DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Small Commercial Building Controls- CO

Description:

Commercial demand response program with prescriptive rebates for smart thermostat demand response.

Equations:

STDR_Electrical_Deman_ Savings_per_ton (Customer kW per Ton)	= I_Qty_Prop_Equip * Eq.kW_Savings_STDR
STDR Electrical Demand Savings (Customers kW per Thermostat)	= STDR_Electrical_Demand_ Savings_per_ton * Tons_per_Thermostat
STDR Electrical Energy Savings per ton (Customer kWh per Ton)	= I_Qty_Prop_Tons * Eq.kWh_Savings_STDR
STDR Electrical Energy Savings (Customer kWh per Thermostat)	= STDR Electrical Energy Savings per ton * Tons_per_Thermostat
STDR Peak Coincident kW (PC_KW_CUST)	= I_Qty_Prop_Equip * Eq.kW_Savings_STDR * STDR_CF
ENERGY STAR Smart Thermostat Energy Savings (Gross kWh)	= Cooling kW * (ES_Reduction_Cooling) * Cooling_EFLH
ENERGY STAR Smart Thermostat Gas Savings (Gross Dth/Yr)	= Baseline Dth * (ES_Reduction_Heating)
ENERGY STAR Smart Thermostat Electrical Energy Savings Electric Heat (Gross Annual kWh)	= Cooling kW * (ES_Reduction_Cooling) * Cooling Hours + Heating kW * (ES_Reduction_Heating) * Heating Hours
ENERGY STAR Smart Thermostat Coincident Demand Savings (Gross PCkW)	= Cooling kW * (ES_Reduction_Cooling) * EnergyStar_CF

Variable ID	Value	Description
I_Qty_Prop_Tons	Customer Input	Quantity of Controlled tons
Eq.kW_Savings_STDR	0.364	Peak coincident kW savings per average commercial AC unit ton with a smart thermostat (Reference 1)
Eq.kWh_Savings_STDR	1.2	kWh savings per year per average commercial AC Unit with a smart thermostat (Reference 1).
Tons_per_Thermsotat	5.71	Average tons controlled per DR enrolled thermostat (Reference 1)
ES_Reduction_Heating	6%	Energy Star Connected Thermostat criteria for annual heating equipment runtime reduction (Reference 1)
ES_Reduction_Cooling	9%	Energy Star Connected Thermostat criteria for annual cooling equipment runtime reduction (Reference 1)
STDR_CF	100%	Coincidence factor of demand response events
Cooling_kW	6.531	Average kW for cooling
Cooling Hours	765	Annual cooling hours
Heating kW	See Table 1	Average kW for electric heating
Heating Hours	950	Annual heating hours
Baseline Dth	74	Baseline heating load per thermostat in Dth
EnergyStar_CF	0%	coincidence factor for ES Thermostats (Reference 2)
STDR Measure Life	5	Measure life for demand response DR
ES Measure Life	10	Measure life for Energy Star thermostat (Reference 2)

Table 1

Heating Type	Heat Pump	Electric Resistance Heat

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Heating kW	5.339	NA

Assumptions:

Demand Response savings are calculated at system peaking conditions of 95 degree Fahrenheit dry bulb.
All EE components use the State's TRM estimates for energy with no demand savings
All DR energy and demand savings based on results of study conducted in MN through summer 2019

References:

(1) Xcel Energy, October 2019. Commercial Smart Thermostat Demand Response Study
(2) Minnesota Technical Resource Manual ver 3.0