DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Home Performance with ENERGY STAR

Description:
Home Performance with Energy Star program, residential natural gas and electric customers receive a cash rebate for implementing multiple energy efficiency improvements.

The Home Performance with ENERGY STAR Product provides a “systems approach” to comprehensive energy improvements. Public Service uses this approach by requiring an upgraded home “shell,” including code level attic insulation and a reduction in air infiltration coupled with a combustion safety check if naturally vented combustion appliances (furnace/boiler or water heater) remain in the home after product participation.

Low-income customers may participate in this product, but also have dedicated product offerings.

Program References:
- Measures “Attic Insulation”, “Wall Insulation”, and “Air Sealing”
- Measures “Heating Efficiency”, “High Efficiency Furnace”
- Measures for “LED”
- Measures for “Energy Star Clothes Washer”
- Measures for “Water Heating Efficiency”
- Measures for “Refrigerator Replacement”, “Removal of Primary Refrigerator”
- Measures for “Air Conditioning” and “Ground Source Heat Pumps”
- Measures for “Evaporative Cooling”
- Measures for “Programmable T-Stat Setback”

Algorithms:
- LED_kW (kW Saved at Customer)
  \[ \text{LED_kW} = (\text{kW_Bulb_Existing} - \text{kW_Bulb_New}) \times (\text{Qty_LED_After} - \text{Qty(LED_Before)}) \]
- LED_kWh (Annual kWh Saved at Customer)
  \[ \text{LED_kWh} = (\text{kW_Bulb_Existing} - \text{kW_Bulb_New}) \times (\text{Qty(LED_After)} - \text{Qty(LED_Before)}) \times (\text{Hours_Per_Bulb}) \]
- Setback_Thermostat_kW_Saved_at_Customer
  \[ \text{Setback_Thermostat_kW_Saved}\text{at Customer} = \text{Setback_Thermostat_kW / Hours_Electric_Cooling} \]
- Setback_Thermostat_PckW (Coincident kWh Saved at Customer)
  \[ \text{Setback_Thermostat_PckW} = \text{Setback_Thermostat_kW} \times \text{CF} \]

Variables:
- Effn
  \[ \text{Effn} = \text{Efficiency of the newly installed natural gas heating unit. We will use the nameplate value provided by the customer.} \]
## DEEMED SAVINGS TECHNICAL ASSUMPTIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTUH</td>
<td>Customer Input</td>
</tr>
<tr>
<td>Qty LED After</td>
<td>Customer Input</td>
</tr>
<tr>
<td>Qty LED Before</td>
<td>Customer Input</td>
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<tr>
<td>kW_Bulb_Existing</td>
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<tr>
<td>kW_Bulb_New</td>
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<tr>
<td>Setback_Thermostat_Dtherm (Customer Dth Savings per year)</td>
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<tr>
<td>Setback_Thermostat_kWh (Customer kWh Savings per year)</td>
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<tr>
<td>Setback Thermostat Coincidence Factor</td>
<td>76%</td>
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<tr>
<td>Setback Thermostat Measure Life</td>
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<tr>
<td>Setback Thermostat Incremental Cost</td>
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<td>Setback_Thermostat_kW (Customer kW Savings)</td>
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<td>Hours_Electric_Cooling (Setback Thermostat Measure)</td>
<td>3412</td>
</tr>
<tr>
<td>NTG</td>
<td>Net-to-Gross Factor – We will use 116% based on Reference 1.</td>
</tr>
</tbody>
</table>

### Inputs:

- Reference Stand-alone programs for a complete list of required customer inputs
- Identify all implemented measures
- Qty LED After
- Qty LED Before
- Quantity Refrigerators Removed

**Example Inputs from Standalone Programs:**

- Attic cost of Attic Insulation
- Attic Square Footage Insulated
- Attic Insulation R-Value Pre Project
- Attic Insulation R-Value Post-Project
- Actual Cost of Air Sealing
- BTUH size of new fuel fired heating equipment
- EFFn of new heating equipment
- EFFn of new domestic water heating equipment
- Blower Door Test-in CFM50
- Blower Door Test-out CFM50
- Climate Zone (Front Range, Western Slope, or Mountains)
- Number of Stories above grade in Home

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Annual energy savings for heating due to an average temperature setback of 2.4 degree F for Heating Season and baseline home heating is 61.6 DTherms / year. Savings is = 4.19 DTherms / year.

Annual energy savings for cooling energy due to average temperature setback of 1.33 Degree F for Cooling Season. Baseline cooling energy per year is 1,901 kWh and the annual savings is 118 kWh / year.

CF for cooling only per T-Stat Setback Bin Calcs in the "Home Energy Squad - CO" program.

Conversion from BTU to kWh, 1kWh = 3412 BTU

Refer to Program “Air Conditioning – CO” to find reference for Cooling Hours.
### Assumptions:

Any home with an existing ACH natural of 0.45 ACH will not be eligible for the air sealing measure.
A Blower Door Test will be required for all participating homes.
The Attic Bypass Air Sealing energy savings will be captured with Air Sealing and Weather Stripping measure.
TMY3 Climate Data used for the following areas: Front Range = Denver; Western Slope = Grand Junction; Mountains = Alamosa

The NTG for the Tier 1 evaporative coolers is 59.7%. This was determined in the 2006 Summit Blue Consulting report. The NTG for the Tier 2 evaporative coolers Qualifying Evaporative Cooling Equipment must be new and be a permanently installed direct (Tier 1 or 2), indirect or two-stage evaporative cooling unit. Portable coolers or systems with vapor compression equipment are not eligible, nor is used or reconditioned equipment.

### References:

1. COLORADO HOME PERFORMANCE WITH ENERGY STAR® PROGRAM EVALUATION Printed May 2014
3. Xcel Energy estimate