DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Energy Efficient Showerheads

Residential customers are eligible to receive a free high-efficiency showerhead to reduce energy and water use.

Algorithms:

Showerhead Natural Gas Savings (Gross Dth/unit)	= ((GPY_Saved x Delta_T x 8.33) / HGE / 1,000,000) = 2.23 Dth/unit
Net Dth	= Gross Dth x NTG
Showerhead Energy Savings (Customer kWh/unit)	= (GPY_Saved x Delta_T x 8.33) / (3412 x HGE) = 429 kWh / unit
Showerhead Energy Savings (Gross Generator kWh)	=(Customer kWh)/(1 - TDLF)
Net generator kWh per showerhead retrofit	= Gross Generator kWh x NTG
Showerhead Demand Savings (Customer kW)	= Customer kWh / 238 hours = 1.80 kW
Showerhead Demand Savings (Gross Generator kW)	= ((GPY_Saved x Delta_T x 8.33 x CF) / (3,412*(1-TDLF)) = 0 kW
Net generator kW per showerhead retrofit	= Gross Generator kW x NTG = 0 kW

Variables:

GPY_Saved	= Gallons per year of hot water saved with high-efficiency showerhead. Showerhead = 3,084 gallons per year per showerhead (References 1, 2)
Delta_T	= Change in temperature of water from incoming water temperature to water heater temperature setting. Delta_T is 74 degrees F. (Reference 1,2)
HGE	= Heat generation efficiency based on Minimum Federal Effiency Standards for water heater efficiency. Used value of 0.59 for gas; value of 0.90 for electric (Reference 6)
CF	= Coincidence Factor, the probability that peak demand of the measure will coincide with peak utility system demand. A CF of 0.0 will be used for showerheads.
8.33	Heat content of 1 gallon water; Btu/gal -F
3,412	Conversion from Btu to kWh; 1 kWh = 3,412 Btuh
Dth	= 1,000,000 Btu
Incremental Costs	= actual costs provided by vendor; $2.75 per showerhead in 2012 and $2.90 per showerhead in 2013 are assumed for the material costs for cost/benefit calculation purposes
NTG	= Net-to-Gross Factor = 99%. The actual installation rate for 2012 and 2013 will be used to determine net savings.
O&M savings	= Water & Sewer savings are assumed to be 4,754 gallons per year @ $0.00382/gallon = $ 22.91 per shower head *(Reference 7)
Measure Life	= 6 years (Reference 5)

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Transmission Distribution Loss Factor (TDLF)	Transmission Distribution Loss Factor = **7.69**%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing - SRD-2

Provided by administrator:	Verified during M&V:
Showerhead received by customer	Yes
Showerhead installed by customer	Yes

Assumptions:

Showerhead replacement	2.5 gpm(Federal Standard) showerhead replaced with 1.5 gpm in 1 shower in home
Water heating efficiency - natural gas	59% federal minimum manufacturer's standard
Water heating efficiency - electric	90% federal minimum manufacturer's standard
Gas/Electric split	We assume that 89% of the houses use gas to heat water and 11% of houses use electric to heat water. For each showerhead that is distributed we will take credit equal to 11% of the electric savings and 89% of the gas savings. We will not determine what type of fuel is used to heat water in each house that receives a showerhead (Reference 8).

Changes From 2010:

No changes.

References

1. Xcel Energy New Mexico Residential Shower Use Study

2. Japanese study: "The effects of variation in body temperature on the preferred water temperature and flow rate during showering"; Authors: Tadakatsu Ohnaka, Yutaka Tochihara, Yumiko Watanabe. Affiliations: a) Department of Physiological Hygiene, The I
3. Handbook of Water Use and Conservation, Denver Water Conservation
4. Xcel Energy Customer End Use Study 2006
5. California Measurement Advisory Committee (CALMAC)
6. http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/htg_products_frmwk_presentation_2007-01-10ver4.pdf
7. http://www.denverwater.org/rateinfo/rates08_vs_09approved.html
8. 2010 Xcel Energy Colorado Home Use Study (PS Co Service Area)