

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Energy Savings Kit

A package of home energy efficiency measures in a kit that will be distributed to low-income customers. Each participant receives a kit containing a high-efficiency showerhead, two high efficiency sink aerators (1.0 and 1.5 GPM), and eight compact fluorescent bulbs (4 - 13 W and 4 - 20 W CFLs).

Algorithms:

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|---|---|
| CFL Electric Energy Savings (Customer kWh) | = (kW_Base - kW_EE) x Hr use |
| CFL Electric Demand Savings (Customer kW) | = (kW_Base - kW_EE) |
| Showerhead Energy Savings (Customer kWh) | = ((HW GPY_Saved x Delta_T x 8.33) / (3,412) / HGE) = 252 429 kWh/showerhead |
| Showerhead Demand Savings (Customer kW) | = 0 kW |
| Aerator (1.5 GPM) Energy Savings (Cust kWh) | = ((HW GPY_Saved x Delta_T x 8.33) / (3412) / HGE) = 185 kWh/aerator |
| Aerator (1.5 GPM) Demand Savings (Cust kW) | = 0 kW |
| Aerator (1.0 GPM) Energy Savings (Cust kWh) | = ((HW GPY_Saved x Delta_T x 8.33) / (3412) / HGE) = 285 kWh/aerator |
| Aerator (1.0 GPM) Demand Savings (Cust kW) | = 0 kW |
| Showerhead Gas Savings (Customer Dth) | = ((HW GPY_Saved x Delta_T x 8.33) / HGE / 1,000,000) = 1.31 2.23 Dth/showerhead |
| Aerator (1.5 GPM) Gas Savings (Customer Dth) | = ((HW GPY_Saved x Delta_T x 8.33) / HGE / 1,000,000) = 0.69 Dth/aerator |
| Aerator (1.0 GPM) Gas Savings (Customer Dth) | = ((HW GPY_Saved x Delta_T x 8.33) / HGE / 1,000,000) = 0.98 Dth/aerator |
| Gas Savings (Gross Dth) | = Customer Dth x (# kits distributed) |
| Gas Savings (net Dth) | = Gross Dth x NTG |
| Electrical Energy Savings (Gross Generator kWh) | = (Customer kWh * number of kits) / (1-TDLF) |
| Electrical Demand Savings (Gross Generator kW) | = (Customer kW * number of kits)*CF / (1-TDLF) |
| Electrical Energy Savings (Net Generator kWh) | = Gross Generator kWh x NTG x Install Rate |
| Electrical Demand Savings (Net Generator kW) | = Gross Generator kW x NTG x Install Rate |

Variables:

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|-----------|---|
| Hrs | = Annual operational hours per year of the fixture. We will use 1,141 hours which represents the average operating hours for the first 8 CFLs installed in a house. (Reference 1) |
| CF | = Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. 0.08 will be used for CFLs (Ref 2) A CF of 0.0 will be used for shower heads and aerators. |
| kW_EE | = Bulb wattage per supplied CFLs = 4 - 13W and 4 - 20W. |
| kW_Base | = Bulb wattage replaced by supplied CFLs = dictated by federal minimum standards. |
| GPY_Saved | = Gallons per year of hot water saved with high-efficiency showerhead assuming 65% of water flow is hot water. Showerhead = 1,258 3,806 gallons per year per shower, Aerator (1.5 GPM) = 653 gallons; aerator (1.0 GPM) = 1,119 gallons. |

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| Delta_T | = Change in temperature of water from incoming water temperature to water heater temperature setting. Delta_T is 74 degrees F. (Reference 5) |
| HGE | = Heat generation efficiency based on steady-state water heater efficiency. Used value of 0.90 for electric and 0.59 for Gas. (Reference 3) |
| Incremental Costs | = costs provided by vendor; |
| Transmission Distribution Loss Factor (TDLF) | Transmission Distribution Loss Factor = 7.7%, the percentage loss of electricity as it flows from the power plant to the customer. |
| Net-to-Gross Factor (NTG) | = We will use 100% as these kits would not be available without the product. |
| Install Rate | = We will use 85% for CFLs and 65% for showerheads and aerators. |
| Non-Energy O&M savings | = Operation and Maintenance savings due top water savings = \$9.33 \$18.34 per showerhead, \$4.84 per 1.5 gpm aerator, and \$8.30 per 1.0 gpm aerator. |

| Measure: | Measure Life (yrs) | |
|------------------------------|-----------------------|-----------------------|
| | 2012 | 2013 |
| CFLs (8 bulbs) | 6.71 | 6.32 |
| Shower head | 6 years (Reference 6) | 6 years (Reference 6) |
| Faucet aerators (2 aerators) | 5 years (Reference 6) | 5 years (Reference 6) |

Assumptions:

Savings shown above include homes with both electric and gas water heaters. In Colorado, ~~85%~~ 89% of homes have gas water heaters and ~~45%~~ 11% of homes have electric water heaters. We will use ~~85%~~ 89% of the gas savings and ~~45%~~ 11% of the electric savings shown above for showerheads and aerators (Reference 7.)

Provided by Customer:

Number of kits distributed
 Number of CFLs installed
 Showerhead Installed
 Number of aerators installed

Verified during M&V:

Yes
 Yes
 Yes
 Yes

Changes From 2011:

Added 2 20W CFLs

References

1. US DOE US Lighting Market Characterization Study 2002
2. Composite Wattages, Operating Hours and Coincidence from CFL METERING STUDY FINAL REPORT, Prepared for: Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, 2005
3. Department of Energy Domestic Hot Water Appliance Calculator
4. Japanese study: "The effects of variation in body temperature on the preferred water temperature and flow rate during showering"
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5. Handbook of Water Use and Conservation, Denver Water Conservation
6. CALMAC; California Measurement Advisory Committee.
7. ~~2006~~ 2010 Residential energy use Colorado service area - Xcel Energy Market Research