Work Paper PGE3PHVC152

**Revision 2**

**Short Form**

**Southern California Edison**

**Economizer Controls**

**Introduction**

This short form workpaper documents (WP) the values adopted from PGE’s WP entitled “Economizer Controls” (PGE3PHVC152\_R5). SCE adopts all the values in PGE3PHVC152\_R5 – Economizer Controls, with the following exceptions.

* This Workpaper Short Form is applicable for SCE’s 2019 program cycle
* Changed applicable climate zones to only SCE climate zones.
* Added Up-Stream Programs: Up-Stream delivery mechanism and Financial Support: Down-Stream Incentive - Deemed
* Corrected load shapes for Heat Pump measures from AC-unit load shape to Heat Pump load shape in calculation template.
* For the 2019 program year, the measure application type has been updated to Retrocommissioning, “BRO-RCx” with reporting 1/1/2019 through 12/31/2019.
* Added clarification on SCE’s incentive method description and applicability.

# Document Revision History

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| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 1 | 12/26/2018 | Stephen Brett Reno, TRC | * Transferred savings to calculation templates for the 2018 program year. * Changed applicable climate zones to only SCE climate zones. * Added Up-Stream Programs: Up-Stream & Financial Support: Down-Stream Incentive - Deemed delivery mechanism * Corrected load shapes for Heat Pump measures in calculation template.   General Policy Requirements:   * 2018 Workpaper Updates are primarily in response to D.16-08-019 which created the Behavioral, Operational, and Retrocommissioning (BRO) measure classification with EUL values of one to three years with retrocommissioning assigned a three-year EUL. Resolution E-4818 directed that all measures which utilize a degraded performance baseline and/or are restorative of performance in nature be classified as retrocommissioning. |
| 2 | 12/26/2018 | Stephen Brett Reno, TRC | * Updated calculation template with noted changes. * Updated measure application type per referenced policy.   General Policy Requirements:   * 2019 Workpaper updates are primarily in response to Resolution E-4818 which added new measure application types including but not limited to Add-On Equipment (AOE) and BRO-Retrocommissioning (BRO-RCx). |

**Measure Summary**

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form work paper details the repair or adjustment of existing economizer controls on existing nonresidential split-system and unitary HVAC equipment. The savings values are based on PGE’s workpaper PGE3PHVC152\_R5 – Economizer Controls” document.  The target market for these measure is non-residential buildings served by unitary DX and split systems which do not serve process or refrigeration loads. These measures are defined for all SCE California climate zones. Applicable building types vary by measure – refer to full PGE workpaper for details. |
| **1.1 Measure & Baseline** | Baseline  This measure assumes the existing unit is equipped with a fully operational economizer with un-optimized economizer controls by either low economizer changeover setpoint or inadequate or malfunctioning sensors.  Measure  Replace existing economizer control sensor or optimizing existing economizer controls by adjusting the changeover setpoint. The controller changeover setpoint should be adjusted appropriately based on the available number of thermostat cooling stages. |
| **1.2 Technical Description** |  |
| **Measures** | AC-11452 (PGE HV299): Economizer Control Adjustment on AC Only Units  AC-11458 (PGE HV298): Economizer Control Adjustment on AC Unit with Gas Heat  AC-11463 (PGE HV300): Economizer Control Adjustment on Heat Pump  AC-11477 (PGE HV301): Economizer Control Adjustment on Variable Volume AC Unit with Gas Heat  AC-11479 (PGE HV295): Economizer Control Replacement on AC Only Units  AC-11504 (PGE HV294): Economizer Control Replacement on AC Unit with Gas Heat  AC-11505 (PGE HV296): Economizer Control Replacement on Heat Pump  AC-11510 (PGE HV297): Economizer Control Replacement on Variable Volume AC Unit with Gas Heat  Energy savings are achieved by allowing the economizer operation during system calls for cooling at higher but still advantageous cool outside air temperatures prior to mechanical cooling.  Refer to PGE3PHVC152\_R5 Section 1.2 for detailed technical description. |
| **Code for All Measures** | These maintenance measures are not governed by either state or federal codes and standards. The document Standard 180-2008, Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systemsmay be used by QM programs as a guide for measure implementation. Only licensed California contractors will participate in the program.  Title 24 (2019) Section 140.4(e) Economizers provides control requirements for air economizers, but compliance is not required as these are maintenance measures. |
| **Requirements** | Participating contractors must ensure the customer facility is physically located within the service territory of the Investor Owned Utility (IOU) administering the program, and that the customer receives electric services from that IOU. Contractors and technicians implementing the measure must meet all certification and training requirements in accordance with program requirements.  Additional technician verification of thermostat wiring and number of cooling stages should be performed to ensure that the first stage of cooling is dedicated to economizer operation and two-stage thermostat operation is enabled where possible. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| **Installation Type** | Deviation. Install type changed from Retro-Commissioning (RC) to **BRO-Retrocommissioning (BRO-RCx)** |
| **Delivery Mechanisms** | Financial Support: Direct Install  Mid-Stream Programs: Mid-Stream Incentive  Deviation from PG&E, Adding:   * **Financial Support: Down-Stream Incentive – Deemed** * **Up-Stream Programs: Up-Stream Incentive**   For SCE, incentive methods include On-bill Finance/Loan - 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. |
| **1.4.1 DEER Data** |  |
| **Net-Gross-Ratio** | Deviating from PG&E’s NTG Section.  All Non-Upstream NTG ID:   * NonRes-sAll-mHVAC-RCA (NTGR: 0.73)   Midstream & Upstream NTG IDs:   * Com-Default>2yrs (NTGR: 0.60) * Ind-Default>2yrs (NTGR: 0.60) * Agric-Default>2yrs (NTGR: 0.60) |
| **Effective and Remaining Useful Life** | EUL ID: NonRes-RCx-Operational (EUL: 3.0 / RUL: 1.0) |
| **Section 2. Calculation Methodology** |  |
| **Energy savings/Peak Demand Reduction – All Measures** | Savings were estimated using eQUEST. The DEER prototypes for the customer average case of the Tech IDs were used with some modification. All savings are normalized by cooling tons.  DEER prototypes were generated using MASControl v3. Except for motel and education relocatable classroom building type with heat pumps, DEER prototypes for AC and Heat Pump measures were created using the 110to134kBtuh cooling capacity range. Variable Volume AC units were created using 240to759kBtuh. The DEER prototypes were modified to create Damper Leakage prototypes, simulating outside and return air damper leakage and exhaust re-entrainment:  Min Outside Air: Varies changed to 20%  Max Outside Air: 100% changed to 70%  Min Air, Occupied: 0.001 changed to 0.2  Outside Air Control: Fixed changed to OA Temp  The base case prototypes were created by modifying the Damper Leak prototypes to simulate the following faults:  55°F Dry Bulb High Limit  63°F Dry Bulb High Limit  68°F Dry Bulb High Limit  Faults were weighted by frequency as seen in the PGECOHVC138 AirCare Plus database.  The measure case prototypes are the unmodified Damper Leak prototypes.  The peak period is defined as 2:00 PM to 5:00 PM on three specific weekdays defined by DEER2014 and varies by climate zone.  Refer to full workpaper PGE3PHVC152\_R5 Section 2 for detailed calculation methodology. |
| **Section 3. Load Shapes** | DEER:HVAC\_Split-Package\_AC,  DEER:HVAC\_Split-Package\_HP |
| **Section 4. Costs** |  |
| **Section 4.1 Base and Measure Costs** | Refer to full workpaper PGE3PHVC152\_R5 Section 4 for detailed costing methodology. |
| **Base Cost** | Economizer Control Adjustment:  The base case is the customer’s existing equipment; therefore, the base case cost is $0.00.  Economizer Control Replacement:  The base case is the customer’s existing equipment; therefore, the base case cost is $0.00. |
| **Measure Cost** | Economizer Control Adjustment:  Material: $0.00  Labor: $2.93  Total: $2.93  Economizer Control Replacement:  Material: $3.21  Labor: $18.78  Total: $21.99 |

**Savings and Calculation Methodology**

This short form made no changes to the adopted PGE savings.

**Costs**

This short form made no changes to the adopted PGE costs.

**Attachments:**

PGE3PHV152.2\_A2 - Calc Templates\_2019