Work Paper PGE3PHVC151

**Revision 1**

**Short Form**

**Southern California Edison**

**Economizer Repair**

**Introduction**

This short form workpaper documents (WP) the values adopted from PGE’s WP entitled “Economizer Repair” (PGE3PHVC151\_R4). SCE adopts all the values in PGE3PHVC151\_R4 – Economizer Repair, with the following exceptions.

* This Workpaper Short Form is applicable for SCE’s 2018 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 2018 program year, the measure application type remains as “REA” with reporting 1/1/2018 through 12/31/2018.
* 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. |

**Measure Summary**

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form work paper details repairing non-functional economizers on existing nonresidential split-system and unitary HVAC equipment. The savings values are based on PGE’s workpaper PGE3PHVC151\_R4 – “Economizer Repair” document.  The target market for this measure is nonresidential buildings served by unitary DX and split systems with economizers that 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 non-functional economizer with the outside air dampers either failed closed or partially open.  Measure  The economizer should be repaired to a functional state and economizers with existing analog controllers have the option of adding an Advanced Digital Economizer Controller (ADEC). |
| **1.2 Technical Description** |  |
| **Measures** | AC-11379 (PGE HV306): Economizer Repair (ADEC) on AC Unit with Gas Heat  AC-11355 (PGE HV307): Economizer Repair (ADEC) on AC Only Unit  AC-11407 (PGE HV308): Economizer Repair (ADEC) on Heat Pump  AC-11408 (PGE HV309): Economizer Repair (ADEC) on Variable Volume AC Unit with Gas Heat  AC-11423 (PGE HV302): Economizer Repair (Non-ADEC) on AC Unit with Gas Heat  AC-11419 (PGE HV303): Economizer Repair (Non-ADEC) on AC Only Unit  AC-11438 (PGE HV304): Economizer Repair (Non-ADEC) on Heat Pump  AC-11441 (PGE HV305): Economizer Repair (Non-ADEC) on Variable Volume AC Unit with Gas Heat  Energy savings are achieved by restoring economizer functionality, thus allowing the HVAC unit to utilize cool outside air prior to mechanical cooling below the high limit setpoint as well as reducing unnecessary conditioning of outside air above the high limit setpoint.  Refer to PGE3PHVC151\_R4 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 operating 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.  This measure requires field documentation of the existing conditions that verify the measure was necessary and that the measure was successfully applied. This measure does not apply if the HVAC system has a fully functional economizer. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| **Installation Type** | Deviation. Install type changed from Retro-Commissioning (RC) to **Retrofit Add-On (REA)** |
| **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:  Failed Closed: Outside Air Fraction: 20%  Failed Partially Open: Outside Air Fraction: 30%  The damper failed closed scenario is weighted by 25% and the damper failed partially open scenario weighted by 75%.  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. |
| **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 PGE3PHVC151\_R4 Section 4 for detailed costing methodology. |
| **Base Cost** | Non-ADEC Economizer Repair:  The base case is the customer’s existing equipment; therefore, the base case cost is $0.00.  ADEC Economizer Repair:  The base case is the customer’s existing equipment; therefore, the base case cost is $0.00. |
| **Measure Cost** | Non-ADEC Economizer Repair:  Material: $21.99  Labor: $28.01  Total: $50.00  ADEC Economizer Repair:  Material: $69.61  Labor: $56.87  Total: $126.48 |

**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:**

PGE3PHVC151.1\_A1 - Calc Templates\_2018