retrofit activity (e.g., savings resulting directly from the lower input wattage of newly installed efficient lighting fixtures). Associated with Resource Programs as opposed to Non-Resource Programs. |
| Direct Install (DI) | Energy efficiency solutions provided directly to the customer at little or no cost through installation contractors provided and managed by an Implementer. |</p>
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<tr>
<td>Disadvantaged Communities (DAC)</td>
<td>Pursuant to Section 39711 of the Health and Safety Code, the California Environmental Protection Agency (CalEPA) developed a means for identifying disadvantaged communities, which may include, but are not limited to: 1. Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation. A.17-01-013 et al. 2. Areas with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment. CalEPA’s CalEnviroScreen tool is used to identify census tracts that meet the definition of a disadvantaged community. The tool can be found here: <a href="https://oehha.ca.gov/calenviroscreen">https://oehha.ca.gov/calenviroscreen</a>.</td>
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<tr>
<td>Downstream</td>
<td>Classification of program delivery in which program is delivered by agents or representatives (including installation contractors) that have direct interaction with end-use customers or through a program website.</td>
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<tr>
<td>Dual Baseline</td>
<td>Means that an existing baseline is used for the calculation of energy savings for the remaining useful life of the removed equipment. At the end of the remaining useful life, the customer would have needed to replace the failed equipment with equipment that reflected current energy efficiency standards and/or standard practices. This second baseline is used to calculate the [reduced] savings for the remainder of the effective useful life of the measure.</td>
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<tr>
<td>Early Retirement (ER)</td>
<td>See Measure Application Types.</td>
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<tr>
<td>Effective Useful Life (EUL)</td>
<td>An estimate of the median number of years that the measures installed under the program are still in place and operable.</td>
</tr>
<tr>
<td>Embedded Energy</td>
<td>The amount of energy (in kWh) needed to supply, move, and treat water (in million gallons or acre/ft), delivered to a user, and to treat the water post-use (if necessary).</td>
</tr>
<tr>
<td>Emerging Technologies (ET)</td>
<td>New energy efficiency technologies, systems, or practices that have significant energy savings potential but have not yet achieved sufficient market share (for a variety of reasons) to be considered self-sustaining or commercially viable. Emerging technologies include late stage prototypes or under-utilized but commercially available hardware, software, design tools or energy services that if implemented appropriately should result in energy savings.</td>
</tr>
<tr>
<td>Energy Efficiency (EE)</td>
<td>Activities or programs that influence customers to reduce energy use by making investments in more efficient equipment or controls, which reduce energy use while maintaining a comparable level of service.</td>
</tr>
<tr>
<td>Energy Efficiency Measure or Measure</td>
<td>Energy using equipment, control system, or practice whose installation and/or implementation results in a reduction of energy purchased from the distribution utility (while maintaining a comparable or higher level of a specific service or to accomplish a specific amount of work). For purposes of these Rules, solar-powered, non-generating technologies are eligible energy efficiency measures. To be included in a program, the CPUC must determine the measure to be acceptable. Also referred to simply as “measure”.</td>
</tr>
<tr>
<td>Energy Efficiency Project</td>
<td>Implementation of an EE measure or group of measures at a customer site, essentially during one construction cycle, through a single incentive application. Note: Projects are not split by meter or property lot lines. Any tiered levels of rigor will be based on cumulative customer savings over a calendar year.</td>
</tr>
<tr>
<td>Energy Insight (EI)</td>
<td>PG&amp;E software system for Trade Professionals that utilizes Salesforce® to track and submit customer rebate and incentive applications.</td>
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<tr>
<td>Energy Service Provider (ESP)</td>
<td>An entity who provides electric supply services to Direct Access Customers within PG&amp;E’s service territory. An ESP may also provide certain metering and billing services to its DA Customers as provided for within these tariffs.</td>
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<td>Term</td>
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<tr>
<td>eRebates</td>
<td>PG&amp;E’s customer facing electronic application workflow that supports residential and non-residential downstream deemed rebate applications.</td>
</tr>
<tr>
<td>Evaluability</td>
<td>An assessment of the probability that sufficient evaluation information will be available when evaluations are actually undertaken.</td>
</tr>
<tr>
<td>Evaluation, Measurement and Verification (EM&amp;V)</td>
<td>Activities that evaluate, monitor, measure, and verify performance or other aspects of energy efficiency programs or their market environment. The CPUC’s Energy Division has management and contracting responsibility estimating savings impacts for purposes of calculating savings claims. The IOUs are authorized to contract and manage studies to evaluate program design and to assess the market. See Measurement &amp; Verification.</td>
</tr>
<tr>
<td>Ex Ante Database (EAdb)</td>
<td>A database containing the official ex ante data available for claims processing.</td>
</tr>
<tr>
<td>Ex Ante Review (EAR)</td>
<td>Process that estimates the potential energy savings and the customer financial incentive for a deemed energy efficiency measure before it is installed and/or implemented based on predictions of typical operating conditions and baseline usage. The review process that occurs before savings for a measure or project savings claim is “frozen” and undertaken to verify that the ex ante values used to calculate the reported savings are reasonable and based on best available information.</td>
</tr>
<tr>
<td>Ex Ante Values</td>
<td>Estimated savings, cost, incentive, effective useful life, net-to-gross ratio, and other values that are the basis of the savings claim. The ex ante values are the values prior to the evaluation of the portfolio cycle. These values reflect the IOU-reported savings. Savings may be revised with an impact evaluation.</td>
</tr>
<tr>
<td>Exception Request</td>
<td>A formal request that, if approved, allows a project to proceed despite being out of compliance with one or more platform requirements. The Exception process is defined in Guidance Document CUST-5051P Exception Management Procedure.</td>
</tr>
<tr>
<td>Ex Post Values</td>
<td>Estimated savings, cost, effective useful life, net-to-gross ratio, and other values that are determined by the CPUC through the Evaluation, Measurement and Verification process for energy efficiency measures, programs, and portfolios.</td>
</tr>
<tr>
<td>Free Rider (FR)</td>
<td>Program participants who would have installed and/or implemented the measure or equipment in the absence of the program. To prevent free ridership, implementers should avoid claiming influence if their interventions, if any, in a specific project don’t happen during customer’s decision-making process or result in no additional efficiency improvement over what the customer is planning to do anyway to meet today’s needs.</td>
</tr>
<tr>
<td>Fuel Substitution</td>
<td>Programs which are intended to substitute energy using equipment of one energy source with a competing energy source (e.g. switch from electric resistance heating to gas furnaces).</td>
</tr>
<tr>
<td>Fuel Switching</td>
<td>See Fuel Substitution.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Full Measure Cost (FMC)</td>
<td>The total cost of the EE measure which may include: audits, design, engineering, construction, equipment, materials, removal, recycling, overhead, sales tax, shipping, and labor directly related to the energy efficiency attributes of the measure. Product or feature choices not directly related to EE should be removed. Labor cost can be contractor or in-house if proof of direct project hours and costs are provided. Invoices should include the make, model, unit price, and quantity of equipment, the vendor name and address, the customer’s name and address, the invoice number, the date of sale, and the total cost. v</td>
</tr>
<tr>
<td>Government Agency Customer (Financing)</td>
<td>A taxpayer-funded federal, state, county, or local government agency that uses tax revenue to pay its PG&amp;E energy bills. Such customers may include, but are not limited to, public schools, State of California colleges and universities, public libraries, and government offices.</td>
</tr>
<tr>
<td>Gross Realization Rate</td>
<td>Also known as Realization Rate. The ratio of achieved energy savings to predicted energy savings that takes into account the likelihood that not all Commission-approved projects undertaken by IOUs will come to fruition. w</td>
</tr>
<tr>
<td>Gross Savings</td>
<td>Gross savings count the energy savings from energy efficiency measures installed by program participants irrespective of whether or not those savings are from free riders. Gross savings are adjusted by a net-to-gross ratio to produce net savings (that is, to remove the savings associated with free riders). x. It should be noted that Gross Savings do include adjustments for Realization and Installation Rates. (See also GSIA.)</td>
</tr>
<tr>
<td>Gross Savings and Installation Adjustment (GSIA)</td>
<td>The GSIA is a DEER adjustment factor that combines the Realization Rate and Installation Rate. It is dependent on both the measure technology and how the measure is delivered. y</td>
</tr>
<tr>
<td>Hard-to-Reach (HTR) - Residential</td>
<td>Those customers who do not have easy access to program information and/or generally do not participate in energy efficiency programs due to a language, income, housing type, geographic, and/or home ownership (split incentives) barrier. These barriers are defined as: Language – Primary language spoken is other than English, and/or Income – Those customers who qualify for the California Alternative Rates for Energy or the Family Electric Rate Assistance Program, and/or Housing Type – Multifamily and Mobile Home Tenants (rent or lease), and/or Geographic – Located in areas other than the San Francisco Bay Area, San Diego area, Greater Los Angeles Area (Los Angeles, Orange, San Bernardino, Riverside and Ventura counties) or Sacramento, or in a Disadvantaged Community (as designated by CalEPA); and/or Home Ownership – Renters. z</td>
</tr>
</tbody>
</table>

When classifying a customer as hard-to-reach, it is considered sufficient if only two of the criteria listed above are met if one of the criteria is the geographic criteria. If the geographic criteria are not met, three of the other criteria must be met.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard-to-Reach – Non-Residential</td>
<td>Business customers who do not have easy access to program information or generally do not participate in energy efficiency programs due to language, business size, geographic location/Disadvantaged Community status, or lease (split incentive) barrier.</td>
</tr>
<tr>
<td>Implementer</td>
<td>Commercial entity involved in designing and/or implementing an energy efficiency program. An Implementer may be a separate commercial entity or a department within the IOU or program administrator. A separate entity, contracted by a program administrator, to design and deliver an energy efficiency program is also referred to as a third-party implementer.</td>
</tr>
<tr>
<td>Incentive</td>
<td>Payments for pre-approved projects that retrofit or install new equipment to save energy and are typically much larger in scope than those that qualify for a rebate; typically, the term “incentives” (as opposed to “rebates”) applies to custom projects.</td>
</tr>
<tr>
<td>Incremental Measure Cost (IMC)</td>
<td>The additional cost of installing a more efficient measure calculated from the price differential between energy efficient equipment and services and standard or baseline equipment or services. Note that any cost premium resulting from features or components that do not improve the efficiency of the equipment is excluded from the incremental measure cost calculation.</td>
</tr>
<tr>
<td>Indirect Energy Savings or Interactive Effects</td>
<td>The secondary energy and demand impacts that result from a measure to a secondary system or equipment not directly involved in the retrofit activity (e.g., cooling or heating energy impacts resulting from the installation of efficient lighting fixtures). Associated with Resource Programs as opposed to Non-Resource Programs.</td>
</tr>
<tr>
<td>Industry Standard Practice (ISP)</td>
<td>A measure or practice that represents the typical current equipment purchased, or a commonly used, currently trending practice in the applicable markets absent the program. ISP represents today’s market trend, i.e., whether a technology would be commonly purchased by customers today (not in situ or saturation), with consideration of key factors or barriers driving the technology adoption. The practice is considered “ISP-by-code” when the selection and adoption of that specific measure or practice is required to meet government standards, codes or regulations (including non-energy regulations). The practice is considered “ISP-by-default” when the selected measure is the only viable option considered by customer. See Standard Practice Baseline. In addition, an ISP can be a method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a customer’s standard way of doing things (e.g., a standard way of complying with legal or ethical requirements, or a customer’s preference for the best product with superior efficiency in customized design). This is generally applicable to custom measures and projects.</td>
</tr>
<tr>
<td>Influence</td>
<td>See Program Influence.</td>
</tr>
<tr>
<td>Installation Rate</td>
<td>The ratio of the number of verified installations of a measure divided by the number of claimed installations rebated by the utility during a claim period. Typically, Installation Rates used on an ex ante basis will be based upon previous ex post evaluations.</td>
</tr>
<tr>
<td>International Performance Measurement and Verification Protocol (IPMVP)</td>
<td>The IPMVP provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. The IPMVP is the leading international standard in M&amp;V protocols. It has been translated into 10 languages and is used in more than 40 countries.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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</tr>
<tr>
<td>Investor Confidence Project (ICP)</td>
<td>ICP offers a series of protocols that define industry best practices for energy efficiency project development as well as a credentialing system that provides third-party validation.</td>
</tr>
<tr>
<td>ICP Targeted Commercial Protocol</td>
<td>This protocol, focused on commercial projects comprised of single energy conservation measures or smaller sets of related energy efficiency measures that have limited or no interactive effects (e.g. lighting, controls, or HVAC replacement), provides standardized methods for how projects are baseline, engineered, installed, operated and measured.</td>
</tr>
<tr>
<td>Investor-Owned Utility (IOU)</td>
<td>A business organization providing a product or service regarded as a utility (such as water, natural gas or electricity) to a service area, and managed as a private enterprise rather than as a function of government or a utility cooperative. (e.g., Pacific Gas and Electric Company)</td>
</tr>
<tr>
<td>Measurement and Verification (M&amp;V)</td>
<td>As distinguished from Evaluation, Measurement &amp; Verification, M&amp;V refers specifically to the process of quantifying measure- or project-level energy and cost savings resulting from improvements in energy-consuming systems. The effort required and rigor achieved from M&amp;V should be commensurate with the project capital investment and savings risk.</td>
</tr>
<tr>
<td>Measure Application Type (MAT)</td>
<td>A categorization of energy efficiency measures based on measure attributes – each measure application type has its own baseline treatment, cost basis, eligibility, and documentation requirements. There are six approved measure application types, which include: Accelerated Replacement, Add-On Equipment, Behavioral, Retrocommissioning and Operational, New Construction, Normal Replacement, and Weatherization. Each of these measure application types is further defined below.</td>
</tr>
<tr>
<td>Accelerated Replacement (AR)</td>
<td>The Accelerated Replacement MAT is used for the replacement of existing equipment that could and would remain operational without program intervention. It is used in direct contrast to the NR MAT, which is used when existing equipment either could not or would not remain operational. Early retirement (non-capacity expansion) measures and replacement of &quot;operating equipment that when broken, non-functional, or unable to provide the intended service is typically repaired&quot; can be classified as AR. New construction and capacity expansion cannot be classified as AR. Any AR measure is expected to pass the CPUC’s preponderance of evidence criteria to be eligible (see Section 2.4.2 for more information on the preponderance of evidence criteria).</td>
</tr>
<tr>
<td>Add-On Equipment (AOE)</td>
<td>An Add-on Equipment (AOE) measure installs new equipment onto an existing host improving the nominal efficiency of the host system. The existing host system must be operational without the AOE, continue to operate as the primary service equipment for the existing load, and is able to fully meet the existing load at all times without the add-on component. The AOE must not be able to operate on its own. The actual energy reduction occurs at the host equipment, not at the add-on component, although any add-on component energy usage must be subtracted from the host savings.</td>
</tr>
<tr>
<td>Behavioral (BRO-Bhv)</td>
<td>The BRO category includes measures that either restore or improve energy efficiency and can be reasonably expected to produce multi-year savings. BRO-Bhv measures include information or educational programs that influence energy-related practices (behavioral).</td>
</tr>
<tr>
<td>Building Weatherization (BW)</td>
<td>The BW category includes improvements to non-mechanical building structures, improving the nominal efficiency of pre-existing equipment that is otherwise expected to perform essential building functions throughout the course of a building’s life cycle, without regular replacement. Such measures improve the efficiency of equipment that does not burn out or when it does burn out the building can function without them; thus, the equipment is typically not replaced unless there is a major building renovation.</td>
</tr>
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</tr>
<tr>
<td><strong>New Construction (NC)</strong></td>
<td>The New Construction MAT is used where equipment is installed in either a new area or an area that has been subject to a major renovation, to expand capacity of existing systems, or to serve a new load.</td>
</tr>
<tr>
<td><strong>Normal Replacement (NR)</strong></td>
<td>The NR MAT is used where existing equipment (including Add-On Equipment) has either failed, no longer meets current or anticipated needs, or is planned to be replaced for reasons unrelated to the program. The NR MAT may be applied to any measure or program, with certain exceptions, and without a burden of proof. This MAT includes measures that previously fit into the now-retired Replace on Burnout (ROB) MAT.</td>
</tr>
<tr>
<td><strong>Operational (BRO-Op)</strong></td>
<td>The BRO category includes measures that either restore or improve energy efficiency, and can be reasonably expected to produce multi-year savings. BRO-Op measures include measures that improve the efficient operation of installed equipment.</td>
</tr>
<tr>
<td><strong>Retrocommissioning (BRO-RCx)</strong></td>
<td>The BRO category includes measures that either restore or improve energy efficiency and can be reasonably expected to produce multi-year savings. BRO-RCx measures include activities and installations that restore equipment performance to its nominal efficiency (i.e. rated, intended, or original efficiency).</td>
</tr>
<tr>
<td><strong>Midstream</strong></td>
<td>Type of program delivery in which incentive goes to the distributor or retailer to encourage promotion of energy efficiency products in the market. Incentive may or may not be passed to the end-use customer. Incentive may or may not be passed to the customer. Does not include programs partnering with contractors or installers.</td>
</tr>
<tr>
<td><strong>Net Savings</strong></td>
<td>The savings attributable to a program realized when free ridership is accounted for. The savings is calculated by multiplying the gross savings by the net to gross ratio.</td>
</tr>
<tr>
<td><strong>Net-to-Gross Ratio (NTG or NTGR)</strong></td>
<td>A ratio or percentage of net program impacts divided by gross or total impacts. Net-to-gross ratios are used to estimate and describe the free-ridership that may be occurring among energy efficiency program participant s.</td>
</tr>
<tr>
<td><strong>New Construction (NC)</strong></td>
<td>Energy efficiency programs that do not directly procure energy resources that can be counted, such as marketing, outreach and education, workforce education and training, and emerging technologies.</td>
</tr>
<tr>
<td><strong>Non-Routine Event</strong></td>
<td>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, implementation/installation, or reporting period of an NMEC project. It therefore must be accounted for in savings calculations. Typical examples of 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.</td>
</tr>
<tr>
<td><strong>Normal Replacement (NR)</strong></td>
<td>See Measure Application Type.</td>
</tr>
<tr>
<td><strong>Normalized Metered Energy Consumption (NMEC)</strong></td>
<td>A method of calculating savings using statistical analyses of actual pre- and post-installation energy usage data, rather than engineering analyses of forecasted savings or application of prescriptive (deemed) values. Expressed mathematically by the IPMVP: Normalized Savings = (Baseline Energy +/- Routine Adjustments to fixed conditions +/- Non-Routine Adjustments to fixed conditions) – (Reporting Period Energy +/- Routine Adjustments to fixed conditions +/- Non-Routine Adjustments to fixed conditions)</td>
</tr>
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<td>Term</td>
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</tr>
<tr>
<td>Observed Savings</td>
<td>Savings calculated based on weather-normalized analysis of pre/post interval data without accounting for routine or non-routine adjustments to fixed conditions. Observed savings do not account for systemic (i.e. exogenous to the effect of the program) changes in energy use, and thus are not directly claimable.</td>
</tr>
<tr>
<td>On-Bill Financing (OBF)</td>
<td>A financing opportunity offered by PG&amp;E that provides zero percent (0%) interest loans to qualified customers toward the purchase and installation of new energy efficient measures or equipment at the customer’s premises. A fixed monthly loan payment amount due will appear as a line item on the customer’s PG&amp;E bill, or, at PG&amp;E’s discretion, by separate bill.</td>
</tr>
<tr>
<td>Payback Period</td>
<td>The period of time required to recoup the funds expended in an investment, whereby future income is not adjusted to account for the time value of money.</td>
</tr>
<tr>
<td>Persistence</td>
<td>Measure life is a function of equipment life and measure persistence. Equipment life is the number of years that a measure is installed and will operate until failure. Measure persistence takes into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued.</td>
</tr>
<tr>
<td>Platform</td>
<td>Rulesets for how PG&amp;E and its Implementers measure, pay for, and claim energy savings, including Deemed, Custom, Meter-Based, and Financing.</td>
</tr>
<tr>
<td>Point-of-Sale (POS)</td>
<td>Rebate for purchase of energy efficient product at the time of sale as a line item on the invoice/receipt.</td>
</tr>
<tr>
<td>Population-Level NMEC</td>
<td>An approach in which energy savings are calculated based on sites’ pre- and post-intervention metered energy consumption data and aggregated across a group of similar sites (population). Sites included in a population must have similar equipment and energy consumption levels; factors that affect their energy usage must be similar; and they must be expected to have similar energy savings from the program.</td>
</tr>
<tr>
<td>Portfolio</td>
<td>A composition of energy efficiency programs, such as all IOU and non-IOU energy efficiency programs funded by ratepayers, that are implemented during a program year or cycle. May also refer to a group of programs sponsored, managed, and contracted for by a particular IOU.</td>
</tr>
<tr>
<td>Preferred Resources Pilot (PRP)</td>
<td></td>
</tr>
<tr>
<td>Preliminary Ex-Ante Review Database (PEARdb)</td>
<td>The Preliminary Ex Ante Review database (PRdb) is a supplement to the Official Ex Ante database (EAdb). While the EAdb contains the official ex ante data that is available for claims processing, the PRdb provides access to data that the ex ante team has recently developed, is currently reviewing or has newly approved.</td>
</tr>
<tr>
<td>Preponderance of Evidence (POE)</td>
<td>Preponderance of evidence is a term borrowed from civil law. The preponderance of evidence standard requires that evidence for two opposing conditions be considered – in this case Accelerated Replacement and Normal Replacement baselines – and the condition more likely to be true (greater than 50% probability) be chosen.</td>
</tr>
<tr>
<td>Program</td>
<td>A collection of defined activities and measures that: • are carried out by the administrator and/or their subcontractors and implementers, • target a specific market segment, customer class, a defined end use, or a defined set of market actors (e.g. designers, architects, homeowners), • are designed to achieve specific efficiency related changes in behavior, investment practices or maintenance practice in the energy market, and are guided by a specific budget and implementation plan.</td>
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<tr>
<td>Program Administrator (PA)</td>
<td>A person, company, partnership, corporation, association or other entity selected by the CPUC and any subcontractor that is retained by an aforesaid entity to contract for and administer energy efficiency programs funded in whole or in part from electric or gas Public Goods Charge funds. For purposes of implementing PU Code Section 381.1, an “administrator” is any party that receives funding for and implements energy efficiency programs pursuant to PU Code Section 381. PAs currently include investor-owned utilities, community choice aggregators, and regional energy networks.</td>
</tr>
<tr>
<td>Program Administrator Cost Test (PAC)</td>
<td>Measures the net resource benefits from the perspective of the program administrator. Like the TRC, the benefits are the avoided costs of the supply-side resources avoided or deferred. The costs are defined to include the net present value of all costs incurred by the program administrator while, unlike the TRC, the PAC excludes the costs incurred by the participating customers. As in the TRC test, the net present values for the PAC are calculated using a discount rate that reflects each utility’s after-tax weighted cost of capital, based on the most recent cost of capital decision.</td>
</tr>
<tr>
<td>Implementation Plan (IP)</td>
<td>A detailed description of a program that includes program theory and design, goals and budgets, logic models, planned processes, program activities and EM&amp;V, and program performance metrics, developed by Program Administrators and stakeholders to detail program and implementation strategies, but not formally filed with the Commission. IPs replace the previous Program Implementation Plans.</td>
</tr>
<tr>
<td>Program Influence</td>
<td>The program services, such as technical or financial assistance, provided during a customer’s decision-making process that motivate a customer to implement the more efficient, more costly energy efficiency measure than they otherwise would have.</td>
</tr>
<tr>
<td>Project Developer (Financing)</td>
<td>A contractor or a team/consortium of contractors and service provider(s) who plan and deliver an energy efficiency project. To participate in OBF, a Project Developer must be credentialed as project developer under the Investor Confidence Project.</td>
</tr>
<tr>
<td>Proof of Payment</td>
<td>Documentation provided which shows evidence that a purchase has been made. This may take the form of an invoice, purchase receipt, lease agreement, etc.</td>
</tr>
<tr>
<td>Public Purpose Program (PPP)</td>
<td>State-mandated gas and electric assistance programs for low income customers, energy efficiency programs, and public-interest research and development that are funded by surcharges on utility bills.</td>
</tr>
<tr>
<td>QA Provider (Financing)</td>
<td>Individuals and firms that have been approved by the Investor Confidence Project (for required experience, have been trained in the ICP System, and are authorized to provide an independent third-party review of projects).</td>
</tr>
<tr>
<td>Qualified Products List (QPL)</td>
<td>List of equipment that meets specifications and qualification requirements set forth in the applicable measure specification.</td>
</tr>
<tr>
<td>Quasi-Experimental Design (QED)</td>
<td>An approach to calculating savings that compares the outcomes of customers who choose to participate in a program and a comparison group of similar customers who do not. This approach is similar to a randomized controlled trial, but does not use random assignment to compose the control and treatment groups.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Term</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Randomized Control Trial (RCT)</td>
<td>A type of experimental design in which members of an eligible population are randomly assigned to either a Treatment Group or a Control Group. A program intervention (for example, implementation of a set of energy efficiency measures, or information about an energy efficiency program) is then provided to only the Treatment Group. The Control group’s energy usage is the baseline against which to measure the treatment group’s savings. (Net savings is estimated as the difference in usage between the two groups.) The approach assumes that non-program-related factors that influence energy usage among eligible customers affect the treatment and comparison groups equally.</td>
</tr>
<tr>
<td>Ratepayer</td>
<td>Those customers who pay for gas or electric service under regulated rates and conditions of service.</td>
</tr>
<tr>
<td>Rebate</td>
<td>A financial incentive paid to the customer in exchange for a specific action, typically the installation of energy efficiency equipment.</td>
</tr>
<tr>
<td>Regressive Baseline</td>
<td>Use of a Code or Standard Practice baseline when existing equipment efficiency exceeds code or standard practice efficiency.</td>
</tr>
<tr>
<td>Remaining Useful Life (RUL)</td>
<td>An estimate of the median number of years that a measure being replaced under the program would remain in place and operable had the program intervention not caused the replacement.</td>
</tr>
</tbody>
</table>
| Remote Ex Ante Database Interface (READI) | READI is a program that allows users to examine the CPUC’s databases of ex ante measure information. With the READI program you can:  
  • Browse and examine the ex ante data tables.  
  • Find existing DEER and non-DEER measure definitions.  
  • Find and examine the Technologies that are used in the measure definitions.  
  • Examine the deemed energy impacts associated with measures in tables and graphs.  
  • Download data tables to your computer as workbook or CSV files.  
  • Create and Save new measures based on existing Scaled measure definitions. |
<p>| Resource Program                        | Energy efficiency programs that generate energy savings that are quantified and tracked by program administrators.                                                                                          |
| Savings Claim                           | The energy and/or demand savings reported by the implementer as achieved by an energy efficiency intervention or program. The term pertains to all savings calculation methodologies.                                         |
| Sector                                  | Customer groups sharing common characteristics and barriers that are building blocks to PG&amp;E’s portfolio, including Residential, Commercial, Public, Industrial, Agricultural, and Cross-Cutting.                               |
| Site-Level NMEC                         | An NMEC approach where savings are calculated at an individual building, project, or site using normalized meter readings taken before and after the energy efficiency intervention. The exact calculation methodology used is project-specific, customized to the unique characteristics of the site or project. The site’s pre-installation energy usage serves as the baseline. Savings may be adjusted to account for site-specific non-routine events (NREs) that occur after the baseline is established. |</p>
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<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Small Business</td>
<td>Resolution E-4939 adopted the small business definition currently approved by the CPUC for use in IOU tariffs: “A small business customer is defined as a non-residential customer with an annual electric usage of 40,000 kilowatt hours (kWh) or less, or an energy demand of 20 kilowatt (kW) or less, or annual consumption of 10,000 therms of gas or less. Alternatively, a small business customer is a customer who meets the definition of “micro-business” in California Government Code Section 14837 (Section 14837). Section 14837 defines a micro-business as a business, together with affiliates, that has average annual gross receipts of $3,500,000 or less over the previous three years, or is a manufacturer, as defined in Section 14837 subdivision (c), with 25 or fewer employees. The California Department of General Services is authorized to amend the gross receipt amount. In January 2010 DGS increased the gross receipt amount from $2,750,000 to the current amount of $3,500,000. (See, California Office of Administrative Law, Regulatory Action Number 2000-1110-01S.) This definition does not include fixed usage or unmetered rate schedule customers.”</td>
</tr>
<tr>
<td>Source BTU Consumption</td>
<td>Conversion of retail energy forms (kWh, therms) into the BTU required to generate and deliver the energy to the site. This conversion is used to compare the relative impacts of switching between fuel sources at the source or BTU level for the three-prong test required for fuel-substitution programs.</td>
</tr>
<tr>
<td>Standard Practice Baseline</td>
<td>A measure or practice used as the baseline for a specific measure that represents what the customer would implement in the absence of program influence or intervention.</td>
</tr>
<tr>
<td></td>
<td>A standard practice can be established from an ISP study, from similar and recent typical activity, or from an analysis of the current viable options applicable to the customer and the customer’s typical decision-making process.</td>
</tr>
<tr>
<td></td>
<td>Where a standard practice is identified that exceeds the minimum efficiency established by a code or regulation, the standard practice is the appropriate baseline.</td>
</tr>
<tr>
<td>Third-Party Implementer</td>
<td>See Implementer.</td>
</tr>
<tr>
<td>Title 24</td>
<td>Title 24 of the California Code of Regulations is known as the California Building Standards Code. Part 6 is the California Energy Code.</td>
</tr>
<tr>
<td>Total Resource Cost Test (TRC)</td>
<td>The TRC is used by the CPUC as the primary indicator of energy efficiency program cost effectiveness and is the ratio between costs and benefits. The costs are those incurred by both participants (e.g., measures/equipment installed) and the program administrator. The benefits are the avoided costs of the supply-side resources avoided or deferred.</td>
</tr>
<tr>
<td>Trade Professionals</td>
<td>Any third party such as contractors, installers, retailers, distributors, manufacturers, engineers, and energy service companies, etc.</td>
</tr>
<tr>
<td>Upstream</td>
<td>Type of program delivery in which an incentive goes to the manufacturer to encourage production and promotion of energy efficiency products in the market. Incentive may or may not be passed to the end-use customer.</td>
</tr>
<tr>
<td>Water-Energy Savings</td>
<td>The savings of Embedded Energy that results from water-savings projects. Considered part of the Water-Energy Nexus.</td>
</tr>
<tr>
<td>Water-Energy Nexus (WEN)</td>
<td>Term applied to the energy used to treat, heat, and convey water in California and programmatic opportunities to reduce energy use and conserve water.</td>
</tr>
<tr>
<td>Weatherization (WEA)</td>
<td>See Measure Application Types.</td>
</tr>
<tr>
<td>Workpaper</td>
<td>Documentation prepared by the program administrators or program implementers that documents the data, methodologies, and rationale used to develop ex ante estimates that are not in already fully contained in the Database for Energy Efficiency Resources (D.10-04-029, footnote page 20).</td>
</tr>
</tbody>
</table>

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and Verification, and Related Issues

Analysis of Demand

March 2017) at pp. 18

Staff Paper: Framework for Establishing the Senate Bill 350 Energy Efficiency Savings Doubling Targets

not electricity or gas)

Administrator Energy Efficiency Evaluation, Measurement and Verification Plan Version 7 (Final)

Guidance for Initial Energy Efficiency Rolling Portfolio Business Plan Filings

California Edison Company (U338E) for Approval of Energy Efficiency Rolling Portfolio Business Plan

California Code of Regulations, Title 24 (Building F Standards Code) and Title 20, Division 2, Chapter 4, Article 4 (Appliance Energy Efficiency Regulations).


CPUC email from Peter Lai, Energy Division, April 19, 2017.


D.05-01-055, p. 53.

Energy Efficiency Policy Manual, p. 53. This document uses the terms “fuel switching” and “fuel substitution” interchangeably. Others use fuel switching to refer to changes to a non-regulated fuel (e.g. not electricity or gas), whereas fuel substitution refers to regulated fuels (electricity or gas). See the CEC Staff Paper: Framework for Establishing the Senate Bill 350 Energy Efficiency Savings Doubling Targets (January 2017) at pp. 18-19.


D.16-08-019, p. 105.


Generalization of EE Policy Manual definition of HVAC interactive effects.

pg


http://www.energy.ca.gov/glossary/glossary-i.html.


Accelerated Replacement currently includes ER, RE and RI, although rules regarding RE and RI are not yet defined per: California Public Utilities Commission, Energy Division, March 2, 2017, Resolution E-4818: Measure level baseline assignment and preponderance of evidence guidance to establish eligibility for an accelerated replacement baseline treatment.

D.16-08-019, p. 104.


California Public Utilities Commission, January 7, 2020, Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption ("NMEC Rulebook"), version 2.0, p. 22.


NMEC Rulebook, p. 12.

Resolution E-4818, p. 37.


D.12-05-015.


D.16-08-019, p. 104.


Chapter 1 Introduction

1.1 Overview
In Decision 16-08-019, the CPUC directs PG&E and other Program Administrators to outsource at least 60 percent of their energy efficiency portfolio budgets to third parties which must propose, design, implement, and deliver the programs. In anticipation of this shift, PG&E has drafted this Resource Savings Rulebook (Rulebook) to inform market actors of the regulatory guidance necessary to design and deliver successful programs.

PG&E’s Energy Efficiency Business Plan establishes the strategy for its energy efficiency portfolio for 2018 - 2025. In the Plan, PG&E envisions a revised portfolio structure centered on resource programs in five customer sectors\(^1\) that rely on a set of four “platforms” that represent the ways to influence, calculate, and claim savings and incentivize customers to invest in energy efficiency.

The four platforms are Deemed, Custom, Meter-Based, and Financing. We envision that prospective implementers may design programs that use one or more of these constructs. While PG&E has limited this Rulebook to the current set of Platforms, it is possible that new platforms may be developed in response to third party program design proposals. Once a third party enters into contract with PG&E to implement a program, PG&E will provide additional training resources and compliance guidance on best practices applied to the platform requirements.

The table and diagram below demonstrate the relationship between platforms, programs, and the Business Plan customer sectors, and the portfolio as a whole. A program may incorporate information from multiple platforms as part of its strategy.

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\(^1\) The five customer sectors are: Residential, Commercial, Industrial, Public, and Agricultural. This document does not include the three cross-cutting sectors, Codes & Standards, Workforce, Education & Training, and Emerging Technologies, but does include Financing. Codes & Standards was not included because its savings are determined ex post by the California Energy Commission and the California Public Utilities Commission (CPUC). Workforce Education & Training and Emerging Technologies are excluded because they are non-resource, while Financing is included because it is both resource and eligible for third-party implementation. Although Behavior was listed as a standalone platform in PG&E’s Business Plan, behavioral savings are now incorporated within the other platforms.
| **Portfolio** | A composition of energy efficiency programs, such as all IOU and non-IOU energy efficiency programs funded by ratepayers that are implemented during a program year or cycle. May also refer to a group of programs sponsored, managed, and contracted for by a particular IOU. |
| **Sector** | Customer groups sharing common characteristics and barriers that are building blocks to PG&E’s portfolio, including Residential, Commercial, Public, Industrial, Agricultural, and Cross-Cutting. |
| **Program** | A collection of defined activities and measures that:  
• are carried out by the administrator and/or their subcontractors and implementers,  
• target a specific market segment, customer class, a defined end use, or a defined set of market actors (e.g. designers, architects, homeowners),  
• are designed to achieve specific efficiency related changes in behavior, investment practices or maintenance practice in the energy market, and are guided by a specific budget and implementation plan. |
| **Platform** | Rulesets for how PG&E and its Implementers measure, pay for, and claim energy savings, including Deemed, Custom, Meter-Based, and Financing. |

In its role as Program Administrator (PA), PG&E must report accurate program and project ex ante savings claims to the CPUC. Ex ante savings are those that have been calculated based on assumptions prior to any evaluation, measurement and verification (EM&V). Impact evaluations, which are a key part of EM&V, measure the program-induced changes in energy use and financial savings.
and/or demand usage attributed to energy efficiency programs. This Rulebook is intended to assist Implementers in achieving robust energy savings that withstand rigorous impact evaluations. More information on EM&V can be found in the Cross-Platform Chapter. When projects claiming energy savings are submitted for approval, PG&E will review and approve them based on compliance with the guidance provided in this Rulebook.

This Rulebook summarizes and details existing CPUC directives and PG&E operational requirements for making ex ante savings claims. It is intended to communicate existing rules and processes only; it is not intended to restrict or impede program design, and it is not a comprehensive program guidebook.

The Rulebook is a PG&E document – it represents our interpretation and understanding of the CPUC’s rules and requirements. While we believe that many of the elements covered by this document are relevant to all PAs, it has not been extensively vetted statewide and is only intended to be applied to PG&E’s portfolio.

1.2 Document Structure
This document contains five chapters. The first and most important is the Cross-Platform Chapter, where we present our understanding of the overarching rules and regulations of energy efficiency in California. All resource program activities should follow the rules in this chapter, regardless of the platform leveraged. We would expect any new platform to be created to be consistent with the Cross-Platform Chapter.

The remaining four chapters discuss regulatory rules and procedures specific to the Deemed, Custom, Meter-Based, and Financing savings calculation approaches. These chapters are organized in the same fashion as the Cross-Platform Chapter and are intended to supplement it by highlighting the rules and requirements unique to each platform. To fully understand all the requirements for each platform, one must read the entirety of both the Cross-Platform chapter and the platform-specific chapter.

Within each chapter, requirements are categorized according to their origin, and indicated in one of the following two ways:

- **CPUC Requirement**: These are PG&E’s interpretation of official CPUC rules and requirements. Implementers must comply with CPUC Requirements to fulfill the orders within various CPUC decisions, resolutions, rulings, and policies.
- **PG&E Requirement**: These are policies created by PG&E that enable compliance with CPUC reporting requirements and quality assurance expectations. Implementers must comply with PG&E Requirements to facilitate logistical scalability in administrating energy efficiency programs.

In addition, call-out boxes are provided for some requirements to add clarity or guidance. These call-outs detail PG&E’s understanding of CPUC guidance and expectations. Compliance with these details is encouraged, but not required; their interpretation and application are at the discretion of the Implementer.

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PG&E has cited publicly available sources for rules and glossary terms wherever possible. In most cases, rule sources can be found directly on the CPUC website. PG&E can also provide these references upon request.

1.3 Audience
This Rulebook is intended to provide current and future Implementers of PG&E energy efficiency programs a better understanding of the regulatory requirements to be followed when proposing, designing, implementing, and delivering successful programs. We also anticipate that other stakeholders of energy efficiency programs will benefit from the increased transparency and centralized guidance.

1.4 Platforms
The following sections provide an overview of the four platforms we present:

1.4.1 Deemed
In the Deemed Platform, energy efficiency savings are quantified via workpapers, which are technical engineering documents that prescribe pre-determined values for energy savings, measure costs, and other ex ante values. Workpapers are generally used for homogenous, high volume interventions and have historically been developed by PAs with CPUC input and approval. The CPUC-maintained Database for Energy Efficiency Resources (DEER) provides ex ante values that can facilitate workpaper development.

1.4.2 Custom
In the Custom Platform, savings are quantified through a site-specific analysis of the customer’s facility. Custom projects are submitted to and approved by the PA before an agreement is made with the customer to implement the project. The financial incentive is paid upon the completion and verification of the installation. An Implementer designing a program with custom, unique, large scale interventions would look to the Custom Rulebook to guide them.

1.4.3 Meter-Based
In the Meter-Based Platform, savings are determined at the whole-building or system-level, based on a comparative analysis of pre- and post-installation metered energy consumption data from participating sites, rather than engineering analyses of forecasted savings or application of prescriptive (deemed) values. Meter-based approaches are a relatively new addition to the savings calculation methodologies used by energy efficiency programs. Although the CPUC has established some rules and guidelines for meter-based projects, guidance will likely continue to evolve. The Meter-Based Chapter seeks to guide Implementers based on PG&E’s current understanding of the CPUC’s requirements.

1.4.4 Financing
The Financing Platform provides the ruleset for programs that seek to incorporate On-Bill Financing (OBF) into their offerings. Although financing tools other than OBF are under development, this Rulebook focuses on OBF due to its current availability. OBF enables Implementers to offer individuals in the marketplace low interest rate financing for energy

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4 California Assembly Bill 802, passed in October 2015, authorizes this approach.
efficiency projects with cost recovery through a customer’s utility bill. This financing can be used alongside other rebates and incentives or on its own to incentivize customers to install energy efficiency measures.

1.5 Terminology
This Rulebook uses a variety of terms defined in the glossary at the beginning of this document. For reference, a key to abbreviations used herein is included in Appendix B.

1.6 Versioning
The Rulebook is intended to be a living document that will be updated for clarity and accuracy over time. Any new rules developed by the CPUC or PG&E will be incorporated into future versions. The current version will be indicated by the date on the cover page and in the footer. All rules described herein are effective as of the date of this document version.
Chapter 2 Cross-Platform

2.1 Introduction
This chapter contains the rules and requirements that apply to all platforms. All program designs that leverage platforms are subject to the ruleset in this chapter.

2.2 Eligibility

2.2.1 Customer Must Pay PPP
Savings claims must be associated with an active PG&amp;E electric or gas meter, and the customer must pay the Public Purpose Programs (PPP) surcharge associated with the meter for which savings will be produced.\(^5\)

Exception: Customers who are exempt from paying gas PPP per Public Utilities Code Section 896 need not meet this requirement. These exempt PG&amp;E customers include the United States government (federal facilities), United States Coast Guard, the American Red Cross, and Indian reservations.\(^6\)

While Direct Access (DA) and Community Choice Aggregation (CCA) customers purchase the electricity commodity from parties other than PG&amp;E, these customers normally pay the PPP surcharge. If they pay the PPP, they are generally eligible to participate in PG&amp;E’s EE programs. See the customer’s PG&amp;E bill for PPP surcharge information.

2.2.2 Double Dipping and Double Counting
**CPUC Requirement:** Projects receiving incentives or claiming savings through any energy efficiency program must not also receive incentives (i.e. double-dip) or claim savings (i.e. double-count) for the same interventions through any other program, regardless of channel (e.g. downstream, midstream, or upstream), provider (e.g. other utilities, the California Energy Commission, or the California Public Utilities Commission), or platform (e.g. deemed, custom, meter-based) offering.\(^7\)

To prevent double dipping and double counting, Implementers should take actions to avoid overlap with other programs involving the same measures. Additionally, Implementers should establish a quality control process with the PA to identify potential double dipping and double counting and rectify if needed.

2.2.3 Offerings May Change Without Notice
**CPUC Requirement:** The CPUC may provide direction on parameters that trigger a change to rebate/incentive levels, savings calculations, and/or eligibility for any measure.

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\(^5\) California Code, Public Utilities Code, PUC Section 339.8 (electric) and Sections 890-900 (gas); Energy Efficiency Policy Manual, p. 9.

\(^6\) California Code, Public Utilities Code, PUC Section 896; PG&amp;E Tariff Gas Schedule G-PPPS.

Implementers should ensure that customer applications and associated terms reflect the potential for such changes. Implementer systems of record should be able to manage retroactive and prospective changes to values.

2.2.4 To-Code Measures

**CPUC Requirement:** For programs that target (or will claim) to-code savings, the implementation plan must describe what program design elements, data collection activities, and/or analyses will be conducted to lend insight into the following questions:
1. 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?
2. What kinds of barriers are preventing code-compliant equipment replacements?
3. Why is natural turnover not occurring within certain markets or for certain technologies?
4. What program interventions would effectively accelerate equipment turnover? 8,9

2.2.5 Fuel Substitution

**CPUC Requirement:** Fuel substitution measures, in the context of energy efficiency programs, involve energy efficiency projects where all or a portion of the existing energy use is converted from one fuel to another (natural gas to electricity or electricity to natural gas). 10 Only equipment powered by electricity and/or natural gas fuels and provided by a CPUC-regulated investor-owned utility or a municipal utility is eligible to participate under fuel substitution measures. 11

In D.19-08-009, the CPUC replaced the “Three-Prong Test” with the “Fuel Substitution Test”. The Fuel Substitution Test states that:

a. **Fuel substitution measures must offer resource value and environmental benefits.** Fuel substitution measures should reduce the need for energy supply without degrading environmental quality. A measure may be “deemed” (have pre-determined savings parameters) or “custom” (have unique savings parameters) and may also be contained within a custom project. To be considered for energy efficiency ratepayer funding, a measure must meet the following requirements: The measure must not increase total source energy consumption when compared with the baseline comparison measure utilizing the original fuel, as currently defined by the baseline policies in D.16-08-019 and Resolution E-4939, Attachment A, and as may be revised by the Commission; 12

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8 Implementation Plans are discussed in more detail in D.15-10-028.
10 The CPUC has updated their requirements for fuel substitution measures. Please refer to the recently released CPUC Fuel Substitution Decision 19-08-009 and Technical Guide using the following link: [https://pda.energydataweb.com/#!/documents/2304/view](https://pda.energydataweb.com/#!/documents/2304/view).
13 Baseline as currently defined by the baseline policies in D.16-08-019 and Resolution E-4939, Attachment A.
b. **The measure must not adversely impact the environment compared to the baseline measure utilizing the original fuel.** This means that the use or operation of the measure must not increase forecasted carbon-dioxide-equivalent emissions.\(^{14}\)

The baseline measure utilizing the original fuel, against which the fuel substitution measure is compared, must be the same for both items a. and b. above.\(^{15}\)

Program implementers must demonstrate that the life-cycle source energy savings and CO\(_2\) emissions reduction of their measure is positive using the Fuel Substitution Calculator.\(^{16}\)

Workpapers with fuel substitution measures must include the completed Fuel Substitution Calculator and the site energy consumption and savings values. To accurately reflect fuel substitution measures in a workpaper, the four ex ante tables should select “Fuel Sub-Deemed” in the Measure Impact Type field. Consult the latest version of DEER for the correct “NTG_ID”, to appropriately assign a net-to-gross to fuel substitution measures.

Fuel substitution measures are not required to pass cost-effectiveness thresholds at the individual measure level to be eligible for energy efficiency program funding.\(^{17}\) However, since fuel substitution measures are included in the cost effectiveness analysis of PA energy efficiency portfolios, program developers should calculate the cost effectiveness of fuel substitution measures. The following CET inputs require different treatment for fuel substitution measures:

1. **Measure Impact Type:** In 2020, the CET was updated to include fuel substitution specific measure impact types. Users should select either “Fuel Sub-Deemed” for deemed measures or “Fuel Sub-Custom” for custom measures.
2. **Measure Savings:** Users will input both the increase in kWh or Therms associated with the "new fuel" measure and the decrease in kWh or Therms associated with the replacement of the baseline “original fuel” measure.
3. **Net-To-Gross (NTG):** Use a default NTG ratio 1.0 until impact evaluation results become available.\(^{18}\)
4. **Incremental Measure Costs:** The measure technology cost may exclude any additional upgrades required to increase the building's total electric or natural gas load (e.g., electric panel upgrades, running new gas lines, increasing size of natural gas lines, etc.).\(^{19}\) If additional upgrades are included in the measure technology cost, cost assumptions should be included in workpapers or project submittals, with appropriate justification and rationale. The necessity of such building upgrades is specific to individual buildings and the cumulative total of installed technologies in the building, and therefore, in most cases, should not be attributed entirely to a single measure technology.\(^{20}\)

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\(^{14}\) D.19-08-019.

\(^{15}\) D.19-08-019.

\(^{16}\) The CPUC Fuel Substitution Calculator is located at: [https://pda.energydataweb.com/#!/documents/2304/view](https://pda.energydataweb.com/#!/documents/2304/view)

\(^{17}\) Fuel Substitution Technical Guidance v 1.1

\(^{18}\) CPUC Decision 19-08-009, August 5, 2019 pp. 22, 42 and 58.

\(^{19}\) CPUC Decision 19-08-009, August 5, 2019 pp. 22 and 23.


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This Test does not apply to new construction applications, but does apply to renovations of existing buildings. The Fuel Substitution Test should not be applied to energy storage technologies or systems.

Program implementers proposing fuel substitution measures must provide all assumptions and calculations for review, utilizing the most recent versions of the Avoided Cost Calculator and the Cost-Effectiveness Tool available at the time the measure is proposed. A fuel substitution measure, depending on the savings platform used, will have different documentation requirements according to the current rules that pertain to those types of measures. For example, current requirements are that program administrators request approval for a deemed measure using a workpaper submission.

The Fuel Substitution Test must be applied at the individual measure level. The baseline against which a fuel substitution measure is compared should be determined in the same manner as for other measures in the energy efficiency portfolio (namely, using code baseline, industry standard practice, or existing conditions, depending on the circumstances of the measure installation). The measure must save energy and also not harm the environment (as currently measured by GHG emissions). When a fuel substitution measure passes the Fuel Substitution Test, it will be assumed to have a NTG ratio of 1.0, until such time as evaluated NTG information is available, when the assumption shall be updated on a prospective basis.

The following information is needed in order to perform the Fuel Substitution Test:

- Measure Description – Brief description of the measure. e.g. Commercial electric steam cooker replacing gas steam cooker
- Quantity – Quantity of the measure units
- EUL – Effective Useful Life of the measure
- Install Year – The year when the proposed measure will be installed and operational
- Original fuel and New fuel
- Measure Application Type
- RUL – Remaining Useful Life for AR measures
- Annual usage (kWh and/or Therm) for the baseline technology
- Annual usage (kWh and/or Therm) for the measure technology
- Annual usage (kWh and/or Therm) for code/industry standard baseline technology for AR measures

The Fuel Substitution Test is normally run at a project’s inception for feasibility, prior to the project’s commitment to confirm qualification, and again at the project’s completion when final costs and savings are known. Additionally, Implementers that expect to include fuel substitution measures in their programs should state so in their implementation plans.

2.2.6 Installations Must Adhere to Laws and Codes

**CPUC Requirement:** All measures(s) must be installed in accordance with all applicable federal, state, and local laws, building codes, manufacturers’ specifications, and permitting requirements. If a contractor performs the installation or improvement, the contractor must hold the appropriate license for the work.

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21 D.19-08-019.
22 D.19-08-019.
A rebate or incentive can only be provided if the customer or contractor certifies that the improvement or installation has complied with any applicable permitting requirements, including from California Building Standards Code (Title 24 of the California Code of Regulations). If a contractor performed the installation or improvement, the contractor must hold the appropriate license for the work performed.  

If a customer or contractor is the recipient of a rebate or incentive offered by an energy efficiency program specifically for the purchase or installation of air-conditioning or heat pump units, and their related fans, the rebate or incentive will be paid only if the customer or contractor provides proof of permit closure.

The Implementer and PG&E will only verify the reasonableness, not the authenticity, of the submitted proof of permit.

2.3 Ex Ante Values
The term "ex ante" refers to all activities and estimations that take place prior to the evaluation of a savings claim. Ex ante values are the basic components of a savings claim; they include not just annual energy and demand savings, but also measure cost, incentive, effective useful life, net-to-gross ratio, and others.

2.3.1 Measure Application Type and Baseline
Energy efficiency savings, especially those attributable to a specific program, cannot be directly measured. All energy savings estimates are relative to a counterfactual – a baseline assumption for the expected energy use if the program intervention does not take place.

The Implementer must assign a measure application type (MAT) in order to determine the appropriate measure baseline, which dictates the calculation basis for benefits, duration of savings, and costs in cost-effectiveness calculations. The cost-effectiveness of a savings claim is expressed as a ratio of benefits to costs.

CPUC Requirement: The CPUC recognizes the following standard categories of MATs:

1. New Construction (NC);
   - Normal Replacement, including Replace and Burnout (NR);
   - Accelerated Replacement (AR);
   - Add-On Equipment (AOE)
   - Building Weatherization, shell and related components (BW);
   - Behavioral (BRO-Bhv);
   - Retro-commissioning (BRO-RCx); and
   - Operational (BRO-Op)

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23 California Code, Public Utilities Code Section 399.4(b)(1).
The MAT represents how an energy efficiency measure is applied to a project and provides the basis by which measure baseline, cost, and energy savings can be determined. Implementers must classify all proposed energy efficiency measures into one of the measure application types in order to determine forecasted savings.\textsuperscript{25} The following table describes the default baseline for each measure application type.\textsuperscript{25}

### Table 2 - Default Baseline by MAT\textsuperscript{27}

<table>
<thead>
<tr>
<th>Alteration Type</th>
<th>Delivery Channel</th>
<th>Savings Platform</th>
<th>Measure Application Type</th>
<th>Add-On-Equipment, Weatherization, Behavioral, RCx, and Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Existing Condition (New Construction, expansions, added load)</td>
<td>All</td>
<td>Custom and Deemed</td>
<td>Code / Standard Practice</td>
<td>N/A</td>
</tr>
<tr>
<td>Existing Buildings (including major alterations)</td>
<td>Upstream &amp; Midstream</td>
<td>All</td>
<td>N/A</td>
<td>Code / Standard Practice</td>
</tr>
<tr>
<td></td>
<td>Downstream / Direct Install</td>
<td>Custom</td>
<td>N/A</td>
<td>Code / Standard Practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deemed</td>
<td>N/A</td>
<td>Code / Standard Practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meter-Based</td>
<td>N/A</td>
<td>Existing</td>
</tr>
<tr>
<td>Non-Building Projects (including Industrial &amp; Agricultural)</td>
<td>SEM programs</td>
<td>Meter-Based</td>
<td>N/A</td>
<td>Existing</td>
</tr>
<tr>
<td></td>
<td>Non-SEM programs</td>
<td>All</td>
<td>N/A</td>
<td>Code / Standard Practice</td>
</tr>
</tbody>
</table>

The MAT also dictates other ex ante values, as summarized below:

### Table 3 - Ex Ante Values Dictated By MAT

<table>
<thead>
<tr>
<th>MAT</th>
<th>Baseline</th>
<th>Measure Cost</th>
<th>EUL</th>
<th>RUL</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>Code / Standard Practice</td>
<td>IMC</td>
<td>Measure EUL</td>
<td>0</td>
</tr>
<tr>
<td>Normal Replacement</td>
<td>Code / Standard Practice</td>
<td>IMC</td>
<td>Measure EUL</td>
<td>0</td>
</tr>
<tr>
<td>Accelerated Replacement</td>
<td>Dual</td>
<td>RC</td>
<td>Lesser of measure EUL or RUL of existing</td>
<td>RUL of existing</td>
</tr>
<tr>
<td>Add-On Equipment</td>
<td>Existing</td>
<td>FMC</td>
<td>RUL of existing</td>
<td>0</td>
</tr>
<tr>
<td>Behavioral, Residential</td>
<td>Existing</td>
<td>FMC</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Behavioral, Non-Residential</td>
<td>Existing</td>
<td>FMC</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Retro-commissioning and Operational</td>
<td>Existing</td>
<td>FMC</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

\textsuperscript{25} Energy Efficiency Policy Manual, pp. 31-32.
\textsuperscript{26} Resolution E-4818, p. 4.
\textsuperscript{27} This table is a modified version of the table officially adopted in D.16-08-019 and updated in Resolution E-4818, p. 4.
2.3.1.1 New Construction

**CPUC Requirement:** The New Construction (NC) MAT is used where equipment is installed in either a new area or an area that has been subject to a major renovation, to expand capacity of existing systems, or to serve a new load. The NC MAT is used where there is no reference operation for existing conditions, such as with new construction, expansions, added load, a change in the function of the space (e.g. office to laboratory), or a substantial change (e.g. ~30% or more) in design occupancy. For NC measures, the baseline is the Standard Practice, or Code baseline in place at the time the project commenced. New construction projects which replace “equipment that is actually broken, non-functional, or unable to provide the intended service” is eligible for normal replacement, but is not eligible for accelerated replacement.

2.3.1.2 Normal Replacement

**CPUC Requirement:** The Normal Replacement (NR) MAT is used where existing equipment (including Add-On Equipment) has either failed, no longer meets current or anticipated needs, is not of proven viability, or is planned to be replaced for reasons unrelated to the program. For NR measures, the baseline is the Standard Practice or Code in place at the time the project commenced. The NR MAT may be applied to any measure or program, with certain exceptions, and without a burden of proof. This MAT includes measures that previously fit into the now-retired Replace on Burnout (ROB) MAT.

Existing equipment that is not operational or is not meeting the existing service requirements, including Add-On Equipment, is categorized as Normal Replacement.

2.3.1.3 Accelerated Replacement

**CPUC Requirement:** The Accelerated Replacement (AR) MAT is used for the replacement of existing equipment that could and would remain operational without program intervention. It is used in direct contrast to the NR MAT, which is used when existing equipment either could not or would not remain operational. AR measures are required to demonstrate both (1) the continued viability of the existing equipment and (2) the program influence on the decision to retire the system early. Evidence that the equipment **could** have remained operational only addresses viability; evidence indicating that the equipment **would** have remained in operation addresses both criteria. Assessment of evidence for and against both viability and influence is referred to as a “preponderance of evidence (POE) based assessment”. The POE may be assessed at the measure, project, or program level. The POE determination is based on the most convincing evidence and its probable truth or accuracy, not on the amount of evidence presented. Program-level POE-based assessments should use broad market data to inform what fraction of program participants are likely AR versus NR.

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28 Resolution E-4818, p.66.
31 Resolution E-4795, p. 39.
32 Resolution E-4818, p. 67.
33 Resolution E-4818.
The AR MAT has three use cases:

1. Early Retirement (ER);
2. Repair Eligible (RE); and
3. Repair Indefinitely (RI).

The ER use case involves the replacement of viable, existing equipment prior to the end of its useful life, when it would normally be replaced. The RE and RI use cases involve the replacement of existing equipment that would normally be repaired. POE-based assessments weigh: (1) whether the existing equipment could be viably operated (or repaired), and (2) whether the existing equipment would continue to be operated (or repaired) in absence of program intervention. AR measures are recorded as a single claim with a dual baseline. Resolution E-4939 adopts the use of consistent POE and reporting requirements for all three use cases of AR.

The dual baseline calculation of savings shall be applied per the current standard reflected in the Energy Efficiency Policy Manual. Dual baseline treatment will not vary by accelerated replacement sub-category. For measures that bring buildings into compliance with, but do not exceed, Code the second baseline will have zero savings.

Programs targeting small business customers (based on the definition of Small Business adopted in Resolution 4939 below) qualify for pre-approval for use of accelerated replacement measure type. Project-level preponderance of evidence must include evidence of customer eligibility for program participation and evidence of equipment viability for the remaining useful life claimed.

2.3.1.4 Add-On Equipment

CPUC Requirement: The Add-On Equipment MAT is used for installations of new equipment onto pre-existing equipment, improving the nominal efficiency of the host system. The existing host system must be operational without the AOE equipment, continue to operate as the primary service equipment for the existing load, and be able to fully meet the existing load at all times without the add-on component. The add-on equipment must not be able to operate on its own. The actual energy reduction occurs at the host equipment, not at the add-on component, although any add-on component energy usage must be subtracted from the host savings. AOE may use a Code, Standard Practice, or Existing Conditions baseline. Using Existing Conditions as the baseline is applicable to building or non-building projects, including industrial and agricultural processes.

The replacement of broken or poorly performing add-on equipment is considered through the NR MAT, not the AOE MAT.

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34 California Public Utilities Commission, Energy Division, April 18, 2015, Disposition for Workpaper PGECOHVC126 Revision 6 (Unitary Air-Cooled Commercial A/C and H/P <65kBtu/h).
35 Resolution E-4818, p.68, OP15.
36 Resolution E-4939, p.49.
37 Resolution E-4795, pp. 26-27.
2.3.1.5 Building Weatherization

**CPUC Requirement:** The Building Weatherization (BW) MAT is used for non-mechanical building efficiency improvements such as windows, insulation, and air sealing. BW measures use an existing condition baseline; however, the use of a Code or Standard Practice baseline is permitted.

2.3.1.6 Behavioral, Retro-commissioning, and Operational

**CPUC Requirement:** The Behavioral, Retro-commissioning, and Operational (BRO) MAT is used for measures that either restore or improve energy efficiency and that can be reasonably expected to produce multi-year savings. By definition, BRO measures result in performance that does not exceed the nominal (rated or original) efficiency of the pre-existing condition. BRO measures may use a Code, Standard Practice, or Existing Conditions baseline.

Savings from correcting deferred maintenance, performance restoration, and operational characteristics are considered within the BRO category. In cases where savings are a component of savings captured through equipment replacement, separate claims should be made for the equipment replacement savings and savings that arise from updating maintenance and operational factors.

2.3.1.7 Baseline

**CPUC Requirement:** All energy efficiency measures must have a baseline from which energy savings are assessed. The baseline establishes the energy consumption profile for a participant in the absence of program influence from the energy efficiency program. The MAT and alteration type are used to determine the baseline. See Table 3 in section 2.3.1 for more details.

2.3.1.8 Code/Standard Practice Baseline

**CPUC Requirement:** The Standard Practice Baseline is an estimate of the activity or installation that would take place absent the energy efficiency program as required by code, regulation, or law, or as expected to occur as standard practice. The Standard Practice Baseline activity or installation must meet the anticipated functional, technical, and economic needs of the customer, building, or process and provide a comparable level of service as the energy efficiency measure.

A Standard Practice baseline must comply with all codes, regulations, and standards when the project commences, including but not limited to: minimum building energy efficiency requirements; emissions requirements; federal, state, and local government regulations; other regulatory agencies. The standard practice need not comply with local reach codes.

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38 Resolution E-4795, p. 21.
39 Resolution E-4795, p. 28.
41 Resolution E-4939, p.8.
42 Resolution E-4795, p. 39.
The standard practice must represent a typical or commonly implemented practice, although it need not be the predominant (i.e. greater than 50%) practice. The selected standard practice must be reasonable to implement. Industry Standard Practice studies may provide suggestions or requirements for common practices.

Standard practices are generally accepted as superior to other alternatives (e.g., a customer’s standard way of complying with legal or ethical requirements, or a customer’s preference for the best product with superior efficiency in customized design). Justification for selection of a Standard Practice baseline (e.g. current purchasing trends, customer considerations) should be provided.

If only one activity or installation meets the customer’s anticipated functional, technical, and economic needs, that option defines the standard practice by default. In cases where the existing conditions are more efficient than the standard practice, the existing conditions define the baseline. Use of the less efficient Code or Standard Practice as the baseline is referred to as a “regressive baseline” and is not allowed – the baseline selected for calculating energy savings may not use more energy than existing conditions.

2.3.1.9 Dual Baseline

CPUC Requirement: The Dual Baseline incorporates elements of both the Existing Conditions baseline and the Standard Practice baseline. A Dual Baseline analysis is used exclusively for AR measures. The Dual Baseline reflects the difference between: 1) the savings that should be credited for the initial years of installation based upon the pre-existing or replaced equipment usage; and 2) the savings credit for later years based upon an eventual pre-existing equipment replacement (assumed to occur if the measure had not been installed as part of the program). At the later date, when the pre-existing equipment would have been replaced due to normal turnover (for reasons such as imminent failure or remodeling), an alternate equipment efficiency baseline is used. A Dual Baseline analysis requires two savings calculation periods:

4. The Existing Conditions baseline is applied to the remaining useful life period, defined as the first baseline period (see the Measure Life section for discussion of RUL determination). For this period, savings are calculated based on the difference between the measure and the Existing Conditions Baseline. The measure cost for this period is the Full Measure Cost.

5. The Standard Practice baseline is applied to the period between the remaining useful life and effective useful life, defined as the second baseline calculation period. For this period, the savings are calculated based on the difference between the measure and the Standard Practice baseline. The measure cost for this period is the full cost of equipment, including installation, for the second baseline equipment measure. The second baseline should be based on known codes and standard practices that will be in effect at the end of the RUL. For measures that do not exceed Code or Standard Practice, the second period of the dual baseline has zero savings.

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46 D.12-05-015.
49 Resolution E-4818, p. 68.
2.3.1.10 Direct and Indirect Energy/Demand Impacts

**CPUC Requirement:** All direct energy/demand impacts, either positive or negative (e.g. heat recovery heat exchanger saves gas but increases electricity use), must be included in savings claims. Indirect/interactive impacts must be included in savings claims, whether positive or negative (e.g. interactive effects from efficient lighting increasing HVAC gas use). HVAC and refrigeration interactive effects are incorporated into DEER and must be included in non-DEER workpapers.\(^{50}\) These interactive effects can only be applied to the portion of energy use that occurs within the conditioned space. Refer to DEER for internal gain fractions for residential appliances.

Programs should detail whether incentives are calculated based solely on direct savings, or both direct and indirect savings.

**Exception:** For projects that also save water, embedded (indirect) energy savings can be claimed.\(^{51}\) The Water-Energy Calculator must be used to determine the embedded energy savings that can be claimed.

2.3.2 Measure Life

2.3.2.1 Effective Useful Life

**CPUC Requirement:** The Effective Useful Life (EUL) is an estimate of median number of years that existing equipment is expected to last - the duration of time that measures installed under the program are still in place and operable. Some industry practices like routine maintenance can extend equipment life beyond the estimated EUL values. The CPUC’s DEER lists EULs for common equipment. The longest allowable effective useful life for equipment is 20 years.\(^{52}\)

For purposes of early retirement determination, measure lives of up to 30 years will be allowed for custom applications that either use Proposition 39 funds.\(^{53}\) As such, the claim may be made that existing equipment can last up to 30 years to prove early retirement for Proposition 39 and

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\(^{50}\) *Energy Efficiency Policy Manual*, p. 34.


\(^{53}\) For more information about the California Clean Energy Jobs Act (Proposition 39), please see: [http://www.energy.ca.gov/efficiency/proposition39/](http://www.energy.ca.gov/efficiency/proposition39/).
PRP projects. In the equations above, the *Existing Equip EUL* is capped at 30 years. Water-Energy Nexus measures also have an available EUL of 30 years for removed equipment.  

Exception 1: Schools (K – 12 and Community Colleges) are allowed to use an EUL of up to 30 years for existing equipment only.  

Exception 2: Water-Energy Nexus measures have an available EUL of 30 years for removed equipment.

### 2.3.2.2 Remaining Useful Life of Existing Equipment

**CPUC Requirement:** The Remaining Useful Life (RUL) is the number of years that equipment being replaced under the program would have remained in place and operable had the program intervention not caused the replacement. The default remaining useful life for existing equipment is one-third of the existing equipment’s EUL. Deviations from this RUL value should be supported by evidence such as equipment installation date, maintenance records, or other external factors.

The MAT also affects which values to use for EUL/RUL, as summarized below:

<table>
<thead>
<tr>
<th>MAT</th>
<th>Measure Life Basis</th>
<th>EUL (Years)</th>
<th>RUL (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>EUL</td>
<td>Measure EUL</td>
<td>Not Defined</td>
</tr>
<tr>
<td>NR</td>
<td>EUL</td>
<td>Measure EUL</td>
<td>0</td>
</tr>
</tbody>
</table>
| AR    | 1<sup>st</sup> Baseline Period = RUL  
2<sup>nd</sup> Baseline Period = EUL-RUL | Measure EUL       | RUL of existing > 1 |
| AOE   | EUL                | The lesser of:  
RUL of host equipment or Measure EUL | Not Defined       |
| BRO-RCx | EUL              | 3                 | 1                 |
| BRO-Op | EUL              | 3                 | 1                 |
| BRO-Bhv | EUL              | 2                 | 1                 |
| BW    | EUL                | Measure EUL       | Not Defined       |

---

56 *D.15-09-023.*  
57 *D.12-05-015*, p.347.
2.3.2.3 Measure Persistence

**CPUC Requirement:** To ensure that energy savings persist, the following requirements apply to all measures:

1. Measures should be permanently installed. If proposed measures are not permanently installed, the Program must demonstrate how the savings will persist over the measure life.\(^{58}\)
2. Retrofit measures must include installation of new equipment or controls.\(^{59,60}\) Repair or re-deployment of existing equipment is not eligible as a retrofit but may be eligible as a BRO measure.
3. For replacement measures, existing equipment must be decommissioned and removed from site. Decommissioned equipment must not be reused, sold, or retained for backup purposes.\(^{61}\)

2.3.2.4 EUL of Add-On Equipment Measures

**CPUC Requirement:** For AOE measures, the EUL is the lesser of the RUL of the host equipment/system or the EUL of the measure.\(^{62}\)

2.3.2.5 BRO EULs

**CPUC Requirement:** Residential Behavioral measures use an EUL of 1 year. Behavioral measures in non-residential settings are permitted to 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.\(^{63}\)

2.3.3 Net-to-Gross Ratio

**CPUC Requirement:** A net-to-gross (NTG) ratio must be determined for every claim. DEER currently has a variety of default NTG ratios, varying by parameters such as length of availability of incentives or sector. Refer to DEER for the full list of default NTG ratios.

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PA energy efficiency goals have changed from gross to net effective January 2018. Although the CPUC is solely responsible for determining net savings, programs are expected to encourage participants to perform actions that would not occur without the energy efficiency program intervention. Implementers should understand how net savings are calculated for planned interventions, and programs should describe in their implementation plans how they seek to attain net savings, including any eligibility and documentation requirements the program would impose to demonstrate program influence. For example, programs may impose and tailor eligibility criteria to exclude likely free riders and include only those customers who are unlikely to adopt energy efficiency absent program support.

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\(^{58}\) California Public Utilities Commission, Energy Division, *Final Ex Ante Review Disposition*, Project ID PGE-16-C-A-0112, project rejected in Ex Ante Review because savings are not expected to persist.

\(^{59}\) New equipment requirement derived from requirement to incentivize higher efficiency, higher cost option as described in *PGE Final 2015 ESPI EAR Memo* and in California Public Utilities Commission, Energy Division, *Final Ex Ante Review Disposition*, Project ID PGE-15-C-I-0005.

\(^{60}\) Derived from *EE Policy Manual* definition of Energy Efficiency Measure, p. 52.

\(^{61}\) California Public Utilities Commission, Energy Division, *Final Ex Ante Review Disposition*, Project ID PGE-16-C-C-0110 required evidence that removed equipment not be sold into secondary market.

\(^{62}\) *Resolution E-4818*, p. 27.

\(^{63}\) *D.16-08-019*, p. 46.
2.3.4 Measure Cost
The following sections describe the ex ante values that are used to calculate the costs side of a “benefit-cost” (cost-effectiveness) calculation.

2.3.4.1 Measure Cost Basis Determination
CPUC Requirement: A measure cost must be submitted for each individual measure. The cost basis is determined by the baseline type, as indicated in the following table.64

<table>
<thead>
<tr>
<th>Baseline Type (MAT)</th>
<th>Applicable Measure Cost Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Practice Baseline (NC, NR)</td>
<td>Incremental Measure Cost (IMC)</td>
</tr>
<tr>
<td>Existing Conditions Baseline (AOE, BRO, BW)</td>
<td>Full Measure Cost (FMC)</td>
</tr>
<tr>
<td>Dual Baseline (AR)</td>
<td>Accelerated Replacement Cost (ARC)</td>
</tr>
</tbody>
</table>

2.3.4.1.1 Full Measure Cost
Full Measure Cost (FMC) is the total amount paid by the customer to implement the energy efficiency measure.

\[
FMC = EE \text{ Equipment} + \text{Engineering} + \text{Construction} + \text{Permitting} + \text{Disposal} + \text{Labor}
\]

2.3.4.1.2 Baseline Cost
Baseline Cost is the total amount that would be paid by the customer to implement the baseline solution.

Baseline Cost = SP Equipment + Engineering + Construction + Permitting + Disposal + Labor

2.3.4.1.3 Incremental Measure Cost
Incremental Measure Cost (IMC) is the marginal cost of implementing the energy efficiency measure. This is how much more expensive the energy efficiency measure is than the baseline or standard practice (SP).

2.3.4.2 Accelerated Replacement Measure Costs
CPUC Requirement: The Accelerated Replacement Cost (ARC) is the cost of the efficiency measure installed in an Accelerated Replacement situation. The ARC is the FMC of the efficiency measure, reduced by the net present value of the FMC that would have been incurred to install the Standard Practice second baseline equipment at the end of the RUL. The ARC is calculated using the following formula:

\[
ARC = FMC - \frac{(FMC - IMC)}{(1 + D)^{RUL}}
\]

Where:
- FMC = full measure cost
- IMC = incremental measure cost
- \(D\) = CPUC-adopted PA discount rate (7.66% for PG&E service territory, 7.65% for SCE service territory, 7.38% for SCG service territory, and 7.36% for SDG&E service territory) 65

65 These are the CPUC-adopted PA discount rates as of the publish date of this Guidance Document but are subject to change. Implementers should verify the currently adopted discount rate with their PA.
RUL = Remaining useful life (in years) of the early retired equipment

2.3.4.3 Eligible Measure Costs and Documentation

CPUC Requirement: Reported measure costs must include all customer out-of-pocket expenses incurred as a result of implementing the energy efficiency measure(s). Out-of-pocket expenses include:

- Audits, design, engineering, and construction costs;
- Permit preparation and fees;
- the cost of any equipment or materials purchased, including sales tax, shipping, and installation;
- Any ongoing operation and maintenance costs;
- Any demolition, removal and recycling or disposal costs (less salvage value);
- Overhead, labor costs (contractor or in-house if proof of direct project hours and costs are provided), or the value of the customer's time in arranging for the installation of the measure (project management), if significant.

At a minimum, for program-installed measures, invoices shall be provided that clearly itemize labor and material costs. Only costs related to the project or measure should be included; the costs of product or feature choices not related to energy efficiency (e.g. standby equipment) should be removed.

Eligible costs may not include:

- spare parts and maintenance supplies,
- maintenance contract,
- standby/backup equipment, and/or
- equipment that does not directly contribute to realization of energy savings.

Four methods of estimating measure costs at pre-installation are listed below in order of preference, where Method 1 is preferable to Method 2, which is preferable to Method 3, etc.

Method 1: Contractor Quote
Obtain measure cost values through a written bid, quote, or proposal from a vendor, contractor, or manufacturer. The documentation should include a breakdown by technology that includes labor, materials, and other related costs (e.g., disposal costs less salvage value).

Method 2: DEER Look-Up
Look up the specific technologies in the DEER measure cost tables. Individual cost values should be documented by referencing the DEER version and the respective DEER cost case ID value. All costs will be tracked and documented, electronically, in a spreadsheet for easy reference.

Method 3: Cost Estimating Reference
Develop the measure costs for the proposed equipment using a cost estimating reference guide, such as RS Means Building Construction Cost Data and CPUC cost study if applicable. Use the most current cost estimating reference applicable to the project application program.

year. Consistent with the other methodologies above, costs and assumptions should be tracked in a spreadsheet. If necessary, the methodology may be documented in a separate document.

Method 4: DEER Approximation
If DEER does not include the specific technologies that are included in the project, the DEER values may be used to approximate the measure costs when Methods 1 through 4 are not available. When using this method, a detailed workpaper is required to document the methodology and assumptions. Consistent with the DEER Look-up method, costs and assumptions should be tracked in a spreadsheet. If necessary, the methodology may be documented in a separate document.

Exception: Whole building new construction projects do not require post-installation itemized invoices.

2.3.4.4 Baseline Technology Mix
CPUC Requirement: Where baseline savings are developed using a mix of technologies, baseline costs must be calculated based on the same baseline technology mix.68

2.3.4.5 Administration and Marketing Costs
CPUC Requirement: IOUs will forecast and report total Administrative, Marketing, Direct Implementation costs by program and subprogram in the cost categories and sub-categories.69

For this reason, Implementers are required to track and report program expenditures in four categories: Administration, Marketing, Implementation, and Incentives. The following lists provide examples of costs that might fall into each budget category.

Administrative Costs:
- Overhead administrative labor, accounting support, IT services and support (portfolio-wide), data request responses, Commission financial audits, regulatory filings support and other ad-hoc support required across all programs;
- Travel and conference fees;
- Employee and contractor labor;
- Membership dues (i.e., trade organizations);
- Maintenance of reporting database (e.g., Customer Relationship Manager, Track It Fast, Program Builder, etc.);
- Supply management function activities to ensure oversight of contractors; and
- Administering contractor payments for services which are non-incentive related.

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2.3.5 Incentives

2.3.5.1 Incentive Costs

**CPUC Requirement:** PAs must file an advice letter if the incentive level of a measure implemented statewide is changed by more than 50% on a cumulative basis annually. The baseline for evaluating incentive level changes resets annually in alignment with the rolling

Marketing Costs:
- Preparing and/or distributing collateral;
- Participation in and support related to outreach events;
- Advertising, media, newspaper, website, and magazine related marketing activities;
- Vacation and sick leave related to marketing labor;
- Marketing-specific IT costs; and
- Staff travel to undertake marketing-specific work activities (excluding conference participation).

Direct Implementation Costs:
- Salaries for employees who have a direct interface with the customer;
- Processing rebate applications;
- Inspecting rebated/incentive measures;
- Engineering related activities;
- Measurement development;
- Education and training of contractors/partners/customers;
- Project management activities (i.e., Planning scope of work, working with contractors and customers, setting goals, reviewing goals, reacting to market conditions, and responding to customer inquiries);
- Program planning, development and design;
- Customer support;
- Energy audits and participation in the Continuous Energy Improvement program;
- Market transformation and long-term strategic plan support;
- Compiling and maintaining information (i.e., data, customer records) for projects;
- Licensing fees or IT development costs for program specific applications for implementation (e.g., benchmarking tool or project management tool);
- Vacation and sick leave-related to direct implementation labor;
- Direct implementation-specific IT costs (e.g., licensing fees or IT development cost for program-specific applications);
- Staff travel to undertake direct implementation-specific work activities (excluding conference participation), and
- Program planning/design/project management and information gathering costs.

Incentive and Rebate Costs:
- Customer incentive and rebate payments; and
- Technical advice / assistance.
portfolio structure through which PG&E must meet energy efficiency portfolio performance targets on an annual basis.\textsuperscript{70}

Customer incentive design should consider differential benefits of the above-code savings relative to the to-code savings and reflect those individual benefits in the payment structure. Incentives for projects bringing conditions up to Code or Standard Practice should be lower than incentives available for exceeding the required Code or Standard Practice. The cost to deliver the energy savings (i.e. \$/kWh or \$/therm) over the life of the EE measure may be a consideration for developing incentive levels.

\subsection{2.3.5.2 Incentive Caps}

\textbf{CPUC Requirement}: Rebates or financial incentives to participants cannot exceed the measure cost unless approved by Commission Staff. See the Measure Costs section for details on measure cost determination.\textsuperscript{71}

\section{2.4 Quality Assurance and Quality Control}

\subsection{2.4.1 Projects May Be Subject to Inspection}

\textbf{PG&E Requirement}: All projects and measures are subject to random inspection by PG&E. Implementer must ensure that customers allow a representative from PG&E, the CPUC, or any authorized third party, if requested, reasonable access to their property to verify the installed measure before a rebate is paid. Rebates will not be paid if customer refuses to allow access for verification within 30 days of PG&E contact. PG&E may contact the measure vendor and/or installer, if needed, to verify purchase and/or installation and may provide customer name and/or address to third parties to complete this verification.

\subsection{2.4.2 Quality Assurance Plan}

\textbf{PG&E Requirement}: Implementers must have a Quality Assurance Plan in place applicable to each platform utilized by their program. The Plan, subject to approval by PG&E, must be designed to ensure compliance with all applicable platform requirements. Examples of QA Plan elements include:

- Measure Verification: Describe, at a minimum, the percentage of inspections to be conducted, the name of the inspection agent, and who will pay inspection costs;
- Approved materials/equipment and installation standards;
- Mechanism for tracking and resolving customer complaints;
- Plan for avoiding double dipping;
- Dispute resolution procedures (applies to subcontractors and customers);
- Procedures to ensure that eligibility conditions are met during the product development and implementation phases;
- Procedures to ensure that regulatory processes are followed (e.g. CPUC custom project review),\textsuperscript{72} and
- Procedure to enable third party inspections and review, including a clear description of measure details and locations.

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{70} California Public Utilities Commission, September 27, 2005, \textit{Decision 05-09-043: Interim Opinion: Energy Efficiency Portfolio Plans And Program Funding Levels For 2006-2008 – Phase 1 Issues.}
\item \textsuperscript{71} \textit{Energy Efficiency Policy Manual}, pp. 18-19.
\item \textsuperscript{72} D.11-07-030, Attachment B.
\end{itemize}
\end{footnotesize}
2.4.3 Utilize PG&E’s Online Salesforce Platform, Energy Insight

**PG&E Requirement:** PG&E will provide the Implementer access to its Salesforce platform, Energy Insight. Implementers will be provided with a template file or direct entry access and training to upload project and financing application data into Energy Insight. Implementers must track all projects in Energy Insight using the data submission methodology provided, subject to PG&E’s internal validation requirements. Implementers shall use PG&E’s Energy Insight portal for all project management documentation, transactions, reports, and communications. Upon successful upload, Implementers will be able to track applications as they go through the process, including rebate status and savings data.

2.4.4 PG&E Payments to Implementer or Customer

**PG&E Requirement:** In order for the Implementer or Customer to receive a rebate or incentive payment, PG&E must receive a complete application meeting all program requirements. PG&E reserves the right to withhold any payment pending review and approval of the claim documentation and inspection results.

2.4.5 Emerging Technologies

**PG&E Requirement:** Emerging technologies are generally those with greater uncertainty around performance against stated metrics, savings values, and/or savings persistence. PG&E may require that emerging technology measures be submitted for evaluation and additional data collection by the Emerging Technologies Program before introduction into the portfolio.

Ideas may be submitted anytime through the Emerging Technologies Coordinating Council idea proposal form at http://www.etcc-ca.com/idea-proposal-form.

2.4.6 Program Evaluation

**CPUC Requirement:** CPUC Staff has the responsibility to perform research on parameters such as free ridership and market effects and to use the results of that research to develop updated NTG values for use in portfolio planning and utility reporting. The IOUs are required to cooperate and facilitate this research. Utility customers are required to cooperate with CPUC Staff in this research as a condition of receipt of energy efficiency funds.\(^73\)

Implementers will be expected to respond in full to all requests from PG&E (or the CPUC and its contractors) to facilitate program evaluation. Implementers will also be responsible for ensuring the evaluator’s access to customers and their premises.

In the box below, PG&E provides a simplified (and by no means comprehensive) example of the typical data fields that are often collected in a project to enable impact evaluations:

\(^73\) *D.12-05-015.*
The following list includes the typical data fields collected for each project to facilitate impact evaluations:

- a) Customer name;
- b) Account number;
- c) Address where efficient equipment was installed;
- d) Customer’s telephone number and email address;
- e) Existing / previous equipment characteristics (could include photos/movies), if applicable;
- f) New equipment installed (measure code);
- g) Quantity of energy efficient measures installed, if applicable;
- h) Date of application agreement;
- i) Date of equipment installation;
- j) Hours of efficient equipment operation, if applicable, and
- k) Baseline determination data, if applicable.

Implemener is responsible for collecting and providing all program data to PG&E and CPUC in an agreed upon format and shall provide the name and full contact information of Implementer’s dedicated data request personnel in the program proposal. PG&E’s EM&V team will review the Implementer’s proposed EM&V approach and will direct Implementer to remedy any deficiencies.
Chapter 3 Deemed Platform

3.1 Introduction
This document applies to all residential and non-residential deemed program activities, including third party programs, statewide programs, and PG&E-implemented localized efforts.

3.2 Eligibility

3.2.1 Workpapers
**CPUC Requirement:** All deemed measures must be supported by CPUC-approved statewide workpapers.\(^7^4\) CPUC-approved workpapers provide deemed energy savings values, deemed calculations, deemed variables and factors, and the methodologies by which they were derived. Workpapers must include the applicability of the values and calculations, sources and references, assumptions, and analyses and evaluations to support the values.\(^7^5\) Implementers may propose new or updated workpapers to PG&E, but proposed workpapers must not provide preferential treatment to any provider of energy efficiency services.\(^7^6,7^7\)

PG&E currently accepts, reviews, and submits to the CPUC Implementer-derived workpapers, leveraging the California Technical Forum (Cal TF) for review and vetting.

3.2.2 Workpaper Document (MS Word)
**CPUC Requirement:** Workpaper narratives shall align with ex ante data submitted. The narrative within a workpaper shall clearly tie to the values used in the Excel data submittal.\(^7^8\)

**PG&E Requirement:** A proposed workpaper document must contain the following sections:

- “At-a-Glance Summary” – This summarizes the workpaper results which includes: Measure Code, Measure Description, Base Case Description, Units, Energy Savings (Base Case – Measure), Full Measure Cost ($/unit), Incremental Measure Cost ($/unit), Effective Useful Life (years), Measure Installation Type, Net-to-Gross Ratio, Important Comments.
- Revision History – This section records updates required by dispositions, program changes, code changes, savings changes, format changes, author and date of modification.
- Section 1 – General Measure & Baseline Data: Measure Description & Background, Technical Description, Installation Types and Delivery Mechanisms, Measure Parameters, Codes and Standards Analysis, EM&V, Market Potential, and Other Studies, Data Quality and Future Data Needs.


\(^7^6\) Energy Efficiency Policy Manual, p. 41.

\(^7^7\) D.18-01-004.

\(^7^8\) Final 2015 Efficiency Savings and Performance Incentive Ex Ante Review Performance Scores.
• Section 2 – Calculation Methodology.
• Section 3 – Load Shapes.
• Section 4 – Costs. Base Case Cost, Measure Case Cost, Full and Incremental Measure Cost.
• Appendices – This includes the data submission template and any associated references noted within the workpaper.

Please see Appendix D for the current Statewide Workpaper Template used by PAs.

3.2.3 CPUC Coordination on New Measure Development

**CPUC Requirement:** When proposing new deemed measures for the energy efficiency program portfolio, the PAs and any third party (Implementer or non-Implementer) must:

- Use due diligence when developing the proposed ex ante values such that those new ex ante values represent the expected electricity and natural gas savings, costs, and lifetime of the measure;
- Undertake research, in collaboration with Commission Staff, as required, to establish reasonable expected values, and
- Assess promising new technologies and use the results of research undertaken during the assessment period to improve the ex ante values.\(^{79}\)

3.2.4 CPUC Workpaper Dispositions

**CPUC Requirement:** Commission Staff may provide review recommendations or “dispositions” on reviewed workpapers. Those disposition types are listed below:

- Approved: workpaper may proceed with no changes to the submission.
- Conditional Approval: disposition includes specific revisions from the Energy Division. If agreed to by PA and Energy Division, workpaper is approved.
- Resubmission Required: Disposition includes request for additional information or specific revisions or additions.
- Rejection: workpaper does not fall within the definition of an energy efficiency measure or does not meet Commission requirements for inclusion into a utility portfolio.\(^{80}\)

Workpapers should include guidance from prior workpaper dispositions.\(^{81}\)

**CPUC Requirement:** Dispositions for workpapers reviewed after the Phase 2 review period will apply on a prospective basis. Ex ante corrections to errors are retroactive.\(^{82}\) A workpaper that does not get approved and receives a disposition must be updated to meet Commission requirements or it may not be included in the portfolio. Any deadlines or effective dates set forth in the disposition must be followed in order for measures to be eligible.

3.2.5 Measure Level Requirements

**PG&E Requirement:** Measure specifications and eligibility requirements must be set for each deemed measure and should be well-defined to clearly align with the measure case description. Specifications and eligibility must be included in a CPUC-approved workpaper document and

\(^{79}\) D.12-05-015, Ordering Paragraph 144, p. 431.
\(^{81}\) Disposition for Workpaper PGE3PHVC153 Revision 3 (Programmable Thermostat – Nonres); Final 2015 Efficiency Savings and Performance Incentive Ex Ante Review Performance Scores.
\(^{82}\) 2017 Workpaper Guidance, November 14, 2016.
any other public-facing collateral such as a product catalog or program handbook. See Workpapers section for further requirements and details.

In order to qualify for a rebate, program participants must follow all applicable measure level requirements. This includes, but is not limited to: building type, climate zone, and delivery type. Unless otherwise specified in the Program Implementation Plan and applicable workpaper, all equipment must be new and, prior to application submission, properly installed and completely operational (following the operational requirements of the equipment). Measures must be more efficient than the pre-existing condition.83

3.2.6 Measure Delivery

PG&E Requirement: Deemed measures may use any of four delivery channels: upstream, midstream, downstream, or direct install. Workpapers may include up to all four delivery types, but programs must implement controls to avoid double-dipping in the event more than one intervention strategy is implemented for a particular measure.

CPUC Requirement: All upstream and midstream interventions must be delivered statewide.84 The following table describes the statewide requirements around each delivery channel.

*Table 5 - CPUC Requirements for Statewide Program Delivery*

<table>
<thead>
<tr>
<th></th>
<th>Upstream</th>
<th>Midstream</th>
<th>Downstream</th>
<th>Direct Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity with which Implementer Partners</td>
<td>Manufacturers</td>
<td>Distributors / Suppliers / Retailers (includes Instant Rebate / Point-of-Sale Programs)</td>
<td>End-use customer</td>
<td>Contractor</td>
</tr>
<tr>
<td>Must be offered Statewide</td>
<td>Yes</td>
<td>Yes</td>
<td>No, unless specifically ordered by the CPUC</td>
<td>No, unless specifically ordered by the CPUC</td>
</tr>
</tbody>
</table>

3.2.7 Measure Eligibility Dates

PG&E Requirement: In order for savings to be accurately determined, deemed rebate applications must be received within the measure effective dates. PG&E’s Energy Insight timestamps applications on the date they are received. The table below outlines the default policies that PG&E currently employs for its programs. Implementers may propose their own program guidelines as long as applications are received by PG&E via eRebates or Energy Insight within the measure effective dates.

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84 D.16-08-019, p. 104.
### Table 6 - Default Measure Eligibility Dates

<table>
<thead>
<tr>
<th>Measure Eligibility Criteria</th>
<th>Non-Residential Applications</th>
<th>Residential Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebate Level &amp; Eligibility Determination Date</td>
<td>Date application is received by PG&amp;E</td>
<td>Purchase Date</td>
</tr>
<tr>
<td>Savings Determination Date</td>
<td>Date application is received by PG&amp;E</td>
<td>Date application is received by PG&amp;E</td>
</tr>
<tr>
<td>Available Application Submittal Options</td>
<td>Downstream / Direct Install: Online via eRebates or Energy Insight</td>
<td>Downstream / Direct Install: Online via eRebates or Energy Insight</td>
</tr>
<tr>
<td></td>
<td>Upstream: Energy Insight</td>
<td>Upstream: Energy Insight</td>
</tr>
<tr>
<td>Deadline to Submit Application</td>
<td>Within one year of purchase or installation date, whichever is later</td>
<td>Within 60 days of purchase or installation date, whichever is later</td>
</tr>
</tbody>
</table>

**CPUC Requirement:** Deemed values must be taken from a DEER version or workpaper effective at the earlier date of either permit issuance (if the installation requires a permit or approval from a regulatory agency) or installation completion.85

#### 3.2.8 Current Workpaper Values

**CPUC Requirement:** The CPUC often approves savings and measure attributes for a specific effective time period.86 The Date Approved (StartDate) is the first date for which a workpaper was approved for use and Expiry Date is the date after which the measure is no longer eligible.

#### 3.2.9 DEER Updates, Bus Stop Schedule

**CPUC Requirement:** Decision 15-10-028 details the mechanics for the Rolling Portfolio schedule as part of Phase II of Rulemaking 13-11-005. Key elements of the Rolling Portfolio schedule and requirements are listed below:

- Final DEER values, updated annually by the CPUC, must be applied prospectively to Implementer programs as applicable. DEER values will be updated once per year with limited exceptions. DEER updates will be proposed by Commission Staff via resolution with opportunity for comment by stakeholder parties. Implementers will have an opportunity to review and comment on DEER updates.
- The last business day in November will be the cut-off date for EM&V studies to be included in the following year’s ex ante update. Draft ex ante values will be released for comment two months later, by January 31st. The PAs suggest that Implementers consider this schedule when anticipating the incorporation of applicable evaluation results into DEER ex ante updates.
- Commission Staff must complete DEER updates by September 1st of each year.
- Updates to workpapers to reflect changes in DEER must be completed by January 1st of the following year. Workpaper updates that include more changes than simply conforming with the latest DEER update may be submitted at any time on the first and third Monday.87

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86 Implementers must ensure that they use valid workpaper values in all savings and cost calculations. Current CPUC-approved workpapers can be found at http://deeresources.net/workpapers.
87 D.15-10-028.
3.2.10 Annual updates

**CPUC Requirement:** DEER values will generally change only once per year, and there will be a delay between when changes are announced and when changes are effective so that market participants have time to incorporate changes into their activities. 88

3.2.11 Workpaper Submittal and Approval Process

The workpaper submittal and approval process has two different tracks, Phase 1 and Phase 2, depending on the type of submission. The following table summarizes the differences between the two types of submission.

**Table 7 – Workpaper Submittals**

<table>
<thead>
<tr>
<th>Types of Workpapers Allowed</th>
<th>Phase 1 Submittals</th>
<th>Phase 2 Submittals</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Updates related to DEER methods, assumptions, and values; these are usually based on the DEER update resolution.</td>
<td>• Workpapers that are not updated due to a DEER update resolution;</td>
<td>• New workpapers not directed in the DEER resolution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deadline to Submit Workpaper</th>
<th>• By January 1st of DEER update year. 89</th>
<th>• First and third Mondays of the month, March through December. 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PAs should allow enough time for review and 90-day transition time when planning for submissions.</td>
<td>• This rule may be adapted in collaboration with PAs to accommodate review schedule of large batches of workpapers.</td>
<td>• Workpaper plans may be required for all workpapers.</td>
</tr>
<tr>
<td>• Workpaper plans may be required for all workpapers.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPUC Review Timeline</th>
<th>• A review timeline up to 2 months for large batches will be agreed upon with the PAs.</th>
<th>• Workpapers chosen for review: 15-day preliminary review + 25-day detailed review.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Workpapers not selected: “interim” approval if after allotted review timeline but remain subject to prospective review.</td>
<td></td>
<td>• If necessary, the CPUC will notify the PAs of a needed extended review period.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workpaper Effective Date</th>
<th>• January 1st of DEER update year, unless otherwise stated.</th>
<th>1. <strong>For updates to existing workpapers:</strong> 90 days after CPUC approval.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Workpapers are effective 90 days after a disposition is published approving the workpaper, unless otherwise stated (e.g. errors).</td>
<td>2. <strong>For new workpapers or workpapers that have new measures added to them:</strong> will become effective upon approval of the workpaper.</td>
<td></td>
</tr>
<tr>
<td>• Workpapers will not have a retroactive effective date. Exceptions can be made for special cases after the CPUC management approval.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

88 D.15-10-028, p. 119.
89 D.15-10-028, p. 84.
90 D.15-10-028, OP 21.
Workpapers with ex ante savings estimates are subject to Commission Staff review and approval.\(^{91}\)

- Phase 2 workpapers chosen for review will undergo a 15-day preliminary review stage to determine whether a complete dataset is submitted in accordance with the Ex Ante Database specification, followed by a 25-day detailed review. Within 25-days of a Phase 2 workpaper submittal to the proper workpaper submission folder on the Workpaper Project Archive site, Commission Staff may (a) Request additional information needed in order for staff to complete a review of the workpaper, (b) require revisions to the workpaper, (c), approve the workpaper, or (d) reject the workpaper. In cases where Commission Staff request additional information or requires revisions, Commission Staff will review and either approve or reject the workpaper within 25 days of receiving the additional information or revised workpaper submitted to the appropriate folder on the Workpaper Project Archive site.\(^{92}\)

- If Phase 2 submitted workpapers are not reviewed within the directed timeline, the ex ante values in the workpapers will receive interim approval but remain subject to prospective review and update under Phase 2 review requirements. If workpapers include errors (such as incorrect parameter values from the current Commission-approved DEER or existing, applicable codes and standards), then ex ante corrections of those errors are retroactive.\(^{93}\)

- For Phase 2 submissions, the effective date is the date when Commission Staff approves the workpaper or once the 25-day detailed review opportunity period has passed. Claims cannot be made prior to the effective date.\(^{94}\)

3.2.12 Existing Workpapers

**PG&E Requirement:** When available, Implementers must use an existing workpaper. A new workpaper may not be developed unless the measure substantially differs from the existing approach. Updates to existing workpapers are encouraged to reflect new/best available data.

3.2.13 Statewide Workpapers

**CPUC Requirement:** For PY2020 and beyond, workpapers must use a statewide approach and provide a complete set of values to cover the entire state of California and all DEER-approved climate zones.\(^{95}\)

**CPUC Requirement:** In those cases where an IOU did not submit Implementation Tables as part of the initial approved statewide workpaper submission, the IOU may adopt the approved statewide workpaper by revising the existing Ex Ante Database (EAD) Implementation Table and resubmit to the CPUC for approval. In these instances where the IOU adoption of the approved statewide workpaper does not materially change the workpaper content or the EAD Tables, except for the Implementation Table, the adoption of the approved statewide workpaper does not constitute a workpaper revision.\(^{96}\)

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\(^{91}\) 2017 Workpaper Guidance, November 14, 2016.

\(^{92}\) Energy Efficiency Policy Manual, Appendix G.

\(^{93}\) 2017 Workpaper Guidance, November 14, 2016.

\(^{94}\) Disposition for Workpaper PGECOHV139 Revision 3 (Residential HVAC Quality Maintenance); 2017 Workpaper Guidance, November 14, 2016.

\(^{95}\) 2017 Workpaper Guidance, November 14, 2016.

\(^{96}\) Biermayer, P. (CPUC Energy Division). 2019. “Guidance memo establishing procedures for IOU adoption of Statewide Workpapers.” Memorandum submitted to Henry Liu, PG&E; Ed Reynoso, SDG&E; Cassie Cuaresma, SCE; Chan U Paek, SoCalGas.
3.2.14 Workpaper Notifications
The CPUC posts Monthly Workpaper Summaries, which summarize workpaper activity during the month, including dispositions that were issued, dispositions in progress, and workpapers considered for future review. These Monthly Workpaper Summaries are available at www.deeresources.com under "Non-DEER Workpapers".

3.2.15 Technologies with a Single Manufacturer/Vendor
**CPUC Requirement:** Workpapers are allowed for technologies supported by one vendor only. However, in these workpapers, technologies and their energy efficiency features must be described generically and using basic engineering principles and should not identify a specific vendor or developer. All other workpaper requirements apply.

3.2.16 Qualified Products Lists
When an Implementer sets the measure-level requirements, the Implementer may choose to leverage a Qualified Products List (QPL) to assist program participants to determine which equipment qualifies for the measure.

**PG&E Requirement:** If the Implementer chooses to require equipment to be included on a QPL when defining measure level requirements, the Implementer is responsible for determining whether to reference external QPLs such as those maintained by national standard setting and qualifying bodies such as the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the California Energy Commission, the DesignLights Consortium®, or the U.S. Environmental Protection Agency’s ENERGY STAR®. If measure-level specifications and eligibility differ from such external QPL specifications, a separate “independent” QPL must be provided in a publicly accessible website with retrievable .csv file that can be integrated into PG&E’s Energy Insight. If a separate “independent” QPL is provided for a deemed measure, the QPL must be maintained and updated on an agreed-upon schedule appropriate to the pace of equipment turnover in that category. Implementer is responsible for the accuracy of “independent” QPLs.

Equipment purchased for deemed measures that leverage a QPL must be on the QPL at the time of application (PG&E default guideline), or at the time the Implementer has indicated in its program terms & conditions, to qualify for a rebate and the equipment model must match exactly as it appears on the QPL.

3.3 Ex Ante Values

3.3.1 Data Reporting Workbook
**CPUC Requirement:** All measures associated with a proposed workpaper must be submitted in the appropriate Ex Ante Specification template. The Ex Ante Specification contains four tables: EnergyImpact, Implementation, Measure, and MeasureCost. These tables contain all of the

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workpaper parameters required to claim ex ante savings and calculate cost effectiveness. Acceptable inputs to the reporting template are included in support tables located in the Ex Ante Specification data template as well as the latest version of the READI Tool\textsuperscript{100}, which contains updated information. The requirements listed below reflect additional information provided by the CPUC.

### 3.3.1.1 Measure Support Table

**CPUC Requirement:** The Measure Support table is one component of the Statewide Data Specification. When a measure is not intended to be applicable to specific building types or climate zones, submit only one line in the Measure Support Table with Building Type = Any and Climate Zone = Any. Implementers shall provide the specific building types and locations in their claims.\textsuperscript{101}

### 3.3.1.2 EnergyImpact Table

**CPUC Requirement:** The EnergyImpact table is one component of the data reporting template for workpapers. When an Energy Impact record is not intended to be applicable to specific building types or climate zones, submit only one line in the EnergyImpact Table with BldgType = Any and BldgLoc = Any. Implementers shall provide the specific building types and locations in their claims.\textsuperscript{102}

### 3.3.1.3 Measure Implementation Reporting

**CPUC Requirement:** The Implementation table is another component of the data reporting template for workpapers. Implementers should report each delivery channel separately in the Implementation table.\textsuperscript{103}

### 3.3.2 Measure Application Type and Baseline

#### 3.3.2.1 Existing Conditions Baseline

**CPUC Requirement:** Workpapers for deemed measures that utilize an Existing Conditions baseline must establish reliable aggregate data reflective of the existing condition and circumstance (buildings, customers, climate zones, etc.) where the measure is to be applied. Workpapers that are submitted for ex ante review and approval by the CPUC may also request an Accelerated Replacement baseline (or blend of Normal and Accelerated Replacement) for specified program deliveries, customer types, and/or measures applications. Such requests should specify the types of evidence collected from participants that will ensure compliant program delivery. Program designs, program rules, and customer eligibility criteria are submitted to the Commission for approval, with a strong argument or data supported case that is highly indicative of inducing accelerated replacement. The program rules must specify the customer eligibility criteria and the evidence of customer and measure eligibility that will be collected for each program installation. The specified evidence must be collected for each installation as part of the program implementation, and this evidence must be made available to the Commission upon request and submitted as supporting documentation with related energy savings claims.\textsuperscript{104}

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\textsuperscript{100} READI can be downloaded from http://deeresources.com/index.php/deer-versions/readi.

\textsuperscript{101} WPSDGENRCC0016r1 Preliminary Workpaper Review.

\textsuperscript{102} WPSDGENRCC0016r1 Preliminary Workpaper Review.

\textsuperscript{103} Preliminary Workpaper Review PGE3PHVC159, PGECODHW125r1.

\textsuperscript{104} E-4818, p. 46.
3.3.3 Measure Life

3.3.3.1 Effective Useful Life and Remaining Useful Life ID

**CPUC Requirement:** For Add-On Equipment and Retro-commissioning measures, provide the Effective Useful Life of the add-on component and the Remaining Useful Life of the equipment that the measure is being applied to. The EUL is the minimum of the EUL of the former and the RUL of the latter.\(^{105}\)

3.3.4 Net-to-Gross Ratio

3.3.4.1 Net-to-Gross Ratio

**CPUC Requirement:** Net-to-Gross ratios must be chosen from available NTG IDs in the READI database tool that is the repository for DEER values.\(^{106}\) Uniform statewide Net-to-Gross values should be used if the variation between utilities is not significant.\(^{107}\)

Gas and electric projects must have separate Net-to-Gross values, unless the values are sufficiently similar that a single value is warranted.\(^{108}\) The DEER default NTG value of 0.7 is available to be assigned to measures that have not been in the same program for at least two years.\(^{109}\) The default residential NTG is 0.55 for measures that have been in programs greater than two years using any delivery mechanism.\(^{110}\)

3.3.4.2 Installation-Rate / Gross Savings Installation Adjustment

**CPUC Requirement:** The installation rate (IR) or Gross Savings Installation Adjustment (GSIA) represents the percentage of units for which incentives were paid but not installed. If measures are removed after installation, the reduction should be captured in the EUL, not the GSIA.\(^{111}\) Commission Staff maintains a table of installation rates for DEER and non-DEER measures in READI. For any measures not listed in this table, the installation rate shall be assumed to be 1.0.\(^{112}\)

3.3.4.3 Emerging Technologies NTG Value

**CPUC Requirement:** Commission Staff shall have the authority to accept or reject a utility Emerging Technologies measure classification and to set any Emerging Technologies measure’s Net-to-Gross at a higher or lower value than the default value (0.85), as it deems appropriate.\(^{113}\)

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\(^{105}\) California Public Utilities Commission, Energy Division, July 25, 2015, *Disposition for Workpaper PG&E3PHVC153 Revision 3 (Programmable Thermostat – Nonres)*.

\(^{106}\) Workpaper Disposition for Lighting Occupancy Sensor Controls.

\(^{107}\) D.12-05-015, p. 54.

\(^{108}\) D.12-05-015, p. 399.


\(^{110}\) California Public Utilities Commission, Energy Division, February 28, 2013, *Disposition for Workpaper (On-Demand Pump Control for Central Domestic Hot Water Systems)*.


\(^{112}\) California Public Utilities Commission, Energy Division, *Disposition for Workpaper PGECOALL111 Revision 0 (Tier 2 Advanced Power Strips)*.

\(^{113}\) D.12-05-015, p.62; DIS.02272013.CPUC, Workpaper Disposition for Lighting Occupancy Sensor Controls, February 27, 2013.
3.3.4.4 Hard-to-Reach NTG Values

**CPUC Requirement:** For direct install measures that claim a hard-to-reach (HTR) NTG value (0.85), the workpaper should detail how HTR installations will be tracked. HTR values are only applicable for measures that meet the following criteria.\(^{114}\)

<table>
<thead>
<tr>
<th>Table 8 - Hard-to-Reach Definitions by Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment</strong></td>
</tr>
<tr>
<td>Residential</td>
</tr>
<tr>
<td>Commercial</td>
</tr>
</tbody>
</table>

If a customer does not have a geographic barrier, a customer that meets three of the other barriers listed above will qualify as hard-to-reach.\(^{115}\)

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The definition of hard-to-reach (HTR) is for a customer, not a building. If a measure is installed into a site owned by a business while occupied by either one or more businesses or residential customers, the ratepayer customer who pays for the energy use impacted by the measure installation is the customer to consider when applying the hard-to-reach definition. When classifying a customer as HTR, two criteria are considered sufficient if one of the criteria met is the geographical criteria.

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\(^{115}\) California Public Utilities Commission, December 18, 2014, *Resolution G-3497: Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric (SDG&E), and Southern California Gas Company (SoCalGas) requesting approval of program year 2012 and partial 2013 energy efficiency incentive awards.*
3.3.4.5 NTG Values for Schools and Constrained Areas

**CPUC Requirement:** Projects undertaken by K-12 schools and community colleges, and programs that target specific transmission, distribution, or generation constrained areas (other than bottoming-cycle combined heat and power projects) may use a NTG value of 0.85 for above code measures.¹¹⁶

3.3.5 Savings Calculations

3.3.5.1 Best Available Data

**CPUC Requirement:** Use the latest evaluation, measurement and verification studies published in the development of ex ante values including energy impacts, cost data, effective useful life, remaining useful life, and net-to-gross ratios.¹¹⁷

If a given measure tier is proposed to be applicable to more than one technology, then several samples of each technology need to be evaluated to ensure that the proposed measure performance is typical of the range of performance available in the market for those same technologies.

3.3.5.2 DEER Values

**CPUC Requirement:** Workpapers must use DEER assumptions, methods, and data in the development of non-DEER values when available/appropriate and shall follow Commission Staff direction relating to the appropriate application of DEER to non-DEER values. Any proposed workpaper measure definitions that are different from DEER definitions should be calculated using DEER reference impacts.¹¹⁸

If DEER values and methods are not available, new values may be proposed for Commission Staff review and approval.¹¹⁹ For non-DEER measures, DEER values should be used as the starting point. In cases where any of the installation parameters differ from the assumptions for the DEER measure, the Implementer should apply DEER methodologies for estimating the non-DEER parameter value.¹²⁰ Non-DEER values may not be used without Commission Staff approval.

Direct replacement of DEER measures is not allowed in workpapers.¹²¹

If a measure is in DEER, the implementation table must reference the DEER measure via the DEER measure ID. Implementers should not submit entries in the Measure Table nor the Energy Impact Table.¹²²

¹¹⁸ Disposition for Workpaper PGECOAPP128 Revision 0 (Retail Products Platform).
¹²¹ Disposition for Workpaper PGECOHVC174 (Multiple Speed Unitary Air-Cooled Commercial Air Conditioners and Heat Pumps ≥65 Bth/h).
¹²² California Public Utilities Commission, Energy Division, March 9, 2015, Disposition for Workpaper PGE3PHVC159 Revision 2 (Duct Test & Seal: Residential).
3.3.5.3 **Building Types**

Workpapers must indicate which building types are eligible for the measure and include the associated savings for each eligible building type. Eligible DEER building types can be found in the READI database. New building types may be proposed to the CPUC for consideration.

The workpaper developer may choose to submit ex ante values by specific building types or alternatively submit weighted average values using the applicable “Com” or “Res” building type. (“Com” or “Res” represent a weighting of all DEER commercial and residential building types respectively). If the energy savings and costs do not vary by building type, specify the building type as “Any.”

**CPUC Requirement:** When selecting building types for upstream measures, the preferred reporting method is to select a representative average building stock for the targeted sector (“Com” or “Res”) rather than individually reporting each specific building type. If a workpaper author chooses to report specific building types, provide information on how the program will identify the specific building type for each claim.124

3.3.5.4 **Building Vintage**

**CPUC Requirement:** The median building vintage shall be used for claims of measures that are applied to buildings whose age is unknown or undocumented.125

3.3.5.5 **Operating Hours**

**CPUC Requirement:** Use the operating hours values and methods from the most recent version of DEER if the measure values are available.

3.3.5.6 **Consolidate Savings by Climate Zone to Eliminate PA-specific Records**

**CPUC Requirement:** Starting in PY2020 consistent with the use of Statewide workpapers, only a single savings value will be used for each climate zone instead of PA-specific values. Until statewide values (field PA=“Any”) can be created in DEER for the affected measures, the table below presents the predominant PA and the corresponding savings value to be used for each climate zone.126

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124 Disposition for Workpaper PGECOHVC126 Revision 6 (Unitary Air-Cooled Commercial A/C and H/P <65kBtu/h).

125 Resolution E-4952, p. 40

### Table 9. Predominant PA to use for Statewide Climate Zone Savings Values

<table>
<thead>
<tr>
<th>CA Climate Zone</th>
<th>Predominant PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZ05</td>
<td>PG&amp;E</td>
</tr>
<tr>
<td>CZ06</td>
<td></td>
</tr>
<tr>
<td>CZ08</td>
<td>SCE, for electric measures</td>
</tr>
<tr>
<td>CZ09</td>
<td>SCG, for gas measures</td>
</tr>
<tr>
<td>CZ10</td>
<td></td>
</tr>
<tr>
<td>CZ13</td>
<td>PG&amp;E</td>
</tr>
<tr>
<td>CZ14</td>
<td>SCE, for electric measures</td>
</tr>
<tr>
<td>CZ15</td>
<td>SCG, for gas measures</td>
</tr>
<tr>
<td>CZ16</td>
<td></td>
</tr>
</tbody>
</table>

### 3.3.5.7 Interactive Effects

**CPUC Requirement:** In DEER, the “whole building” energy impacts include interactive effects while the “direct end use” energy impacts exclude interactive effects. Implementers must include HVAC interactive effects in non-DEER workpapers. In DEER, the “whole building” energy impacts include interactive effects while the “direct end use” energy impacts exclude interactive effects. Interactive effects must only be applied to the portion of energy use that occurs within the conditioned space. Refer to DEER for internal gain fractions of residential appliances.

### 3.3.5.8 Water-Energy Nexus Measures

**CPUC Requirement:** Implementers may propose water-energy measures to be incorporated into the existing Water Energy Nexus (WEN) workpaper, WPSPGEWEN0001. The information listed in this section reflects the unique requirements for water-energy measures and should be combined with requirements provided in Section 5 for workpaper development.

### 3.3.5.9 Use of the Water-Energy Cost-Effectiveness Calculator

**CPUC Requirement:** The Water-Energy Calculator can be found via the CPUC’s Water Energy Nexus website at http://www.cpuc.ca.gov/nexus_calculator/ and must be used to calculate embedded energy savings. Implementers must provide justification for any departures from the default values contained in the Water-Energy Calculator.

### 3.3.5.10 Water-Energy Measure Parameters

**CPUC Requirement:** The following parameters shall be applied when calculating savings for water-energy measures:

- **Net-to-Gross:** WEN measures shall use the DEER NTG value when available. If the DEER value is not available, then the measure shall use the Metropolitan Water District (MWD) value. If neither the DEER nor MWD NTG is available, then the measure shall default to a NTG value of 0.85.

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127 *Energy Efficiency Policy Manual*, p. 34; *Disposition for Workpaper PGECOAPP104 Revision 4 and Revision 5 (Energy Efficient Televisions)*.
128 *Disposition for Workpaper PGECOAPP128 Revision 0 (Retail Products Platform)*.
129 California Public Utilities Commission, Energy Division, *Disposition for Workpaper PGECOALL112 (Water Energy Nexus (WEN))*.
130 D.15-09-023.
131 D.15-09-023.
- Effective Useful Life: WEN measures have a maximum expected useful life of 30 years for removed equipment.\(^{132}\)
- Direct Energy Savings: For measures that have both direct and embedded energy savings, the measure attributes for the direct energy saving measure will be used for embedded energy savings even if they do not directly apply to the water efficiency portion of the measure (for example, load shape, climate zone, building type, etc.).\(^{133}\)

### 3.3.5.11 Updating Workpapers with Water Savings

**PG&E Requirement:** When modifying or retiring a deemed measure, if there are water savings related to the measure, the WEN workpaper must be updated to reflect the change. The WEN workpaper must be updated when new deemed measures are offered that include water savings to include an associated water measure to claim savings for the embedded energy.

### 3.3.5.12 Water Savings for Water Energy Measures

**CPUC Requirement:** WEN measures shall use the water savings reported in the direct energy savings measure workpaper, where available. If water savings are not reported in the workpaper, or it is a water-only measure and therefore has no workpaper, must propose values using the Water-Energy Calculator.\(^{134}\) An Implementer must propose a revision to the WEN workpaper in order to have a new water-only measure available for use.

### 3.3.6 Incentives

#### 3.3.6.1 Deemed Incentives

**PG&E Requirement:** Implementers may propose rebate levels for deemed measures, but these levels must be approved by PG&E. The rebate governance process is still in development as of the writing of this Rulebook version. Please refer to the Cross-Platform Chapter for more information on this topic.

#### 3.3.6.2 Incentives for Schools and Constrained Areas

**CPUC Requirement:** Projects undertaken by K-12 schools and community colleges, and programs that target specific transmission, distribution, or generation constrained areas (other than bottoming-cycle combined heat and power projects) shall provide customer incentives that are the higher of 75% of incremental measure cost, or what is available under prior policies.\(^{135}\)

#### 3.3.6.3 Payment Processing

**Best Practice:** PG&E may pay deemed rebate payments directly to recipients (e.g. end-use customers, distributors, contractors, retailers, or manufacturers), or through Implementers. The sections below provide the requirements for both scenarios.

#### 3.3.6.4 PG&E-Processed Payments

**PG&E Requirement:** For rebate applications submitted directly to PG&E for payment, a complete application must include the following information and documentation:

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\(^{132}\) *D.15-09-023.*

\(^{133}\) *D.15-09-023.*

\(^{134}\) *D.15-09-023.*

\(^{135}\) *D.14-10-046, pp. 163-164.*
Table 10 - Information Requirements for PG&E-Processed Incentive Applications

<table>
<thead>
<tr>
<th>Data</th>
<th>Downstream</th>
<th>Midstream</th>
<th>Upstream</th>
<th>Direct Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy of Invoice and shipping document</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Equipment Manufacturer/Model</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Installation Site Address</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invoice Number</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Project Cost</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material and Labor Cost</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Measure Code</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Payee Name/Address/Tax Status/Tax ID (If Implementer is not payee)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Project Installation Date</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Proof of Purchase</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of Equipment Installed</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service agreement ID (SA ID)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Site Building Type</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Contact Name/Phone Number/Email Address</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Project Flag (i.e. Hard to Reach)</td>
<td>✓ (if applicable)</td>
<td></td>
<td></td>
<td>✓ (if applicable)</td>
</tr>
<tr>
<td>Store</td>
<td></td>
<td></td>
<td></td>
<td>✓ (if applicable)</td>
</tr>
</tbody>
</table>

*Applicability of a data requirement is determined by program. This table describes requirements based on current PG&E programs.

3.3.6.5 Implementer Processed Payments

**PG&E Requirement:** Implementer may be responsible for payment of the deemed rebate to the customer/contractor/distributor/retailer/manufacturer and PG&E will reimburse the Implementer.

3.4 Quality Assurance and Quality Control

3.4.1 Project Inspections

**PG&E Requirement:** The PG&E Central Inspection Program (CIP) inspects and provides QA/QC of energy savings programs. CIP ensures customer safety, protects PG&E against liability, identifies potential fraud, and validates energy savings. Examples of CIP inspection areas include: verification of bill amount versus found amount, Natural Gas Appliance Testing, AC Tune Up, Duct Testing, and HVAC Treatments.

PG&E will create and maintain CIP Procedures for all deemed measures. PG&E will determine which measures require mandatory inspections and which are subject to non-mandatory,
random inspections. CIP inspection timing duration is typically within 15 calendar days of application received date.

Mandatory inspections: All project applications for measures with mandatory inspections will be inspected and will not be paid until pass is received. CIP will contact customer to schedule inspection.

Non-Mandatory Inspections: PG&E will determine the inspection percentages for deemed measures. If selected, the project application will be held for payment until the inspection is passed. CIP will contact customer to schedule inspection. If CIP is unsuccessful in its attempts to contact the customer, the application will be accepted, and CIP will proceed to another project application.

3.4.2 Equipment Location List
Best Practice: Implementers shall track where equipment is installed and provide an installed equipment location list to PG&E upon request to assist in the inspection process. For example, if multiple equipment types are installed in one building or location, the Implementer shall record sufficient descriptors to enable an inspector to properly locate the newly installed equipment.

3.4.3 Incomplete Applications
PG&E Requirement: If an application is incomplete or needs further clarification, PG&E will request the missing information and provide the time frame by which the information or clarification is required. Applications may be rejected if the missing information is not provided in the time frame expected. Rejected applications that are resubmitted will be subject to the eligibility requirements, incentive levels, and funding available at that time of re-application.

3.4.4 Proof of Measure Requirements
PG&E Requirement: The Implementer must take the following steps before a rebate check is issued:

1) Verify adherence to measure requirements, including:
   a) Customer eligibility;
   b) Equipment make and model matches Qualified Products List (QPL), if applicable; and
   c) Specifications and eligibility as stated in product catalog and/or via communications from PG&E Program Manager (i.e. Participation Agreement, Energy Efficiency Communications).
2) Proof of purchase/installation (as required by customer type or delivery channel).
3) Validate rebate calculations.
4) Collect Signed Program Participation Agreement.
5) Collect Signed Access Agreement, where required.
6) Collect Free Ridership Form, if applicable.
7) Collect HVAC Certification, if applicable.
8) Collect HTR Questionnaire, if applicable.

3.4.5 Application Records
PG&E Requirement: The Implementer must maintain application records and provide them at PG&E’s or CPUC’s request. PG&E reserves the right to withhold reimbursement payments pending review and approval of the supporting documentation and field inspection results.
3.4.6 Dispute Resolution Process

**CPUC Requirement:** When Implementers disagree with CPUC Energy Division Staff positions on submitted workpapers, Implementers shall work with PG&E staff to set up meetings with Commission Staff to discuss the disagreement and work toward consensus. If the disagreement persists past meetings with Commission Staff and Staff's recommendations on the disputed values are included in a draft Resolution, Implementers shall work with IOU staff to develop comments on the draft Resolution.\(^{136}\)

The *Energy Efficiency Policy Manual* outlines a dispute resolution process based on D.12-05-015 for when an entity submitting a workpaper to Commission Staff finds the Staff requirements for that workpaper unacceptable. In this case, Commission Staff and the IOU will schedule one or more meetings to work toward agreement. If agreement is reached, Commission Staff will upload the workpaper to the Workpaper Project Area at which point the workpaper will become effective. Disputes that cannot be resolved through meetings with Staff will be addressed through the Resolution review process. In this case, Commission Staff will include recommendations on the disputed ex ante values in a draft Resolution. The IOUs will have an opportunity to submit comments on Staff's proposed adjustments to the disputed values in the draft Resolution, and the Resolution will be subject to Commission vote. Draft Resolutions will be issued every six months to address disputed ex ante values for workpapers submitted during the previous six months.\(^{137}\)

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\(^{136}\) Please note the two uses of the word “resolution” in this section. A “dispute resolution process” is the general process used to resolve disagreements and reach consensus with Commission Staff. The “draft Resolution” refers to the Commission’s formally published documents upon which interested parties may comment.

Chapter 4 Custom Platform

4.1 Introduction
The Custom Platform Rulebook provides the ruleset that applies to programs that include custom measures (also termed "calculated" measures). Custom measures are energy efficiency efforts where the customer financial incentive and the ex ante energy savings are determined using a site-specific analysis and are finalized at project completion. An agreement is made with the customer wherein the financial incentive is paid upon the completion and verification of the installation. In addition, Custom projects are subject to the CPUC custom project review process as established by Commission Decision 11-07-030.138

4.2 Eligibility

4.2.1 Minimum Project Size
PG&E Requirement: In order to qualify as a Custom project, the calculated incentive at time of project application must be greater than or equal to $5,000. Statewide Government Partnerships have a minimum project calculated incentive of $10,000. This requirement is due to the high cost of custom project review and processing. Exceptions for future programs will be considered on a case by case basis. Currently, this requirement does not apply to Savings By Design (SBD), the Advanced Pumping Efficiency Program, or Regional Small & Medium Business programs.

4.2.2 Deemed Measures
CPUC Requirement: All measures that have calculation methodologies approved in workpapers or DEER must adopt those methodologies.139

Whenever possible, deemed measures should be processed through the deemed platform. This reduces processing cost and time.

Exception 1: Deemed measures can be calculated and incentivized through the SBD program. If the entire project consists of deemed eligible measures (i.e. a Systems Approach project), then the project must use the Deemed Platform to calculate savings.

Exception 2: If the workpaper for a deemed measure does not include a building type that matches or is similar to the building type for a project (including the COM and OTR building types), the measure must be processed through the Custom Platform.

4.2.3 Holds on Specific Measures
CPUC Requirement: CPUC Staff have placed holds on certain custom measures, including high emissivity coatings on furnace refractory measures, variable refrigerant flow measures in custom retrofit projects, and plastic recycling machines. Please refer to Appendix C for the technology-specific guidance related to these measures.

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138 D.11-07-030.
4.2.4 Non-IOU Supply Framework

**CPUC Requirement:** To qualify for incentives, the customer’s reduction in energy usage due to the EE measure must coincide with periods the customer is purchasing energy from utility and thus reducing grid/system impact. The time period is hourly for electricity and monthly for natural gas with some exceptions for small commercial customers and for customers with on-site photovoltaic solar systems on a net energy metering rate. See CPUC Guidance Document for analysis details.\(^{140}\)

4.3 Influence

4.3.1 Program Influence

**CPUC Requirement:** A narrative and supporting evidence must be provided that demonstrates what the customer was planning to do prior to the energy efficiency program intervention and how the program induced the customer to improve efficiency. The documentation must cover how this specific measure was first brought up for discussion and what steps the program representative took to screen for free ridership. A free rider is a program participant who would have installed the measure absent the program.\(^{141}\)

4.3.2 PG&E Approval Before Implementation

**PG&E Requirement:** Custom measure equipment may not be ordered, purchased, or installed before PG&E has provided written project approval. This approval is either indicated by the project record in Energy Insight advancing to “Approved for Installation” stage or can be provided by a formally granted exception as described below.\(^{142}\)

Exception 1: Pre-ordering of long lead time equipment before project approval is permissible with written PG&E approval in the form of an approved Exception Request. Customer may be asked to demonstrate that the equipment has a long lead time. This approval typically only applies to ordering equipment – not demolition or installation. Approval of preorder requests will be considered when all three of the below considerations are met:

- PG&E or Implementer influence on the project is clearly demonstrated.
- The customer, project, and measure are clearly determined to be eligible.
- PG&E has confidence in the early savings claims calculations.

4.3.3 Substantial Changes in Project Scope

**PG&E Requirement:** If the scope of a custom project changes substantially from what was identified in the original project application review, the change must be disclosed to PG&E. Substantial changes include modifications to the proposed equipment type, size, quantity, or configuration, the expansion of a project to include additional retrofits, or the splitting of a project into multiple phases. The revised project scope and supporting calculations are subject to a new review and approval prior to the removal of existing equipment/systems or the installation of the replacement equipment/systems. PG&E’s Custom Implementation Team (CIT) can approve scope changes.

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\(^{142}\) D.11-07-030 requires CPUC approval prior to incentive agreement for projects selected for ex ante review.
4.4 Ex Ante Values

4.4.1 Measure Application Type and Baseline

4.4.1.1 Like-For-Like Retrofits

**CPUC Requirement:** Proposed NR, AR, NEC, AOE, and WEA measures must be more efficient than existing equipment. Installing equipment that is of the same efficiency as the existing equipment, even if existing equipment is no longer operational, is defined as a like-for-like replacement, which is not eligible for incentives.\[143\]

4.4.2 Savings Calculations

4.4.2.1 DEER Values and Methodologies

**CPUC Requirement:** When available, Implementers must use measure values, methods, and assumptions including: operating hours, EUL, interactive effects, coincident diversity factors, and DEER defined peak periods from the most recent version of DEER to estimate ex ante savings.\[144\] These may be accessed using the READI (Remote Ex Ante Database Interface) Tool.

Peak demand reduction calculations must be performed using the DEER defined peak demand period.\[145\] The DEER method for calculating peak demand reductions utilizes an estimated average grid level impact for a measure between 4 and 9 p.m. during a “heat wave” defined after the fact by identifying the three consecutive weekdays with the hottest weather conditions that are expected to produce a regional grid peak event.\[146\]

Resolution E-4867 directed that a working group be convened to make recommendations to update the DEER peak period. The definition presented above is current as of this writing and as presented in Resolution E-4952 which was a result of the working group which updated the definition of DEER Peak Period as of January 1, 2020.

4.4.2.2 Water-Energy Savings Calculations

**CPUC Requirement:** Projects that save water may use the Water-Energy Cost-Effectiveness Calculator developed by Navigant and GEI Consultants under contract with the CPUC to calculate the embedded energy (energy used to pump and treat water and wastewater upstream and downstream of the customer) from water savings on a customer’s site. A customer must receive water from an off-site source (i.e. municipal and irrigation district supplied).\[147\]

\[143\] D.12-05-015.
\[145\] California Public Utilities Commission, Energy Division, Disposition for Workpaper PGECOCOM102.
\[147\] D.15-09-023.
Notes: Water savings documentation must be submitted, and the Calculator must be included. Refer to the following site for the Water-Energy Cost-Effectiveness Calculator and user guide: http://www.cpuc.ca.gov/nexus_calculator/.

4.4.2.3 Reviewable Calculations

CPUC Requirement: All calculations and associated attachments submitted in relation to a custom project must be readable and transparent. For complex calculations, Implementers must provide the actual equations (proposed formulas) that are used to calculate the savings impacts and provide the non-hard coded and unlocked energy savings calculation workbook for the proposed measures. For projects where an energy model is submitted, appropriate explanation of the model inputs and outputs must be provided. Energy models should have the software version clearly indicated in the project files.

4.4.2.4 Standard Calculation Tools

PG&E Requirement: PG&E has created Standard Calculation Tools that are available to Implementers and must be used for the following measures:

1. Pool Pumps – Addition of a variable frequency drive to a commercial pool pump to reduce flow during unoccupied hours;
2. Pumps – Addition of a variable frequency drive to pumping applications;
3. Air Compressors – For the few measures available above-code, and for the to-code ER and AOE measures available;
4. Lighting;
5. HVAC; and

These Standard Calculation Tools are available from PG&E upon request.

4.5 Quality Assurance and Quality Control

Please refer to the Cross-Platform Chapter for more information on this topic.

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PG&E’s CIT and technical reviewers perform a policy review and a technical review of custom measures to ensure that high quality ex ante values are determined for every custom measure and project.

4.5.1 Measurement and Verification (M&V) Plan

CPUC Requirement: Every Custom project application must include an M&V plan to verify savings post-installation. The M&V plan must indicate how the pre-installation M&V data was used to establish each measure baseline and how the post-installation M&V data will be used to true-up the final ex ante savings estimates. Provide concise equations with explanations demonstrating how the final savings estimates will be determined using the measured data. The level of rigor should be commensurate with the size and complexity of the project. Small or simple projects may require only verification. M&V plans for most other projects must provide concise descriptions of measurement points, measurement period, measurement interval,

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measurement equipment, system diagrams, discussion of the accuracy of measurement equipment and uncertainty associated with the results.\textsuperscript{149}

4.5.2 Pre-Installation Site Inspection

**CPUC Requirement:** The implementer or technical reviewer must perform a pre-installation site inspection to verify existing equipment and loads on the equipment, in accordance with PG&E’s Inspection Standard,\textsuperscript{150} and to confirm proposed measures are not on site. The inspection details must be documented. Existing equipment cannot be decommissioned before PG&E approval for installation. This requirement is not applicable to Savings By Design.\textsuperscript{151}

4.5.3 PG&E Early Policy Review

**PG&E Requirement:** Projects with initial estimated savings that exceed 500,000 kWh or 200,000 therms must be submitted to PG&E for a policy review early in the project development stage, when measure descriptions, measure application type, and baselines are determined, but before detailed analysis or savings calculations are performed. The PG&E Custom Implementation Team (CIT) will review the project and consider it for a Collaborative Review with CPUC staff. CIT will provide guidance to the Implementer related to eligibility, influence, measure application type, and baseline to improve the project quality and to ensure compliance. PG&E reserves the right to reject projects that do not follow this protocol.

4.5.4 Project Approval Expiration

**PG&E Requirement:** Projects must be installed, commissioned, and submitted for post-installation review before the approval expiration deadline. Requests to extend the deadline are handled through the PG&E Exception Request process.

4.5.5 CPUC Custom Project Review Requirements

**CPUC Requirement:** Project approval with an incentive agreement shall not be issued before a project is either released from CPUC Custom Project Review after being submitted to the Custom Measure and Project Archive (CMPA) project list or approved by an CPR disposition, or otherwise allowed to proceed by the CPUC CPR team.\textsuperscript{152, 153}

> PG&E may allow a project to proceed to installation with an approved exception, after submitting complete project documentation on the CMPA, with the understanding that the outcome of the custom project review will impact the project savings and incentive.

4.5.6 Project Documentation Requirements

**CPUC Requirement:** For custom projects, the specific records to be maintained may vary based on the type of project. Examples of the expected data elements include:\textsuperscript{154}

1. Documentation to support program influence;

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\textsuperscript{150} PG&E Customized Inspection Standard (CUST-5205S).

\textsuperscript{151} Energy Efficiency Policy Manual.

\textsuperscript{152} D.11-07-030.

\textsuperscript{153} Memo on CPUC staff EAR enhancement, October 19, 2015.

\textsuperscript{154} D.11-07-030.
2. Documentation to support baseline assignment (Code/Standard requirement, Early Retirement, Retrofit, Replace On Burnout, Standard Practice, CPUC policy, etc.);
3. Existing system controls and operating status description;
4. Existing system output capacities – current output and maximum/design capacity;
5. Pre-installation inspection report;
6. Post-installation inspection report;
7. Proposed modifications with schematic as applicable;
8. Preliminary savings calculations and supporting data with documentation to ensure replicability;
9. Manufacturer’s cut sheets when used to estimate ex ante savings or when needed to ensure replicability;
10. Fuel switching considerations and any required analysis per CPUC policy regarding fuel switching projects (see Energy Efficiency Policy Manual);
11. Other fuel savings and/or load increases resulting from the project;
12. HVAC interactive effects values and methods used to develop those values, when measures cause a change in HVAC system loads;
13. Interactions between multiple measures that act to increase or decrease savings relative to a measure stand-alone savings estimate;
14. Pre/post production output data when used in savings calculations and the source of such records;
15. Billing history - one-year pre installation, with interval data required when available; when ex ante estimated values rely upon a per-unit-production changes based on multi-year production data, corresponding billing histories are required;
16. IOU or Implementer program manual (a single archive of these documents should be referenced rather than including the documents in each project archive);
17. Transparent calculations;
18. M&V plans, reports and raw data archives, where applicable; and
19. EUL/RUL value, analysis, or source.
Chapter 5 Meter-Based Platform

5.1 Introduction
This chapter compiles the current rules and guidance associated with meter-based savings approaches at the time of this Rulebook's release. The Meter-Based Platform comprises several approaches, including Randomized Controlled Trials (RCTs), Quasi-Experimental Designs (QEDs), and Normalized Metered Energy Consumption (NMEC), and Strategic Energy Management (SEM). The specifics of each approach are discussed below, but the common threads that connect them all include:

1. Savings determinations are based on a comparative analysis of pre- and post-installation analysis of metered energy consumption data from all participating sites;
2. Savings are determined at the whole building- or system-level, rather than through calculations at the level of individual measures or interventions;
3. Savings determination methods are embedded in program design; and
4. Meter based savings analyses may be used to inform continuous program improvement.

5.2 Background
California Assembly Bill (AB) 802 modified California Public Utilities Code §381.2(b) to allow NMEC meter-based energy efficiency programs, authorizing PAs 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:

1. 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;
2. Operational, behavioral, and retro-commissioning activities reasonably expected to produce multi-year savings; and
3. 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.”

5.3 Meter-Based Analytical Approaches
EE interventions seek to reduce energy usage. This can make their impact difficult to measure, because doing so requires determining how much energy would have been used in the absence of the intervention. Approaches within the Meter-Based Platform use different methods to determine that baseline—which may be based on a control or comparison group, or a site’s own pre-installation energy usage, adjusted for outside factors like weather and schedule. Because each approach studies participants’ energy usage over a period of time, meaning that factors and other equipment outside of the program intervention can also affect energy usage, meter-based approaches must find a way to capture the change in energy usage that is due to the project itself.

155 NMEC Rulebook, p. 5 and Section 381.2(b) (bullets and paragraph breaks added for clarity).
5.3.1 Randomized Controlled Trials
Randomized Controlled Trials are “true” experiments: they determine whether or not participants receive an intervention at random (for example, by tossing a coin).\(^{156}\) Those assigned to receive the intervention are called the Treatment Group; those assigned not to are called the Control Group. Checks are performed to confirm the groups do not differ in meaningful ways. After the Treatment Group receives the intervention, each group’s energy consumption is observed and the difference in their outcomes is considered the intervention’s effect. In other words, the Control Group’s energy usage is the baseline against which to measure the Treatment Group’s savings. The approach assumes that non-program-related factors that influence energy usage among eligible customers affect the treatment and comparison groups equally.

RCT programs are referred to as “opt-out” rather than “opt-in” because Treatment Group members do not choose to receive the intervention. However, participants assigned to the Treatment Group may request to leave the program. The “opt-out” nature of the design means that only certain programs are suitable for an RCT.

Savings are determined and claimed at the program level, after sufficient post-intervention metered energy consumption data can be collected and analyzed. The M&V methods used to randomly assign participants and analyze data are codified in a procedural work paper submitted for CPUC review and approval.

5.3.2 Quasi-Experimental Design
Programs that use Quasi-Experimental Design also compare the outcomes of customers who receive an intervention and those who do not, but do not use random assignment. In a QED program, customers choose to participate in a program or receive an intervention (the Treatment Group, sometimes also called the “Program Group” to avoid confusion with RCT terminology). Then, a Comparison Group of similar customers is chosen to serve as a baseline.

The Comparison Group is designed to be as similar as possible to the Treatment Group: participants must also be eligible for the program, and when possible, they may be chosen due to other known characteristics such as geography and/or pre-program consumption levels. As with a true experimental control group, the Comparison Group is intended to experience the same external, non-program-related factors that affect the Treatment Group’s energy consumption.\(^{157}\) However, the groups are not as equivalent as those in an RCT: the Treatment Group chose to receive the intervention, and comparison group members did not. Other differences that cannot be observed may have helped drive that decision. As a result, statistical analysis techniques that can address those differences are used.

Savings are determined and claimed at the program level, after sufficient post-intervention metered energy consumption data can be collected and analyzed. The M&V methods used to construct the comparison group and analyze data are codified in a procedural workpaper submitted for CPUC review and approval.


5.3.3 Normalized Metered Energy Consumption

Under the Normalized Metered Energy Consumption (NMEC) approach, energy savings are determined by comparing participants’ pre- and post-intervention energy consumption data, after normalizing, or mathematically accounting, for factors that affect energy usage and are unrelated to the energy efficiency intervention(s). Each site’s own pre-intervention data, normalized to post-intervention conditions, serves as a baseline against which to measure savings.

Specific requirements for this approach are discussed in the modeling approaches section. The NMEC approach may utilize either a population-level or a site-level approach.

5.3.3.1 Population-Level NMEC

Population-level NMEC is an approach in which energy savings are calculated based on sites’ pre- and post-intervention metered energy consumption data and aggregated across a group of similar sites (population). Sites included in a population must have similar equipment and energy consumption levels; factors that affect their energy usage must be similar; and they must be expected to have similar energy savings from the program.\(^{158}\)

Measurement methods and calculation software are set before the program starts; they remain consistent throughout and apply to all sites in a uniform fashion.\(^{159}\) Data collection is consistent across all sites or projects, data cleaning steps are applied consistently across all sites, and any eligibility rules are applied consistently across all sites. The savings calculation approach for a population-level NMEC program is documented in a Program-level Measurement and Verification plan submitted prior to program launch.

In this approach, savings are claimed at the program level.\(^ {160}\)

5.3.3.2 Site-Level NMEC

Using the site-level NMEC approach, savings are calculated at an individual building, project, or site using normalized meter readings taken before and after the energy efficiency intervention. The exact calculation methodology used is project-specific, customized to the unique characteristics of the site or project\(^ {161}\), and may include adjustments for site-specific non-routine events (NREs)\(^ {162}\) that occurred at the site during the baseline, reporting, or installation period. The site’s pre-installation energy consumption, adjusted for post-installation conditions, serves as the baseline.

The general savings calculation approach for a site-level NMEC program must be documented in a Program Level M&V plan submitted prior to program launch. For each specific project, the M&V method, including non-program related factors for which M&V practitioners will normalize, must be detailed in a project-level measurement and verification plan, which must also conform to the program-level M&V Plan. Savings are claimed at the project-level.\(^ {163}\)

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\(^{158}\) NMEC Rulebook, version 2.0, p. 12.

\(^{159}\) NMEC Rulebook, p. 5.

\(^{160}\) NMEC Rulebook, p. 17.

\(^{161}\) NMEC Rulebook, p. 5.

\(^{162}\) The CPUC Site-level NMEC Rulebook, sec. 2, p. 5, defines a non-routine event as an “externally driven (i.e. not related to the energy efficiency intervention) significant change affecting energy use.”

\(^{163}\) NMEC Rulebook, p. 5.
5.3.3.3 Strategic Energy Management

Strategic Energy Management is a holistic, whole-facility approach to energy savings that focuses on business practice change affecting organizational culture to reduce energy waste and improve energy intensity through behavioral and operational change. SEM programs use site-level analysis of metered energy consumption data to determine savings from program activities at the facility, and measure the savings over two years. For large capital measures, custom projects may occur simultaneously at the site, and their savings are subtracted out of the “SEM” savings. “Strategic Energy Management” as used by the CPUC refers to specific, standalone programs designed by consultants to the investor owned utilities.164

The IOUs and their consultants jointly developed a single SEM program design and evaluation protocol, which is currently implemented by third parties individually under contract to each IOU. This PA/Consultant-designed 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, retro-commissioning, and operations (BROs)-type activities.165 If they do not use an NMEC approach, SEM programs are allowed to use an Existing Conditions baseline.166

Because the SEM approach provides for project tracking by the customer and the program implementer, these programs will naturally document project influence and allow a default net-to-gross ratio of 1.0 to apply to custom projects when program influence is evident.167

5.4 Eligibility

5.4.1 Customer Eligibility

Please refer to the Cross-Platform Chapter for more information on this topic.

5.4.2 Site Eligibility

5.4.2.1 Site Eligibility for RCT and QED

**PG&E Requirement:** Site eligibility will be determined by criteria outlined in the program’s procedural workpaper.

5.4.2.2 Site Eligibility for NMEC

**CPUC Requirement:** Only projects in existing buildings are eligible for NMEC; new construction projects are not eligible.168

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164 Evolving guidance on SEM programs is available at https://pda.energydataweb.com/ and 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.

165 D.18-01-004, p. 47.

166 D.16-08-019, p. 38.

167 D.16-08-019, p. 41.

168 NMEC Rulebook, p. 8.
PG&E Requirement: PG&E must provide fuel at the service point(s) included in an NMEC project continuously for the 12 months before and 12 months after implementation. Otherwise, sufficient metered energy consumption data will not be available for analysis.

CPUC Requirement: (Population-level NMEC only) Sites included in a population must have similar equipment types, drivers of energy consumption over a 12-month period, and levels of energy consumption. They must also reasonably be expected to have similar savings resulting from the intervention.\(^{169}\)

CPUC Requirement: (Site-level NMEC only) Projects should follow the baseline modeling guidance provided in the CPUC’s NMEC Rulebook, including:

1. The baseline model must use at least 12 months of data (consumption, weather, etc.).
2. The baseline energy consumption shall be adjusted for non-routine events, as needed, but non-routine events may be removed only if they affect less than 25% of the data. If they affect more than 25% of the data, then that site must be removed.
3. Baseline models must be assessed for goodness-of-fit, following CPUC guidance, and it is strongly suggested that projects be screened for feasibility of proposed methods.\(^{170}\)

5.4.2.3 Meter Identification

5.4.2.3.1 Utility Meters

PG&E Requirement: Implementers must identify the meters within the project boundary at the outset of the project, and use PG&E meters when feasible.

5.4.2.3.2 Non-Utility Meters

CPUC Requirement: Submetering is permissible for NMEC projects.\(^ {171}\) Non-utility meters must meet minimum accuracy requirements outlined by meter type in the CPUC’s NMEC Rulebook.\(^ {172}\)

PG&E Requirement: M&V Plans for programs and projects that will use submeters must address the submetering requirements and how they will be met. If non-utility meters are to be used, the implementer shall obtain permission from PG&E to use the alternate meter type.

PG&E Requirement: Non-utility meters must be calibrated according to the manufacturer’s recommendations; any calibration records must be maintained by the customer and available for PG&E to review upon request. Calibration records are not required for utility meters. If non-utility meters measure a non-energy parameter (e.g. current, flow), programs should justify why it is appropriate to measure those parameters in lieu of energy. Those justifications may be made at either the project or program level, as appropriate.\(^ {173}\)

5.4.3 Intervention Eligibility (Allowable Projects and Measures)

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\(^{169}\) NMEC Rulebook, p. 12.

\(^{170}\) NMEC Rulebook, p. 15.

\(^{171}\) NMEC Rulebook, p. 19.

\(^{172}\) NMEC Rulebook, p. 19-20.

5.4.3.1 Savings Detectability

**PG&E Requirement:** (RCT, QED) Statistical analysis must demonstrate that the proposed intervention is expected to produce statistically significant reductions in energy consumption, to at least a 90/50 precision and confidence level.

**CPUC Requirement:** (Population-level NMEC): Population-level NMEC programs must be designed to meet or exceed a 90% confidence / 25% range fractional savings uncertainty (FSU) as calculated using a CPUC-compliant method (e.g., ASHRAE Guideline 14 methods applied to daily data), or must seek an exception. These levels may be modified in the future.\(^\text{174}\)

**CPUC Requirement:** (Site-level NMEC) The CPUC recommends, but does not require, that site-level NMEC projects strive for minimum savings of 10% of annual consumption.\(^\text{175}\) 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.\(^\text{176}\)

**Best Practice:** Because many factors, including those that cannot be reliably captured in a mathematical model, can cause small variations in energy consumption in a building, meter-based approaches are most appropriate for deep, multi-measure interventions. However, for a well-designed RCT or QED with large treatment and control/comparison groups, savings of a relatively small magnitude may be detectable at the program level.

5.4.3.2 Measure Eligibility

**CPUC Requirement:** 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
3. Behavioral, retro-commissioning, and operational measures are allowed, including maintenance and repair. Maintenance and repair measures should follow the guidance and additional requirements as described in the CPUC’s NMEC Rulebook.

5.4.3.2.1 Eligible Measure Application Types

**CPUC Requirement:** Please refer to Table 3 in section 2.3.1 of the Cross-Platform Chapter for more information on this topic. Normal Replacement, Accelerated Replacement, Add-On-Equipment, Weatherization, Behavioral, Retro-commissioning, and Operational measure application types are permitted for meter-based projects, and use existing conditions baseline.\(^\text{177}\)

\(^{174}\) NMEC Rulebook, p. 12.
\(^{175}\) NMEC Rulebook, p. 9.
\(^{176}\) NMEC Rulebook p. 9
\(^{177}\) Resolution E-4818, Sec. 1.6, Table 1.1. Information in this table is also available in Sec. 2.3.1 of this rulebook.

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5.4.3.2.2 Commonly Repaired Equipment

**PG&E Requirement:** Programs that provide incentives and/or claim savings for replacement of failed equipment must make a data-supported case that a given piece of equipment has a history of being repaired rather than replaced to justify use of an Existing Conditions baseline.178

5.4.3.2.3 Repair of Non-Essential Component(s) of Equipment or Systems

**CPUC Requirement:** Non-essential components are those that, when failed or not operating as designed or optimally, only reduce efficiency and do not prevent the equipment from delivering the original service or function. Repair of non-essential components of existing equipment or systems is allowed provided that, when failed, the full system can perform the design function at near design capacity, and, when failed, the overall annual system efficiency is reduced by more than 20%, and either:

- the failure type/component is not considered “standard” or “routine” maintenance and there is no requirement to do so to maintain warranty or service coverage or for health and/or safety reasons, or
- the failure typically remains unrepaird for 2-3 years or more and is not no cost or low cost. These types of repairs are allowed provided that the intent is to support an activity to bring enhanced maintenance and system optimization practice into standard practice at a facility, and not simply to transfer standard maintenance activities and costs to be a ratepayer funded activity. See Resolution E-4818 for more information.179

5.4.3.2.4 Maintenance of Equipment

**CPUC Requirement:** Site-level NMEC 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. This requirement should be carried out consistent with statutorily defined or Commission adopted workforce standards.180

5.4.3.2.5 Fuel Substitution Measures

**PG&E Requirement:** Programs targeting fuel substitution measures must address related M&V and reporting issues in their Program-level M&V plan.

5.4.3.3 Industrial Projects and NMEC

**CPUC Requirement:** The full NMEC approach may only be used for industrial operations and maintenance (O&M) and behavior, retrocommissioning, and operational (BRO) projects when carried out under a Commission-defined Strategic Energy Management program. However, NMEC projects are permitted in industrial buildings when they are similar to projects that would be performed in a commercial building.181

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178 HOPPS White Paper Ruling.
179 Resolution E-4818.
180 NMEC Rulebook p. 10
181 NMEC Rulebook, p. 8.
**PG&E Requirement:** NMEC savings calculation methods may be used for industrial O&M and BRO projects as part of an IPMVP Option C-compliant Custom project. However, the project must follow all Custom rules.

**5.4.3.4 Double Dipping and Double Counting**

**CPUC Requirement:** Participants in meter-based programs are subject to the same double dipping limitations placed on all EE program participants. Namely, projects receiving incentives or claiming savings through any energy efficiency program must not also receive incentives (i.e. double-dip) or claim savings (i.e. double-count) for the same interventions through any other program, regardless of channel (e.g. downstream, midstream, or upstream), provider (e.g. other utilities, the California Energy Commission, or the California Public Utilities Commission), or platform (e.g. deemed, custom, meter-based) offering.\(^{182}\)

**PG&E Requirement:** Because savings for meter-based programs and projects are measured using metered energy consumption data from before and after program participation, the checks on double counting differ from those for deemed and custom program participants. If a customer participates in an EE program during the pre-intervention baseline period, that could reduce baseline model goodness-of-fit. If a customer participates in an EE program unrelated to the meter-based project during the installation period or post-intervention reporting period, that unrelated intervention could affect our ability to accurately measure savings that result from the meter-based program. Program implementers must address double-counting in their program level M&V plans or procedural workpapers. In addition, NMEC program implementers must screen customers for double-counting and obtain commitment from participants that they will not participate in any other energy efficiency programs during the pre- or post-intervention period. Implementers must get PG&E approval for any deviation from this requirement.

**5.5 Savings Calculations and Data Management**

Savings calculations at the program and project level will be described in procedural workpapers for RCT and QED programs, and Program and/or Project-level M&V plans for NMEC and SEM programs.

**5.5.1 Gross Savings Determination**

**PG&E Requirement:** For a given program or project, PG&E and the implementer will agree on a gross savings methodology, including the meter-based approach to use, and collaborate on a final procedural workpaper (RCT, QED) or M&V plan (NMEC, SEM). PG&E is the final arbitrator of savings calculations.

**CPUC Requirement:** Methods used to calculate savings for NMEC programs must be documented in the program-level M&V plan sufficiently that they can be replicated by other involved stakeholders (for example, ex post evaluators).\(^ {183}\)

**PG&E Requirement:** Methods used to calculate savings for meter-based programs—including data cleaning and editing steps, calculation methods and tools, methods for handling non-routine events, program eligibility, and disqualification rules—must be documented in the final

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\(^{183}\) NMEC Rulebook p. 18
M&M plan or procedural workpaper in sufficient detail that another practitioner could replicate them.

5.5.1.1 Program Measurement & Verification (M&V) Plans

CPUC Requirement: (NMEC) All third-party proposals using NMEC methods to determine gross savings must include an M&V plan as part of their bid proposal. The bid M&V plan is a program-level document that does not constitute the final M&V plan for the program, but serves as a basis for discussion, negotiation and planning. It shall include:

1. A description of the program target population and participant eligibility criteria;
2. Documentation of the expected costs, energy savings, DEER peak impacts, and effective useful life (EUL) of planned measures and intervention strategies;
3. 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
4. Approach to ensure adequate data collection, monitoring and documentation of energy savings for each project over the reporting period.

5.5.1.2 Final Program M&V Plans

PG&E Requirement: NMEC Implementers shall collaborate with PG&E to finalize a program-level M&V plan to be filed with their Implementation Plan. PG&E approval of the final M&V plan is required.

For programs and projects that will claim savings at the site level, M&V plans should address the topics discussed in the LBNL Site-level NMEC Technical Guidance document. Additional guidance on M&V for site-level NMEC can be found in Southern California Edison's NMEC Procedures Manual.

For programs that will claim savings at the population level, M&V plans should address topics including the data that will be used to estimate savings, its source(s), what method will be used, and why it is appropriate.

5.5.1.3 Baseline Model Development

All meter-based savings calculation methodologies are based on the premise that the baseline for determining savings is the state / condition of the site before any energy efficiency intervention takes place. For RCTs and QEDs, the pre-intervention condition (baseline) is determined using comparison groups. For NMEC and SEM, the baseline is based on normalized pre-intervention savings data at the participating building.

5.5.1.3.1 Normalization

PG&E Requirement: Gross savings must be normalized for relevant factors, and the program or project M&V plan should discuss and justify the selection of these variables.
Best practices call for publicly available sources (e.g. weather data from published government sources), in M&V where possible. If such data are not publicly available, the data source must be disclosed. Implementers may also be required to make non-public data available to PG&E and CPUC evaluators.

**CPUC Requirement**: Specific or nearby weather data for baseline model development and avoided energy use calculations are allowed. Final savings claims must be normalized by long term weather based upon the most up-to-date weather files (such as CALEE 2018). Weather and other normalizing adjustments should be applied to the baseline and performance period.\(^{187}\)

#### 5.5.1.3.2 Metering Duration

**PG&E Requirement**: Energy usage and other relevant data from participating sites and projects must be monitored for sufficient durations to meet CPUC requirements and best practices. The CPUC requires a one-year baseline period, a minimum of one year of monitoring post-implementation, and a minimum of two years of monitoring post-implementation when BRO measures are included.\(^{188}\)

#### 5.5.1.3.3 Calculations and Eligible Tools

**PG&E Requirement**: PG&E and the Implementer will agree on a method to be used to calculate savings estimates on which payments and savings claims will be based. Savings will be estimated using a publicly available methodology (equations and/or code) that is sufficiently documented that its results can be replicated, and to which a version number or publication date is attached. Version or methodology changes must have clearly specified effective dates.

#### 5.5.1.3.4 Software Requirements

**CPUC Requirement**: 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.\(^{189}\)

**CPUC Requirement**: 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.\(^{190}\)

**PG&E Requirement**: PG&E savings claims and implementer performance payments will be based on measurement methods and calculation software or tools that are publicly available; sufficiently documented that their results can be replicated, reviewed, and understood; and approved by PG&E prior to program launch.

**PG&E Requirement**: Proprietary software may be used for Implementer/customer interactions and customer incentive payments. Implementers choosing to use proprietary software for this purpose will be required to follow all CPUC guidelines related to proprietary software, will need to document and justify variance between PG&E claim calculations and proprietary calculations.

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\(^{187}\) NMEC Rulebook, p. 18.
\(^{188}\) CPUC Site-level NMEC Rulebook, p. 12.
\(^{189}\) NMEC Rulebook, p. 18
\(^{190}\) NMEC Rulebook, p. 18
and must allow PG&E and their consultants to review the software and methodologies upon request.

### 5.5.1.4 Evaluability

Please refer to the Cross-Platform Chapter for information on program evaluation.

Examples of information that will likely improve program evaluability for meter-based programs include: establishing policies for, and maintaining records of, data that are considered outliers, how those outliers are defined, and what actions, if any, were taken with those outliers (e.g. discard, normalize, use as-is), and detailing procedures to identify duplicate records and the action(s) that were taken to avoid double counting of savings with other energy efficiency programs.

### 5.5.1.5 Adjustments for Non-Routine Events (NREs)

A non-routine event is a change in site energy use that is not accounted for in the independent variables used to develop the baseline model or energy use, and not attributed to the efficiency measures installed. Non-routine events involve energy-governing factors which do not usually change (such as: the facility size, the design and operation of installed equipment, the number of weekly production shifts, or the type of occupants). Non-Routine Events should be distinguished from energy-governing factors expected to change routinely during the reporting period (such as: weather or production volume).

**PG&E Requirement:** Prior to program or project initiation, Implementers should work with PG&E to define NREs in the program or project context and establish clear procedures to identify potential NREs, confirm which events meet the NRE definition or threshold, and adjust savings calculation methods to account for them.

**CPUC Requirement:** (Site-level NMEC; SEM) Programs or projects using site-level approaches should track and adjust for NREs (e.g., occupancy changes, equipment failure, or major increases/decreases in operational hours that are large enough to affect savings). Once NREs are identified and agreed to by the program implementer and PA, the baseline model must be adjusted to account for the resulting changes in energy consumption. The appropriate non-routine event adjustment is typically determined using an engineering analysis to normalize the project characteristics across the reporting period.

### 5.5.1.6 Interactive Effects

**Best Practice:** While meter-based programs must consider interactive effects, it may not be necessary to perform a meter-based analysis on both electric and gas, depending on the program interventions. Programs should describe in their M&V plans how they will account for interactive effects (e.g. metering both electric and gas, metering one fuel and estimating a value for the other).

### 5.5.1.7 Load Shapes

**CPUC Requirement:** Currently, Implementers may use and report only load shapes provided in DEER. Alternatively, a weighted blend of DEER load shapes based on metered data may be calculated and provided. Please consult a member of PG&E’s Program Management team for more information.

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191 NMEC Rulebook, p. 15.
5.5.1.8 **EUL for Bundled Measures**

**CPUC Requirement:** Project lifecycle savings must be based on a weighted average EUL method, unless staff approves an alternative method for EUL calculation. EULs should be based on DEER, workpaper, or other Commission adopted values, where available. See LBNL Technical Guidelines for proposed weighted EUL calculation method.\(^{193}\)

**CPUC Requirement:** Behavioral interventions will use an EUL of two years in non-residential sectors, one year in residential sectors; operational and retro-commissioning interventions will use an EUL of three years.\(^{194}\)

**PG&E Requirement:** Weighted average EULs should comprise the best available estimate of the relative contribution of different measures to total savings, based on available data. Programs that use a population-level approach should calculate a population-level weighted average EUL; programs/projects that use a site-level approach should calculate a site- or project-level weighted average EUL. Implementers should consult with PG&E about the approach to calculating weighted average EUL and provide their calculations and the data used.

**Weighted average EUL example:**

- Measure 1: 100,000 kWh savings, 10-year EUL
- Measure 2: 200,000 kWh savings, 3-year EUL

The EUL of the bundle would be \((100,000 \times 10 + 200,000 \times 3) \div (100,000 + 200,000) = 5.33\) years.

**PG&E Requirement:** To facilitate EUL estimation, Implementers must collect site-level data on the measures installed or implemented (including in programs that will claim savings using a population-level approach). Implementers who will use a site-level approach must also document any equipment being replaced, and implementers using a population-level approach may be required to do so as well.

5.5.2 **Net Savings Determination**

**CPUC Requirement:** The CPUC has assigned default net-to-gross ratios to meter-based programs and projects. As of the time of publication of this rulebook, those were:\(^{195}\)

- RCT programs: 1.00;
- NMEC projects that install a combination of measures (different NTGRs apply by sector):
  - Non-Residential: 0.95;
  - Residential Single-Family: 0.85;
  - Residential Multi-Family: 0.55; and
- SEM: 1.00.

As of the time of publication of this rulebook, a default NTGR was not available for QEDs.

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\(^{193}\) NMEC Rulebook, p. 16.

\(^{194}\) D.16-08-019, pp. 94 and 101.

5.6 Payments and Incentives

5.6.1 Customer Payments
**CPUC Requirement:** Customer payments are not required. Other sources of assistance (technical support, project financing) may be provided in addition to, or in lieu of, customer payments. If given, customer payment for a given measure must not exceed the full measure cost without justification and approval from Commission staff.\(^{196}\)

5.6.2 Incentive Structure in the M&V Plan
**CPUC Requirement:** Program-level M&V plans must include 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.\(^{197}\)

5.6.3 Incentives Must Pay for Performance
**CPUC Requirement:** For meter-based programs, a “significant portion” of the incentives paid through the program shall be determined based on NMEC-measured performance (i.e. payments should be based on a pay-for-performance model).\(^{198}\) Incentive payments shall be structured to limit and mitigate the risk associated with up-front payments that could exceed the value of realized savings.\(^{199}\)

**CPUC Requirement:** Incentives paid in meter-based programs may not be based on deemed or ex ante savings. Incentives should pay only for interventions influenced by the program.\(^{200}\)

5.6.4 BRO Incentives
**CPUC Requirement:** Recipients of behavioral, retro-commissioning, and operational measures shall only be paid incentives after participant has committed to a minimum three-year maintenance plan (evidence must be made available to Commission staff upon request).\(^{201}\)

5.6.5 CPUC Incentive Guidance
**CPUC Requirement:** When developing incentives, program implementers should strive to follow CPUC guidance provided in D.18-05-041.\(^{202}\)

5.7 Quality Assurance and Quality Control
**PG&E Requirement:** Programs and projects that use the meter-based platform should include a feedback mechanism in which meter-based savings estimates are shared with Implementers and/or customers in order to communicate program performance and help improve programs over time.

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\(^{196}\) *Energy Efficiency Policy Manual.*

\(^{197}\) NMEC Rulebook, p. 7.

\(^{198}\) NMEC Rulebook, p. 9.

\(^{199}\) *HOPPS White Paper Ruling,* Attachment A, at 11-12.

\(^{200}\) NMEC Rulebook, p. 9.

\(^{201}\) NMEC Rulebook, p. 9.

5.7.1 Pre-Installation Site Inspection (Site-Level)

**PG&E Requirement:** PG&E may conduct pre-installation site inspections. The need will be determined on a program-by-program or case-by-case basis.

5.7.2 PG&E Early Policy Review (Site-Level)

**PG&E Requirement:** PG&E may conduct early policy review. The need will be determined on a program-by-program or case-by-case basis.

5.7.3 Custom Project Review Requirements (Site-Level)

**CPUC Requirement:** The CPUC requires that projects using site-level NMEC approaches to estimate savings “follow a modified custom process review”\(^{203}\) so that Commission staff may provide early feedback to PAs and implementers. This review will not cause project stoppages or delays, and does not constitute approval of projects or savings claims. Project information must be submitted to the Custom Measure and Project Archive (CMPA), but will not be required to wait for approval to proceed. Implementers should review Chapter 4 for general information on the custom process. **Project-level review is not required for population-level NMEC approaches.**\(^{204}\)

5.7.4 Project Documentation Requirements (Site-Level and Population-Level)

**PG&E Requirement:** As with the custom platform, the specific records to be maintained for meter-based projects may vary based on the type of project. Documentation requirements will be determined on a program-by-program or case-by-case basis. Refer to section 4.5.5 for examples that may be applicable to site-level projects. In particular, Implementers should ensure that they document program influence throughout the life of a project.

5.7.5 Energy Model Fitness Thresholds

**PG&E Requirement:** Models of building energy usage for participating customers should demonstrate the ability to sufficiently characterize energy use by meeting certain goodness-of-fit metrics to which the Implementer and PG&E agree at the outset of the program.

5.7.6 Baseline Period Requirements

**CPUC Requirement:** One year of pre-implementation usage data is required for meter-based savings calculations.\(^{205}\)

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Savings uncertainty is a function of both the interval length and the monitoring duration (e.g. hourly readings of electric usage for twelve months), so programs must specify both parameters. Both interval length and monitoring duration should be considered together when designing eligibility criteria. The effects of an energy efficiency intervention must be observable when interval length, monitoring duration, effect size (i.e. percentage of savings), coefficient of variation of the model, and confidence interval are accounted for. See the Savings Calculations section of this document (Section 5.5) for details.

\(^{204}\) January 31, 2019 NMEC Ruling, p.6.
\(^{205}\) CPUC Site-level NMEC Rulebook, sec. 2, p. 4.
5.7.7 Timing of Payments and Claims

**PG&E Requirement:** PG&E will agree with the Implementer on a payment schedule for each program. Implementers may propose a schedule of when payments and claims could be made. Payments tied to performance should be made after at least a sufficient amount of monitoring time, and within a reasonable amount of time of implementation, so that the risk of over or underpayment is mitigated. Programs will likely vary the interval lengths based on the budget and nature of the interventions.

Consideration should be given to the nature of the measures installed (e.g. weather-dependent energy savings should include heating and cooling seasons in determining the measurement payment period). Conversely, measures that affect only baseload may only require three months for payment determination, but the energy savings determination should be trued up at the end of the requisite measurement period to verify persistence of saving.

5.8 Additional Resources

Meter-based approaches are discussed in detail and periodically updated in several publications available on the CPUC’s Rolling Portfolio Guidance page: https://www.cpuc.ca.gov/general.aspx?id=6442456320
Chapter 6 Financing Platform

6.1 Introduction
The Financing Platform guides energy efficiency program Implementers and energy efficiency project developers to incorporate financing into their energy efficiency programs. On-Bill Financing (OBF) and other financing offerings may be used with incentives or independently to motivate customers to install energy efficiency measures.

6.1.1 OBF Loans
**PG&E Requirement:** OBF loans are available for loan terms of up to 120 months for eligible energy efficiency projects. The availability of OBF loans is subject to availability of funds. The loan is an interest free loan, with monthly repayments integrated into the customer’s PG&E bill with repayments sized to be equal to the project’s projected monthly energy savings.

6.1.1.1 OBF Terms
**PG&E Requirement:** The Standard OBF loan is available for all eligible energy efficiency projects, subject to application approval and funding availability. The standard OBF terms may be changed at PG&E’s discretion.

<table>
<thead>
<tr>
<th>Loan Terms</th>
<th>Non-Residential Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum Loan Amount</td>
<td>Typically $250,000 per premises, however, loans of up to $4,000,000 per premises may be awarded where, in PG&amp;E’s sole opinion, unique opportunities exist to capture large energy savings, and the customer is not receiving any other rebates and incentives.</td>
</tr>
<tr>
<td>Maximum Term</td>
<td>120 Months</td>
</tr>
</tbody>
</table>

6.1.1.2 Cost Buy Downs
**PG&E Requirement:** Where a project’s payback period exceeds the maximum loan term, customers may “buy-down” the project cost to meet the necessary loan terms. This buy-down reflects the amount that will not be covered by On-Bill Financing and should be coordinated directly with the customer. The buy-down is not paid to PG&E.

6.1.1.3 Early Repayment and Closing a PG&E Account with and OBF Loan
**PG&E Requirement:** A customer may pre-pay the loan without penalty (customer or Implementer should contact PG&E prior to prepayment of loan balance). If there is a loan balance on a closed account, the balance is due in full on the customer’s final utility bill. If the customer with the loan agreement opens a new account at a new location, they may make payment arrangements with PG&E’s credit team. The loan balance will be treated as a past due bill, not as a continuation of the OBF loan. If the customer breaks the payment arrangement, the customer risks meter shut-off pursuant to the discontinuance provisions in PG&E’s tariff under Rule 11.207,208

6.1.1.4 Obtaining an OBF Loan

**PG&E Requirement:** Customers and Implementers must follow the loan application procedures in order to obtain the OBF Loan. The steps to obtaining an OBF Loan are as follows:

a. **Payment History Screening:** PG&E will review the customer’s eligibility for the OBF Loan based on payment history. Customers with a history of late payment may be ineligible for a loan.

b. **Customer Pre-Installation Loan Agreement (optional):** In order to guarantee funding, pre-qualify the project as eligible, and pre-qualify a customer as eligible, a project may be submitted for pre-installation review by PG&E. Sufficient information on the measures, costs, and energy savings must be provided to PG&E to establish eligibility for a pre-installation loan agreement. The loan agreement must be signed by the customer for the funding to be reserved.

c. **Post-Installation Review:** Following installation, supporting information (i.e., invoices, engineering review, project QA review) must be submitted to PG&E. PG&E will use this information to determine the final loan amount. If the loan size changes between pre-install and post-install, then the loan agreement shall be reissued and must be signed the customer before the loan payment is made.

d. **Loan Payment:** The loan is paid to the designated payee (the customer or assigned payee) following review of the project following installation.

The OBF customer and Contractor Handbook provides more detail of how to submit OBF loan applications.\(^{209}\)

### 6.2 Eligibility

#### 6.2.1 Customer Eligibility

**PG&E Requirement:** OBF is available to non-residential PG&E customers that meet the following conditions throughout the duration of the retrofit project.\(^{210}\)

- The PG&E customer must be a business customer or a federal, state, county or local government agency (see definition of government agency customer below). Business customers and government agency customers are collectively referred to as “customer.”
- The customer currently receives service from PG&E at the location of the retrofit project.
- The customer has maintained an active PG&E account for the previous 24 months.
- The customer must be in good credit standing from when the customer’s program application is approved through the funding of the loan. A customer’s credit standing will be determined according to a payment history screening, which may be based upon the existence of any 24-hour disconnection notices in the last 12 months.

If the customer’s account does not satisfy all of the requirements of the payment history screening, the customer will receive an email notification within five business days stating the reason for disqualification. If the customer does not pass the payment history screening, customer may submit an appeal to the OBF Program team through a PG&E Account Representative.

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6.2.2 Direct Access/Energy Service Provider and Community Choice Aggregation Accounts

**PG&E Requirement:** DA and CCA customers who install qualifying energy efficiency measures are eligible for OBF if they receive a monthly bill from PG&E, which includes PG&E charges. See Section 11 for information on calculation of energy savings for DA/ESP and CCA customers.

6.2.3 Net Metered Accounts

**PG&E Requirement:** Net Energy Metered customers may participate in OBF if they receive a monthly bill from PG&E. Energy savings incorporated into the OBF loan terms will be calculated based on net usage rather than gross usage.

6.2.4 Project Eligibility

**PG&E Requirement:** Any project that is developed using the project eligibility criteria described in the Deemed, Custom or Meter-Based Platforms is eligible for On-Bill Financing. Project developers and Implementers should follow the guidelines, procedures and requirements described in those platforms. Projects that do not follow the procedures outlined in the Deemed, Custom, or Meter-Based Platforms should follow the procedures in this section to establish project eligibility.

6.2.5 Project Developer Eligibility

**PG&E Requirement:** The Project Developer is a contractor or a team/consortium of contractors and service provider(s) who plan and deliver the energy efficiency project. To participate in OBF, the developer must be project developer in the Investor Confidence Project (ICP) network. An exception is made for those developers using the OBF lighting template for, where the developer does not need to be part of the Investor Confidence Project network.

6.2.6 Measure Eligibility

**PG&E Requirement:** For OBF-only projects, the following measure eligibility criteria apply:

- The energy efficiency measure must be calculated to decrease the amount of energy used to provide a specific service or to accomplish a specific amount of work;
- Any lighting measures that are part of the project scope must be included on the DesignLights Consortium’s Qualified Product List;
- Non-advanced (i.e. non-LED) lighting measures are not eligible;
- Any lighting controls installed must not exceed 20 percent of project costs, and must exceed the requirements of Title 24;
- Equipment to be replaced as part of the project should be functioning at the time of replacement;
- Retro-commissioning measures that will be included in the loan must have a minimum three-year maintenance plan;
- The average EUL of the energy efficiency measures included in the project must be at least as long as the loan term.

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211 [http://www.eeperformance.org/project-developers.html](http://www.eeperformance.org/project-developers.html)

6.2.7 Eligible Costs
PG&E Requirement: An OBF loan may only cover those costs associated with the required components of the energy efficiency project (EE Project). Eligible projects costs may include:

- Implementation costs, such as project capital expenditures;
- Project Developer development fees;
- Initial and ongoing M&V expenses, only if paid upfront under the loan disbursement;
- O&M activities, including costs for customer O&M training, if paid upfront under the loan disbursement;
- Quality Assurance Provider costs;
- An EE Project performance guarantee.

6.2.8 Equipment and Charges Not Eligible for Financing
PG&E Requirement: The following items are not eligible for financing through OBF:

- Customer in-house labor or customer project management costs for the energy efficiency measure installation (e.g., time spent by staff coordinating with contractors at customer facilities);
- Basic lighting measures, defined as all non-LED lighting retrofits;
- Behavioral measures;
- Add-ons to existing renovation projects.

6.3 Influence
PG&E Requirement: Projects that establish eligibility for OBF by complying with the influence-related rules of the Deemed, Custom, or Meter-Based Platforms shall follow the influence rules described in those chapters. For projects that will only use financing, the OBF loan must only be used for projects that otherwise would not be installed.

6.4 Ex Ante Values

6.4.1 Savings Claims Methodology
PG&E Requirements: OBF projects do not have a unique savings claim methodology. Savings will be calculated using the appropriate savings calculation methodology.

- Projects that are eligible due to their compliance with the project eligibility in the Deemed, Custom, or Meter-Based Platforms should use the respective platform rules for claiming savings.
- Projects that are qualified using the OBF-only methodology described in the project eligibility section above will use the savings calculation methodology applicable to the Meter-Based platform.

6.4.2 Cost Calculations

**PG&E Requirement:** OBF costs will be allocated to the program Implementer for the purposes of program evaluation. As ratepayer-funded OBF funds are returned to PG&E with no interest, PG&E will allocate the cost of the projects based on:

- Capital Costs – The real cost to ratepayers for deploying non-earning capital plus anticipated default costs;
- Administration Costs - The costs to PG&E of administering OBF.

### 6.4.2.1 Standard OBF Cost Allocation

**PG&E Requirement:** The standard OBF costs are calculated as follows:

**Administration Cost:** $2,000 per loan.

**Capital Costs:** Capital costs will vary based on the term of the loans in the Implementer’s program. They will be calculated as a percentage of the loan Principal.

**Table 12 – Capital Costs Allocated to Loans**

<table>
<thead>
<tr>
<th>Loan Term (Years)</th>
<th>OBF Costs as a % of Principal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Than 4 Years</td>
<td>5.0%</td>
</tr>
<tr>
<td>4-7 Years</td>
<td>10.0%</td>
</tr>
<tr>
<td>More Than 7 Years</td>
<td>16.5%</td>
</tr>
</tbody>
</table>

As an example, the allocated cost for a 7-year, $1,000,000 loan would be:

**Table 13 - Example Calculation of OBF Cost Allocation**

<table>
<thead>
<tr>
<th>Loan Principal</th>
<th>$1,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Term</td>
<td>84 months (7 years)</td>
</tr>
<tr>
<td>7-Year Capital OBF Cost @ 10% of Principal</td>
<td>$100,000</td>
</tr>
<tr>
<td>OBF Admin Costs</td>
<td>$2,000</td>
</tr>
<tr>
<td>Total Allocated OBF Costs</td>
<td>$102,000</td>
</tr>
</tbody>
</table>

In this example, with a loan term of seven years, the 10% loan term rate is used on the initial loan principal of $1,000,000.

### 6.4.2.2 Reserved Funding Cost Allocation

**PG&E Requirement:** Implementers are able to reserve a dedicated pool of funding for their program annually. The benefits of reserving funding for an Implementer are the additional flexibility available in the term of the loans and reduced capital costs. Capital costs are lower as PG&E can more efficiently manage the loan pool requirements. The following costs will be applied to Implementers using reserved OBF funding:

**Administration Cost:** $2,000 per loan.

**Capital Costs:** Capital costs will vary based on the term of the loans in the Implementer’s program. They will be calculated as a percentage of the loan principal.
Table 14 - Capital Costs Allocated to Loans for Reserved Funding

<table>
<thead>
<tr>
<th>Loan Term (years)</th>
<th>OBF Costs as a % of Principal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Than 4 years</td>
<td>4%</td>
</tr>
<tr>
<td>4-7 Years</td>
<td>7.5%</td>
</tr>
<tr>
<td>More Than 7 years</td>
<td>11.5%</td>
</tr>
</tbody>
</table>

Any unused funding at the year-end will have the less than four years capital cost of 4% assigned to the Implementer costs for evaluation purposes. The following table provides an example of the costs the Implementer would be assigned for reserved funding:

Table 15 - Example Calculation of OBF Cost Allocation for Reserved Funding

<table>
<thead>
<tr>
<th>Reserved Funding</th>
<th>$12,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding Used</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>Weighted Average Loan Term</td>
<td>84 months (7 years)</td>
</tr>
<tr>
<td>OBF Cost @ 10% of Principal</td>
<td>$750,000</td>
</tr>
<tr>
<td>OBF Admin Costs (10 loans)</td>
<td>$20,000</td>
</tr>
<tr>
<td>Unused Funding Costs (4% of $2M)</td>
<td>$80,000</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$850,000</td>
</tr>
</tbody>
</table>

In this example, the Implementer reserved funding of $12 million for the year and used $10 million of the funding across 10 loans. The weighted average of the loans provided was 7 years (Note: loan costs will be assigned on an individual loan basis) and, therefore, the allocated cost is 7.5% of the principal. The administration cost is $20,000 for 10 loans. The unused funding cost of 4% is applied to the $2 million of unused funding for a total of $80,000. The total costs assigned are, therefore, $850,000.

In comparing the cost allocation methodologies, it should be noted in these comparable examples that the OBF costs are 8.5% of the overall principal using the reserved methodology, and 10.2% using the standard methodology.

6.5 Payment Calculations

6.5.1 Loan Calculations

**PG&E Requirement:** The OBF Loan is limited in size by the project’s estimated energy cost savings. The savings must be sufficient to repay the loan during the maximum allowable payment term to fully fund a project. The monthly OBF payment is calculated based on a project's estimated monthly energy savings.

The following is an example calculation:
Table 16 - Sample OBF Loan Calculation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Project Cost for Measures</td>
</tr>
<tr>
<td>2.</td>
<td>Rebates or Incentives</td>
</tr>
<tr>
<td>3.</td>
<td>Customer Total Loan Amount</td>
</tr>
<tr>
<td>4.</td>
<td>Customer Average Retail Rate (per kWh)</td>
</tr>
<tr>
<td>5.</td>
<td>Estimated Annual Energy Savings (kWh)</td>
</tr>
<tr>
<td>6.</td>
<td>Estimated Annual Energy Cost Savings ([d * e])</td>
</tr>
<tr>
<td>7.</td>
<td>Estimated Monthly Energy Cost Savings ([f / 12])</td>
</tr>
<tr>
<td>8.</td>
<td>Loan Term</td>
</tr>
<tr>
<td>9.</td>
<td>Monthly Loan Amount (rounded down to nearest full monthly payment)</td>
</tr>
</tbody>
</table>

The customer's loan terms in this example would be $176.47 per month for 51 months.

In the case where the energy cost savings are insufficient to support a loan within the maximum loan term a customer may buy-down the cost of the project (see Section 6.1.1.3). While projected bill neutrality for the project is a requirement for the loan, no guarantee of bill neutrality is provided to the customer and no amendments to the loan are made once the loan has been provided.

6.5.1.1 Determining Average Rates for DA and CCA Customers

**PG&E Requirement:** To estimate the monetary value of gas and electric savings for the purpose of the OBF payback calculation for Direct Access and Community Choice Aggregation customers, PG&E will use the customer's actual average past 12-month transportation cost ($/therm or $/kWh) plus the customer's actual 12-month weighted average cost of gas ($/therm) and electricity ($/kWh) from their commodity provider(s). If actual weighted average cost is unavailable, PG&E’s average past 12-month weighted average cost of gas ($/therm), and electricity ($/kWh) can be used as a proxy for the commodity cost.

6.5.1.2 Establishing Energy Savings for Loans Qualified through other Platforms

**PG&E Requirement:** For projects that use the Deemed, Custom or Meter-Based methodologies, PG&E will use the projected energy savings for the project using those procedures.

6.5.1.3 Establishing Energy Savings for all Other Projects

**PG&E Requirement:** Project energy savings calculations must be submitted for review by a third-party QA Provider for verification of completeness and accuracy (see QA section for more information). The QA Provider may request a review of the calculation methods, baseline assumptions, utility billing history, or calculation tools as needed. The development of energy savings calculations and cost estimates shall be in accordance with Section 4 of the ICP Targeted Commercial Protocol, with the following exceptions:

- The person performing savings calculations does not need a specific qualification or certification however the organization must be part of the ICP Project Developer network. An exception is made where the developer is using the OBF lighting template, where the organization are not required to be part of the ICP Project Developer network;
- Cost estimates for all projects must be based on actual project bids from the installing contractor, not estimates calculated by the Project Developer or others. Cost estimates must be broken out by individual energy efficiency measure and Project Developer must provide an itemized invoice.
6.6 Inspections and QA/QC

**PG&E Requirement:** Projects that establish eligibility for an OBF loan using the Deemed, Custom or Meter-Based Platform should refer to the QA requirements described in those sections. All other projects should follow the rules described in this section.

**Table 17 – Inspections and QA/QC Requirements**

<table>
<thead>
<tr>
<th>Platform</th>
<th>Project Eligibility Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deemed</td>
<td>Deemed Platform Section 7</td>
</tr>
<tr>
<td>Custom</td>
<td>Custom Platform Section 7</td>
</tr>
<tr>
<td>Meter-Based</td>
<td>Meter-Based Platform Section 7</td>
</tr>
<tr>
<td>Financing</td>
<td>Savings calculations and project eligibility must be reviewed and validated by an eligible QA provider prior to issuance of a Pre-installation loan agreement, and prior to the loan funds being disbursed.</td>
</tr>
</tbody>
</table>

6.6.1 QA Provider Eligibility

**PG&E Requirement:** To perform a QA review for OBF, the QA Provider must be part of the ICP QA network. A single firm or individual can be both a QA Provider and a Project Developer but cannot serve both functions for the same individual project.\(^{216}\)

6.6.2 Operational Performance Verification

**PG&E Requirement:** Every project should have a short Operational Performance Verification (OPV) plan that establishes the scope and performance criteria for verifying a given project, and for adjusting the energy savings estimates as necessary. The verification of the installation, and verification that it is installed and operates correctly, shall be in accordance with Section 5.0 of the ICP Targeted Commercial Protocol, with the following exceptions:

- A qualified OPV Authority does not need to be appointed;
- Qualifications for person performing OPV do not need to be provided;
- Statements by the Project Developer, that the project as designed and built “conforms with the intent and scope of the original project and has the ability to achieve predicted energy savings” does not need to be provided. This statement is inherent in the application to PG&E;
- Updated energy savings calculations, which reflect the installed condition of the project, must be provided. This energy savings calculation(s) provided at the time of the installation form the basis of the loan amount.

6.6.3 Operations and Maintenance (O&M)

**PG&E Requirement:** All projects require a brief O&M Plan which describes the planned scope of O&M activities, O&M services and training provided by the Project Developer, and training materials. O&M services may be included in the loan amount provided the project cost meets the program requirements. The operations and maintenance requirements shall be in accordance with Section 6.0 of the ICP Targeted Commercial Protocol, with the following exceptions:

- Annual follow-up monitoring or evaluation is required for all projects; and
- An O&M plan must be written and included in the project package.

6.6.4 Measurement and Verification Plan

**PG&E Requirements:** The Project Developer team must develop an IPMVP-compliant Measurement and Verification (M&V) plan that describes how the energy savings and performance will be monitored over time and reported to the customer. The M&V plan will be shared with the customer and will establish the expected outcomes for the project, including how to analyze and remedy variances between actual and expected energy performance. The measurement and verification requirements, including the requirements for the M&V Plan, shall be in accordance with Section 7.0 of the ICP Targeted Commercial Protocol, with the exception that justification for the IPMVP option(s) applied is not required.

6.7 Payment Processing

6.7.1 Post Installation

**PG&E Requirement:** The OBF loan is paid upon completion of the project. All rebates and incentives must be approved before the OBF Loan is paid. For those projects that do not receive a rebate a project must the post-installation QA review.

6.7.2 Loan Modification

**PG&E Requirement:** If the final scope of the project differs from the scope detailed in the original Loan Agreement, a Loan Modification Agreement (form that must be completed and signed by an authorized representative of the customer) may be required. For projects where the final loan amount changes by less than $100 and there is no change to the loan term, a loan modification may be requested, but will not be required.

6.7.3 OBF Check Disbursement

**PG&E Requirement:** Once the signed Loan Modification Agreement (if applicable) is received by PG&E, the loan will be created, and the loan check will be issued to the customer or the contractor in accordance with the loan agreement. The check will be mailed to the address specified on the loan agreement. The loan disbursement cannot be split into multiple checks. PG&E is not obligated to fund the loan after installation under one or more of the following conditions:

- The final loan does not meet minimum loan amount;
- Payback exceeds the program’s maximum limit;
- There is no original customer signature on the OBF Loan Modification Agreement (if a loan adjustment is necessary);
- PG&E determines that the customer no longer meets the credit requirements.

6.8 Other Ratepayer Supported Energy Efficiency Financing Programs

**PG&E Requirement:** The California Alternative Energy and Transportation Financing Authority administers the statewide energy efficiency financing pilots as ordered in D.13.09.044. The financing pilot programs are supported by PG&E ratepayer funds, and savings are attributed to the PG&E energy efficiency portfolio. The financing pilot programs use a combination of credit enhancements, and on-bill repayment to make low cost private financing available to customers implementing energy efficiency projects.

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Program Implementers may integrate these programs, and any other future ratepayer funded financing program, into programs in combination with incentives or as stand-alone offerings. The financing programs will cover the following sectors:

- Single Family Residential (currently available as the Residential Energy Efficiency Loan Assistance Program);\textsuperscript{218}
- Small Business;
- Commercial;
- Master Metered Multifamily.

\textsuperscript{218} http://www.treasurer.ca.gov/caeatfa/cheef/reel/index.asp.
Appendix A – Bibliography


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## Appendix B – Abbreviations

The following abbreviations are used throughout the document:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOE</td>
<td>Add-On Equipment Measure Application Type</td>
</tr>
<tr>
<td>AR</td>
<td>Accelerated Replacement Measure Application Type</td>
</tr>
<tr>
<td>ARC</td>
<td>Accelerated Replacement Cost</td>
</tr>
<tr>
<td>ASHRAE</td>
<td>American Society of Heating, Refrigerating and Air-Conditioning Engineers</td>
</tr>
<tr>
<td>BRO</td>
<td>Behavioral, Retro-commissioning, and Operational</td>
</tr>
<tr>
<td>BRO-Bhv</td>
<td>Behavioral Measure Application Type</td>
</tr>
<tr>
<td>BRO-RCx</td>
<td>Retrocomissioning Measure Application Type</td>
</tr>
<tr>
<td>BRO-Op</td>
<td>Operational Measure Application Type</td>
</tr>
<tr>
<td>BTU</td>
<td>British Thermal Unit</td>
</tr>
<tr>
<td>BW</td>
<td>Building Weatherization Measure Application Type</td>
</tr>
<tr>
<td>CAL TF</td>
<td>California Technical Forum</td>
</tr>
<tr>
<td>CCA</td>
<td>Community Choice Aggregators</td>
</tr>
<tr>
<td>CE</td>
<td>Capacity Expansion Measure Application Type</td>
</tr>
<tr>
<td>CEC</td>
<td>California Energy Commission</td>
</tr>
<tr>
<td>CFL</td>
<td>Compact Fluorescent Lightbulb</td>
</tr>
<tr>
<td>CIP</td>
<td>Central Inspection Team</td>
</tr>
<tr>
<td>CIT</td>
<td>Custom Implementation Team</td>
</tr>
<tr>
<td>CMPA</td>
<td>Custom Measure and Project Archive</td>
</tr>
<tr>
<td>COM</td>
<td>Commercial Building Type</td>
</tr>
<tr>
<td>CPR</td>
<td>Custom Project Review</td>
</tr>
<tr>
<td>CPUC</td>
<td>California Public Utilities Commission</td>
</tr>
<tr>
<td>CV(RMSE)</td>
<td>Coefficient of Variation of the Root Mean Squared Error</td>
</tr>
<tr>
<td>DA</td>
<td>Direct Access</td>
</tr>
<tr>
<td>DAC</td>
<td>Disadvantaged Community</td>
</tr>
<tr>
<td>DEER</td>
<td>Database for Energy Efficient Resources</td>
</tr>
<tr>
<td>DI</td>
<td>Direct Install</td>
</tr>
<tr>
<td>EAdb</td>
<td>Ex Ante Database</td>
</tr>
<tr>
<td>EAR</td>
<td>Ex Ante Review</td>
</tr>
<tr>
<td>EE</td>
<td>Energy Efficiency</td>
</tr>
<tr>
<td>EI</td>
<td>Energy Insight</td>
</tr>
<tr>
<td>EISA</td>
<td>Energy Independence and Security Act</td>
</tr>
<tr>
<td>EM&amp;V</td>
<td>Evaluation, Measurement, &amp; Verification</td>
</tr>
<tr>
<td>ER</td>
<td>Early Retirement</td>
</tr>
<tr>
<td>ERC</td>
<td>Early Retirement Cost</td>
</tr>
<tr>
<td>ESP</td>
<td>Energy Service Provider</td>
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<tr>
<td>ET</td>
<td>Emerging Technologies</td>
</tr>
<tr>
<td>EUL</td>
<td>Effective Useful Life</td>
</tr>
<tr>
<td>EM&amp;V</td>
<td>Evaluation, Measurement and Verification</td>
</tr>
<tr>
<td>FMC</td>
<td>Full Measure Cost</td>
</tr>
<tr>
<td>FR</td>
<td>Free Rider</td>
</tr>
<tr>
<td>GSIA</td>
<td>Gross Savings and Installation Adjustment</td>
</tr>
<tr>
<td>HTR</td>
<td>Hard-to-Reach</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Term</td>
</tr>
<tr>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>HVAC</td>
<td>Heating, Ventilation, and Air Conditioning</td>
</tr>
<tr>
<td>ICP</td>
<td>Investor Confidence Project</td>
</tr>
<tr>
<td>IMC</td>
<td>Incremental Measure Cost</td>
</tr>
<tr>
<td>IOU</td>
<td>Investor-Owned Utility</td>
</tr>
<tr>
<td>IP</td>
<td>Implementation Plan</td>
</tr>
<tr>
<td>IPMVP</td>
<td>International Performance Measurement and Verification Protocol</td>
</tr>
<tr>
<td>ISP</td>
<td>Industry Standard Practice</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>MAT</td>
<td>Measure Application Type</td>
</tr>
<tr>
<td>M&amp;V</td>
<td>Measurement and Verification</td>
</tr>
<tr>
<td>MWD</td>
<td>Metropolitan Water District</td>
</tr>
<tr>
<td>NC</td>
<td>New Construction Measure Application Type</td>
</tr>
<tr>
<td>NMBE</td>
<td>Normalized Mean Bias Error</td>
</tr>
<tr>
<td>NMEC</td>
<td>Normalized Metered Energy Consumption</td>
</tr>
<tr>
<td>NR</td>
<td>Normal Replacement</td>
</tr>
<tr>
<td>NTG or NTGR</td>
<td>Net-to-Gross Ratio</td>
</tr>
<tr>
<td>OBF</td>
<td>On-Bill Financing</td>
</tr>
<tr>
<td>OTR</td>
<td>“Other” Building Type</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
</tr>
<tr>
<td>PA</td>
<td>Program Administrator</td>
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<tr>
<td>PAC</td>
<td>Program Administrator Cost Test</td>
</tr>
<tr>
<td>PC</td>
<td>Project Cost</td>
</tr>
<tr>
<td>PEARdb</td>
<td>Preliminary Ex Ante Review database</td>
</tr>
<tr>
<td>POE</td>
<td>Preponderance of Evidence</td>
</tr>
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<td>POS</td>
<td>Point-of-Sale</td>
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<tr>
<td>PPP</td>
<td>Public Purpose Program</td>
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<tr>
<td>QA/QC</td>
<td>Quality Assurance/Quality Control</td>
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<tr>
<td>QED</td>
<td>Quasi-Experimental Design</td>
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<td>QPL</td>
<td>Qualified Product List</td>
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<tr>
<td>RCA</td>
<td>Refrigerant Charge Adjustment</td>
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<tr>
<td>RCT</td>
<td>Randomized Control Trial</td>
</tr>
<tr>
<td>RCx</td>
<td>Retro-commissioning</td>
</tr>
<tr>
<td>RE</td>
<td>Repair Eligible</td>
</tr>
<tr>
<td>READI</td>
<td>Remote Ex Ante Database Interface</td>
</tr>
<tr>
<td>REA</td>
<td>Retrofit Add-on</td>
</tr>
<tr>
<td>RI</td>
<td>Repair Indefinitely</td>
</tr>
<tr>
<td>ROB</td>
<td>Replace on Burnout</td>
</tr>
<tr>
<td>RUL</td>
<td>Remaining Useful Life</td>
</tr>
<tr>
<td>SBD</td>
<td>Savings by Design</td>
</tr>
<tr>
<td>TRC</td>
<td>Total Resource Cost</td>
</tr>
<tr>
<td>UES</td>
<td>Unit Energy Savings</td>
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<td>VRF</td>
<td>Variable Refrigerant Flow</td>
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<td>WEA</td>
<td>Weatherization</td>
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<td>WEN</td>
<td>Water-Energy Nexus</td>
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<td>Workpaper Project Archive</td>
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<tr>
<td>WRR</td>
<td>Wattage Reduction Ratio</td>
</tr>
</tbody>
</table>
Appendix C – Technology-Specific Guidance

The requirements provided in this appendix provide technology-specific requirements for workpaper development. This is not an exhaustive list of historical requirements, but rather a select subset of requirements currently in effect or with an effective date in the near future. This section will continue to be updated in future Rulebook revisions.

A.1 Lighting

A.1.1 Exterior Lighting

A.1.1.1 Baseline and EUL

CPUC Requirement: LEDs are considered standard practice for exterior lighting applications, therefore savings would only be assigned for the highest performing LED products. Implementers using Accelerated Replacement (AR) measures shall demonstrate the following:

3. Procedures for establishing preponderance of evidence of accelerated replacement
4. Development of updated NTG values above the existing conditions baseline to the standard practice baseline.
5. Standard practice baseline that represents the typical types of LED fixtures that would be installed absent the programs.
6. Measure definitions that represent the higher performing LED fixtures that exceed the performance of the standard practice baseline established per above description.219

A.1.1.2 Lighting Net-to-Gross (NTG)

CPUC Requirement: The Net-to-Gross Ratio for all LED Outdoor utilizing all measure application types, is 0.91.220

A.1.1.3 Operating Hours

CPUC Requirement: Operating hours must be taken from the most applicable and updated DEER data.221 Outdoor lighting measures have a maximum ex ante approved value of 4,100 hours per year.222 Use consistent hours of use reductions amongst lighting workpapers for fixtures that have motion sensors.223

Note: Parking garages are assumed to be 2767.5 hours of use. This Equivalent Full-Load Hours (EFLH) is the average of the full power and lower-power usage at 35% power (the mid-point in the 20% to 50% range allowed) per CPUC’s disposition “2017ExteriorLEDFixturesDisposition-1Mar2017-FINAL”.

220 California Public Utilities Commission, Energy Division, May 7, 2018, 2018 Outdoor Lighting Disposition for Workpaper PGECOLTG R8
223 Disposition for Workpapers Covering Exterior LED Lighting Fixtures.
A.1.2 Interior Lighting

A.1.2.1 Linear Lamps and Fixtures

A.1.2.1.1 Equivalent Lumens

**CPUC Requirement:** *Equivalent lumen instead of wattage bins.* Previously, lighting measures were defined or binned for a range of wattages (e.g. 5 to 8 watts, 9 to 12 watts). Now measures are binned according to equivalent lumens provided rather than on rated wattage (i.e. 4' linear between 4500 and 5400 lumens). The change to lumen bins is based on the premise that customers buy lighting replacements to meet service requirements (e.g. lumens) rather than the rated lamp watts. This change also allows measures to remain stable as efficacy continues to improve because the lumen requirement for a given application is likely to remain the same, but the wattage needed to achieve this lumen requirement will drop as efficacy increases. Lastly, as part of the re-binning, the sizes of the bins were reduced, improving the overall accuracy of calculations associated with each binned measure, while increasing the calculated savings.\(^{(224)}\)

A.1.2.1.2 Baseline Mix and Efficacy

Lighting measures will assume the mixed baseline noted in Table 20. For linear lamp measures not explicitly addressed in Table 8 or Table 9, a baseline mix of 50% TLED and 50% LED luminaires will be assumed. Tubular TLEDs are generally less expensive and efficient than either an LED retrofit kit (which includes light source, driver, and an optically designed insert for a troffer) or an LED fixture completely designed and optimized for LED technology. Since consumers select between TLEDs, retrofit kits, or a full LED fixture replacement when considering LED technology, TLEDs are included in the baselines of fixture and retrofit kit measures. Linear measures will assume the mixed baseline noted in Attachment A, section 1.1.1 of Resolution E-5009.\(^{(225)}\)

\(^{(224)}\) DEER Resolution E-5009, p. A-2

\(^{(225)}\) DEER Resolution E-5009, p. A-3
Table 18. Baseline Technology Mix\textsuperscript{226}

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>% TLED</th>
<th>% LED base</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED High/Low Bay, 4500 to &lt;5400 lumens</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>LED High/Low Bay, 5400 to &lt;6500 lumens</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>LED High/Low Bay, 6500 to &lt;7800 lumens</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>LED High/Low Bay, 7800 to &lt;9400 lumens</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>LED High/Low Bay, 9400 to &lt;11800 lumens</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>LED High/Low Bay, 11800 to &lt;14800 lumens</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>LED High/Low Bay, 14800 to &lt;18500 lumens</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>LED High/Low Bay, 18500 to &lt;23100 lumens</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>LED High/Low Bay, 23100 to &lt;30000 lumens</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>LED High/Low Bay, 30000 to &lt;39000 lumens</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>LED High/Low Bay, 39000 to &lt;50700 lumens</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>LED High/Low Bay, 50700 to &lt;65900 lumens</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 19. Baseline Technology Mix by Fixture Types\textsuperscript{227}

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>% TLED</th>
<th>% LED base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troffer</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>Ambient</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>Parking Garage</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Lighting fixture applications as shown in the table below are effective January 1, 2020 and expiring December 31, 2020. These fixtures shall incorporate the baseline assumptions for the technology measure mix noted in Table 8 and the lamp and fixture efficacies as shown in Table 10.

Table 20. Baseline Efficacy by Fixture Type\textsuperscript{228}

<table>
<thead>
<tr>
<th>Technology Type</th>
<th>CPUC-Approved Workpaper (LPW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Low Bay</td>
<td>105</td>
</tr>
<tr>
<td>Linear Ambient</td>
<td>105</td>
</tr>
<tr>
<td>Troffer</td>
<td>100</td>
</tr>
<tr>
<td>TLED</td>
<td>111</td>
</tr>
</tbody>
</table>

\textbf{A.1.2.2 Product Tiers and Incentives}

\textbf{CPUC Requirement:} Define product tiers in a way that assigns greater savings for higher performance measures and place an efficacy floor on eligible measures.\textsuperscript{229} For residential upstream lighting programs, the electric IOUs shall only offer incentives for LED bulbs to products that are in the top half of quality on the market and that meet the Voluntary California Quality LED Specification (CEC Spec).\textsuperscript{230}

\textsuperscript{226} CPUC Resolution E-5009, September 12, 2019, Tables A-1 and A-2 on pg. A-3.

\textsuperscript{227} CPUC Resolution E-5009, September 12, 2019, Tables A-1 and A-2 on pg. A-3.

\textsuperscript{228} CPUC Resolution E-5009, September 12, 2019, Table A-3 on pg. A-4.

\textsuperscript{229} California Public Utilities Commission, Energy Division, September 29, 2017, Disposition for Workpaper PGECOLTG178 Revision 3 (Covering High And Low Bay LED Fixtures).

\textsuperscript{230} D.12-11-015, OP30.
A.1.2.3 Operating Hours
Use DEER operating hours for lighting projects within DEER building types except for projects utilizing an IPMVP Option C or Option D analysis, provided that analysis accounts for interactive effects.\(^{231}\)

A.1.2.4 Baseline Selection
The baseline LED efficacy shall be representative of the typical performance of non-qualifying fixtures that provide the same level of service as the measure fixture.\(^{232}\) The second baseline for the AR MAT for interior lighting shall be LEDs.\(^{233}\)

**CPUC Requirement:** The standard practice baseline for all interior hard-wired LED ceiling fixture, grid/troffer fixtures, and retrofit kits shall be 100% LED and a minimum efficacy of 100 lumens per watt. This also applies to the NR baseline and second baseline for AR for linear LED replacement lamps.\(^{234}\)

**CPUC Requirement:** The standard practice baseline for interior high-bay and interior low-bay lighting applications must be based on a significant fraction of LED technology. Approved baseline percentage mixes are available in DEER. Effective January 1, 2020, the standard practice baseline must be 100% LED.\(^{235}\)

A.1.2.5 Lighting Net-to-Gross (NTG)
**CPUC Requirement:** The Net-to-Gross Ratio for all LED Indoor Lighting utilizing all measure application types, is 0.91.

A.1.2.6 LED Ambient Fixtures

A.1.2.6.1 EUL For LED Ambient Fixtures
**CPUC Requirement:** Use an EUL of 50,000 basis hours with a 16-year maximum life for both residential and nonresidential building types for LED ambient fixtures and retrofit kits.\(^{236}\)

Note: Additional information on rated hours/maximum life (years) for various lighting technology types can be found in 2013-2014 Lighting Retrofit Disposition spreadsheet.\(^{237}\) Additional information on normalized hours of use for various applications can be found in the 2015 Lighting Retrofit Guidance memo.\(^{238}\) Note however that subsequent guidance has directed that dusk-to-lawn lighting operating hours are capped at 4100 hours.\(^{239}\)

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\(^{232}\) *D.12-11-015, OP30.\(^{233}\) Resolution E-4952, p. 44

\(^{234}\) Resolution E-4952, p. 44

\(^{235}\) Resolution E-4952

\(^{236}\) California Public Utilities Commission, Energy Division, August 23, 2015, *Disposition for Workpaper PGECOLTG179 (LED Ambient Commercial Fixtures and Retrofit Kits).*

\(^{237}\) 2013-2014 Lighting Retrofit Disposition-14December2013.xls


\(^{239}\) SCE/PG&E to track down specific reference (update in DEER?)
**CPUC Requirement:** DEER lighting code baselines should reflect the most recent Title 24 lighting power density requirements as well as changes in standard practice at the earliest opportunity.240

**A.1.2.7 LED Specialty Screw-In General Service Lamps, Small Diameter Directional Lamps, and Reflectors**

**CPUC Requirement:** Federal Standards scheduled to take effect in 2020 will recategorize reflector, globe and candelabra screw-in lamps as General Service Lighting lamps, making them subject to the minimum 45 lumen per watt (lm/W) requirements. The outcome of the new standard will be to move these lamp types to a 100% LED baseline and, as a result, the existing screw-in lamp and screw-in fixture measures expired December 31, 2019. A-lamps were previously eliminated from PA programs in 2018 for the same reason. A few niche-lighting exceptions to the 100% LED baseline may remain, such as low lumen and marine application lamps. There may also be an opportunity to implement measures for LED lamps or fixtures that are higher efficiency than the baseline efficacy. But large volume screw-in lamp replacements can no longer be offered as a normal replacement beginning January 1, 2020.241 On July 1, 2018, the approved wattage reduction ratio (WRR) values will change for savings calculations for LED Specialty Lamps and Reflectors using a baseline of incandescent lamps. The current and future WRRs are listed in the table below.

Table 21 –Wattage Reduction Ratio Values for LED Specialty Lamps and Reflectors

| Lamp Type | Watts  | Wattage Reduction Ratio
text
|-----------|--------|----------------------------------
| MR16      | All    | Not Eligible                    |
| PAR20     | All    | 3.21                            |
| PAR30     | All    | 2.34                            |
| PAR38     | All    | 2.60                            |
| R/BR      | < 11W  | 4.17                            |
|           | ≥ 11W, <14W | 3.28                      |
|           | ≥ 14W  | 2.97                            |

240 Disposition for Workpaper PGECOLTG179 (LED Ambient Commercial Fixtures and Retrofit Kits).
| Candelabra | All | 4.61 |
| Globe      | < 3W | 4.68 |
|            | ≥ 3W | 3.10 |
| Can Retrofit | All | 2.34 |

After July 1, 2018, MR16 and other screw-in small diameter directional lamps with diameters of 2.25 inches or less are not eligible for program offerings.\(^{243}\)

The approved baseline for globe and candelabra lamp shapes will be 5% CFL, 35% LED, and 60% incandescent. The approved based for reflectors (except small diameter directional lamps) will be revised to 10% CFL, 40% LED, and 50% incandescent.

Effective January 1, 2019, programs shall adopt minimum efficacy requirements as specified in the table below:\(^{244}\)

<table>
<thead>
<tr>
<th>CRI</th>
<th>Efficacy (LPW) (beginning January 1, 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>124.4</td>
</tr>
<tr>
<td>83</td>
<td>122.1</td>
</tr>
<tr>
<td>84</td>
<td>119.8</td>
</tr>
<tr>
<td>85</td>
<td>117.5</td>
</tr>
<tr>
<td>86</td>
<td>115.2</td>
</tr>
<tr>
<td>87</td>
<td>112.9</td>
</tr>
<tr>
<td>88</td>
<td>110.6</td>
</tr>
<tr>
<td>89</td>
<td>108.3</td>
</tr>
<tr>
<td>90</td>
<td>106.0</td>
</tr>
<tr>
<td>91</td>
<td>103.7</td>
</tr>
<tr>
<td>92</td>
<td>101.4</td>
</tr>
<tr>
<td>93</td>
<td>99.1</td>
</tr>
<tr>
<td>94</td>
<td>96.8</td>
</tr>
<tr>
<td>95-100</td>
<td>95.0</td>
</tr>
</tbody>
</table>

In addition, eligible measures must have a compliance score of 297 (= 2.3 x color rendering index + Efficacy).\(^{245}\)

**A.1.2.8 Residential LED Operating Hours and EULs**

**CPUC Requirement:** For residential building types, the maximum allowed EUL is 16 years and for commercial building types, the maximum allowed EUL is 12 years. Although the minimum lamp life required for Energy Star products is 25,000 hours and most products claim a lamp life...

\(^{243}\) Disposition for Workpaper (2018 Screw-in LED Savings Methods).

\(^{244}\) Disposition for Workpaper (2018 Screw-in LED Savings Methods).

\(^{245}\) Revisions to Disposition for Comprehensive Workpaper (Screw-In Lamps).

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of 25000-35000 hours, the Energy Division recommends using a maximum lamp life of 20,000 hours. Since the effective useful life (EUL) is dependent on the hours of operation, the EUL varies by building type.

The EUL is calculated using the following equation:

\[ \text{EUL} = \frac{\text{Rated Life of Lamp (max 20,000 hours)}}{\text{Average Operating Hours for Building Type}}. \]

The table below summarizes the ex ante annual operating hours and corresponding EUL values for common DEER building types.\(^{246}\)

\(^{246}\) California Public Utilities Commission, Energy Division, May 14, 2012, *Disposition for Workpaper (Integral LED Lamp Replacements)*.
Table 23 – LED Operating Hours and EULs by Building Type

<table>
<thead>
<tr>
<th>Lamp Description</th>
<th>Wattage</th>
<th>Hours</th>
<th>Single Family</th>
<th>*Small Office</th>
<th>*Motel</th>
<th>*Small Retail</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candelabra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Globe</td>
<td>All</td>
<td>15,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/BR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For commercial building types, the maximum allowed EUL is 12 years. Refer to current DEER READI Tool for the complete list of building operating hours and EULs by building types.

A.1.2.9 LED A-Lamp Baseline

**CPUC Requirement:** Effective July 1, 2018, the Standard Practice baseline for A-lamps and spiral CFLs shall be as follows[^247]:

- For ≤ 90 LPW: 25% CFL, 75% LED; and
- For > 90 LPW: 55% CFL, 20% LED, 25% halogen.

A.1.2.10 LED A-Lamp EUL

**CPUC Requirement:** Effective January 1, 2019, the LED screw-in A-lamp EUL is reduced from 20,000 hours to 10,000 hours.[^248]

The CPUC does not expect that LED A-lamps would remain in the energy efficiency portfolio after 2018. However, if they remain, these new EUL values shall be effective January 1, 2019.

A.1.2.11 Efficacy Requirements

**CPUC Requirement:** In accordance with the Energy Independence and Security Act (EISA), the following minimum efficacy requirements must be followed for 2019:[^249]

Table 24 – Minimum Efficacy Requirements by EISA Wattage Beginning in 2019

<table>
<thead>
<tr>
<th>EISA Wattage</th>
<th>Minimum Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>40W</td>
<td>95</td>
</tr>
<tr>
<td>60W</td>
<td>100</td>
</tr>
<tr>
<td>75W and 100W</td>
<td>110</td>
</tr>
</tbody>
</table>

[^248]: Resolution E-4952, page A-39
[^249]: Revisions to Disposition for Comprehensive Workpaper (Screw-In Lamps); Disposition for Workpaper (2018 Screw-in LED Savings Methods).
As of January 1, 2018, Title 20 requires all general service lamps manufactured for sale in California to have a minimum efficacy of 45 lumens/watt. This will eventually eliminate the availability of filament based, incandescent general service lamps as inventories of these lamps manufactured prior to this date are gradually sold out of existing inventories. The change in Title 20 necessitates revision to the standard practice baseline for energy efficient lamps measures so that the baseline considers the likely choices for lamp purchases. Commission Staff directs Program Administrators to consider this in updates to LED A-lamp workpapers.\(^\text{250}\)

### A.1.2.12 Non-DEER Operating Hours

**CPUC Requirement:** For lighting projects in non-DEER buildings, Implementers must employ data-loggers to track fixture operating hours in all space types within that building following the methods described in CPUC guidance or the schedules for the lighting circuits controlled automatically through an existing building energy management system may be used.\(^\text{251}\)

### A.1.2.13 Product Tracking

**CPUC Requirement:** Wattage and rated lumen output of all program lamps must be tracked and submitted to PG&E on quarterly.\(^\text{252}\)

### A.1.2.14 Non-DEER Operating Hours

**CPUC Requirement:** For lighting projects in non-DEER buildings, Implementers must employ data-loggers to track fixture operating hours in all space types within that building following the methods described in CPUC guidance or the schedules for the lighting circuits controlled automatically through an existing building energy management system may be used.\(^\text{253}\)

### A.2 HVAC

#### A.2.1 General

**CPUC Requirement:** For proposed HVAC measures utilizing performance maps, the full range of “enhanced” equipment offerings in the market must be cataloged, performance maps developed, and energy savings estimated for each in order to select a typical expected performance for a given set of equipment characteristics. If using performance maps different from those in DEER, either use DEER assumptions or show intermediate calculations in which cycling loss is incorporated into curves.\(^\text{254}\)

#### A.2.2 Net-to-Gross Values

**CPUC Requirement:** The NTG values for HVAC measures below are:\(^\text{255}\)

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\(^\text{250}\) Disposition for Workpaper (2018 Screw-in LED Savings Methods).


\(^\text{252}\) Disposition for Workpaper (2018 Screw-in LED Savings Methods).


\(^\text{254}\) Disposition for Workpaper PGECOHVC174 (Multiple Speed Unitary Air-Cooled Commercial Air Conditioners and Heat Pumps ≥65 Bth/h)

\(^\text{255}\) Resolution E-4952, page A-36
Table 25 – NTG Values for HVAC Measures

<table>
<thead>
<tr>
<th>HVAC Equipment Type</th>
<th>2019 NTG</th>
<th>2020 NTG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Upstream Packaged Units</td>
<td>0.75</td>
<td>0.60</td>
</tr>
<tr>
<td>Commercial Quality Maintenance</td>
<td>0.73 / 0.60</td>
<td>0.45</td>
</tr>
<tr>
<td>Residential Quality Maintenance</td>
<td>0.78 / 0.55</td>
<td>0.55</td>
</tr>
</tbody>
</table>

A.2.3 Heat Pump and Heat Recovery Variable Refrigerant Flow Systems

**CPUC Requirement:** For the following list of building types, Tier 1 and 2 Heat Pump and Heat Recovery Variable Refrigerant Flow (VRF) systems must use the comparable Title 24 VRF system as a baseline.

- Assembly
- Education – Community College
- Education – Secondary School
- Education – University
- Health/Medical – Nursing Home
- Hotel
- Large Office
- Lodging – Motel
- Manufacturing Light Industrial
- Primary Schools
- Small Office

Tier 1 efficiency must be at least 15% higher than Code energy efficiency rating and the replacement system must have a rated efficiency at least as high as the Tier 1 energy efficiency rating to qualify as a VRF measure.\(^\text{256}\)

VRF fuel-switching measures are not currently allowed. They may be allowed in the future when it can be shown that the choice to adopt VRF systems is primarily influenced by Programs. VRF fuel-switching measures must also satisfy the CPUC “three-prong” test requirements.\(^\text{257}\)

A.2.4 Variable Refrigerant Flow Measures in Custom Retrofit Projects

**CPUC Requirement:** VRF measures for existing building projects are on hold pending approved calculation methodology for customized retrofit projects. VRF systems in SBD may be included only for the purposes of setting the incentive rate in the compliance run but must be modeled as neutral for the whole building savings claim.

Note: VRF measures are available through mid/up-stream offerings for some building types.

A.2.5 High Emissivity Coatings on Furnace Refractory Measures


**CPUC Requirement:** “CPUC Staff requires a hold be placed on any applications with this measure until further review can be performed. The IOU must not execute any incentive agreements for projects with this measure until instructed by CPUC staff.”

**A.2.6 Residential Duct Sealing**

**CPUC Requirement:** A duct sealing measure is not eligible if it is part of an HVAC unit installation or replacement. Duct sealing implemented as part a new system installation is only eligible if it is part of the installation of an above code HVAC system installation.

**A.2.7 Non-Residential HVAC Rooftop Quality Maintenance**

**CPUC Requirement:** Condenser coil cleaning, evaporator cleaning, and air flow adjustment are related to refrigerant charge adjustment (RCA) savings and the unit energy savings (UES) are to be calculated as prescribed below:

- Condenser Coil Cleaning UES Values = DEER RCA UES values * 0.125;
- Evaporator Coil Cleaning UES Values = DEER RCA UES values * 0.0625; and
- Air Flow Adjustment UES Values = DEER RCA UES values * 0.0625.

Economizer decommissioning is not an accepted measure.

**A.2.8 HVAC Cooling Efficiency Measures**

**CPUC Requirement:** For all HVAC (or other) measures’ equipment sizes, in order to use the (customer average) pre-existing savings values in DEER (which indicates an accelerated replacement measure type is being assigned to a claim), program claims will be required to provide rated efficiency values for the systems that are replaced. Evidence of the pre-existing equipment rated capacity must be retained in the project files (such as a picture of the equipment and its nameplate showing the model number and rating information). This information is required to support the claim, support evaluation verification of the claim and to provide data for future refinement of pre-existing baseline values.

**A.2.9 Boilers and Water Heaters**

Compliance with the methodology outlined in the 2018 Residential Water Heater Disposition is required for water heater measures (deemed and custom) that are covered by a UEF (uniform energy factor) rating and the following measure technologies:

- Gas and conventional electric storage water heaters with 30-, 40-, and 50-gallon capacities; and
- Small gas instantaneous water heaters.

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259 California Public Utilities Commission, Energy Division, March 9, 2015, *Disposition for Workpaper PGE3PHVC159 Revision 2 (Duct Test & Seal: Residential)*.


261 *Disposition for Workpaper (Non-Residential HVAC Rooftop Quality Maintenance)*.

262 Resolution E-4867, p. 23.

A.2.10 On Demand Pump Controller for Domestic Hot Water Systems

**CPUC Requirement:** Savings values should be categorized based on the size of building served, “per dwelling unit” served by the domestic hot water system: “Low-Rise” (up to three stories) or “High-Rise” (from three stories and up).\(^{264}\)

A.2.11 Chillers

**CPUC Requirement:** All chiller measures, including custom projects and non-DEER deemed measures supported by workpapers, must have efficiency levels of at least ten percent better than Title 24 minimum efficiency requirements.\(^{265}\)

A.2.11.1 Chiller Efficiency Degradation

**CPUC Requirement:** In the savings analysis, account for the degradation in chiller efficiency at higher condensing temperatures in order to make the DEER peak kW calculation accurate. This requirement is not applicable to Savings By Design or other new load projects.

A.2.11.2 Lead Chillers

**CPUC Requirement:** Lead chiller measures may only be utilized in custom programs and shall not be used in deemed downstream, upstream incentive or direct install programs. Custom programs for lead chiller measures shall include pre- and post-installation measurement and verifications that support the measure chiller is installed and operating as the lead chiller.\(^{266}\)

A.2.12 Smart Thermostats

A.3 Plug Loads

A.3.1 Television EUL and Load Shape

**CPUC Requirement:** When estimating EUL for televisions, take into account that: annual television usage may decrease with television age, and older televisions may eventually get displaced to locations where they see little usage.\(^{267}\)

**CPUC Requirement:** In the absence of a more similar DEER load shape, television measures should use the interior CFLs load shape in cost effectiveness calculations.\(^{268}\)

A.3.2 Power Strips

**CPUC Requirement:** The effective useful life of a power strip measure must be reduced by the fraction of customers who are expected to de-install the measure before its end of life.\(^{269}\)

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\(^{265}\) Resolution E-4952, p. 36

\(^{266}\) Resolution E-4952, p. 37

\(^{267}\) Disposition for Workpaper PGECOAPP104 Revision 4 (Energy Efficient Televisions).

\(^{268}\) Disposition for Workpaper PGECOAPP104 Revision 4 and Revision 5 (Energy Efficient Televisions).

\(^{269}\) Disposition for Workpaper PGECOAPP111 Revision 0 (Tier 2 Advanced Power Strips); California Public Utilities Commission, Energy Division, August 25, 2015, *Disposition for Workpaper WPSDGEREHE0004 Revision 0.3 (Tier 2 Advanced Power Strips)*.
**CPUC Requirement**: The Tier 2 Connected APS workpaper is not approved for use for "control outlet" devices unless supported by a field study.\(^{270}\)

### A.4 Other

#### A.4.1 Pump Overhauls

**CPUC Requirement**: Pump overhauls fall into the Behavioral, Retro-commissioning, and Operational (BRO) measure type. The Implementer must assess the customer's standard practice in identifying and overhauling pumps, and only offer ratepayer incentives to accelerate the normal practice. The baseline for each project must be the customer's normal practice for refurbishment. Second baseline savings impacts are zero unless the Implementer can demonstrate that the refurbished pump efficiency exceeds the OEM pump efficiency. The incremental cost used in the ARC cost calculation must be set to zero unless the Implementer can demonstrate that the program causes additional refurbishment measures which increase efficiency to be installed that would not be installed as standard practice.\(^{271}\)

Like-for-like pump assembly replacements are not eligible and are not considered pump overhauls. Pump right-sizing projects implemented to address increased or decreased demand or changes in system conditions, such as higher head requirements, do not qualify as BRO measures.

#### A.4.2 Plastic Recycling Machines

**CPUC Requirement**: “For future projects: Determine both the New Construction and retrofit market industry standard practice for plastics recycling machines, since it appears that available equipment choices are limited. Any remaining projects in the pipeline, (either NC or retrofit), shall be placed on hold until the IOUs complete an ISP study to assess and determine proper NC baseline.”\(^{272}\)

---

\(^{270}\) *Disposition for Workpaper SCE17CS014 Revision 1 (Tier 2 Advanced Power Strips)*

\(^{271}\) California Public Utilities Commission, Energy Division, Ex Ante Review Disposition, *PGE-16-T-I-0046_2K1600059214+ Multiple Pump Repair Second EAR 2017-08-18*

Appendix D – Statewide Workpaper Template

Workpaper SW13XX###
Revision #

Program Administrator

Workpaper Title

Read and delete/replace all notes in red.
At-a-Glance Summary

<table>
<thead>
<tr>
<th>Measure Codes</th>
<th>List all solution/measure codes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Description</td>
<td>Describe the measure.</td>
</tr>
<tr>
<td>Base Case Description</td>
<td>Describe the base case technology that will be replaced with the energy efficient technology. State whether this is the customer’s existing equipment or code/standard equipment.</td>
</tr>
<tr>
<td>Units</td>
<td>E.g. per lamp, per ton</td>
</tr>
<tr>
<td>Energy Savings</td>
<td>Provide average values, or leave the following text intact: Refer to Excel Calculation Attachment</td>
</tr>
<tr>
<td>Full Measure Cost ($/unit)</td>
<td>Provide average values, or leave the following text intact: Refer to Excel Calculation Attachment</td>
</tr>
<tr>
<td>Incremental Measure Cost ($/unit)</td>
<td>Provide average values, or leave the following text intact: Refer to Excel Calculation Attachment</td>
</tr>
<tr>
<td>Effective Useful Life</td>
<td>List all EULs and sources. E.g. 15 years (DEER EUL ID: HVAC-airAC)</td>
</tr>
<tr>
<td>Measure Installation Type</td>
<td>New Construction (NEW/NC), Replace on Burnout (ROB), Retrofit or Early Retirement (RET/ER), Retrofit First Baseline Only (REF), Retrofit Add-on (REA)</td>
</tr>
<tr>
<td>Net-to-Gross Ratio</td>
<td>List all NTG ratios and sources. E.g. 0.6 (DEER NTGR ID: Com-Default&gt;2yrs)</td>
</tr>
<tr>
<td>Important Comments</td>
<td>This work paper has a complementary Ex Ante Database data set that will be provided in a separate submission to the California Public Utilities Commission (CPUC).</td>
</tr>
</tbody>
</table>
Revision History

<table>
<thead>
<tr>
<th>Rev</th>
<th>Date</th>
<th>Author</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6/1/15</td>
<td>Author (PA)</td>
<td>Note all significant changes, including but not limited to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Measure offerings and requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Calculation methodology and savings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Delivery mechanisms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• DEER values: NTG, IR, Technology Fields, EUL, load shapes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Hours of operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Adjustments in response to CPUC Commission Staff (CS) and California Technical Forum (Cal TF) comments. Refer to table below.</td>
</tr>
</tbody>
</table>

Commission Staff and California Technical Forum Comments

<table>
<thead>
<tr>
<th>Rev</th>
<th>Party</th>
<th>Submittal Date</th>
<th>Comment Date</th>
<th>Comments</th>
<th>WP Developer Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CS</td>
<td>6/2/15</td>
<td>6/15/15</td>
<td>Comment 1, Comment 2</td>
<td>Response 1, Response 2</td>
</tr>
<tr>
<td>0</td>
<td>Cal TF</td>
<td>6/2/15</td>
<td>6/15/15</td>
<td>Comment 1, Comment 2</td>
<td>Response 1, Response 2</td>
</tr>
</tbody>
</table>


The Cal TF approved the version X of this workpaper found under the “Approved Measures” section of the website, [http://www.caltf.org/approved-measures/](http://www.caltf.org/approved-measures/)
Section 1. General Measure & Baseline Data

1.1 Measure Description & Background

Complete the following table of measure descriptions. If there are a large number of measures, give a general description instead of detailing each one. Indicate “N/A” for fields that do not apply. You may include content from the program catalog/directory. Industry standard practice refers to an efficiency level or other condition that is common practice but not specified by a code or standard.

Base, Standard, and Measure Cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Description of Typical Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>e.g. Interior Fixture T5 Linear Fluorescent</td>
</tr>
<tr>
<td>Existing Condition</td>
<td>e.g. Metal Halide Fixture</td>
</tr>
<tr>
<td>Code/Standard</td>
<td>e.g. Pulse Start Metal Halide Fixture</td>
</tr>
<tr>
<td>Industry Standard Practice</td>
<td>e.g. Pulse Start Metal Halide Fixture</td>
</tr>
</tbody>
</table>

Complete the following table of measures and codes:

<table>
<thead>
<tr>
<th>Measure Codes</th>
<th>Measure Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCG</td>
<td>LT-12345 E.g. Up to 128 Watt Interior Fixture T5 Linear Fluorescent replacing 101 - 175 Watt Lamp Base Case</td>
</tr>
<tr>
<td>SDG&amp;E</td>
<td>LD123</td>
</tr>
<tr>
<td>SCE</td>
<td></td>
</tr>
<tr>
<td>PG&amp;E</td>
<td></td>
</tr>
</tbody>
</table>

Describe requirements for these measures, including:

- **Eligibility requirements**: Any specific baseline requirements or restrictions that limit measure savings or ability to be reported.
- **Implementation and installation requirements**: Eligibility of certain building types and conditions, climate zones, area types, vintages, etc.
- Other program restrictions and guidelines

1.2 Technical Description

Provide a detailed technical description of the measure. The workpaper should be focused on a single technology; if not, consider creating multiple work papers. Provide justification if this measure is considered an Emerging Technology (ET) and ET values are used in Section 1.4.

1.3 Installation Types and Delivery Mechanisms

Indicate the **Installation Type** and **Delivery Mechanism** of the measures and explain why these were selected. See the tables below for more information. Describe the programs that will be using these measures.
### Installation Type Descriptions

<table>
<thead>
<tr>
<th>Installation Type</th>
<th>Savings</th>
<th>Life 1st Baseline (BL)</th>
<th>Life 2nd BL</th>
<th>Life 1st BL</th>
<th>Life 2nd BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace on Burnout (ROB)</td>
<td>Above Code or Standard</td>
<td>N/A</td>
<td>EUL</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>New Construction (NEW/NC)</td>
<td>Above Code or Standard</td>
<td>N/A</td>
<td>EUL</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Retrofit or Early Replacement (RET/ER)</td>
<td>Above Customer Existing</td>
<td>Above Code or Standard</td>
<td>RUL</td>
<td>EUL-RUL</td>
<td></td>
</tr>
<tr>
<td>Retrofit First Baseline Only (REF)</td>
<td>Above Customer Existing</td>
<td>N/A</td>
<td>EUL</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Retrofit Add-on (REA)</td>
<td>Above Customer Existing</td>
<td>N/A</td>
<td>EUL</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

A delivery mechanism is a delivery method paired with an incentive method. Delivery mechanisms are used by programs to obtain program participation and energy savings.

### Delivery Method Descriptions

<table>
<thead>
<tr>
<th>Delivery Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance Turn-in and Recycling</td>
<td>The program motivates customers, through financial incentives, to recycle appliances that are functional but inefficient. This prevents the continued use of those appliances, by both the current owner and potential future owners.</td>
</tr>
<tr>
<td>Audit/Information/Testing Services</td>
<td>The program performs a free assessment of a customer’s facility and provides the customer with information and guidance on energy efficiency opportunities.</td>
</tr>
<tr>
<td>Commissioning and Retro-commissioning</td>
<td>The program modifies or repairs existing equipment to ensure that it works as intended.</td>
</tr>
<tr>
<td>Financial Support</td>
<td>The program motivates customers, through financial incentives such as rebates or low interest loans, to implement energy efficient measures or projects.</td>
</tr>
<tr>
<td>Innovative Design</td>
<td>The program funds new ideas that meet reasonable scientific scrutiny for potential energy savings. These innovative measures typically have small market penetration (less than 5%) or are targeted toward relatively unreached market segments.</td>
</tr>
<tr>
<td>New Construction</td>
<td>The program offers financial incentives and/or design assistance to customers involved with new building construction. This is intended to motivate customer to exceed Title 24 building energy efficiency requirements (residential or nonresidential).</td>
</tr>
<tr>
<td>Partnership</td>
<td>The program implements projects through a partnership between the utility and an institutional, government, or community-based organization.</td>
</tr>
<tr>
<td>Performance Based</td>
<td>The program offers financial incentives that vary based on the energy efficiency performance of specific projects.</td>
</tr>
<tr>
<td>Up-Stream Programs</td>
<td>See Up-Stream Incentive and Up-Stream Buy Down in the Incentive Method table.</td>
</tr>
</tbody>
</table>
### Incentive Method Descriptions

<table>
<thead>
<tr>
<th>Incentive Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Install</td>
<td>The program implements energy efficiency measures for qualifying customers, at no cost to the customer.</td>
</tr>
<tr>
<td>Down-Stream Incentive</td>
<td>The customer installs qualifying energy efficient equipment and submits an incentive application to the utility program. Upon application approval, the utility program pays an incentive to the customer. Such an incentive may be deemed or customized.</td>
</tr>
<tr>
<td>Mid-Stream Incentive</td>
<td>The program gives a financial incentive to a midstream market actor, such as a retailer or contractor, to encourage the promotion of efficient measures. The incentive may or may not be passed on to the end-use customer.</td>
</tr>
<tr>
<td>Up-Stream Incentive</td>
<td>The program gives a financial incentive to an upstream market actor, such as a manufacturer or distributor, to encourage the manufacture, provision, or distribution of an efficient measure. The incentive may or may not be passed on to the end-use customer.</td>
</tr>
<tr>
<td>Up-Stream Buy Down</td>
<td>The program gives a financial incentive to an upstream market actor, such as a manufacturer or distributor, with specific requirements to pass down the incentive to the end use customer. Such an incentive buys-down the cost of an efficient measure for the end-use customer by at least the amount of the financial incentive.</td>
</tr>
<tr>
<td>Giveaway</td>
<td>The program provides customers with energy efficiency equipment or services for free.</td>
</tr>
<tr>
<td>Exchange/Replacement</td>
<td>The utility program holds events where customers can trade functional equipment for similar but more energy efficient equipment, free of charge.</td>
</tr>
<tr>
<td>On-Bill Finance/Loan</td>
<td>The program offers financing for the cost an efficient measure as part of the utility bill. This can be an add-on option to an existing program or can serve as an organizing principle for its own program.</td>
</tr>
</tbody>
</table>

### 1.4 Measure Parameters

#### 1.4.1 DEER Data

If any of the measures in this work paper are not directly from the Database of Energy Efficient Resources (DEER), explain why DEER measures were not used and how the work paper methodology differs from DEER methodology. Complete the summary table below.
DEER Difference Summary

<table>
<thead>
<tr>
<th>DEER Item</th>
<th>Used for Workpaper?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified DEER methodology</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Scaled DEER measure</td>
<td>Yes or No</td>
</tr>
<tr>
<td>DEER Base Case</td>
<td>Yes or No</td>
</tr>
<tr>
<td>DEER Measure Case</td>
<td>Yes or No</td>
</tr>
<tr>
<td>DEER Building Types</td>
<td>Yes or No</td>
</tr>
<tr>
<td>DEER Operating Hours</td>
<td>Yes or No</td>
</tr>
<tr>
<td>DEER eQUEST Prototypes</td>
<td>Yes or No</td>
</tr>
<tr>
<td>DEER Version</td>
<td>DEER 2015, READI v2.2.0</td>
</tr>
<tr>
<td>Reason for Deviation from DEER</td>
<td>E.g. DEER assumes different operating hours; DEER does not contain this type of measure.</td>
</tr>
<tr>
<td>DEER Measure IDs Used</td>
<td>E.g. R-Out-CFLscw-Ext(100)-dWP184, R-Out-CFLscw-Ext(150)-dWP276</td>
</tr>
</tbody>
</table>

Net-to-Gross Ratio

The Net-to-Gross (NTG) Ratio is used to estimate and describe free-ridership. Choose the appropriate NTG values from READI. Provide justification for hard-to-reach (HTR) and ET values, and describe how they relate to studies or program terms and conditions.

The NTG values were obtained using the DEER READI tool. The relevant NTG values for the measures in this work paper are in the table below.

<table>
<thead>
<tr>
<th>NTGR ID</th>
<th>Description</th>
<th>Sector</th>
<th>BldgType</th>
<th>Measure Delivery</th>
<th>NTGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res-Default&gt;2 yrs</td>
<td>All other EEM with no evaluated NTGR; existing EEM with same delivery mechanism for more than 2 years</td>
<td>Res</td>
<td>Any</td>
<td>Any</td>
<td>0.55</td>
</tr>
<tr>
<td>Com-Default&gt;2 yrs</td>
<td>All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years</td>
<td>Com</td>
<td>Any</td>
<td>Any</td>
<td>0.6</td>
</tr>
</tbody>
</table>

If applicable, keep this note: Note: Direct install measures that are not hard-to-reach will use the default NTG value.

Spillage Rate

Spillage rates are not tracked in workpapers; they are tracked in an external document which will be supplied to the Commission Staff.

Installation Rate

The Installation Rate (IR) addresses the percentage of units that are claimed but not installed. Choose the appropriate IR values from READI. Most measure will use a default IR of 1. If there is a GSIA ID ending in “-All,” use it instead of an IOU-specific GSIA ID.
The IR values were obtained using the DEER READI tool. The relevant IR values for the measures in this work paper are in the table below.

<table>
<thead>
<tr>
<th>GSIA ID</th>
<th>Description</th>
<th>Sector</th>
<th>BldgType</th>
<th>ProgDelivID</th>
<th>GSIAValue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Def-GSIA</td>
<td>Default GSIA values</td>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>1</td>
</tr>
</tbody>
</table>

Effective and Remaining Useful Life
The EUL is an estimate of the median number of years that an installed measure will remain in place and is operational. When determining the EUL, consider non-technical factors such as long-term persistence. For example, a 20% removal rate of products after year 1 but before the end of the products’ technical life will result in a reduced EUL. Specify the source of the EUL information (DEER, study, engineering judgment, etc.). If the EUL is calculated based on operating hours (usually only for lighting), show the calculation equation. If fields are not applicable, indicate “N/A.”

The EUL and RUL values were obtained using the DEER READI tool. DEER defines the RUL as 1/3 of the EUL value. The RUL value is only applicable to the first baseline period for an RET measure with an applicable code baseline. The relevant EUL and RUL values for the measures in this work paper are in the table below.

<table>
<thead>
<tr>
<th>EUL ID</th>
<th>Description</th>
<th>Sector</th>
<th>UseCategory</th>
<th>EUL (Years)</th>
<th>RUL (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC-airAC</td>
<td>Air Conditioners (air-cooled, split and unitary)</td>
<td>Com</td>
<td>HVAC</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

1.4.2 Codes and Standards Analysis
Indicate any relevant federal, state, regional, or other codes. Describe the impacts of those codes and provide references and the specific language from those documents. Commonly referenced sources include:
- California’s Title 24 Building Energy Efficiency Standards
- California’s Title 20 Appliance Efficiency Program Codes
- Title 10 of Electronic Code of Federal Regulations
- Air Quality Management District
- U.S. Environmental Protection Agency
- Water Resources Board

Complete the following summary table:

<table>
<thead>
<tr>
<th>Code Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Title 24 (2013)</td>
</tr>
<tr>
<td>Title 20 (2014)</td>
</tr>
<tr>
<td>DOE</td>
</tr>
</tbody>
</table>

1.5 EM&V, Market Potential, and Other Studies – Base Case and Measure Case Information
Summarize relevant studies that have been reviewed for this workpaper and may influence measure development or implementation, even if they do not affect work paper calculations. Ask EM&V and SRE groups to recommend appropriate reports. Commonly used sources include:

- Evaluation, measurement, and verification studies
- Impact and market studies
- Emerging Technologies reports
- Codes and Standards reports
- Technical evaluations and demonstrations

Although studies within California may be the most applicable, do not limit the scope to only California, in particular for measures that are not weather sensitive.

For each study that has influenced this workpaper, create a new subsection based on 1.5.1, and provide the requested information.
1.5.1 Study Title #1
Provide:
- Type, author, and completion date of study
- Time frame and market covered
- Techniques used (modeling, surveys, monitoring, etc.)
- Relevance to and impacts on this work paper
- Any concerns about the quality of the survey techniques, number of respondents, etc.

1.6 Data Quality and Future Data Needs
Comment on:
- The quality of currently available data
- Any additional data that need to be gathered to support this workpaper, and how it may impact the work paper. New measures may require data collection through implementation or other longer-term studies, and products may start out as low impact but move to high impact later on.
- A timeline for future data collection and work paper revisions
- Whether the data may become out of date at a certain time, e.g. costs due to changing market

Section 2. Calculation Methodology
Provide a clear, detailed, all-inclusive, and defensible explanation of the energy savings and demand reduction calculation methodology, for electricity and/or gas. Explain all assumptions and provide sample calculations. The methodology must meet current industry standards for accuracy and acceptability. Reference relevant DEER, EM&V, CPUC, and other sources used to inform the methodology. Supporting attachments should be embedded or referenced in the Attachments and References sections. For RET/ER measures with applicable code, provide savings calculations for both baseline periods. Provide documentation for any industry standard practices used as baselines.

If any measures are taken directly from or created with READI, either embed the READI export or indicate the DEER Measure ID in the table below. If READI is not used, delete the following sentence and the “READI Data Used” table.

The following table indicates which measures are taken directly from or created with the DEER READI tool.

<table>
<thead>
<tr>
<th>Measure Code</th>
<th>Measure Name</th>
<th>READI Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT-11111, LD123</td>
<td>13 Watt CFL</td>
<td>Embedded File or ID</td>
</tr>
<tr>
<td>LT-11112, LD124</td>
<td>18 Watt CFL</td>
<td>Embedded File or ID</td>
</tr>
</tbody>
</table>
Demand reduction estimates must consider the DEER peak demand period, which is 4:00 p.m. to 9:00 p.m. during specific weekday periods and varies by climate zone shown in table below.

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16-Sep</td>
<td>18-Sep</td>
</tr>
<tr>
<td>2</td>
<td>8-Jul</td>
<td>10-Jul</td>
</tr>
<tr>
<td>3</td>
<td>8-Jul</td>
<td>10-Jul</td>
</tr>
<tr>
<td>4</td>
<td>1-Sep</td>
<td>3-Sep</td>
</tr>
<tr>
<td>5</td>
<td>8-Sep</td>
<td>10-Sep</td>
</tr>
<tr>
<td>6</td>
<td>1-Sep</td>
<td>3-Sep</td>
</tr>
<tr>
<td>7</td>
<td>1-Sep</td>
<td>3-Sep</td>
</tr>
<tr>
<td>8</td>
<td>1-Sep</td>
<td>3-Sep</td>
</tr>
<tr>
<td>9</td>
<td>1-Sep</td>
<td>3-Sep</td>
</tr>
<tr>
<td>10</td>
<td>1-Sep</td>
<td>3-Sep</td>
</tr>
<tr>
<td>11</td>
<td>8-Jul</td>
<td>10-Jul</td>
</tr>
<tr>
<td>12</td>
<td>8-Jul</td>
<td>10-Jul</td>
</tr>
<tr>
<td>13</td>
<td>8-Jul</td>
<td>10-Jul</td>
</tr>
<tr>
<td>14</td>
<td>26-Aug</td>
<td>28-Aug</td>
</tr>
<tr>
<td>15</td>
<td>25-Aug</td>
<td>27-Aug</td>
</tr>
<tr>
<td>16</td>
<td>8-Jul</td>
<td>10-Jul</td>
</tr>
</tbody>
</table>

Section 3. Load Shapes

Load shapes are used for portfolio lifecycle cost analysis. A load shape indicates the distribution of a measure’s energy savings over one year. A load shape is a set of fractions summing to unity, with one fraction per hour (or other time period). Multiplying a savings value by the load shape value for any particular hour yields the energy savings for that particular hour.

If possible, use DEER load shapes, which are hourly. PAs also have Time-of-Use (TOU) load shapes which split a year into five or six broad time periods; they are defined by utility tariffs. PAs may have Load Shape Viewers which can be used to determine the appropriate load shape. Note: for SCE the “Occupancy” load shape is not in the Shape Viewer but is an acceptable load shape.

The ideal load shape for net benefits estimates would represent the difference between the base case and measure case. The closest load shapes that are applicable to the measures in this work paper are listed in the table below.

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Load Shape</th>
<th>E3 Alternate Building Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurant – Fast Food</td>
<td>DEER:Indoor_Non-CFL_Ltg</td>
<td>NON_RES</td>
</tr>
<tr>
<td>Office – Small</td>
<td>DEER:Indoor_Non-CFL_Ltg</td>
<td>NON_RES</td>
</tr>
</tbody>
</table>

Section 4. Costs

If possible, use values and methodologies from the 2010-2012 WO017 Ex Ante Measure Cost Study Final Report. Other sources for cost include:

- Cost studies by PAs or the CPUC
• Program and invoice data from PAs and their vendors
• Online retailers and point-of-sale data
• Wholesale costs supplemented by bulk purchase discounts, contractor mark-ups, warranties, and other factors that determine the retail price
• Construction estimation resources such as RS Means
• DOE or Title 24 rulemaking support documents

Describe the references and methodology used to develop the base and measure case costs. Costs should be broken down into material and labor. Indicate any incremental maintenance costs such as water consumption or reduced replacement.

4.1 Base Case Cost

Determine base case cost using the methodology above.

4.2 Measure Case Cost

Determine measure case cost using the methodology above.

4.3 Full and Incremental Measure Cost

Full and Incremental Measure Cost Equations

<table>
<thead>
<tr>
<th>Installation Type</th>
<th>Incremental Measure Cost</th>
<th>Full Measure Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Baseline</td>
</tr>
<tr>
<td>ROB</td>
<td>(MEC + MLC) − (BEC + BLC)</td>
<td>(MEC + MLC) − (BEC + BLC)</td>
</tr>
<tr>
<td>NEW/NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET/ER</td>
<td>(MEC + MLC) − (BEC + BLC)</td>
<td>MEC + MLC</td>
</tr>
<tr>
<td>REF</td>
<td>(MEC + MLC) − (BEC + BLC)</td>
<td>MEC + MLC</td>
</tr>
<tr>
<td>REA</td>
<td>MEC + MLC</td>
<td>MEC + MLC</td>
</tr>
</tbody>
</table>

MEC = Measure Equipment Cost; MLC = Measure Labor Cost
BEC = Base Case Equipment Cost; BLC = Base Case Labor Cost

Calculate FMC and IMC and insert into the table below.

Full and Incremental Costs

<table>
<thead>
<tr>
<th>Installation Type</th>
<th>Incremental Measure Cost</th>
<th>Full Measure Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Baseline</td>
</tr>
<tr>
<td>ROB</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>RET</td>
<td>$100</td>
<td>$500</td>
</tr>
</tbody>
</table>
Attachments

Attachments can be embedded here (using Word’s Insert > Object function) or maintained separately. Attachments can include cost effectiveness data, calculation spreadsheets, specifications, studies, data sets, etc. **Do not attach confidential or customer information.** Create references for files maintained separately and note that they are available upon request.

References

Provide full citations for all references. References should be linked through endnotes to show how the references support specific workpaper content: