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Program: Data Center Efficiency

Description:

Holistic: Customers may apply for rebates under the Data Center Efficiency product for measures not listed under prescriptive rebate products for this program.
Custom: Each Data Center efficiency project will be analyzed individually by Xcel Energy. Technical variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methodologies.
Prescriptive: Commercial customers receive a rebate for installing electrically-commutated, backward-curved plug fans on computer room air conditioning units' (CRAC) supply fans in data centers instead of baseline forward-curved AC centrifugal fans in new or retrofit applications.
Computer Efficiency Prescriptive: Rebates are offered to end-use customers for installing Virtual Desktop Infrastructure (VDI) devices, also known as "Thin Client" systems, instead of new PCs. Rebates are also offered for purchasing servers that are labeled 80 PLUS titanium; all eligible servers are required to have redundant power supplies and power supplies rated 80 PLUS platinum will serve as a baseline, since this is the Energy Star rating baseline.

Program References:

Holistic Program Savings	Refer to the appropriate program to find all applicable formulas (Customer kW, Customer kWh, Customer PCkW, etc.) or assumptions (Hours, Runtime, etc.) for prescriptive measures savings claimed through the holistic data center product architecture.

Algorithms:

Custom Calculations:	Non-prescriptive electrical energy savings and electrical demand savings will be calculated based on the project-specific details. Each project will undergo an engineering review in accordance with standard engineering practices. Where prescriptive elements exist, the review will be in accordance with the calculation methodologies detailed in the prescriptive products.
Fan Power Reduction (kW)	= (Baseline Fan Power - Efficient Fan Power) * Typical % of CRAC Units in Use
Baseline Fan Power (kW)	= Fan HP * 0.7457 kW/HP
Efficient Fan Power (kW)	= Fan HP * 0.7457 kW/HP * Comparison Load Factor
Comparison Load Factor	= (Base Efficiency Adjustment Factor / Proposed Efficiency Adjustment Factor) - Underfloor Distribution Savings Factor (when applicable)
Base Efficiency Adjustment Factor	= Baseline Fan Efficiency * Baseline Belt Efficiency * Baseline Motor Efficiency
Proposed Efficiency Adjustment Factor	= Proposed Fan Efficiency * Proposed Drive Efficiency * Proposed Motor Efficiency
Cooling Interaction kW	= Fan Cooling Load (tons) * Cooling System kW/ton [per temperature bin]
Cooling Interaction kWh	= Cooling Interaction kW * Cooling System Hours [per temperature bin]
Fan Cooling Load (tons)	= Fan Power Reduction (kW) * 3413 / 12000
Gross kW Saved at Customer per Unit (kW)	= Fan Power Reduction + Cooling Interaction kW
Gross Coincident kW Saved at Customer per UnitkW)	= Gross kW Saved at Customer per Unit * Coincidence Factor
Gross Annual kWh Saved at Customer per Unit (kWh/yr)	= (Fan Power Reduction * Fan Hours of Operation) + Cooling Interaction kWh

Algorithms For Plate and Frame Heat Exchangers:

Gross Annual kWh Saved at Customer	= (Coeff_A *(T_WB_Onset ^ 2) + Coeff_B * (T_DB_Balance ^ 2) + Coeff_C * T_WB_Onset * T_DB_Balance + Coeff_D * T_WB_Onset + Coeff_E * T_DB_Balance + Coeff_F) * EFLH_Segment / Coeff_G * Chiller_IPLV_Existing / BaseCase_IPLV * FPHX_Tons / 100
Gross kW Saved at Customer	= Gross Annual kWh Saved at Customer / FPHX_EFLH

FPHX_EFLH	= Gross Annual kWh Saved at Customer / Chiller_IPLV_Existing / FPHX_Tons
FPHX_Slope	= (Chiller_Peak_Tons - Zero_Load) / (T_DB_Design - T_DB_Balance)
FPHX_Intercept	= Chiller_Peak_Tons - (FPHX_Slope * T_DB_Design)
FPHX_Tons	= Minimum of (FPHX_Slope * T_DB_Onset + FPHX_Intercept OR HX_Actual_Tons)

Algorithms For Desktop PC Virtualization (VDI):

Customer_kW	= ((Eq.kW_Savings * I_Qty_Prop_Equip) - (((I_Watts /1000) + Eq.kW_Server) * I_Qty_Prop_Equip)) * Eq.kW_Factor
Customer_kWh	= (Eq.kW_Savings * I_Qty_Prop_Equip - (I_Watts /1000 + Eq.kW_Server) * I_Qty_Prop_Equip) * Eq.kWh_Factor * Eq.Hours
PC_kW_Customer	= ((Eq.kW_Savings * I_Qty_Prop_Equip) - (((I_Watts /1000) + Eq.kW_Server) * I_Qty_Prop_Equip)) * Eq.kW_Factor * Eq.Coincidence_Factor
Increm_Electric_O_M_Savings	= ((Eq.Labor_Savings - Eq.License_Fees) * I_Qty_Prop_Equip) + (((Eq.kW_Savings - ((I_Watts / 1000) + Eq.kW_Server)) * I_Qty_Prop_Equip) * Eq.Hours * Eq.Heating_Factor * P_GasRate)

Algorithms For High Efficiency Power Supply Server:

F Server kW	= (I_Input_Wattage_per_Power_Supply * Eq.Quantity * Eq.Load_Factor / 1000) * ((1 / Eq.Baseline_Efficiency) - (1 / Eq.Proposed_Efficiency))
F Server kWh	= F_Server_kW * 8760
F Server Cust PCkW	= F_Server_Cust_kW * Eq.Coincidence_Factor
F Server Sec kW	= F_Server_kW * 3412 / 12000 * P_Agg_kWTon_Avg
F Server Sec kWh	= F_Server_kW * 3412 / 12000 * P_Agg_kWhTon_Avg
Customer_kW	= (F_Server_kW + F_Server_Sec_kW) * I_Qty_Prop_Equip
Customer_kWh	= (F_Server_kWh + F_Server_Sec_kWh) * I_Qty_Prop_Equip

Variables:	Value	Description
Custom Project - Operation and Maintenance Savings	#	Will be calculated for each specific project based on project details.
Custom Project - Measure Lifetime	#	Will be calculated for each specific project based on project details.
Custom Project - Incremental Cost	#	Will be calculated for each specific project based on project details.
Underfloor Distribution Savings Factor	13.30%	Additional Fan Energy Savings Caused by Mounting EC Fans Below the CRAC Unit For Underfloor Air Distribution (Derived from Results in Ref 2). This value is not used if the efficient fans will not be installed underfloor.
Baseline Fan Efficiency	53.81%	Efficiency of baseline forward-curved fans. Computed by taking the average of two values: the efficiency given by Ref 7 for the input motor size and the societal average value used in California given by Ref 8

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Baseline Belt Efficiency	95%	Percentage of energy input into the belt drive from the baseline fan motor that passes to the impeller, averaged over the lifetime of the belt, since the belt's efficiency deteriorates over time (Ref 7)
Baseline Motor Efficiency	91.18%	Efficiency of baseline fan motor. This value is dependent on the motor size and is calculated by interpolating within the NEMA Premium Motor Efficiency Table and using the motor type (number of poles, open/closed) distribution assumption to find the average NEMA Premium efficiency for that motor size. (Ref 10)
Proposed Fan Efficiency	65.97%	Efficiency of efficient (EC) fan motor. This value is derived from manufacturer efficiency data on various sizes of EC fan collected from several sources (Ref 8, 11, 12).
Proposed Drive Efficiency	99.50%	Percentage of energy input into the motor drive from the EC fan motor that passes to the impeller, averaged over the lifetime of the drive, since the drive's efficiency deteriorates over time (Ref 7)
Proposed Motor Efficiency	88.96%	Efficiency of the EC fan motor. This value is dependent on the motor size and is calculated by inputting the motor size into each of three motor efficiency cubic curve fits derived from curves in Ref 5 and applying the motor type (number of poles) distribution assumption below to find the average EC motor efficiency for that motor size.
Coincidence Factor	100%	Assumed, based on the fact that most data centers operate 24/7
Existing CRAC Unit Age	10	Assumed age of existing CRAC unit that the fan(s) will be installed in, based on information in Ref 3. This value is used to determine the Retrofit measure lifetime value.
Typical % of CRAC Units In Use	83%	Assumed % of total CRAC units in the facility that will be operating simultaneously. Many data centers use redundancy for backup capacity, meaning some fans installed in CRAC units will be installed in units that do not operate regularly. To account for this in forecasting and for Net-to-Gross, a %-in-use value is used. This value was derived from a sample of custom rebate projects in Colorado involving CRAC units in data centers.
Average Cost per Fan, Retrofit	$4,386.00	Estimated average cost of retrofitting an EC fan onto an existing CRAC unit. Derived from a sample of custom rebate projects in Colorado involving EC fan replacements.
Average Cost per Fan, New (Incremental)	$1,700.00	Estimated average cost of selecting an EC fan option over a baseline fan option when purchasing a new CRAC unit. This comes from a Colorado custom rebate project.

Variables For Plate and Frame Heat Exchangers:

T_DB_Design	93.5°F	Design Temperature for Front Range cooling calculations.
	96.6°F	Design Temperature for Western Slope cooling calculations.
	84.2°F	Design Temperature for Mountain cooling calculations.
EFLH_Segment	See Table 3	= Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.

Zero_Load	0	Chiller load when no call for cooling in building. Used in calculation of building chiller load profile.
FPHX_Coeff_A through FPHX_Coeff_G	See Table 4	= Values for the coefficients based on customer Market Segment. Coefficients resulted from a multivariable data regression analysis to estimate the energy savings based on Flat Plate HX Onset Wetbulb Temperature and the building balance point for a FPHX sized to offset 100 tons building load. The resulting savings are scaled based on market segment hours and customer provided HX tons as part of the overall FPHX formula above.
BaseCase_IPLV	0.57	kW/ton assumed in building the multivariable regression for Flat Plate Heat Exchanger kWh savings.
Added Tower kW/ton	0.1 kW/ton (Reference 5)	Average additional power use of the Cooling Tower due to the installation of the heat exchanger (tower fans will need to run more to bring down the water temperature to meet the cooling load directly as opposed to providing normal condenser water temps for the chiller). This is built into the regression analysis and part of the estimated kWh savings.

Variables For Desktop PC Virtualization (VDI):

Eq.kW_Savings	0.0213	Aggregated power demand of a baseline desktop computer
Eq.kW_Server	0.0040	Average server power used to support a virtualized server
Eq.kW_Factor	1.33	Average annual demand of the cooling system that has to remove the heat gain caused by a desktop computer
Eq.kWh_Factor	1.13	Average annual energy consumption of the cooling system that has to remove the heat gain caused by a desktop computer
I_Qty_Prop_Equip	Customer Input	Number of VDI, "thin client", devices installed instead of a desktop PC computer
i_watts__c	Customer Input	Rated wattage of the VDI, "thin client", device installed
Eq.Hours	8760	Number of hours that a desktop computer is connected to a virtualized server and available to operate
Eq.Coincidence_Factor	100%	Probability that the calculated Customer kW will coincide with the period of peak generator operation
Eq.Heating_Factor	-0.000508	Average annual energy consumption of the heating system that has to compensate for the negative heat gain associated with the more efficient desktop computer (Dth/kWh).
P_GasRate	$5.56	Forecasted natural gas rate for businesses ($/Dth)
Eq.Labor_Savings	$42.50	Annual labor savings per desktop
Eq.License_Fees	$12.00	Annual software license fee per desktop
Net-to-Gross	88%	Reference 30
Measure Life	10	Life of a VDI, "thin client", in years (Reference 9)
Eq.Cost	$117.00	Cost of high efficiency model over baseline model (Reference 6)

Variables For High Efficiency Power Supply Server:

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Eq.Baseline_Efficiency	89.10%	Power supply efficiency of a 80 PLUS Platinum rated server
Eq.Proposed_Efficiency	92.82%	Power supply efficiency of a 80 PLUS Titanium rated server
Eq.Quantity	2	Each power supply contains two power supplies for 100% redundancy
Eq.Load_Factor	11.58%	Power supply load factor
P_Agg_kWTon_Avg	1.025	Aggergate kW/ton of the cooling system types that have to remove the heat gain caused by a server
P_Agg_kWhTon_Avg	6,611.78	Aggergate kWh/ton of the cooling system types that have to remove the heat gain caused by a server
I_Input_Wattage_per_Power_Supply	Customer Input	Rated wattage of the power supply
I_Qty_Prop_Equip	Customer Input	Number of servers with a high efficiency power supply
Eq.Coincidence_Factor	100%	Probability that the calculated Customer kW will coincide with the period of peak generator operation
Net-to-Gross	88%	Reference 30
Measure Life	5	Lifetime of a server in years (Reference 18)
Eq.Cost	Table 5	Additional cost required to purchase a server with a high efficiency power supply over the baseline server

Inputs:	Default Value	Description
Custom Project	#	All variables for each project (equipment wattage, equipment efficiency, hours of operation, etc.) will be calculated for each specific project based on project details.
Number of Fans	#	Number of fans installed in this project, customer input
Fan Power (HP)	#	Rated/nominal baseline forward curved fan motor power, customer input
Distribution Type	In-unit or Below-Floor	Air distribution type/fan location, either in-unit or underfloor. Customer must indicate whether the new EC fans will be installed in unit or underfloor
HVAC System Type	Chilled Water	HVAC system type serving the data center/CRAC units where the fans will be installed. There are five options and the customer must indicate which option best matches their system. The options are shown in Table 1 below.

Inputs For Plate & Frame Heat Exchangers (in addition t	Default Value	Description
T_WB_Onset	#	Onset Wet Bulb Temperature provided by the customer. This is the dry bulb temperature at which the chiller will be turned off and the FPHX turned on to make chill water.
T_DB_Balance	#	Building Balance Point Temperature, the outside air dry bulb temperature at which there is no cooling load. Not used to calculate Process and Data Center Market Segment loads which are assumed constant and independent of OSA DB temperature. This value is assumed to be -20 deg F for data center applications.
Chiller_Peak_Tons	#	Existing Chiller plant's maximum load in tons on a design summer day. If chiller nameplate tons are provided, clarification on quantity and manner of operation will also be required. For single chillers with only nameplate data an 85% factor will be applied to account for oversizing.

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HX_Actual_Tons	#	Actual HX Capacity
Chiller_IPLV_Existing	#	Integrated Part Load Value (in kW/ton) for the existing chiller plant.
County / Zone	#	
Quantity Flat Plate Heat Exchangers	#	
Market segment	Data Center	

Assumptions:	**Value**	**Description**
~~Study-Based 'Custom Project NTG~~	~~100%~~	~~A net-to-gross factor of 100% will be used for Data Center projects that follow the study path.~~
Custom Project NTG	Table 6	Net-to-gross factor for custom and prescriptive Data Center Projects, excluding VDI and Server measures since these were not part of the program evaluation.
Holistic Prescriptive NTG	Per Program	Prescriptive products not associated with the study track will utilize the net-to-gross value indicated in their end use.
Fan Hours of Operation	8,760	Hours of operation for the CRAC unit fans
Chiller Efficiency (COP)	5.55	Assumed efficiency of data center central centrifugal chiller (ASHRAE 90.1-2001 (150-300 tons, centrif) page 34, Table 6.2.1L). Converted to kW/ton for use in the analysis.
DX Efficiency (EER)	9.5	Assumed efficiency of DX CRAC units (ASHRAE 90.1-2001 (>=240,000 BTU/h and <760,000 BTU/h, air cooled DX) page 27, Table 6.2.1A). Converted to kW/ton for use in the analysis
Glycol-Cooled DX Efficiency (EER)	11	Assumed efficiency of glycol (water) cooled DX CRAC units (ASHRAE 90.1-2001 (>=240,000 BTU/h, water cooled air conditioners) page 27, Table 6.2.1A). Converted to kW/ton for use in the analysis.

Assumptions (Continued):	**Value**	**Description**
Cooling Tower Fan Energy (GPM/HP)	20	ASHRAE maximum cooling tower fan energy requirement (ASHRAE 90.1-2001 Centrif. Cooling Tower Fan Power, page 32, Table 6.2.1G) used to determine the cooling tower fan power/ton, along with the GPM/ton assumption.
Cooling Tower Sizing Factor (GPM/ton)	3	Standard cooling tower sizing rule of thumb (Ref 13,14,15)
Primary Chilled Water Pump Power (HP)	5	Assumed, based on assumed chiller size and typical primary pump size
Primary Chilled Water Pump Load	75%	Assumed, based on rule-of-thumb for pump load factor
Primary Chilled Water Pump Motor Efficiency	89.50%	Assumed, based on NEMA Premium motor efficiency for 5-hp motors
Chiller Size (tons)	150	Assumed, based on minimum chiller size within range used for chiller efficiency determination. This and the primary chilled water pump assumptions only affect the primary pump analysis and are only a very small portion of the total savings for this measure.
Measure Life (Retrofit)	10	Lifetime (in years) of the retrofit measure. This is based on subtracting the average CRAC unit age from the new construction lifetime.

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Measure Life (New Construction)	20	Lifetime (in years) of the new construction measure. This is based on the primary cooling equipment lifetimes used in other Xcel Colorado programs, along with the California DEER 2013 lifetime for new chillers.
Desired Chilled Water Temperature (F)	45	Chilled water supply temperature. This is a typical value for most chilled water systems.
Cooling Tower Approach (F)	7	Cooling tower approach (difference between outdoor air wet bulb temperature and condensing temperature). Values can range from 4-12 F, but 7 is typical.
Cooling Tower Design Wet Bulb Temperature (F)	69	Assumed design wet bulb temperature for cooling towers installed in the relevant location (69 F used for CO), based on weather data.
Chiller Minimum Efficiency Dry Bulb Temperature (F)	93	Assumed design dry bulb temperature for chiller in the relevant location (93 F used for CO
Chiller Maximum Efficiency Dry Bulb Temperature (F)	30	Assumed dry bulb temperature below which the chiller's efficiency will not decrease any fu
Dry Cooler Dry Bulb Approach Temperature (F)	15	Dry cooler approach (difference between outdoor air dry bulb temperature and condensing temperature). 15 F is the most common value (Ref 7)
Cooling Equipment Temperature-based Efficiency Improvement (%/F)	0.50%	Assumed efficiency improvement for chiller and DX systems (and, for simplicity, cooling tower fans) based on outdoor dry bulb temperature decrease (due to lower condenser pressure). Standard Xcel Energy assumption for cooling interaction.
Distribution of AC Motors by Type	16.67%	Assumed distribution of the six AC motor types: TEFC with 2, 4, and 6 poles, and ODP with 2, 4, and 6 poles. For simplicity, it is assumed that all six occur with equal frequency.
Distribution of EC Motors by Type	33.33%	Assumed distribution of the three EC motor types: 2, 4, and 6-poles. For simplicity, it is assumed that all three occur with equal frequency.
Existing Motor Load Factor	75.00%	Assumed load factor on existing CRAC/CRAH fan. This value is consistent with our other prescriptive programs for constant speed fans.
Deemed Baseline Motor BHP for New Construction	11.55	Assumed baseline motor HP for new construction applications.
Existing HX Redundancy	N/A	No other airside or waterside economizers are in operation
Reasons for HX Peak Coincident Operation	N/A	Projects will not have peak kW savings as wet bulb temp will be too high to provide a reasonable chill water supply temperature during peak summer periods.
HX Installation Location	N/A	Heat exchanger is installed in parallel with the chiller and will use existing cooling towers when in operation.

Table 1: Cooling System Efficiencies

HVAC System Type	Rated Efficiency	kW/ton	Notes
Chilled Water	5.55 COP	0.634	kW/ton is the rated efficiency
DX	9.5 EER	1.263	kW/ton is the rated efficiency
Glycol-Cooled DX	11 EER	1.091	kW/ton is the rated efficiency
Glycol-Cooled DX with Waterside Economizer	N/A	0.756	kW/ton is calculated from weather data and includes free cooling
Chilled Water with Waterside Economizer	N/A	0.407	kW/ton is calculated from weather data and includes free cooling

Table 2: Cooling Efficiency Table (kW/ton)

Temperature	Chilled Water	DX	Water-Cooled DX	Water-Cooled DX w/ WS Economizer	Chilled Water w/WS Economizer

Determinate Temperature: (dB/wB)	Wet Bulb	Dry Bulb	Dry Bulb	Dry Bulb	Wet Bulb
-3	0.4584	0.8653	0.8316	0.1231	0.0036
-1	0.4584	0.8653	0.8316	0.1231	0.0036
1	0.4584	0.8653	0.8316	0.1231	0.0036
3	0.4584	0.8653	0.8316	0.1231	0.0036
5	0.4584	0.8653	0.8316	0.1231	0.0036
7	0.4584	0.8653	0.8316	0.1231	0.0036
9	0.4584	0.8653	0.8316	0.1231	0.0043
11	0.4584	0.8653	0.8316	0.1231	0.0052
13	0.4584	0.8653	0.8316	0.1231	0.0065
15	0.4584	0.8653	0.8316	0.1231	0.0083
17	0.4584	0.8653	0.8316	0.1231	0.0108
19	0.4591	0.8653	0.8316	0.1231	0.0145
21	0.4601	0.8653	0.8316	0.1231	0.0202
23	0.4613	0.8653	0.8316	0.1231	0.0297
25	0.4645	0.8653	0.8316	0.1231	0.0468
27	0.4766	0.8653	0.8316	0.1231	0.0817
29	0.4903	0.8653	0.8316	0.1231	0.1141
31	0.4993	0.8716	0.8377	0.2252	0.1141
33	0.5202	0.8842	0.8498	0.3307	0.1141
35	0.5468	0.8968	0.8619	0.4397	0.1141
37	0.5924	0.9095	0.8741	0.5522	0.1141
39	0.6314	0.9221	0.8862	0.6682	0.6314
41	0.6385	0.9347	0.8984	0.7876	0.6385
43	0.6492	0.9474	0.9105	0.9105	0.6492
45	0.6514	0.9600	0.9226	0.9226	0.6514
47	0.6587	0.9726	0.9348	0.9348	0.6587
49	0.6735	0.9853	0.9469	0.9469	0.6735

Table 2: Cooling Efficiency Table (kW/ton) (Continued)

Temperature	Chilled Water	DX	Water-Cooled DX	Water-Cooled DX w/ WS Economizer	Chilled Water w/WS Economizer
Determinate Temperature: (dB/wB)	Wet Bulb	Dry Bulb	Dry Bulb	Dry Bulb	Wet Bulb
51	0.6808	0.9979	0.9591	0.9591	0.6808
53	0.6871	1.0105	0.9712	0.9712	0.6871
55	0.6971	1.0232	0.9833	0.9833	0.6971
57	0.7086	1.0358	0.9955	0.9955	0.7086
59	0.7167	1.0484	1.0076	1.0076	0.7167
61	0.7172	1.0611	1.0198	1.0198	0.7172
63	0.7284	1.0737	1.0319	1.0319	0.7284
65	0.7303	1.0863	1.0440	1.0440	0.7303
67	0.7302	1.0989	1.0562	1.0562	0.7302
69	0.7512	1.1116	1.0683	1.0683	0.7512
71	N/A	1.1242	1.0805	1.0805	N/A

73	N/A	1.1368	1.0926	1.0926	N/A
75	N/A	1.1495	1.1047	1.1047	N/A
77	N/A	1.1621	1.1169	1.1169	N/A
79	N/A	1.1747	1.1290	1.1290	N/A
81	N/A	1.1874	1.1412	1.1412	N/A
83	N/A	1.2000	1.1533	1.1533	N/A
85	N/A	1.2126	1.1654	1.1654	N/A
87	N/A	1.2253	1.1776	1.1776	N/A
89	N/A	1.2379	1.1897	1.1897	N/A
91	N/A	1.2505	1.2019	1.2019	N/A
93	N/A	1.2632	1.2140	1.2140	N/A
95	N/A	1.2632	1.2140	1.2140	N/A
97	N/A	1.2632	1.2140	1.2140	N/A
99	N/A	1.2632	1.2140	1.2140	N/A
101	N/A	1.2632	1.2140	1.2140	N/A
103	N/A	1.2632	1.2140	1.2140	N/A

Table 3. Equivalent Full Load Hours by Building Type

Building Type / Market Segment	Front Range EFLH	Mountain EFLH
Data Centers	8,760	8,760

EFLH*- Zone 1 (Front Range/Denver); Zone 2 (Western State as represented by Grand Junction) and Zone 3 (Mountain Areas as represented by Alamosa)

Table 4: Plate and Frame Savings Formula Coefficients

	FPHX_Coeff_A	FPHX_Coeff_B	FPHX_Coeff_C	FPHX_Coeff_D	FPHX_Coeff_E	FPHX_Coeff_F	FPHX_Coeff_
Data Center	(19.61)	-	-	10,079.26	-	(173,921.79)	8,760

Table 5: Incremental Cost (Eq.Cost) for High Efficiency Server Incentives

	401 - 600 Watt Servers	601 - 1000 Watt Servers	>1000 Watt Servers
80 PLUS Titanium rated	$ 32.38	$ 37.63	$ 42.88

Table 6: NTG for Data Center Measures by Identification Path

	Study Identified	Site Visit Identified	Customer Identified
NTG	100%	80%	45%

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3. Bick Group Website FAQ (http://www.bickgroup.com/data-center-ec-fans-for-data-centers.asp?w=1)

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References for Computer Efficiency Measures:

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2. Energy Star Calculator Tool; LBNL 2007 or Energy Star Specification
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DEEMED SAVINGS TECHNICAL ASSUMPTIONS

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28. ECOVA - Sales market share analysis, Feb. 2016.
29. 2013 EPA Study for Energy Usage of Average Computer Sold
30. 2016 Computer Efficiency Program Evaluation

Changes from Recent Filing

Added Plate/Frame Prescriptive TAs directly from cooling program as non-data center plate and frame HX's are now custom.
Added prescriptive measure for VDI and high efficiency servers.
Added NTG and program paths based on program evaluation