Ohio | Public Utilities Commission

Application to Commit Energy Efficiency/Peak Demand Reduction Programs (Mercantile Customers Only)

Case No.: 12-1828**-EL-EEC**

Mercantile Customer: Millcreek-West Unity Local Schools

Electric Utility: The Toledo Edison Company

Program Title or Description: New K-12

Rule 4901:1-39-05(F), Ohio Administrative Code (O.A.C.), permits a mercantile customer to file, either individually or jointly with an electric utility, an application to commit the customer's existing demand reduction, demand response, and energy efficiency programs for integration with the electric utility's programs. The following application form is to be used by mercantile customers, either individually or jointly with their electric utility, to apply for commitment of such programs in accordance with the Commission's pilot program established in Case No. 10-834-EL-POR

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the electric utility's energy efficiency and demand reduction (EEDR) rider will be automatically approved on the sixty-first calendar day after filing, unless the Commission, or an attorney examiner, suspends or denies the application prior to that time. Completed applications requesting the exemption from the EEDR rider (Option 2) will also qualify for the 60-day automatic approval so long as the exemption period does not exceed 24 months. Rider exemptions for periods of more than 24 months will be reviewed by the Commission Staff and are only approved up the issuance of a Commission order.

Complete a separate application for each customer program. Projects undertaken by a customer as a single program at a single location or at various locations within the same service territory should be submitted together as a single program filing, when possible. Check all boxes that are applicable to your program. For each box checked, be sure to complete all subparts of the question, and provide all requested additional information. Submittal of incomplete applications may result in a suspension of the automatic approval process or denial of the application.

Any confidential or trade secret information may be submitted to Staff on disc or via email at ee-pdr@puc.state.oh.us.

Section 1: Mercantile Customer Information

Name:Millcreek West Unity Local Schools

Principal address:1401 W. Jackson West Unity OH 43570

Address of facility for which this energy efficiency program applies:1401 W. Jackson West Unity OH 43570

Name and telephone number for responses to questions:Neil Wittberg 614 949 5616

Electricity use by the customer (check the box(es) that apply):

☒ The customer uses more than seven hundred thousand kilowatt hours per year at the above facility. (Please attach documentation.)

☐ The customer is part of a national account involving multiple facilities in one or more states. (Please attach documentation.)

Section 2: Application Information

A) The customer is filing this application (choose which applies):

☐ Individually, without electric utility participation.

☒ Jointly with the electric utility.

B) The electric utility is: The Toledo Edison Company

C) The customer is offering to commit (check any that apply):

☒ Energy savings from the customer's energy efficiency program. (Complete Sections 3, 5, 6, and 7.)

☐ Capacity savings from the customer's demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)

☐ Both the energy savings and the capacity savings from the customer's energy efficiency program. (Complete all sections of the Application.)

Section 3: Energy Efficiency Programs

A) The customer's energy efficiency program involves (check those that apply):

☐ Early replacement of fully functioning equipment with new equipment. (Provide the date on which the customer replaced fully functioning equipment, and the date on which the customer would have replaced such equipment if it had not been replaced early. Please include a brief explanation for how the customer determined this future replacement date (or, if not known, please explain why this is not known)). **If Checked, Please see Exhibit 1 and Exhibit 2**

☐ Installation of new equipment to replace equipment that needed to be replaced The customer installed new equipment on the following date(s): _____.

☒ Installation of new equipment for new construction or facility expansion. The customer installed new equipment on the following date(s):

SEE EXHIBIT 2.

☐ Behavioral or operational improvement.

B) Energy savings achieved/to be achieved by the energy efficiency program:

1) If you checked the box indicating that the project involves the early replacement of fully functioning equipment replaced with new equipment, then calculate the annual savings [(kWh used by the original equipment) – (kWh used by new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: _____ kWh

2) If you checked the box indicating that the customer installed new equipment to replace equipment that needed to be replaced, then calculate the annual savings [(kWh used by less efficient new equipment) – (kWh used by the higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: _____ kWh

Please describe any less efficient new equipment that was rejected in favor of the more efficient new equipment. **Please see Exhibit 1 if applicable**

3) If you checked the box indicating that the project involves equipment for new construction or facility expansion, then calculate the annual savings [(kWh used by less efficient new equipment) – (kWh used by higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: 620,657 kWh

Please describe the less efficient new equipment that was rejected in favor of the more efficient new equipment. **Please see Exhibit 1 if applicable**

4) If you checked the box indicating that the project involves behavioral or operational improvements, provide a description of how the annual savings were determined.

Section 4: Demand Reduction/Demand Response Programs

A) The customer's program involves (check the one that applies):

☐ Coincident peak-demand savings from the customer's energy efficiency program.

☐ Actual peak-demand reduction. (Attach a description and documentation of the peak-demand reduction.)

☐ Potential peak-demand reduction (check the one that applies):

☐ The customer's peak-demand reduction program meets the requirements to be counted as a capacity resource under a tariff of a regional transmission organization (RTO) approved by the Federal Energy Regulatory Commission.

☐ The customer's peak-demand reduction program meets the requirements to be counted as a capacity resource under a program that is equivalent to an RTO program, which has been approved by the Public Utilities Commission of Ohio.

B) On what date did the customer initiate its demand reduction program?

_____

C) What is the peak demand reduction achieved or capable of being achieved (show calculations through which this was determined):

_____ kW

Section 5: Request for Cash Rebate Reasonable Arrangement (Option 1) or Exemption from Rider (Option 2)

Under this section, check the box that applies and fill in all blanks relating to that choice.

Note: If Option 2 is selected, the application will not qualify for the 60-day automatic approval. All applications, however, will be considered on a timely basis by the Commission.

A) The customer is applying for:

☒ Option 1: A cash rebate reasonable arrangement.

OR

☐ Option 2: An exemption from the energy efficiency cost recovery mechanism implemented by the electric utility.

OR

☐ Commitment payment

B) The value of the option that the customer is seeking is:

Option 1: A cash rebate reasonable arrangement, which is the lesser of (show both amounts):

☒ A cash rebate of $29,674 (Rebate shall not exceed 50% project cost. Attach documentation showing the methodology used to determine the cash rebate value and calculations showing how this payment amount was determined.)

Option 2: An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider.

☐ An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for _____ months (not to exceed 24 months). (Attach calculations showing how this time period was determined.)

OR

☐ A commitment payment valued at no more than $_____. (Attach documentation and calculations showing how this payment amount was determined.)

OR

☐ Ongoing exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for an initial period of 24 months because this program is part of the customer's ongoing efficiency program. (Attach documentation that establishes the ongoing nature of the program.) In order to continue the exemption beyond the initial 24 month period, the customer will need to provide a future application establishing additional energy savings and the continuance of the organization's energy efficiency program.)

Section 6: Cost Effectiveness

The program is cost effective because it has a benefit/cost ratio greater than 1 using the (choose which applies):

☐ Total Resource Cost (TRC) Test. The calculated TRC value is: _____(Continue to Subsection 1, then skip Subsection 2)

☒ Utility Cost Test (UCT) . The calculated UCT value is: **See Exhibit 3** (Skip to Subsection 2.)

Subsection 1: TRC Test Used (please fill in all blanks).

The TRC value of the program is calculated by dividing the value of our avoided supply costs (generation capacity, energy, and any transmission or distribution) by the sum of our program overhead and installation costs and any incremental measure costs paid by either the customer or the electric utility.

The electric utility's avoided supply costs were _____.

Our program costs were _____.

The incremental measure costs were _____.

Subsection 2: UCT Used (please fill in all blanks).

We calculated the UCT value of our program by dividing the value of our avoided supply costs (capacity and energy) by the costs to our electric utility (including administrative costs and incentives paid or rider exemption costs) to obtain our commitment.

Our avoided supply costs were **See Exhibit 3**

The utility's program costs were **See Exhibit 3**

The utility's incentive costs/rebate costs were **See Exhibit 3**

Section 7: Additional Information

Please attach the following supporting documentation to this application:

- Narrative description of the program including, but not limited to, make, model, and year of any installed and replaced equipment.
- A copy of the formal declaration or agreement that commits the program or measure to the electric utility, including:
  1) any confidentiality requirements associated with the agreement;
  2) a description of any consequences of noncompliance with the terms of the commitment;
  3) a description of coordination requirements between the customer and the electric utility with regard to peak demand reduction;
  4) permission by the customer to the electric utility and Commission staff and consultants to measure and verify energy savings and/or peak-demand reductions resulting from your program; and,
  5) a commitment by the customer to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.
- A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results. Additionally, identify and explain all deviations from any program measurement and verification guidelines that may be published by the Commission.

Ohio | Public Utilities Commission

Application to Commit Energy Efficiency/Peak Demand Reduction Programs (Mercantile Customers Only)

Case No.: 12-1828-**EL-EEC**

State of Ohio :

Traci Thompson, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

   Millcreek-West Unity Local Schools
   [insert customer or EDU company name and any applicable name(s) doing business as]

2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.

Traci Thompson, Treasurer
Signature of Affiant & Title

Sworn and subscribed before me this 30th day of May, 2012 Month/Year

Signature of official administering oath

Jana R. Griffin, Notary
Print Name and Title

My commission expires on Jana R. Griffin Notary Public, State of Ohio Williams County My Commission Expires: June 23, 2012

Exhibit 1

Customer Legal Entity Name: Millcreek-West Unity Local School District

Site Address: Millcreek-West Unity K-12
Principal Address: 1401 W. Jackson Street

Project No.	Project Name	Narrative description of your program including, but not limited to, make, model, and year of any installed and replaced equipment:	Description of methodologies, protocols and practices used in measuring and verifying project results	What date would you have replaced your equipment if you had not replaced it early? Also, please explain briefly how you determined this future replacement date.	Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.
1	Millcreek West Unity K-12 High Efficient Envelope	A new K-12 was built for Millcreek SD in West Unity Ohio. They installed an energy efficient envelope that far exceeds ASHRAE's minimum requirements. The rebate was calculated by creating a building energy model in equest and comparing the energy use against an ASHRAE minimum envelope per 90.1 appendix G.	Data was gathered from the plans (Attachment D) and input to Equest to create an as built model. This building was compared to an identical model with code minimum envelope (walls, roofs and windows) insulation values and savings was calculated (see Attachment A for a summary of model results, detailed model outputs can be provided upon request). This was input to the custom rebate calculator to determine the rebate amount.	N/A	ASHRAE baseline code complient envelope per 90.1 standard
2	High Efficient Lighting and Occ Sensors	highly efficient lighting and occ sensors were installed throughout the new K-12 facility	Data was gathered from the electrical plans (Attachment D) and the electrical o&ms (Attachment G) this was input to our lighting count sheet (Attachment B) and then input to the lighting rebate calculator to determine savings and rebate amount.	N/A	code minimum lighting
3	Heat Recovery Units	Heat recovery units, by renewaire, were installed on all of the dedicated outdoor air units (9) throughout the new facility. These are static plate energy recovery units.	Data was gathered from the mechanical plans (Attachment D) and input into Attachment F. Savings was calculated using binned weather data and calculating the amount of energy revocered by these units based on their effectiveness, occupied hours, flow rates and indoor setpoints Rebate was calculated using custom rebate calculator.	N/A	N/A
4	Ground Source Heat Pumps	Highly efficient climate master ground source heat pumps were installed at the new k-12	Specifications were gathered from Attachment D and input to Attachment C. The total rebate amount was calculated based on the $250 per heat pump prescriptive amount. kWh savings were calculated in Equest comparing the as built building to an ASHRAE baseline building (per 90.1 appendix G) Calculation : Baseline HVAC kWh usage - Proposed HVAC kWh usage= (529615 + 62024 + 669 + 117679) - (38345+35912+113935+206739) = 315,056 kWh	N/A	code minimum efficient heat pumps
5	VFDs	VFDs were installed on the ground source heat pump loop at the new K-12	Data was gathered from Attachment D and Attachment H and input into the motors and drives calculator to determine the rebate amount. kWh savings were calculated based on a 25% reduction in energy use over a motor with no such control in place. 2*30 hp * .746 kw/hp * 5520 hrs * .8LF *.25 = 49,415 kWh An analysis was done in yaskawa's software tool on one of the 2 identical motors to check savings. A value of 33,037 kWh savings per motor was determined. The estimate for both motors of 49,415 kWh is being applied for because it is more conservative.	N/A	no motor controls
6	Energy Efficient Split Systems	Split systems were installed to cool the computer rooms throughout the facility. These systems have a SEER of 16	Data was gathered from Attachment D as well as split system specs / efficiencies from Attachment L&M The kWh savings was calculated in Attachment K. The rebate amount was determined from the prescriptive business incentive of $150 for split systems under 65,000 btuh and efficiencies over 14.3 seer	N/A	Ashrae minimum efficient split systems

Exhibit 2

Customer Legal Entity Name: Millcreek-West Unity Local School District
Site Address: Millcreek-West Unity K-12
Principal Address: 1401 W. Jackson Street

	Unadjusted Usage, kwh (A)	Weather Adjusted Usage, kwh (B)	Weather Adjusted Usage with Energy Efficiency Addbacks, kwh (c) *Note 1*
2011	1,290,560	1,290,560	1,911,217
			622,233
			161,541
Average	**1,290,560**	**1,290,560**	**898,330**

Project Number	Project Name	In-Service Date	Project Cost $	50% of Project Cost $	KWh Saved/Year (D) counting towards utility compliance	KWh Saved/Year (E) eligible for incentive	Utility Peak Demand Reduction Contribution, KW (F)	Prescriptive Rebate Amount (G) $	Eligible Rebate Amount (H) $ *Note 2*
1	Millcreek West Unity K-12 High Efficient Envelope	09/28/2009	$9,591,919	$4,795,960	45,464	45,464	-	$3,637	$2,728
2	High Efficient Lighting and Occ Sensors	09/28/2009	$123,463	$61,732	141,241	141,241	-	$6,660	$4,995
3	Heat Recovery Units	09/28/2009	$22,500	$11,250	65,223	65,223	-	$5,218	$3,914
4	Ground Source Heat Pumps	09/28/2009	$516,000	$258,000	315,056	315,056	-	$21,500	$16,125
5	VFDs	09/28/2009	$7,524	$3,762	49,415	49,415	-	$2,100	$1,575
6	Energy Efficient Split Systems	09/28/2009	$5,481	$2,741	4,258	4,258	-	$450	$338
					-	-	-		
		Total	**$10,266,887**		**620,657**	**620,657**	**0**	**$39,565**	**$29,674**

Docket No. 12-1828
Site: 1401 W. Jackson Street

Notes
(1) Customer's usage is adjusted to account for the effects of the energy efficiency programs included in this application. When applicable, such adjustments are prorated to the in-service date to account for partial year savings.

(2) The eligible rebate amount is based upon 75% of the rebates offered by the FirstEnergy Commercial and Industrial Energy Efficiency programs or 75% of $0.08/kWh for custom programs for all energy savings eligible for a cash rebate as defined in the PUCO order in Case NO.10-834-EL-EEC dated 9/15/2010, not to exceed the lesser of 50% of the project cost or $250,000 per project. The rebate also cannot exceed $500,000 per customer per year, per utility service territory.

Commitment Payment $

Exhibit 3 Utility Cost Test

UCT = Utility Avoided Costs / Utility Costs

Project	Total Annual Savings, MWh (A)	Utility Avoided Cost $/MWh (B)	Utility Avoided Cost $ (C)	Utility Cost $ (D)	Cash Rebate $ (E)	Administrator Variable Fee $ (F)	Total Utility Cost $ (G)	UCT (H)
1	45	$ 308	$ 14,016	$ 675	$2,728	$455	$ 3,857	**3.6**
2	141	$ 308	$ 43,542	$ 675	$4,995	$1,412	$ 7,082	**6.15**
3	65	$ 308	$ 20,107	$ 675	$3,914	$652	$ 5,241	**3.84**
4	315	$ 308	$ 97,125	$ 675	$16,125	$3,151	$ 19,951	**4.87**
5	49	$ 308	$ 15,234	$ 675	$1,575	$494	$ 2,744	**5.55**
6	4	$ 308	$ 1,313	$ 675	$338	$43	$ 1,055	**1.24**
Total	**621**	**$ 308**	**191,336**	**4,050**	**$29,674**	**$6,207**	**39,930**	**4.8**

Notes

(A) From Exhibit 2, = kWh saved / 1000

(B) This value represents avoided energy costs (wholesale energy prices) from the Department of Energy, Energy Information Administration's 2009 Annual Energy Outlook (AEO) low oil prices case. The AEO represents a national average energy price, so for a better representation of the energy price that Ohio customers would see, a Cinergy Hub equivalent price was derived by applying a ratio based on three years of historic national average and Cinergy Hub prices.This value is consistent with avoided cost assumptions used in EE&PDR Program Portfolio and Initial Benchmark Report, filed Dec 15, 2009 (See Section 8.1, paragraph a).

(C) = (A) * (B)

(D) Represents the utility's costs incurred for self-directed mercantile applications for applications filed and applications in progress. Includes incremental costs of legal fees, fixed administrative expenses, etc.

(E) This is the amount of the cash rebate paid to the customer for this project.

(F) Based on approximate Administrator's variable compensation for purposes of calculating the UCT, actual compensation may be less.

(G) = (D) + (E) + (F)

(H) =(C) / (G)

Millcreek-West Unity Local School District ~ Millcreek-West Unity K-12
Docket No. 12-1828

Site: 1401 W. Jackson Street

Lighting Inventory Form

Applicant Name: Millcreek West Unity SD
Facility Name: Millcreek West Unity K-12
Date:
Lighting Zone (exterior only): Lighting Zone 3

Instructions: Please use one line for each fixture type in a room or area
For existing or proposed control, choose OCC for Occupany Sensor, DAYLTG for photosensor, or NONE for none. Controls must save energy to qualify.
The total of Column S, the quantities of CFLs and exit signs in Column M, and the quantities of sensors in Column R, will be used to calculate your incentive on the NonStandard Lighting form.

PROJECT BASIC INFORMATION								BASELINE				PROPOSED INSTALLATION							Energy Calculations														Post Fixture Cut Sheet Number
Line Item	Area Description	Floor	Space Description	Interior or Exterior Fixture	Predominant Space Type	Exterior Lighting Description (Exterior Lighting Only)	Area Cooling	Units e.g. Square Feet (ft^2) If multiple fixture types are used, please only enter the total area/distance/qty once per space.		Lighting Power Density (W/unit)	Baseline kW / Space (kW)	Proposed Fixture Qty	Proposed Fixture Code	Post Watts/ Fixture (W)	Post kW / Space (kW)	Are Occupancy Sensors Required by Code?	Proposed Control Please enter DAYLTG, OCC or NONE.	Proposed Sensor Quantity When applicable	Interior Change in Connected Load (kW)	Exterior Change in Connected Load (kW)	Applicant Coincidence Factor (CF) Estimate	Coincidence Factor	Interactive Factor (demand)	Interactive Factor (energy)	Controls Factor	Interior Demand Savings (kW)	Exterior Demand Savings (kW)	Applicant Equivalent Full Load Hours (EFLH) Estimate	Prescribed Equivalent Full Load Hours	Annual Interior Fixture kWh Saved	Annual Exterior Fixture kWh Saved	Annual kWh Saved (Sensors only)	
e.g.	*Office*	*2*	*Other*	*Interior*	*Office - Small*		*Cooled Space*	*30,000*	*ft^2*	*1.0*	*30.00*	*150*	*F42ILL*	*59*	*8.85*	*No*	*OCC*	*25*	*21.15*		*84%*	*84%*	*34%*	*12%*	*30%*	*23.81*		*2,808*	*3,435*	*81,368*		*10,214*	*1*
e.g.	*Office*	*2*	*Conference, Meeting or Training Room*	*Interior*	*Office - Small*		*Cooled Space*		*ft^2*	*1.0*	*0.00*	*25*	*CF11/1*	*13*	*0.33*	*Yes*	*OCC*	*2*	*-0.33*		*84%*	*84%*	*34%*	*12%*	*30%*	*-0.37*		*2,808*	*3,435*	*-1,250*			*1*
e.g.	*Restaurant*	*1*	*Other*	*Exterior*	*Dusk-to-Dawn Lighting*	*Drive-through windows/doors*	*Uncooled space*	*3*	*window(s)*	*400.0*	*1.20*	*5*	*Example Cut Sheet 2*	*25*	*0.13*	*No*	*NONE*			*1.08*	*88%*	*0%*	*0%*	*0%*	*0%*		*0.00*	*8,760*	*3,833*		*4,120*	*0*	*1A*
1	K-12	2	Other	Interior	Education - Secondary School		Cooled Space	122,752	ft^2	1.2	147.30	1	Cut Sheet 1	123,820	123.82	No	OCC	157	23.48		85%	57%	34%	12%	30%	17.94		2,808	2,080	54,706		86,535	
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179																	NONE																

PROJECT BASIC INFORMATION								BASELINE			PROPOSED INSTALLATION							Energy Calculations														Post Fixture Cut Sheet Number
Line Item	Area Description	Floor	Space Description	Interior or Exterior Fixture	Predominant Space Type	Exterior Lighting Description (Exterior Lighting Only)	Area Cooling	Units e.g. Square Feet (ft^2) If multiple fixture types are used, please only enter the total area/distance/qty once per space.	Lighting Power Density (W/unit)	Baseline kW / Space (kW)	Proposed Fixture Qty	Proposed Fixture Code	Post Watts/ Fixture (W)	Post kW / Space (kW)	Are Occupancy Sensors Required by Code?	Proposed Control Please enter DAYLTG, OCC or NONE.	Proposed Sensor Quantity When applicable	Interior Change in Connected Load (kW)	Exterior Change in Connected Load (kW)	Applicant Coincidence Factor (CF) Estimate	Coincidence Factor	Interactive Factor (demand)	Interactive Factor (energy)	Controls Factor	Interior Demand Savings (kW)	Exterior Demand Savings (kW)	Applicant Equivalent Full Load Hours (EFLH) Estimate	Prescribed Equivalent Full Load Hours	Annual Interior Fixture kWh Saved	Annual Exterior Fixture kWh Saved	Annual kWh Saved (Sensors only)	
180																NONE																
181																NONE																
182																NONE																
183																NONE																
184																NONE																
185																NONE																
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249																NONE																
250																NONE																
Totals								122,752		147.30	1			123.82				23.48	0.00						17.94	0.00			54,706		86,535	
																		23.48							17.94					141,241		

Project Estimated Annual Savings Summary

Estimated Annual kWh Savings	141,241
Total Change in Connected Load	23.48

Annual Estimated Cost Savings	$14,124.10
Annual Operating Hours	2,080

Interior Lighting Incentive @ $0.05/kWh (excluding retrofit CFLs, sensors, or LED exit signs)	$2,735.30
Exterior Lighting Incentive @ $0.05/kWh (excluding retrofit CFLs, sensors, or LED exit signs)	$0.00
Total retrofit CFL Incentive @ $1/screw-in CFL lamp; $15/hard-wired CFL lamp (includes all retrofit CFLs, both interior and exterior)	$0.00
Total retrofit LED Exit Incentive @ $10/exit sign	$0.00
Total Lighting Controls Incentive @ $25/sensor (includes all Lighting Controls, both interior and exterior)	$3,925.00

Total Calculated Incentive	$6,660.30

Total Fixture Quantity excluding retrofit CFLs and LED Exit Sign	1
Total Lamp Quantity for retrofit Screw-In CFLs	0
Total Lamp Quantity for retrofit Hard-Wired CFLs	0
Total Fixture Quantity for retrofit LED Exit Signs	0
Total Quantity for Occupancy Sensors	157
Total Quantity for Daylight Sensors	0

Please briefly describe how you estimated your coincidence factor (CF) and applicant equivalent full-load hours (EFLH) for facility type “Other” indicated on the Lighting Form tab

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Mercantile Customer Program - Custom Project Rebate Calculator

Project Name and Number:	P-1, P-3
Site Name:	**Millcreek West Unity K-12**
Completed by (Name):	**Neil Wittberg**
Date completed:	**5/21/2012**

Energy Conservation Measure	Annual Energy Savings kWh	Eligible Prescriptive Rebate Amount kWh * $0.08
Whole Building Envelope Performance	**45,464**	**3637.12**
Heat Recovery Units	**65,223**	**5217.84**
Total Project Energy Savings kWh	**110,687**	
Total Custom Prescriptive Rebate Amount $		**$ 8,854.96**

Notes about this rebate calculation:
A new K-12 was built for Millcreek SD in West Unity Ohio. They installed a closed loop ground source heat pump system, energy recovery ventilators, efficient lighting and envelope as well as vfd's on their pumps. The rebate was calculated by creating a building energy model in equest and comparing the energy use against an ASHRAE baseline building per 90.1 appendix G.

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Project Name:	VFDs
Site Name:	Millcreek West Unity K-12
Completed by (Name):	Neil
Date completed:	5/29/2012

Variable Frequency Drive Rebate Form

VFD and Controlled Motor Nameplate DATA											
Motor Application	**VFD Manufacturer**	**VFD Model Number**	**Unique Motor ID(s)**	**Motor Location**	**Enclosure type: TEFC or ODP**	**Annual Hours of Operation[2]**	**Load Factor (LF)[3]**	**Motor Model Number**	**Motor HP**	**Motor Nominal Efficiency**	**Total Motor Incentive [1] $**
Heat Pump Circulat	Automation Direct	DuraPulse	P-1	Mechanical 126	TEFC	5520	0.8	M4104T-9	30	92.4	**1,050**
Heat Pump Circulat	Automation Direct	DuraPulse	P-2	Mechanical 126	TEFC	5520	0.8	M4104T-9	30	92.4	**1,050**
											0
											0
											0
											0
										Incentive through 10/11/2011 @ $35/hp	**2,100**

(1) VFD incentives (through 10/11/2011) are calculated at a flat rate of $35 per horsepower controlled, up to a maximum of 500 hp controlled per VFD.
When a single VFD is used to control two motors in a lead/lag (standby, redundant) configuration, use only the horsepower rating of one motor to figure controlled horsepower. For instance, if a single VFD controls two 30hp motors with only one operating at a time, the incentive calculation should be based on 30 hp: 30hp x $35/hp = $900.

(2) For VAV fan motors, enter 2790 annual hours of operation. For HVAC pump motors, enter 5520 annual hours of operation. For all other motor usage, please estimate your annual hours of operation and attach an explanation of how you determined this value.

(3) For all motor and VFD applications, use the Load Factor (LF) default value of 0.80, unless data is available to support the use of a motor-specific LF other than 0.80. Please attach an explanation, including your analysis and/or data used, to support motor-specific LF value.

millcreek west unity p-1
Neil Wittberg
to:
vmnofziger@firstenergycorp.com
09/24/2012 05:15 PM
Hide Details
From: Neil Wittberg <neil.wittberg@plugsmart.com>

To: "vmnofziger@firstenergycorp.com" <vmnofziger@firstenergycorp.com>

2 Attachments

Millcreek West Unity - As Built.pdf Millcreek West Unity_BaseEnvelope.pdf

Vicky,

I've attached the model reports for this. The kWh savings was determined by taking the difference of the total electricity uses between the two. This model only captures savings attributable to the roof, wall and window R-values.

Let me know if this clears everything up.

Neil M. Wittberg
Energy Engineer
Plug Smart
P: 614.949.5616
F: 1.800.518.5576
www.plugsmart.com

Orientation and Energy Use Comparison **Attachment A**

Baseline		As Built	
Azimuth (degrees)	Energy Use (kWh)	Azimuth (Degrees)	Energy Use (kWh)
0	988,007.00	0	942,543.00

Savings (kWh) **45,464.00**

REPORT- BEPU Building Utility Performance WEATHER FILE- Toledo OH TMY2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	268788.	0.	272097.	38345.	35912.	0.	113935.	206739.	0.	6728.	0.	0.	942543.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	618.	0.	0.	0.	0.	0.	0.	3122.	0.	3740.

TOTAL ELECTRICITY 942543. KWH 8.430 KWH /SQFT-YR GROSS-AREA 8.430 KWH /SQFT-YR NET-AREA
TOTAL NATURAL-GAS 3740. THERM 0.033 THERM /SQFT-YR GROSS-AREA 0.033 THERM /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.14
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 2
HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 10

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

REPORT- BEPU Building Utility Performance WEATHER FILE- Toledo OH TMY2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
KWH	268788.	0.	272097.	59710.	33118.	0.	125454.	221871.	0.	6970.	0.	0.	988007.
FM1 NATURAL-GAS													
THERM	0.	0.	0.	848.	0.	0.	0.	0.	0.	0.	3125.	0.	3973.

TOTAL ELECTRICITY 988007. KWH 8.837 KWH /SQFT-YR GROSS-AREA 8.837 KWH /SQFT-YR NET-AREA
TOTAL NATURAL-GAS 3973. THERM 0.036 THERM /SQFT-YR GROSS-AREA 0.036 THERM /SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.15
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 0
HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 13

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Project Title: Millcreek West Unity k-12

Prepared By:Neil

Date:4/25/2012

ATTACHMENT B

Room #	Type	Area	OS	A	B	C	D	E	F	G	H	I	F1	F1M	F1S	F1A	F2	F2M	F2S	F2A	F3	F3M	F3S	F4	F4A	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	AA	BB	CC	Room #
	Fixture Wattage			395	395	42	42	42	42	32	52	79	91	91	91	91	91	91	91	91	61	61	61	175	175	61	61	61	71	122	106	106	61	58	256	32	129	125	125	
17	Lobby	129	1											1	1																									17
16	Storage	100	1																							2														16
15	Office	230	1																		4																			15
14	Office	259	1										4																											14
18	Restroom	296	1			1	3														3								1											18
19	Restroom	261	1				2														3								2											19
20	Storage	345	1																		1	2	2																	20
21	Restroom	53	1																		1																			21
22	Restroom	89	1				1														1																			22
23	Conference Room	277	1											3	3																									23
24	Hall	250											1								5																			24
25	Storage	402	1																			3	3																	25
26	Office	351	1										4																											26
																																								0
																																								0
																																								0
13	Office	162	1										1	1	1																									13
12	Office	137	1											1	1																									12
11	Office	140	1											1	1																									11
10	Office	135	1											1	1																									10
9	Office	189	1											2	2																									9
8	Office	184	1										1	1	1																									8
7	Office	138	1											1	1																									7
6	Office	137	1											1	1																									6
5	Office	175	1										1	1	1																									5
4	Office	212	1											2	2																									4
3	Lobby	236	1																		3																			3
2	Lobby	290																			6															3				2
1	Lobby	188					2																																	1
52	Lobby	775																			17																			52
51	Office	151	1											1	1																									51
50	Storage	111	1																			2																		50
48	Restroom	65	1																		1																			48
49	Office	212	1				1							1	1																									49
47	Classroom	961	2										8	2	2																									47
46	Classroom	894	1										4	4	4																									46
45	Classroom	875	1										4	4	4																									45
44	Classroom	887	1										4	4	4																									44
39	Classroom	893	1										4	4	4																									39
38	Classroom	880	1										4	4	4																									38
37	Classroom	880	1										4	4	4																									37
32	Hall	2623																			10																		1	32
41	Restroom	288	1				1														2								2											41
42	Restroom	188	2			1	1														2								1											42
43	Mech/Elec	120																								2														43
40	Hall	212																			4																			40
002A	Stairs	323																			2																			002A
36	Classroom	1200	2										5	5	5																									36
35	Restroom	57	1																		1																			35
34	Restroom	57	1																		1																			34
33	Classroom	1200	2										5	5	5																									33
84	Laboratory	1762	2																											20										84
80	Laboratory	1680	2																											16										80
82	Storage	411																												3										82
83	Office	233	1																							1				2										83
81	Office	223	1																							1				2										81
85	Lobby	103					1																																	85
78	Hall	1521																			17															3				78
79	Hall	83																			2																			79
74	Office	90	1										1																											74
75	Restroom	96	1							1											1																			75
076A	Mech/Elec	73																								1														076A
76	Exercise Area	318	1										4																											76
72	Restroom	276	1							4											2								1											72
73	Locker	741	2																									12												73
71	Restroom	282	1							4											2								1											71
70	Locker	792	2																									12												70
69	Laundry	182	1																		1	1	1																	69
68	Restroom	82	1							1											1																			68
67	Office	82	1										1																											67
77	Hall	133																			3																			77
66	Mech/Elec	127																								2														66
65	Mech/Elec	103																								2														65
64	Exercise Area	1042	2										4	6	6																									64
63	Classroom	1283	2										4	8	8																									63
53	Classroom	954	2										8	2	2																									53
62	Laboratory	1143	2										4	6	6																									62
59	Mech/Elec	89																			1																			59

61	Classroom	227	1								3																				61
60	Laboratory	1393	2								4	8	8																		60
003A	Stairs	323															2														003A
58	Hall	1787															15														58
53	Classroom	954	1								8	2	2																		53
54	Classroom	905	1								4	4	4																		54
55	Classroom	894	1								4	4	4																		55
56	Classroom	883	1								4	4	4																		56
57	Classroom	914	1								4	4	4																		57
86	Gym	6407		18	6																			13							86
87	Gym	10298		22	8																			21							87
124	Office	352	1								5																				124
125	Office	139	1									1	1																		125
123	Lobby	94					1																								123
121	Hall	1293								4							14														121
89	Hall	360															6	1	1												89
109	Dining	4414						43																		55					109
110	Storage	481	1															3	3												110
115	Storage	283	1												2	2															115
127	Mech/Elec	362																				6									127
126	Mech/Elec	147																				16									126
104	Mech/Elec	1480																						6							104
90	Lobby	1294															6	5	5											4	90
88	Hall	536															5	1	1												88
91	Lobby	232					3																								91
96	Laboratory	1877	4																	3	15										96
98	Office	120	1												1	1															98
99	Office	99	1												1	1															99
97	Hall	347	2														6														97
100	Restroom	63	1												1	1															100
101	Office	136	1														1														101
102	Storage	644	2														8														102
103	Mech/Elec	73																				2									103
92	Lobby	98	1												1	1															92
93	Restroom	244	1			1	1										2								1						93
94	Restroom	230	1				1										2								2						94
95	Hall	189															3														95
105	Locker	117	1															1	1										2		105
106	Hall	44								1																					106
107	Hall	60								1																					107
108	Locker	141	1															1	1										2		108
114	Food Prep	1034	2								1	7	7				1														114
118	Mech/Elec	84	1														1														118
119	Locker	67	1											1																	119
120	Restroom	65	1														1														120
113	Office	100	1								1																				113
112	Food Prep	250	1								1	1	1																		112
004A	Stairs	114	1																				1								004A
128	Mech/Elec	42																				1									128
111	Food Prep	586	2									5	5																		111
215	Classroom	931	1								4	4	4																		215
216	Classroom	897	1								4	4	4																		216
217	Classroom	900	1								4	4	4																		217
211	Classroom	880	1								4	4	4																		211
212	Classroom	880	1								4	4	4																		212
213	Classroom	912	1								4	4	4																		213
223	Classroom	912	1								4	4	4																		223
224	Classroom	880	1								4	4	4																		224
225	Classroom	909	1								4	4	4																		225
221	Mech/Elec	119																				2									221
218	Hall	205																2	2												218
220	Restroom	244	2				1										2								1						220
219	Restroom	210	2			1	1										2								2						219
226	Classroom	961	2								8	2	2																		226
229	Storage	110	1															1	1												229
227	Restroom	66	1														1														227
228	Office	209	1									2	2																		228
230	Office	155	1									1	1																		230
002B	Stairs	328															3														002B
207	Stacks	147	1												1	1															207
208	Mech/Elec	215																				6									208
209	Office	130	1									1	1																		209
210	Office	408	1									2	2																		210
206	Reading	2430	7				6		12																		28	4			206
205	Classroom	439	1												3	3															205
204	Classroom	968	2										1	1	6	5															204
203	Restroom	273	1				2										2								2						203
202	Restroom	298	1			1	2										3								1						202
001B	Stairs	286					2										2														001B
200	Lobby	792					6										8														200
214	Hall	2724					1										22														214
232	Classroom	908	1								4	4	4																		232
233	Classroom	883	1								4	4	4																		233
234	Classroom	886	1								4	4	4																		234
235	Classroom	921	1								4	4	4																		235

238	Classroom	921	1		4	4	4							238
239	Classroom	883	1		4	4	4							239
240	Classroom	885	1		4	4	4							240
241	Classroom	891	1		4	4	4							241
236	Hall	1880						15						236
003B	Stairs	318						3						003B
231	Classroom	947	2		6	3	3							231
242	Classroom	1247	2		4	8	8							242
237	Mech/Elec	95									2			237
243	Storage	192	1						1	1				243
244	Mech/Elec	180									3			244
245	Hall	433		1				4					3	245
246	Mech/Elec	1906									16			246
247	Hall	77										2		247
250	Mech/Elec	1405									8			250
248	Mech/Elec	173	1		1	1	1							248
249	Mech/Elec	127									2			249
														0
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TOTALS	112373	157	40	14		0	40	43	12	10	6	0	206	204	205	0	2	16	15	0	237		22		15	75	3	64	17		55	28	4	0	4	13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
			1351																																																

Totals

Occupancy Controls	
Watts Controlled	OS>500W
182	0
122	0
244	0
364	0
422	0
409	0
305	0
61	0
103	0
546	1
0	0
366	0
364	0
0	0
0	0
0	0
273	0
182	0
182	0
182	0
364	0
273	0
182	0
182	0
273	0
364	0
183	0
0	0
0	0
0	0
182	0
122	0
61	0
224	0
1092	2
1092	1
1092	1
1092	1
1092	1
1092	1
1092	1
0	0
306	0
277	0
0	0
0	0
0	0
1365	2
61	0
61	0
1365	2
2440	2
1952	2
0	0
305	0
305	0
0	0
0	0
0	0
91	0
93	0
0	0
364	0
321	0
732	2
321	0
732	2
183	0
93	0
91	0
0	0
0	0
0	0
1456	2
1820	2
1092	2
1456	2
0	0

Room Type	Area	COMcheck Rating	Allowed Wattage	Proposed Wattage	Proposed Watts/SF
Audience	0	0.9	0	0	#DIV/0!
Classroom	35525	1.4	49735	43316	1.219310345
Conference Room	277	1.3	360.1	546	1.971119134
Dining	4414	0.9	3972.6	7636	1.729950159
Dorm Room	0	1.1	0	0	#DIV/0!
Exam/Treatment	0	1.5	0	0	#DIV/0!
Exercise Area	1360	0.9	1224	1820	1.338235294
Food Prep	1870	1.2	2244	2609	1.395187166
Gym	16705	2.3	38421.5	23404	1.401017659
Hall	14757	0.5	7378.5	9161	0.620790133
Laboratory	7855	1.4	10997	5901	0.751241248
Laundry	182	0.6	109.2	122	0.67032967
Lobby	4231	1.3	5500.3	3879	0.916804538
Locker	1858	0.6	1114.8	2701	1.453713671
Lounge	0	1.2	0	0	#DIV/0!
Mail Sorting	0	1.2	0	0	#DIV/0!
Mech/Elec	6920	1.5	10380	5092	0.73583815
Nurse	0	1	0	0	#DIV/0!
Office	5288	1.1	5816.8	6384	1.207261725
Operating Room	0	2.2	0	0	#DIV/0!
Parking Garage	0	0.2	0	0	#DIV/0!
Patient Room	0	0.7	0	0	#DIV/0!
Pharmacy	0	1.2	0	0	#DIV/0!
Reading	2430	1.2	2916	3968	1.632921811
Restroom	3783	0.9	3404.7	4577	1.209886334
Sales Area	0	1.7	0	0	#DIV/0!
Stacks	147	1.7	249.9	182	1.238095238
Stairs	1692	0.6	1015.2	877	0.518321513
Storage	3079	0.8	2463.2	1645	0.534264372
Workshop	0	1.9	0	0	#DIV/0!
Totals	**Area**		**Allowed Wattage**	**Proposed Wattage**	**% Above/Below Code**	**Watts Saved**
	112373		147302.8	123820	15.94%	23482.8

Hours of Operation	Electric Rate	kWh Saved	$ Saved
		0	0

If Doing COMcheck with whole building Area, fill in Area below (Default building type is School):

Building Type	Area	COMcheck Rating	Allowed Wattage	Proposed Wattage	% Above/Below Code	Watts Saved
School	112373	1.2	134847.6	123820	8.18%	11027.6

Hours of Operation	Electric Rate	kWh Saved	$ Saved
		0	0

Occupancy Sensor Summation:

Watts Controlled	OS>500W	OS Total
81609	79	78

273	0
1820	2
0	0
0	0
1092	1
1092	1
1092	1
1092	1
1092	1
0	0
0	0
455	0
182	0
0	0
0	0
0	0
0	0
366	0
364	0
0	0
0	0
0	0
0	0
0	0
0	0
3150	4
182	0
182	0
366	0
182	0
61	0
488	0
0	0
182	0
277	0
306	0
0	0
634	1
0	0
0	0
634	1
1426	2
61	0
91	0
61	0
91	0
273	0
61	0
0	0
910	2
1092	1
1092	1
1092	1
1092	1
1092	1
1092	1
1092	1
1092	1
0	0
0	0
235	0
348	0
1092	2
122	0
61	0
364	0
182	0
0	0
182	0
0	0
182	0
364	0
3968	7
546	1
1183	2
348	0
380	0
0	0
0	0
0	0
1092	1
1092	1
1092	1
1092	1

1092	1
1092	1
1092	1
1092	1
0	0
0	0
1092	2
1820	2
0	0
122	0
0	0
0	0
0	0
0	0
0	0
273	0
0	0
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0	0
0	0
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0	0
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0	0
0	0
0	0
0	0

78

79

81609

Audience	Classroom	Conference Room	Dining	Dorm Room	Exam/Treatment	Exercise Area	Food Prep	Gym	Hall	Laboratory	Laundry	Lobby	Locker	Lounge	Mail Sorting	Mech/Elec	Nurse	Office	Operating Room	Parking Garage	Patient Room	Pharmacy	Reading	Restroom	Sales Area	Stacks	Stairs	Storage	Workshop
0	0	0	0	0	0	0	0	0	0	0	0	129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	230	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	259	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	296	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	345	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	0	0	0	0	0
0	0	277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	402	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	351	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	162	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	135	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	189	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	138	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	175	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	212	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	775	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	212	0	0	0	0	0	0	0	0	0	0	0
0	961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	894	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	887	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	893	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	2623	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	288	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	188	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	323	0	0
0	1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	0	0	0	0	0
0	1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1680	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	411	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	233	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	223	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1521	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	276	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	741	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	282	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	792	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	182	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1042	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1283	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	0	0	0	0	0	0	0	0	0	0	0	0	0
0	227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1393	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	323	0	0
0	0	0	0	0	0	0	0	0	1787	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0	954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	905	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	894	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	914	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	6407	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	10298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	352	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	360	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	908	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	886	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	921	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0	885	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	891	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	947	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Proposed Watts

A	B		D	E	F	G	H	I	F1	F1M	F1S	F1A	F2	F2M	F2S	F2A	F3	F3S	F4A	F5	F6	F7	F8	F10	F11	F12	F13	F14	F15	AA	BB	CC												
15800	5530	0	1680	1806	504	320	312	0	18746	18564	18655	0	182	1456	1365	0	14457	1342	2625	4575	183	3904	1207	5830	2968	244	0	1024	416	0	0	125	0	0	0	0	0	0	0	0	0	0	0

	Fixture Wattage																																									
	395	395	0	42	42	42	32	52	79	91	91	91	91	91	91	91	91	61	61	175	61	61	61	71	106	106	61	58	256	32	129	125	125	0	0	0	0	0	0	0	0	0	0	0	0
	Fixture Type																																											
	A	B	0	D	E	F	G	H	I	F1	F1M	F1S	F1A	F2	F2M	F2S	F2A	F3	F3S	F4A	F5	F6	F7	F8	F10	F11	F12	F13	F14	F15	AA	BB	CC	0	0	0	0	0	0	0	0	0	0	0	0
Audience	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Classroom	0	0	0	0	0	0	0	0	0	167	145	146	0	1	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conference Room	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dining	0	0	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dorm Room	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exam/Treatment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exercise Area	0	0	0	0	0	0	0	0	0	8	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Food Prep	0	0	0	0	0	0	0	0	0	2	13	13	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gym	40	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hall	0	0	0	2	0	0	0	6	0	1	0	0	0	0	0	0	0	131	4	0	0	2	0	0	0	0	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Laboratory	0	0	0	0	0	0	0	0	0	8	14	14	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laundry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lobby	0	0	0	13	0	0	0	0	0	0	1	1	0	0	1	1	0	40	5	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Locker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	24	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lounge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mail Sorting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mech/Elec	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	2	0	0	71	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nurse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Office	0	0	0	1	0	0	0	0	0	19	21	21	0	0	2	2	0	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Room	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking Garage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Patient Room	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pharmacy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reading	0	0	0	6	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restroom	0	0	0	16	0	0	10	0	0	0	0	0	0	0	1	1	0	36	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sales Area	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stacks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stairs	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	9	10	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Workshop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Fixtures	1333

Millcreek SD
Heat Pumps

ATTACHMENT C

Qualifying Efficiencies				Number Qualifying	Incentive @ $250/heat pump	Accepted Measure Cost
eer	14.7	cop	3.4	86	$ 21,500.00	$ 516,000.00

2064

Tag	CFM	OA	Cooling	Heating	EER	COP	Cool Frac	Heat Frac	Add Cool	Add Heat	Tot Cooling	Tot Heating	Cooling EIR	Heating EIR	Qualify
1-1	550	195	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.262102383	1
1-2	1510	510	43.5	40.9	19.4	3.8	0.012255	0.012371	0	25.53312	43.5	66.4331196	0.175876289	0.257940129	1
1-3	550	195	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.262102383	1
1-4	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.253908005	1
1-5	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.257940129	1
1-6	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.253908005	1
1-7	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.257940129	1
1-8	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.253908005	1
1-9	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.257940129	1
1-10	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.253908005	1
1-11	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.257940129	1
2-1	640	175	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.178638743	0.262102383	1
2-2	580	200	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.235955876	1
2-3	1230	285	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-4	1230	285	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-5	640	195	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.178638743	0.235955876	1
2-6	640	195	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.178638743	0.235955876	1
2-7	1230	270	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-8	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-9	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-10	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.229294065	1
2-11	460	30	15	13.9	19	3.7	0.004226	0.004204	0	8.677515	15	22.577515	0.179578947	0.235955876	1
2-12	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.229294065	1
2-13	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-14	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.229294065	1
2-15	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
2-16	1060	390	31.6	32.1	19.2	3.9	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.177708333	0.229294065	1
2-17	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
3-1	1230	420	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
3-2	1230	420	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.232577276	1
3-3	550	180	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.235955876	1
3-4	460	155	15	13.9	19	3.7	0.004226	0.004204	0	8.677515	15	22.577515	0.179578947	0.235955876	1
3-5	730	250	23.2	20.4	19.1	3.7	0.006536	0.00617	0	12.73535	23.2	33.1353457	0.178638743	0.235955876	1
3-6	640	235	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.178638743	0.231752441	1
3-7	640	105	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.267958115	0.231752441	1
3-8	460	85	15	13.9	19	3.7	0.004226	0.004204	0	8.677515	15	22.577515	0.118144044	0.231752441	1
3-9	640	320	22.8	20.2	19.1	3.7	0.006423	0.00611	0	12.61049	22.8	32.8104894	0.27153089	0.231752441	1
3-10	460	40	15	13.9	19	3.7	0.004226	0.004204	0	8.677515	15	22.577515	0.103206292	0.231752441	1
4-1	880	330	26.1	23.9	19.1	3.7	0.007353	0.007229	0	14.92033	26.1	38.8203315	0.300804594	0.231752441	1
4-2	550	195	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.231752441	1
4-3	550	195	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.066115764	0.231752441	1
4-4	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
4-5	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
4-6	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.329084078	0.228492313	1
4-7	640	100	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.127195308	0.231752441	1
4-8	1060	375	31.6	32.1	17.6	3.8	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.145512848	0.228492313	1
4-9	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
4-10	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.234316195	0.228492313	1
4-11	1060	375	31.6	32.1	17.6	3.8	0.008903	0.009709	0	20.03944	31.6	52.1394411	#REF!	0.228492313	1
4-12	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
5-1	1060	490	31.6	32.1	17.6	3.8	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.193863636	0.228492313	1

5-2	550	195	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.231752441	1
5-3	550	195	15.5	14.1	19	3.7	0.004367	0.004265	0	8.802371	15.5	22.9023713	0.179578947	0.231752441	1
5-4	1790	375	55.7	48.5	18.2	3.7	0.015692	0.014669	0	30.27766	55.7	78.7776602	0.187472527	0.231752441	1
5-5	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
5-6	1230	570	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
5-7	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
5-8	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
5-9	1510	500	43.5	40.9	19.4	3.8	0.012255	0.012371	0	25.53312	43.5	66.4331196	0.175876289	0.228492313	1
5-10	1230	465	42.1	40.1	19.4	3.8	0.011861	0.012129	0	25.03369	42.1	65.1336943	0.175876289	0.228492313	1
6-1	5600	1360	127	115.3	16.2	3.6	0.03578	0.034874	0	71.97967	127	187.279675	0.210617284	0.235106946	1
6-2	5600	1360	127	115.3	16.2	3.6	0.03578	0.034874	0	71.97967	127	187.279675	0.210617284	0.235106946	1
7-1	9200	3465	241.8	215.6	16.2	3.6	0.068122	0.065211	0	134.5951	241.8	350.195124	0.210617284	0.235106946	1
7-2	9200	3465	241.8	215.6	16.2	3.6	0.068122	0.065211	0	134.5951	241.8	350.195124	0.210617284	0.235106946	1
8-1	3950	1840	130	116.8	16.2	3.6	0.036625	0.035328	0	72.9161	130	189.716097	0.210617284	0.235106946	1
8-2	1800	880	56.7	48.8	18.2	3.7	0.015974	0.01476	0	30.46494	56.7	79.2649446	0.187472527	0.231752441	1
8-3	955	120	28.1	25.9	19.1	3.7	0.007917	0.007834	0	16.16889	28.1	42.0688948	0.178638743	0.231752441	1
8-4	1510	100	43.5	40.9	19.4	3.8	0.012255	0.012371	0	25.53312	43.5	66.4331196	0.175876289	0.228492313	1
8-5	1510	100	43.5	40.9	19.4	3.8	0.012255	0.012371	0	25.53312	43.5	66.4331196	0.175876289	0.228492313	1
8-6	1060	45	31.6	32.1	17.6	3.8	0.008903	0.009709	0	20.03944	31.6	52.1394411	0.193863636	0.228492313	1
8-7	640	60	22.5	20.1	19.1	3.7	0.006339	0.006079	0	12.54806	22.5	32.6480612	0.178638743	0.231752441	1
8-8	790	190	25.6	23.6	19.1	3.7	0.007212	0.007138	0	14.73305	25.6	38.333047	0.178638743	0.231752441	1
8-9	1790	760	56.2	48.6	18.2	3.7	0.015833	0.0147	0	30.34009	56.2	78.9400883	0.187472527	0.231752441	1
8-10	460	75	15	13.9	19	3.7	0.004226	0.004204	0	8.677515	15	22.577515	0.179578947	0.231752441	1
8-11	880	255	26.1	23.9	19.1	3.7	0.007353	0.007229	0	14.92033	26.1	38.8203315	0.178638743	0.231752441	1
8-12	1510	290	43.5	40.9	19.4	3.8	0.012255	0.012371	0	25.53312	43.5	66.4331196	0.175876289	0.228492313	1
8-13	1060	460	32	32.2	17.6	3.8	0.009015	0.009739	0	20.10187	32	52.3018692	0.193863636	0.228492313	1
8-14	1060	460	32	32.2	17.6	3.8	0.009015	0.009739	0	20.10187	32	52.3018692	0.193863636	0.228492313	1
9-1	560	515	16.3	14.3	19	3.7	0.004592	0.004325	0	8.927228	16.3	23.2272276	0.179578947	0.231752441	1
9-2	550	510	16.3	14.3	19	3.7	0.004592	0.004325	0	8.927228	16.3	23.2272276	0.179578947	0.231752441	1
9-3	640	640	23.9	20.8	19.1	3.7	0.006733	0.006291	0	12.98506	23.9	33.7850584	0.178638743	0.231752441	1
9-4	1230	1230	44.7	41.5	17.6	3.7	0.012593	0.012552	0	25.90769	44.7	67.4076886	0.193863636	0.231752441	1
9-5	1230	1230	44.7	41.5	17.6	3.7	0.012593	0.012552	0	25.90769	44.7	67.4076886	0.193863636	0.231752441	1
9-6	1060	975	33.4	32.5	19.2	3.9	0.00941	0.00983	0	20.28915	33.4	52.7891537	0.177708333	0.225322636	1
10-1	1790	535	55.9	49.5	18.2	3.7	0.015749	0.014972	0	30.90194	55.9	80.4019418	0.187472527	0.231752441	1
10-2	1920	535	56.5	49.8	18.2	3.7	0.015918	0.015063	0	31.08923	56.5	80.8892263	0.187472527	0.231752441	1

		Add Heat
-224,776	0.068119	140.5966
-216,438	0.065592	135.3812
-144,743	0.043864	90.53623
-16,120	0.004885	10.083
-43,420	0.013158	27.15906
-10,006	0.003032	6.258717
-9,470	0.00287	5.923451
-36,265	0.01099	22.68363
-34,742	0.010529	21.731
-34,159	0.010352	21.36633
-31,328	0.009494	19.59555
-51,129	0.015495	31.98101
-25,541	0.00774	15.9758
-23,248	0.007045	14.54154
-56,283	0.017057	35.20482
-44,367	0.013445	27.7514
-44,180	0.013389	27.63443
-43,908	0.013306	27.4643
-43,275	0.013115	27.06836
-41,041	0.012437	25.671
-19,866	0.00602	12.42611
-8,010	0.002427	5.010226
-15,150	0.004591	9.476271
-25,603	0.007759	16.01459
-20,336	0.006163	12.7201
-42,002	0.012729	26.2721
-50,724	0.015372	31.72768
-17,701	0.005364	11.07191
-9,644	0.002923	6.032288
-25,500	0.007728	15.95016
-16,316	0.004945	10.2056
-33,731	0.010222	21.09862
-2,215	0.000671	1.385475
-56,670	0.017174	35.44688
-49,260	0.014928	30.81195
-42,343	0.012832	26.4854
-51,727	0.015676	32.35505
-42,137	0.01277	26.35654
-50,906	0.015427	31.84152
-17,505	0.005305	10.94932
-17,085	0.005178	10.68661
-45,233	0.013708	28.29308
-30,916	0.009369	19.33785
-18,806	0.005699	11.76309
-70,231	0.021284	43.92924
-65,366	0.019809	40.8862

-8,790	0.002664	5.498114
-22,288	0.006754	13.94106
-36,119	0.010946	22.59231
-6,661	0.002019	4.166432
-41,600	0.012607	26.02065
-27,693	0.008392	17.32187
-47,678	0.014449	29.82242
-26,036	0.00789	16.28543
-2,557	0.000775	1.599394
-32,514	0.009853	20.33739
-31,393	0.009514	19.63621
-31,393	0.009514	19.63621
-31,205	0.009457	19.51862
-34,759	0.010534	21.74163
-32,658	0.009897	20.42746
-31,628	0.009585	19.7832
-31,095	0.009423	19.44981
-34,450	0.01044	21.54835
-30,631	0.009283	19.15958
-46,528	0.0141	29.1031
-41,996	0.012727	26.26835
-9,477	0.002872	5.92783
-17,657	0.005351	11.04439
-16,695	0.005059	10.44266
-58,850	0.017835	36.81047
-42,204	0.01279	26.39845
-42,092	0.012756	26.3284
-44,585	0.013512	27.88776
-23,633	0.007162	14.78236
-58,355	0.017685	36.50084
-41,871	0.012689	26.19016
-43,245	0.013105	27.04959
-40,419	0.012249	25.28194
-48,844	0.014802	30.55175
-50,594	0.015333	31.64637
-67,142	0.020347	41.99708
-13,914	0.004217	8.703157
-4,763	0.001443	2.97924
-26,345	0.007984	16.4787
-3,299,779		2064

Attachment _F_: Heat Recovery Unit Calculations

HEAT RECOVERY UNIT SAVINGS SUMMARY										
	AHU-1	AHU-2	AHU-3	AHU-4	AHU-5	AHU-6	AHU-7	AHU-8	AHU-9	TOTAL
kWh:	15,055.4	3,206.2	7,701.9	15,194.8	14,584.9	9,479.3	4,019.4	11,187.3	2,962.3	65,222.5
Dollars:	$ 1,204.43	$ 256.50	$ 616.16	$ 1,215.58	$ 1,166.79	$ 758.34	$ 321.55	$ 894.98	$ 236.98	$ 6,671.32
75%	$ 903.32	$ 192.37	$ 462.12	$ 911.69	$ 875.09	$ 568.76	$ 241.16	$ 671.24	$ 177.74	$ 5,003.49

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-1

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	60.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	4320 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	2,979.72	Heating kWh:	12,075.65
Dollars:	$238.38	Dollars:	$966.05
75%	$178.78	75%	$724.54

HRU on 50% of weekend
Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	1.53
85	89	87.7	36.2	57	100%	87.7	36.20	6.52
80	84	82.1	33.3	229	100%	82.1	33.30	18.45
75	79	76.7	31.2	289	100%	76.7	31.20	16.20
70	74	72.5	29.6	246	100%	72.5	29.60	9.20
65	69	67.9	28.2	260	100%	67.9	28.20	5.48
60	64	62.6	24.9	243	100%	62.6	24.90	4.23
55	59	57.2	21.7	172	100%	57.2	21.70	2.05
50	54	52.1	19.1	192	100%	52.1	19.10	8.11
45	49	47.4	16.8	133	100%	47.4	16.80	9.18
40	44	43.0	14.8	199	100%	43.0	14.80	18.38
35	39	37.4	12.7	248	100%	37.4	12.70	28.98
30	34	32.1	10.6	182	100%	32.1	10.60	25.73
25	29	27.6	9	146	100%	27.6	9.00	23.36
20	24	23.1	7.4	100	100%	23.1	7.40	17.87
15	19	17.4	5.6	110	100%	17.4	5.60	21.97
10	14	12.0	4	58	100%	12.0	4.00	12.66
5	9	7.4	2.7	20	100%	7.4	2.70	4.67
0	4	2.6	1.3	19	100%	2.6	1.30	4.75
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	1.58
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								240.90

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-2

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	10.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	5520 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	634.57	Heating kWh:	2,571.67
Dollars:	$50.77	Dollars:	$205.73
75%	$38.07	75%	$154.30

Weekend Factor 0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	0.33
85	89	87.7	36.2	57	100%	87.7	36.20	1.39
80	84	82.1	33.3	229	100%	82.1	33.30	3.93
75	79	76.7	31.2	289	100%	76.7	31.20	3.45
70	74	72.5	29.6	246	100%	72.5	29.60	1.96
65	69	67.9	28.2	260	100%	67.9	28.20	1.17
60	64	62.6	24.9	243	100%	62.6	24.90	0.90
55	59	57.2	21.7	172	100%	57.2	21.70	0.44
50	54	52.1	19.1	192	100%	52.1	19.10	1.73
45	49	47.4	16.8	133	100%	47.4	16.80	1.96
40	44	43.0	14.8	199	100%	43.0	14.80	3.91
35	39	37.4	12.7	248	100%	37.4	12.70	6.17
30	34	32.1	10.6	182	100%	32.1	10.60	5.48
25	29	27.6	9	146	100%	27.6	9.00	4.98
20	24	23.1	7.4	100	100%	23.1	7.40	3.81
15	19	17.4	5.6	110	100%	17.4	5.60	4.68
10	14	12.0	4	58	100%	12.0	4.00	2.70
5	9	7.4	2.7	20	100%	7.4	2.70	0.99
0	4	2.6	1.3	19	100%	2.6	1.30	1.01
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	0.34
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								51.30

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-3

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	60.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	2210 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	1,524.35	Heating kWh:	6,177.59
Dollars:	$121.95	Dollars:	$494.21
75%	$91.46	75%	$370.66

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	0.78
85	89	87.7	36.2	57	100%	87.7	36.20	3.34
80	84	82.1	33.3	229	100%	82.1	33.30	9.44
75	79	76.7	31.2	289	100%	76.7	31.20	8.29
70	74	72.5	29.6	246	100%	72.5	29.60	4.71
65	69	67.9	28.2	260	100%	67.9	28.20	2.80
60	64	62.6	24.9	243	100%	62.6	24.90	2.17
55	59	57.2	21.7	172	100%	57.2	21.70	1.05
50	54	52.1	19.1	192	100%	52.1	19.10	4.15
45	49	47.4	16.8	133	100%	47.4	16.80	4.70
40	44	43.0	14.8	199	100%	43.0	14.80	9.40
35	39	37.4	12.7	248	100%	37.4	12.70	14.83
30	34	32.1	10.6	182	100%	32.1	10.60	13.16
25	29	27.6	9	146	100%	27.6	9.00	11.95
20	24	23.1	7.4	100	100%	23.1	7.40	9.14
15	19	17.4	5.6	110	100%	17.4	5.60	11.24
10	14	12.0	4	58	100%	12.0	4.00	6.48
5	9	7.4	2.7	20	100%	7.4	2.70	2.39
0	4	2.6	1.3	19	100%	2.6	1.30	2.43
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	0.81
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								123.24

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-4

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	60.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	4360 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	3,007.31	Heating kWh:	12,187.46
Dollars:	$240.59	Dollars:	$975.00
75%	$180.44	75%	$731.25

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	1.54
85	89	87.7	36.2	57	100%	87.7	36.20	6.58
80	84	82.1	33.3	229	100%	82.1	33.30	18.62
75	79	76.7	31.2	289	100%	76.7	31.20	16.35
70	74	72.5	29.6	246	100%	72.5	29.60	9.28
65	69	67.9	28.2	260	100%	67.9	28.20	5.53
60	64	62.6	24.9	243	100%	62.6	24.90	4.27
55	59	57.2	21.7	172	100%	57.2	21.70	2.07
50	54	52.1	19.1	192	100%	52.1	19.10	8.18
45	49	47.4	16.8	133	100%	47.4	16.80	9.27
40	44	43.0	14.8	199	100%	43.0	14.80	18.55
35	39	37.4	12.7	248	100%	37.4	12.70	29.25
30	34	32.1	10.6	182	100%	32.1	10.60	25.97
25	29	27.6	9	146	100%	27.6	9.00	23.58
20	24	23.1	7.4	100	100%	23.1	7.40	18.03
15	19	17.4	5.6	110	100%	17.4	5.60	22.17
10	14	12.0	4	58	100%	12.0	4.00	12.78
5	9	7.4	2.7	20	100%	7.4	2.70	4.71
0	4	2.6	1.3	19	100%	2.6	1.30	4.79
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	1.60
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								243.13

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-5

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	60.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	4185 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	2,886.61	Heating kWh:	11,698.29
Dollars:	$230.93	Dollars:	$935.86
75%	$173.20	75%	$701.90

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	1.48
85	89	87.7	36.2	57	100%	87.7	36.20	6.32
80	84	82.1	33.3	229	100%	82.1	33.30	17.87
75	79	76.7	31.2	289	100%	76.7	31.20	15.69
70	74	72.5	29.6	246	100%	72.5	29.60	8.91
65	69	67.9	28.2	260	100%	67.9	28.20	5.31
60	64	62.6	24.9	243	100%	62.6	24.90	4.10
55	59	57.2	21.7	172	100%	57.2	21.70	1.98
50	54	52.1	19.1	192	100%	52.1	19.10	7.85
45	49	47.4	16.8	133	100%	47.4	16.80	8.90
40	44	43.0	14.8	199	100%	43.0	14.80	17.81
35	39	37.4	12.7	248	100%	37.4	12.70	28.08
30	34	32.1	10.6	182	100%	32.1	10.60	24.92
25	29	27.6	9	146	100%	27.6	9.00	22.63
20	24	23.1	7.4	100	100%	23.1	7.40	17.31
15	19	17.4	5.6	110	100%	17.4	5.60	21.28
10	14	12.0	4	58	100%	12.0	4.00	12.27
5	9	7.4	2.7	20	100%	7.4	2.70	4.52
0	4	2.6	1.3	19	100%	2.6	1.30	4.60
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	1.53
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								233.38

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-6

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	60.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	2720 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	1,876.12	Heating kWh:	7,603.19
Dollars:	$150.09	Dollars:	$608.25
75%	$112.57	75%	$456.19

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	0.96
85	89	87.7	36.2	57	100%	87.7	36.20	4.10
80	84	82.1	33.3	229	100%	82.1	33.30	11.61
75	79	76.7	31.2	289	100%	76.7	31.20	10.20
70	74	72.5	29.6	246	100%	72.5	29.60	5.79
65	69	67.9	28.2	260	100%	67.9	28.20	3.45
60	64	62.6	24.9	243	100%	62.6	24.90	2.67
55	59	57.2	21.7	172	100%	57.2	21.70	1.29
50	54	52.1	19.1	192	100%	52.1	19.10	5.10
45	49	47.4	16.8	133	100%	47.4	16.80	5.78
40	44	43.0	14.8	199	100%	43.0	14.80	11.57
35	39	37.4	12.7	248	100%	37.4	12.70	18.25
30	34	32.1	10.6	182	100%	32.1	10.60	16.20
25	29	27.6	9	146	100%	27.6	9.00	14.71
20	24	23.1	7.4	100	100%	23.1	7.40	11.25
15	19	17.4	5.6	110	100%	17.4	5.60	13.83
10	14	12.0	4	58	100%	12.0	4.00	7.97
5	9	7.4	2.7	20	100%	7.4	2.70	2.94
0	4	2.6	1.3	19	100%	2.6	1.30	2.99
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	1.00
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								151.68

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-7

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	10.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	6920 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	795.51	Heating kWh:	3,223.90
Dollars:	$63.64	Dollars:	$257.91
75%	$47.73	75%	$193.43

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	0.41
85	89	87.7	36.2	57	100%	87.7	36.20	1.74
80	84	82.1	33.3	229	100%	82.1	33.30	4.92
75	79	76.7	31.2	289	100%	76.7	31.20	4.33
70	74	72.5	29.6	246	100%	72.5	29.60	2.46
65	69	67.9	28.2	260	100%	67.9	28.20	1.46
60	64	62.6	24.9	243	100%	62.6	24.90	1.13
55	59	57.2	21.7	172	100%	57.2	21.70	0.55
50	54	52.1	19.1	192	100%	52.1	19.10	2.16
45	49	47.4	16.8	133	100%	47.4	16.80	2.45
40	44	43.0	14.8	199	100%	43.0	14.80	4.91
35	39	37.4	12.7	248	100%	37.4	12.70	7.74
30	34	32.1	10.6	182	100%	32.1	10.60	6.87
25	29	27.6	9	146	100%	27.6	9.00	6.24
20	24	23.1	7.4	100	100%	23.1	7.40	4.77
15	19	17.4	5.6	110	100%	17.4	5.60	5.86
10	14	12.0	4	58	100%	12.0	4.00	3.38
5	9	7.4	2.7	20	100%	7.4	2.70	1.25
0	4	2.6	1.3	19	100%	2.6	1.30	1.27
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	0.42
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								64.32

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-8

INPUTS

Minimum Fraction Outdoor Air:	50%		
Heat Recover Effectiveness:	60.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	5635 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	2,302.35	Heating kWh:	8,884.95
Dollars:	$184.19	Dollars:	$710.80
75%	$138.14	75%	$533.10

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	50%	89.5	13.20	0.00
100	104	102.0	0	0	50%	87.0	13.20	0.00
95	99	97.0	0	0	50%	84.5	13.20	0.00
90	94	91.3	38.3	11	50%	81.7	32.35	1.00
85	89	87.7	36.2	57	50%	79.9	31.30	4.25
80	84	82.1	33.3	229	50%	77.1	29.85	12.03
75	79	76.7	31.2	289	50%	74.4	28.80	10.57
70	74	72.5	29.6	246	50%	72.3	28.00	6.00
65	69	67.9	28.2	260	100%	67.9	28.20	7.14
60	64	62.6	24.9	243	100%	62.6	24.90	5.52
55	59	57.2	21.7	172	100%	57.2	21.70	2.67
50	54	52.1	19.1	192	95%	53.0	19.43	10.10
45	49	47.4	16.8	133	77%	53.0	18.98	9.25
40	44	43.0	14.8	199	66%	53.0	18.80	15.71
35	39	37.4	12.7	248	55%	53.0	18.87	20.76
30	34	32.1	10.6	182	50%	52.1	18.50	16.78
25	29	27.6	9	146	50%	49.8	17.70	15.24
20	24	23.1	7.4	100	50%	47.6	16.90	11.65
15	19	17.4	5.6	110	50%	44.7	16.00	14.33
10	14	12.0	4	58	50%	42.0	15.20	8.26
5	9	7.4	2.7	20	50%	39.7	14.55	3.05
0	4	2.6	1.3	19	50%	37.3	13.85	3.10
-5	-1	-1.7	0.1	6	50%	35.2	13.25	1.03
-10	-6	-7.1	-1.3	0	50%	32.5	12.55	0.00
								178.44

USA_OH_Toledo.725360_TMY3.bin
HEAT RECOVERY UNIT SAVINGS
AHU-9

INPUTS

Minimum Fraction Outdoor Air:	100%		
Heat Recover Effectiveness:	10.0%		
Summer Set Point Temperature:	72 F	Winter Set Point	70
Set Point Enthalpy:	26.39 Btu/lba	Set Point Enthalpy:	22.72
Supply Air Temperature:	53 F		
Supply Air Enthalpy:	21.86 Btu/lba		
Supply Air Volume:	5100 cfm		
Supply Air Density:	0.075 lb/ft^3		

Rate:	$0.08		
75% Load EER:	18.31	COP	3.73

SAVINGS

Cooling kWh:	586.29	Heating kWh:	2,376.00
Dollars:	$46.90	Dollars:	$190.08
75%	$35.18	75%	$142.56

Weekend Factor
0.142857

StrTemp	EndTemp	Toa(F)	hoa(Btu/lba)	hrs	foa	Tma(F)	hma(Btu/lba)	Q (mmBTU)
105	109	107.0	0	0	100%	107.0	0.00	0.00
100	104	102.0	0	0	100%	102.0	0.00	0.00
95	99	97.0	0	0	100%	97.0	0.00	0.00
90	94	91.3	38.3	11	100%	91.3	38.30	0.30
85	89	87.7	36.2	57	100%	87.7	36.20	1.28
80	84	82.1	33.3	229	100%	82.1	33.30	3.63
75	79	76.7	31.2	289	100%	76.7	31.20	3.19
70	74	72.5	29.6	246	100%	72.5	29.60	1.81
65	69	67.9	28.2	260	100%	67.9	28.20	1.08
60	64	62.6	24.9	243	100%	62.6	24.90	0.83
55	59	57.2	21.7	172	100%	57.2	21.70	0.40
50	54	52.1	19.1	192	100%	52.1	19.10	1.60
45	49	47.4	16.8	133	100%	47.4	16.80	1.81
40	44	43.0	14.8	199	100%	43.0	14.80	3.62
35	39	37.4	12.7	248	100%	37.4	12.70	5.70
30	34	32.1	10.6	182	100%	32.1	10.60	5.06
25	29	27.6	9	146	100%	27.6	9.00	4.60
20	24	23.1	7.4	100	100%	23.1	7.40	3.52
15	19	17.4	5.6	110	100%	17.4	5.60	4.32
10	14	12.0	4	58	100%	12.0	4.00	2.49
5	9	7.4	2.7	20	100%	7.4	2.70	0.92
0	4	2.6	1.3	19	100%	2.6	1.30	0.93
-5	-1	-1.7	0.1	6	100%	-1.7	0.10	0.31
-10	-6	-7.1	-1.3	0	100%	-7.1	-1.30	0.00
								47.40

725360TY.bin

StrTemp	EndTemp	T(F)	Twb(F)	h(Btu/lba)	w(lbw/lba)	hrs1-8	hrs9-16	hrs17-24
105	109	107	-99	-99	-99	0	0	0
100	104	102	-99	-99	-99	0	0	0
95	99	97	-99	-99	-99	0	0	0
90	94	91.3	74.8	38.3	0.0148	0	11	5
85	89	87.7	72.4	36.2	0.0138	0	57	23
80	84	82.1	68.8	33.3	0.0124	0	229	93
75	79	76.7	66	31.2	0.0117	23	289	178
70	74	72.5	63.8	29.6	0.0112	80	246	211
65	69	67.9	61.9	28.2	0.0109	268	260	273
60	64	62.6	57	24.9	0.0091	336	243	293
55	59	57.2	51.9	21.7	0.0073	264	172	246
50	54	52.1	47.5	19.1	0.0061	260	192	206
45	49	47.4	43.5	16.8	0.005	225	133	167
40	44	43	39.6	14.8	0.0041	199	199	197
35	39	37.4	35.8	12.7	0.0035	329	248	311
30	34	32.1	31.6	10.6	0.0027	269	182	180
25	29	27.6	28.2	9	0.0022	203	146	167
20	24	23.1	24.9	7.4	0.0017	150	100	147
15	19	17.4	20.9	5.6	0.0013	117	110	78
10	14	12	17.4	4	0.001	70	58	76
5	9	7.4	14.4	2.7	0.0008	56	20	42
0	4	2.6	11.3	1.3	0.0006	35	19	14
-5	-1	-1.7	8.5	0.1	0.0005	25	6	13
-10	-6	-7.1	5.1	-1.3	0.0004	11	0	0
-15	-11	-13	-99	-99	-99	0	0	0
-20	-16	-18	-99	-99	-99	0	0	0
-25	-21	-23	-99	-99	-99	0	0	0
-30	-26	-28	-99	-99	-99	0	0	0

hrs1-24
0
0
0
16
80
322
490
537
801
872
682
658
525
595
888
631
516
397
305
204
118
68
44
11
0
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0
0

General Information
- Overview
- Specifications
- Performance Data
- Parts List
- Drawings

More Information
- Where To Buy
- Baldor Sales Offices

Return to List

AC Motors | Severe Duty |

Specifications: M4104T-9

ATTACHMENT H

SPEC. NUMBER:	10C151Y734H2
CATALOG NUMBER:	M4104T-9
FL AMPS:	76-70/35
208V AMPS:	--
BEARING-DRIVE-END:	6311
BEARING-OPP-DRIVE-END:	6309
DESIGN CODE:	C
DOE-CODE:	010A
FL EFFICIENCY:	92.4
ENCLOSURE:	TEFC
FRAME:	286T
HERTZ:	60
INSULATION-CLASS:	F
KVA-CODE:	G
SPEED [rpm]:	1770
OUTPUT [hp]:	30
PHASE:	3
POWER-FACTOR:	86
RATING:	40C AMB-CONT
SERIAL-NUMBER:	--
SERVICE FACTOR:	1.15
VOLTAGE:	208-230/460

* For certified information, contact your local Baldor office.

Split System Savings Calc ATTACHMENT K

P-6

Millcreek West Unity

minimum ASHRAE efficiency	10.9	seer
Operating Hours	2800	
total capacity	52000	btu/hr
seer	16	

Current Use	Minimum Eff Use
9100	13357.8

Savings 4257.798

MITSUBISHI ELECTRIC

HVAC Advanced Products Division

Attachment L

Mr. SLIM®

Split Zoning A/C and Heat Pumps

SUBMITTAL DATA: MSY-A24NA & MSY-A24NA

24,000 BTU/H WALL-MOUNTED AIR-CONDITIONING SYSTEMS

Job Name: Location: Date:

Purchaser: Engineer:

Submitted to: For ☐ Reference ☐ Approval ☐ Construction

Unit Designation: Schedule No.:

GENERAL FEATURES

- Wall-mounted indoor unit for residential applications
- Compact side discharge outdoor unit
- Zone control
- Quiet operation for both indoor and outdoor units
- "Powerful Mode" function permits system to temporarily run at a lower/higher temperature with an increased fan speed, which quickly brings the room to the optimum comfort level
- Wireless remote controller is included
- Indoor unit powered from outdoor unit using A-Control
- Automatic restart following a power outage
- Self-check functon — onboard diagnostics
- Dry Mode function is standard
- Limited warranty: one year on parts and defects and six years on the compressor

Indoor Unit: MSY-A24NA

Outdoor Unit: MUY-A24NA

Wireless Remote Controller

OPTIONAL ACCESSORIES

Indoor Unit

- M-NET Control Adapter (MAC-399IF)
- MA Contact Terminal Interface (MAC-397IF)
- Wired Remote Controller (PAR-21MAA; requires MAC-397IF)
- Condensate Pump (230V; SI3100-230)
- Anti-allergy Enzyme Filter (MAC-2300FT)
- Three-pole Disconnect Switch (TAZ-MS303)

Cooling*

Rated Capacity . . . . . 22,000 Btu/h
Minimum Capacity . . . . . 4,400 Btu/h
SEER 16.0
Total Input . . . . . 2,880 W

* Rating Conditions (Cooling) - Indoor: 80ºF (27ºC) DB, 67ºF (19ºC) WB; Outdoor: 95ºF (35ºC) DB, 75ºF (24ºC) WB.

Power Supply . . . . . 208 / 230V, 1-Phase, 60 Hz
Breaker Size . . . . . 20 A

Voltage

Indoor - Outdoor S1-S2 . . . . . AC 208 / 230V
Indoor - Outdoor S2-S3 . . . . . DC 12-24V
Indoor - Remote Controller . . . . . Wireless

OPERATING RANGE

		Indoor Intake Air Temp.	Outdoor Intake Air Temp.
Cooling	Maximum	90°F (32°C) DB, 73°F (23°C) WB	115°F (46°C) DB
	Minimum	67°F (19°C) DB, 57°F (14°C) WB	14°F (-10°C) DB

Indoor Unit

MCA . . . . . 1.0 A
Fan Motor . . . . . 0.76 F.L.A.
Airflow (Lo - Med - Hi - Powerful)
Cooling . . . . . 296 - 431 - 568 - 624 Dry CFM
265 - 385 - 508 - 558 Wet CFM

Sound Pressure Level (Lo - Med - Hi - Powerful)
Cooling . . . . . 34 - 40 - 49 - 51 dB(A)

DIMENSIONS	UNIT INCHES / MM
W	43-5/16 / 1,100
D	10-1/4 / 260
H	12-13/16 / 325

Weight . . . . . 37 lbs. / 17 kg
External Finish . . . . . Munsell No. 3Y 7.8 / 1.1
Field Drainpipe Size O.D. . . . . 5/8" / 15.88 mm
Remote Controller . . . . . Wireless

Outdoor Unit

Compressor . . . . . DC-driven Inverter Twin Rotary
MCA . . . . . 17 A
Fan Motor . . . . . 0.93 F.L.A.
Sound Pressure Level
Cooling . . . . . 55 dB(A)

DIMENSIONS	INCHES / MM
W	33-1/16 / 840
D	13 / 330
H	33-7/16 / 849

Weight . . . . . 128 lbs. / 58 kg
External Finish . . . . . Munsell 3Y 7.8 / 1.1

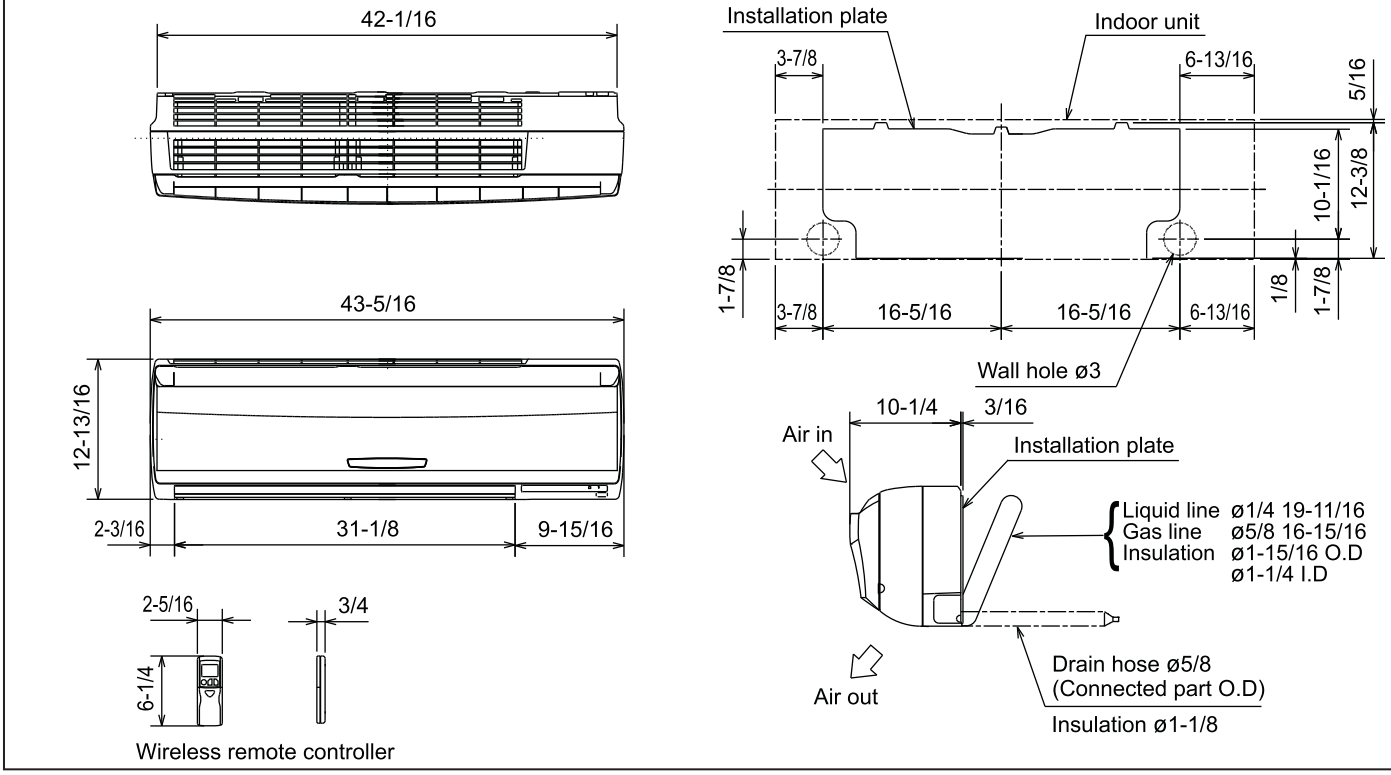
Refrigerant Type R410A
Refrigerant Pipe Size O.D.
Gas Side . . . . . 5/8" / 15.88 mm
Liquid Side . . . . . 1/4" / 6.35 mm
Max. Refrigerant Pipe Length . . . . . 100 ft. / 30 m
Max. Refrigerant Pipe Height Difference . . . . . 50 ft. / 15 m
Connection Method . . . . . Flared

R410A INVERTER

DIMENSIONS: MSY-A24NA & MUY-A24NA

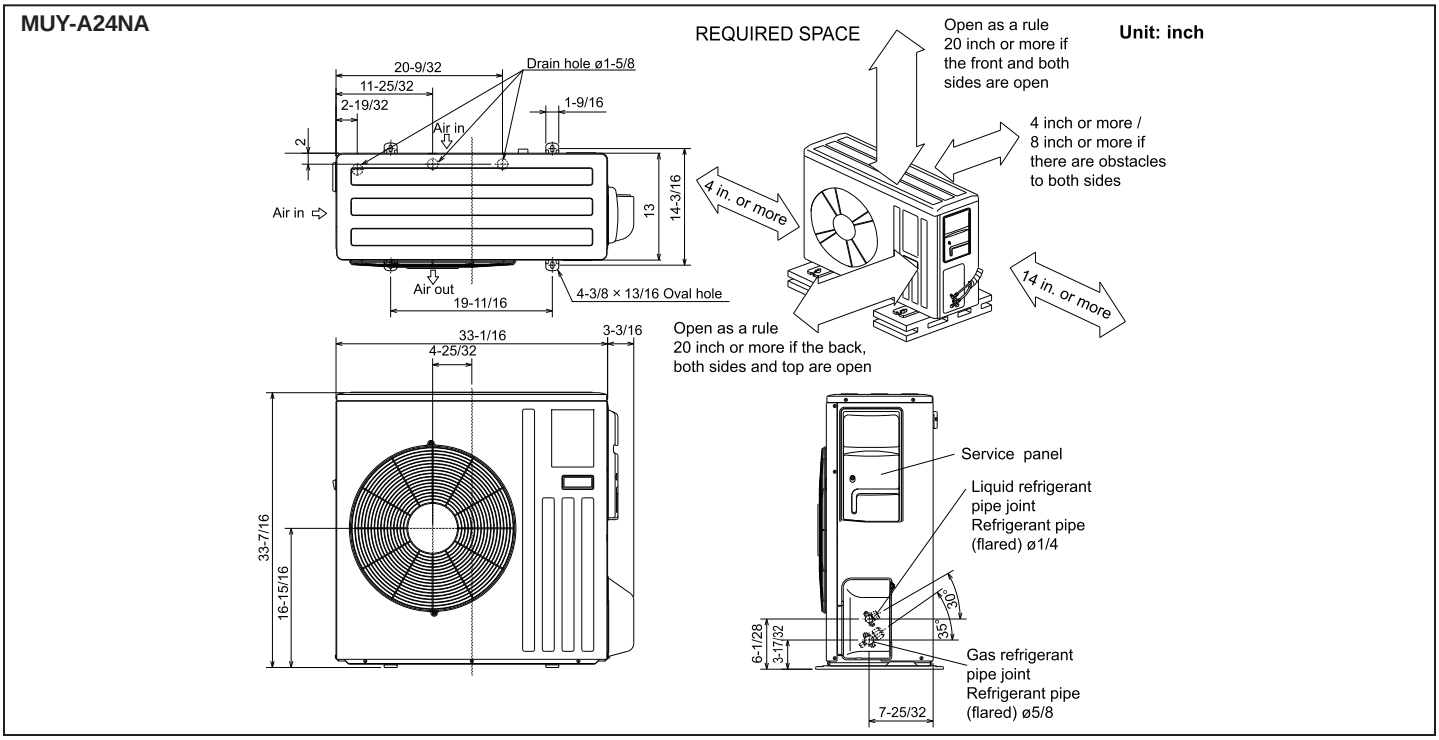
MSY-A24NA

Unit: inch



MUY-A24NA

Unit: inch



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AHRI Standard 210/240
Certification applies only when the complete system is listed with AHRI.

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www.mehvac.com

Specifications are subject to change without **notice.**

MITSUBISHI ELECTRIC

HVAC Advanced Products Division

Attachment M

Mr. SLIM®

Split Zoning A/C and Heat Pumps

SUBMITTAL DATA: MSY-A15NA & MSY-A15NA

15,000 BTU/H WALL-MOUNTED AIR-CONDITIONING SYSTEMS

Job Name: Location: Date:

Purchaser: Engineer:

Submitted to: For ☐ Reference ☐ Approval ☐ Construction

Unit Designation: Schedule No.:

GENERAL FEATURES

- Wall-mounted indoor unit for residential applications
- Compact side discharge outdoor unit
- Zone control
- Quiet operation for both indoor and outdoor units
- "Powerful Mode" function permits system to temporarily run at a lower/higher temperature with an increased fan speed, which quickly brings the room to the optimum comfort level
- Wireless remote controller is included
- Indoor unit powered from outdoor unit using A-Control
- Automatic restart following a power outage
- Self-check functon — onboard diagnostics
- Dry Mode function is standard
- Limited warranty: one year on parts and defects and six years on the compressor

Indoor Unit: MSY-A15NA

Wireless Remote Controller

Outdoor Unit: MUY-A15NA

OPTIONAL ACCESSORIES

Indoor Unit

- M-NET Control Adapter (MAC-399IF)
- MA Contact Terminal Interface (MAC-397IF)
- Wired Remote Controller (PAR-21MAA; requires MAC-397IF)
- Condensate Pump (230V; SI3100-230)
- Anti-allergy Enzyme Filter (MAC-415FT)
- Three-pole Disconnect Switch (TAZ-MS303)

Cooling*

Rated Capacity . . . . . 15,000 Btu/h
Minimum Capacity . . . . . 3,100 Btu/h
SEER 16.0
Total Input . . . . . 1,690 W

* Rating Conditions (Cooling) - Indoor: 80ºF (27ºC) DB, 67ºF (19ºC) WB; Outdoor: 95ºF (35ºC) DB, 75ºF (24ºC) WB.

Power Supply . . . . . 208 / 230V, 1-Phase, 60 Hz
Breaker Size . . . . . 15 A

Voltage

Indoor - Outdoor S1-S2 . . . . . AC 208 / 230V
Indoor - Outdoor S2-S3 . . . . . DC 12-24V
Indoor - Remote Controller . . . . . Wireless

OPERATING RANGE

		Indoor Intake Air Temp.	Outdoor Intake Air Temp.
Cooling	Maximum	90°F (32°C) DB, 73°F (23°C) WB	115°F (46°C) DB
	Minimum	67°F (19°C) DB, 57°F (14°C) WB	14°F (-10°C) DB

Indoor Unit

MCA . . . . . 1.0 A
Fan Motor . . . . . 0.76 F.L.A.
Airflow (Lo - Med - Hi - Powerful)
Cooling . . . . . 268 - 328 - 381 - 419 Dry CFM
240 - 293 - 342 - 376 Wet CFM

Sound Pressure Level (Lo - Med - Hi - Powerful)
Cooling . . . . . 34 - 40 - 45 - 47 dB(A)

DIMENSIONS	UNIT INCHES / MM
W	30-11/16 / 780
D	8-1/4 / 210
H	11-3/4 / 299

Weight . . . . . 23 lbs. / 10 kg
External Finish . . . . . Munsell No. 3Y 7.8 / 1.1
Field Drainpipe Size O.D. . . . . 5/8" / 15.88 mm
Remote Controller . . . . . Wireless

Outdoor Unit

Compressor . . . . . DC-driven Inverter Twin Rotary
MCA . . . . . 14 A
Fan Motor . . . . . 0.52 F.L.A.
Sound Pressure Level
Cooling . . . . . 50 dB(A)

DIMENSIONS	INCHES / MM
W	31-1/2 / 800
D	11-1/4 / 286
H	21-5/8 / 549

Weight . . . . . 88 lbs. / 40 kg
External Finish . . . . . Munsell 3Y 7.8 / 1.1

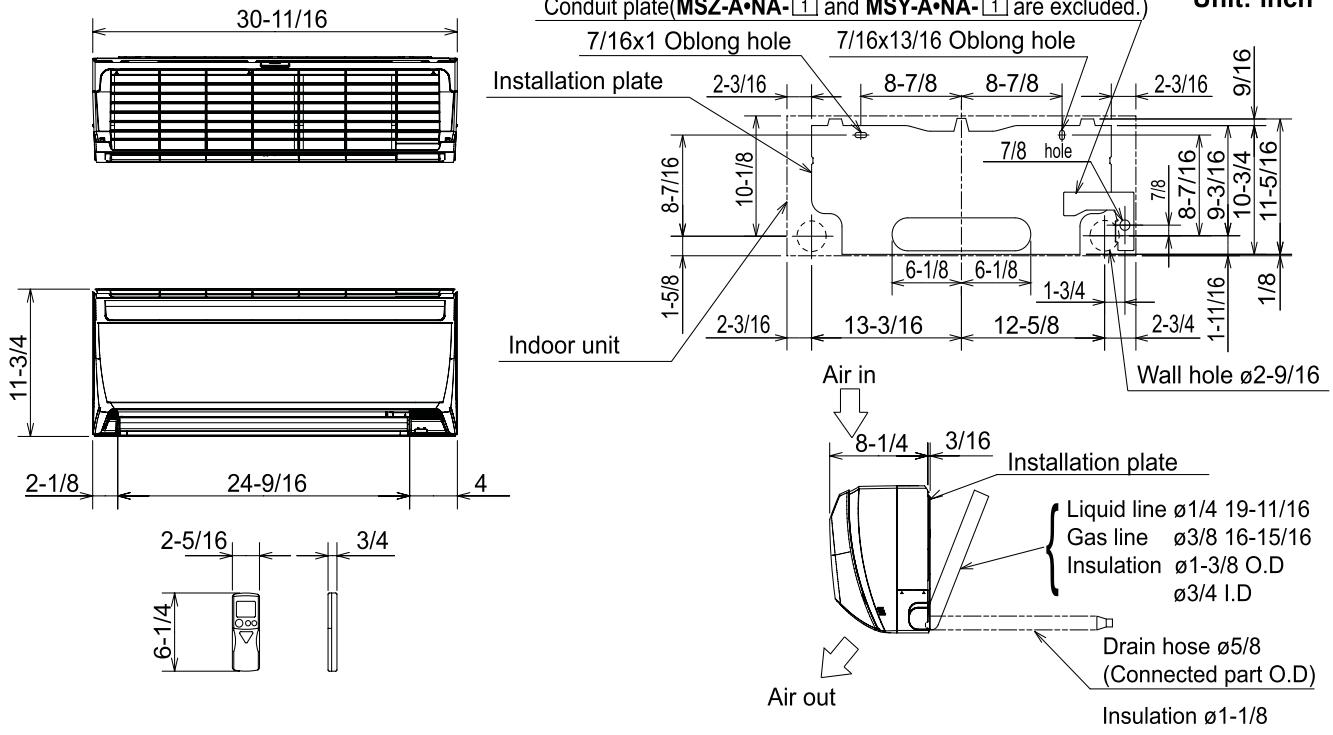
Refrigerant Type R410A
Refrigerant Pipe Size O.D.
Gas Side . . . . . 1/2" / 12.7 mm
Liquid Side . . . . . 1/4" / 6.35 mm
Max. Refrigerant Pipe Length . . . . . 65 ft. / 19 m
Max. Refrigerant Pipe Height Difference . . . . . 40 ft. / 12 m
Connection Method . . . . . Flared

R410A INVERTER

DIMENSIONS: MSY-A15NA & MUY-A15NA

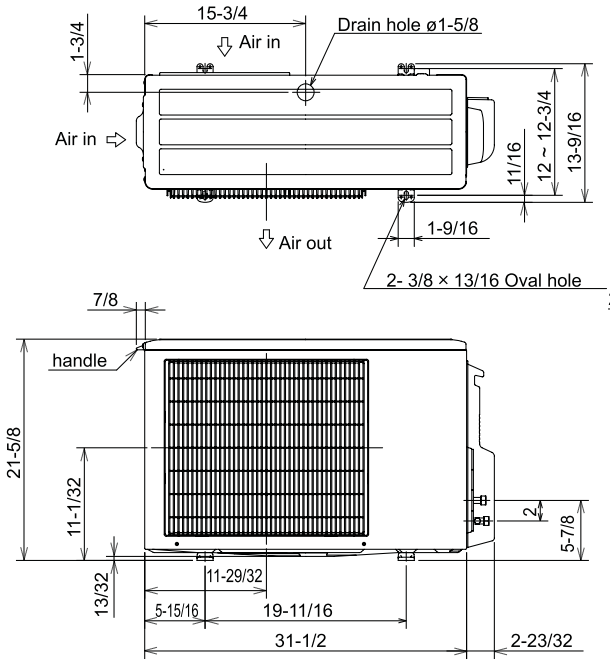
MSY-A15NA

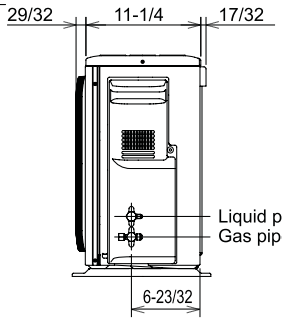
Unit: inch



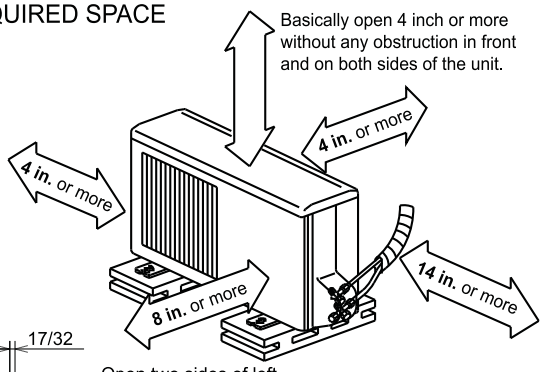
MUY-A15NA

Unit: inch





REQUIRED SPACE



Open two sides of left, right, or rear side.

Liquid pipe :1/4 (flared)
Gas pipe :3/8 (flared) ··· **MUZ-A09/12NA**
:1/2 (flared) ··· **MUZ-A15/17NA, MUY-A15/17NA**

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Specifications are subject to change without **notice.**

Mercantile Customer Project Commitment Agreement
Cash Rebate Option

THIS MERCANTILE CUSTOMER PROJECT COMMITMENT AGREEMENT ("Agreement") is made and entered into by and between Toledo Edison, its successors and assigns (hereinafter called the "Company") and Millcreek West Unity Local Schools, Taxpayer ID No.34-6407273its permitted successors and assigns (hereinafter called the "Customer") (collectively the "Parties" or individually the "Party") and is effective on the date last executed by the Parties as indicated below.

WITNESSETH

WHEREAS, the Company is an electric distribution utility and electric light company, as both of these terms are defined in R.C. § 4928.01(A); and

WHEREAS, Customer believes that it is a mercantile customer, as that term is defined in R.C. § 4928.01(A)(19), doing business within the Company's certified service territory; and

WHEREAS, R.C. § 4928.66 (the "Statute") requires the Company to meet certain energy efficiency and peak demand reduction ("EE&PDR") benchmarks; and

WHEREAS, when complying with certain EE&PDR benchmarks the Company may include the effects of mercantile customer-sited EE&PDR projects; and

WHEREAS, Customer has certain customer-sited demand reduction, demand response, or energy efficiency project(s) as set forth in attached Exhibit A (the "Customer Energy Project(s)") that it desires to commit to the Company for integration into the Company's Energy Efficiency & Peak Demand Reduction Program Portfolio Plan ("Company Plan") that the Company will implement in order to comply with the Statute; and

WHEREAS, the Customer, pursuant to the Public Utilities Commission of Ohio's ("Commission") September 15, 2010 Order in Case No. 10-834-EL-EEC, desires to pursue a cash rebate of some of the costs pertaining to its Customer Energy Project(s) ("Cash Rebate").

WHEREAS, Customer's decision to commit its Customer Energy Project(s) to the Company for inclusion in the Company Plan has been reasonably encouraged by the possibility of a Cash Rebate.

WHEREAS, in consideration of, and upon receipt of, said cash rebate, Customer will commit the Customer Energy Project(s) to the Company and will comply with all other terms and conditions set forth herein.

NOW THEREFORE, in consideration of the mutual promises set forth herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties, intending to be legally bound, do hereby agree as follows:

1. **Customer Energy Projects.** Customer hereby commits to the Company and Company accepts for integration into the Company Plan the Customer Energy Project(s) set forth on attached Exhibit 1. Said commitment shall be for the life of the Customer Energy Project(s). Company will incorporate said project(s) into the Company Plan to the extent that such projects qualify. In so committing, Customer acknowledges that the information provided to the Company about the Customer Energy Project(s) is true and accurate to the best of its knowledge.

    a. By committing the Customer Energy Project(s) to the Company, Customer acknowledges and agrees that the Company shall control the use of the kWh and/or kW reductions

resulting from said projects for purposes of complying with the Statute. It is expressly agreed that Customer may use any and all energy related and other attributes created from the Customer Energy Project(s) to the extent permitted by state or federal laws or regulations, provided, and to the extent, that such uses by Customer do not conflict with said compliance by the Company.

b. The Company acknowledges that some of Customer's Energy Projects contemplated in this paragraph may have been performed under certain other federal and/or state programs in which certain parameters are required to be maintained in order to retain preferential financing or other government benefits (individually and collectively, as appropriate, "Benefits"). In the event that the use of any such project by the Company in any way affects such Benefits, and upon written request from the Customer, Company will release said Customer's Energy Project(s) to the extent necessary for Customer to meet the prerequisites for such Benefits. Customer acknowledges that such release (i) may affect Customer's cash rebate discussed in Article 3 below; and (ii) will not affect any of Customer's other requirements or obligations.

c. Any future Customer Energy Project(s) committed by Customer shall be subject to a separate application and, upon approval by the Commission, said projects shall become part of this Agreement.

d. Customer will provide Company or Company's agent(s) with reasonable assistance in the preparation of the Commission's standard joint application for approval of this Agreement ("Joint Application") that will be filed with the Commission, with such Joint Application being consistent with then current Commission requirements.

e. Upon written request and reasonable advance notice, Customer will grant employees or authorized agents of either the Company or the Commission reasonable, pre-arranged access to the Customer Energy Project(s) for purposes of measuring and verifying energy savings and/or peak demand reductions resulting from the Customer Energy Project(s). It is expressly agreed that consultants of either the Company or the Commission are their respective authorized agents.

2. **Joint Application to the Commission.** The Parties will submit the Joint Application using the Commission's standard "Application to Commit Energy Efficiency/Peak Demand Reduction Programs" ("Joint Application") in which they will seek the Commission's approval of (i) this Agreement: (ii) the commitment of the Customer Energy Project(s) for inclusion in the Company Plan; and (iii) the Customer's Cash Rebate.

   The Joint Application shall include all information as set forth in the Commission's standard form which, includes without limitation:

   i. A narrative description of the Customer Energy Project(s), including but not limited to, make, model and year of any installed and/or replaced equipment;
   ii. A copy of this Agreement; and
   iii. A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results.

3. **Customer Cash Rebate and Annual Report.** Upon Commission approval of the Joint Application, Customer shall provide Company with a W-9 tax form, which shall at a minimum include Customer's tax identification number. Within the greater of 90 days of the Commission's approval of the Joint Application or the completion of the Customer Energy Project, the Company

will issue to the Customer the Cash Rebate in the amount set forth in the Commission's Finding and Order approving the Joint Application.

a. Customer acknowledges: i) that the Company will cap the Cash Rebate at the lesser of 50% of Customer Energy Project(s) costs or $250,000; ii) the maximum rebate that the Customer may receive per year is $500,000 per Taxpayer Identification Number per utility service territory; and iii) if the Customer Energy Project qualifies for a rebate program approved by the Commission and offered by the Company, Customer may still elect to file such project under the Company's mercantile customer self direct program, however the Case Rebate that will be paid shall be discounted by 25%; and

b. Customer acknowledges that breaches of this Agreement, include, but are not limited to:

   i. Customer's failure to comply with the terms and conditions set forth in the Agreement, or its equivalent, within a reasonable period of time after receipt of written notice of such non-compliance;

   ii. Customer knowingly falsifying any documents provided to the Company or the Commission in connection with this Agreement or the Joint Application.

c. In the event of a breach of this Agreement by the Customer, Customer agrees and acknowledges that it will repay to the Company, within 90 days of receipt of written notice of said breach, the full amount of the Cash Rebate paid under this Agreement. This remedy is in addition to any and all other remedies available to the Company by law or equity.

4. **Termination of Agreement.** This Agreement shall automatically terminate:

   a. If the Commission fails to approve the Joint Agreement;

   b. Upon order of the Commission; or

   c. At the end of the life of the last Customer Energy Project subject to this Agreement.

   Customer shall also have an option to terminate this Agreement should the Commission not approve the Customer's Cash Rebate, provided that Customer provides the Company with written notice of such termination within ten days of either the Commission issuing a final appealable order or the Ohio Supreme Court issuing its opinion should the matter be appealed.

5. **Confidentiality.** Each Party shall hold in confidence and not release or disclose to any person any document or information furnished by the other Party in connection with this Agreement that is designated as confidential and proprietary ("Confidential Information"), unless: (i) compelled to disclose such document or information by judicial, regulatory or administrative process or other provisions of law; (ii) such document or information is generally available to the public; or (iii) such document or information was available to the receiving Party on a non-confidential basis at the time of disclosure.

   a. Notwithstanding the above, a Party may disclose to its employees, directors, attorneys, consultants and agents all documents and information furnished by the other Party in connection with this Agreement, provided that such employees, directors, attorneys, consultants and agents have been advised of the confidential nature of this information and through such disclosure are deemed to be bound by the terms set forth herein.

b. A Party receiving such Confidential Information shall protect it with the same standard of care as its own confidential or proprietary information.

c. A Party receiving notice or otherwise concluding that Confidential Information furnished by the other Party in connection with this Agreement is being sought under any provision of law, to the extent it is permitted to do so under any applicable law, shall endeavor to: (i) promptly notify the other Party; and (ii) use reasonable efforts in cooperation with the other Party to seek confidential treatment of such Confidential Information, including without limitation, the filing of such information under a valid protective order.

d. By executing this Agreement, Customer hereby acknowledges and agrees that Company may disclose to the Commission or its Staff any and all Customer information, including Confidential Information, related to a Customer Energy Project, provided that Company uses reasonable efforts to seek confidential treatment of the same.

6. **Taxes.** Customer shall be responsible for all tax consequences (if any) arising from the payment of the Cash Rebate.

7. **Notices.** Unless otherwise stated herein, all notices, demands or requests required or permitted under this Agreement must be in writing and must be delivered or sent by overnight express mail, courier service, electronic mail or facsimile transmission addressed as follows:

If to the Company:	**If to the Customer:**
FirstEnergy Service Company	Millcreek West Unity Local Schools
76 South Main Street	1401 W. Jackson St.
Akron, OH 44308	West Unity OH 43570
Attn: Victoria Nofziger	Attn: Traci Thompson
Telephone: 330-384-4684	419.924.2366
Fax: 330-761-4281	email: TThompson@hilltopcadets.org
Email: vmnofziger@firstenergycorp.com	

or to such other person at such other address as a Party may designate by like notice to the other Party. Notice received after the close of the business day will be deemed received on the next business day; provided that notice by facsimile transmission will be deemed to have been received by the recipient if the recipient confirms receipt telephonically or in writing.

8. **Authority to Act.** The Parties represent and warrant that they are represented by counsel in connection with this Agreement, have been fully advised in connection with the execution thereof, have taken all legal and corporate steps necessary to enter into this Agreement, and that the undersigned has the authority to enter into this Agreement, to bind the Parties to all provisions herein and to take the actions required to be performed in fulfillment of the undertakings contained herein.

9. **Non-Waiver.** The delay or failure of either party to assert or enforce in any instance strict performance of any of the terms of this Agreement or to exercise any rights hereunder conferred, shall not be construed as a waiver or relinquishment to any extent of its rights to assert or rely upon such terms or rights at any later time or on any future occasion.

10. **Entire Agreement.** This Agreement, along with related exhibits, and the Company's Rider DSE, or its equivalent, as amended from time to time by the Commission, contains the Parties' entire understanding with respect to the matters addressed herein and there are no verbal or collateral representations, undertakings, or agreements not expressly set forth herein. No change in, addition to, or waiver of the terms of this Agreement shall be binding upon any of the Parties unless the same is set forth in writing and signed by an authorized representative of each of the Parties. In

the event of any conflict between Rider DSE or its equivalent and this document, the latter shall prevail.

11. **Assignment.** Customer may not assign any of its rights or obligations under this Agreement without obtaining the prior written consent of the Company, which consent will not be unreasonably withheld. No assignment of this Agreement will relieve the assigning Party of any of its obligations under this Agreement until such obligations have been assumed by the assignee and all necessary consents have been obtained.

12. **Severability.** If any portion of this Agreement is held invalid, the Parties agree that such invalidity shall not affect the validity of the remaining portions of this Agreement, and the Parties further agree to substitute for the invalid portion a valid provision that most closely approximates the economic effect and intent of the invalid provision.

13. **Governing Law.** This Agreement shall be governed by the laws and regulations of the State of Ohio, without regard to its conflict of law provisions.

14. **Execution and Counterparts.** This Agreement may be executed in multiple counterparts, which taken together shall constitute an original without the necessity of all parties signing the same page or the same documents, and may be executed by signatures to electronically or telephonically transmitted counterparts in lieu of original printed or photocopied documents. Signatures transmitted by facsimile shall be considered original signatures.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed by their duly authorized officers or representatives as of the day and year set forth below.

Millcreek West Unity Local
(Customer)

By: Traci Thompson

Title: Treasurer

Date: 5/30/12

Toledo Edison
(Company)

By: John C. Lanzi

Title: VP, Energy Efficiency

Date: 6-7-12

Energy Savings Predictor Report

Industrial Edition

Date: 10/2/2012

To:

Prepared by:

Project: Millcreek West Unity

Utility:	First Energy: Toledo Edison	Base Rate:	$ 0.10
Demand Charge:	$ 0.10	Alternate Rate:	$ 0.10

Estimated Energy Savings

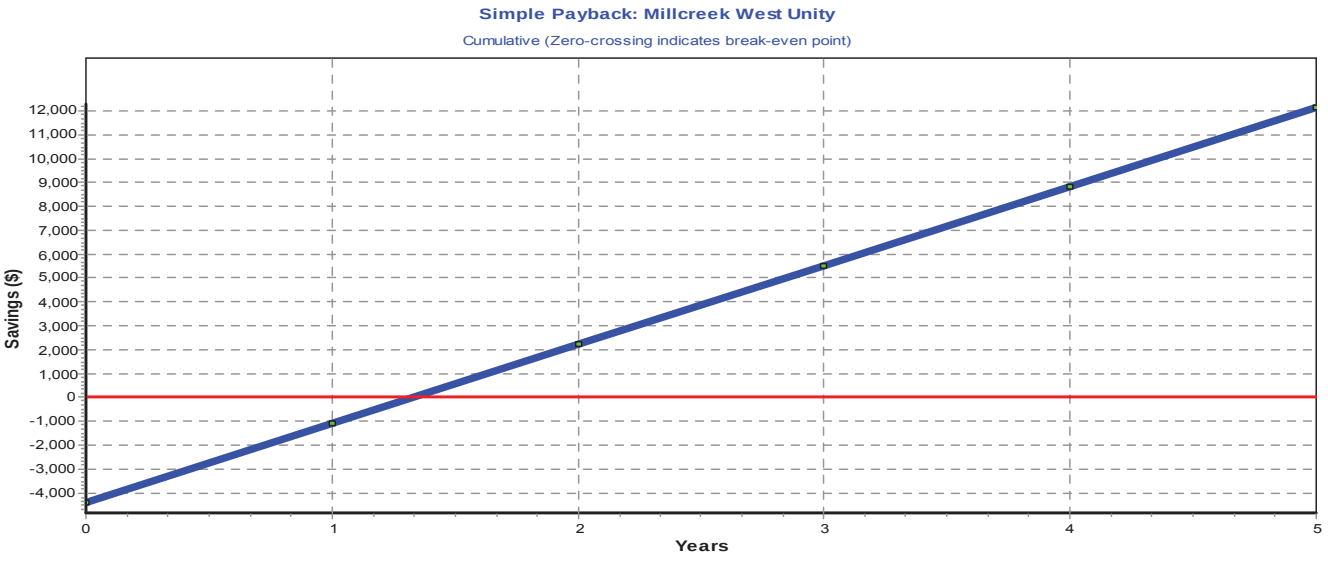
System	Energy Usage
Present System:	119,160 kWh
Drive System:	86,123 kWh
Energy Saved:	**33,037 kWh**

Predicted Savings:	Total
Energy Saved/Year:	$ 3,304
Yearly Savings:	**$ 3,308**

Carbon Dioxide Emissions

System	Carbon Footprint
Present System:	43.67 Ton(s)
Drive System:	31.56 Ton(s)
Carbon Dioxide Savings:	**12.11 Ton(s)**

Simple Project Payback/ROI: 1.330 Years



Carbon Dioxide (CO2) savings estimation based on electricity produced from Coal at 0.733 of CO2/Lbs

Weight Units: English

Calculations are based on available data. Yaskawa America, Inc. assumes no responsibility for the accuracy of the supplied data or of this report.

GLHP

System Data

Pump System

System Identification: GLHP

Type: Pump System

Flow Control: Discharge Valve

Minimum Head: 10 ft.wg.

Motor Data

Efficiency:	92.4 %
Power:	30 HP
Voltage:	208 V
FLA:	88 A

Incentive

Utility Rebate: $ 0 per system; One-time

Hours of Operation

Hours per Day:	22 Hours
Days per Week:	5 Days
Weeks per Year:	50 Weeks
Total Hours:	5,500 Hours/Year

Drive and Installation Data

Drive Cost:	$ 4,400
Install Cost:	$ 0
Dem. Rebate:	$ 0.10
# Systems:	1

Drive Selection

Catalog #: P7U20221A

Duty Cycle

Rate	Flow (%)	Time (%)	Time (Hours)
B	100 %	20 %	1,100
B	90 %	30 %	1,650
B	80 %	20 %	1,100
B	70 %	10 %	550
B	60 %	10 %	550
B	50 %	5 %	275
B	40 %	5 %	275
B	30 %	0 %	0
B	20 %	0 %	0
B	10 %	0 %	0

B = Base Rate

A = Alternate Rate

Carbon Dioxide Emissions

System	Carbon Footprint Single	Carbon Footprint Total
Present System:	43.67 Ton(s)	43.67 Ton(s)
Drive System:	31.56 Ton(s)	31.56 Ton(s)
Savings:	**12.11 Ton(s)**	**12.11 Ton(s)**

Payback Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Equipment Cost:	$ 4,400					$ 4,400
Installation Cost:	$ 0					$ 0
Utility Rebate:	$ 0					$ 0
Demand Savings:	$ 5	$ 5	$ 5	$ 5	$ 5	$ 23
Energy Saved:	$ 3,304	$ 3,304	$ 3,304	$ 3,304	$ 3,304	$ 16,519
Total:	**$ -1,091**	**$ 2,217**	**$ 5,525**	**$ 8,834**	**$ 12,142**	**$ 12,142**

Estimated Energy Savings

Operating Info:	Single	Total
Operating Hours:	5,500 Hours	5,500 Hours
Present System:	119,160 kWh	119,160 kWh
Drive System:	86,123 kWh	86,123 kWh
Energy Saved:	**33,037 kWh**	**33,037 kWh**

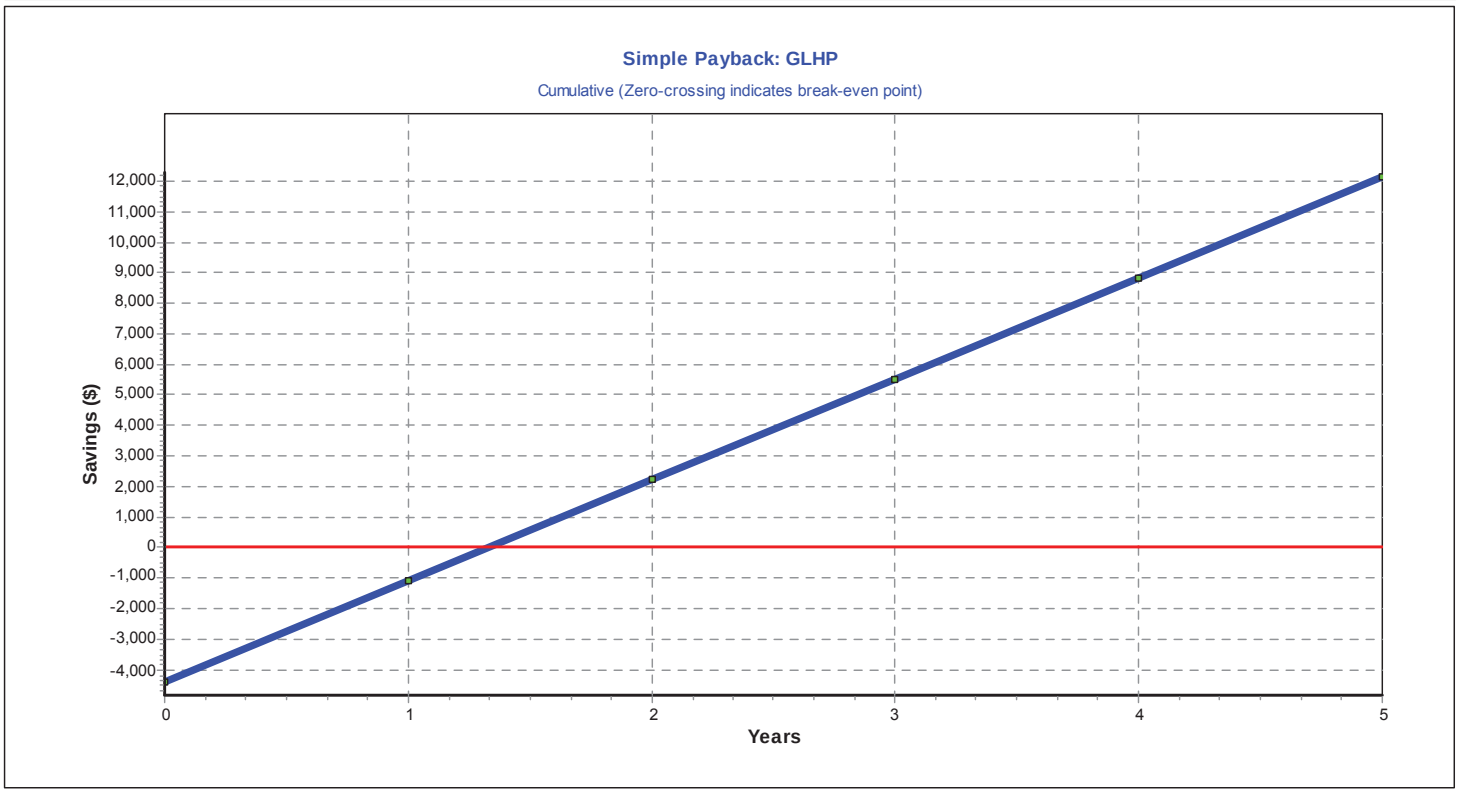
Predicted Savings:	Single	Total
Energy Saved/Year:	$ 3,304	$ 3,304
Demand Savings/Year:	$ 5	$ 5
Yearly Savings:	**$ 3,308**	**$ 3,308**
Simple Payback Time:	1.330 Years	

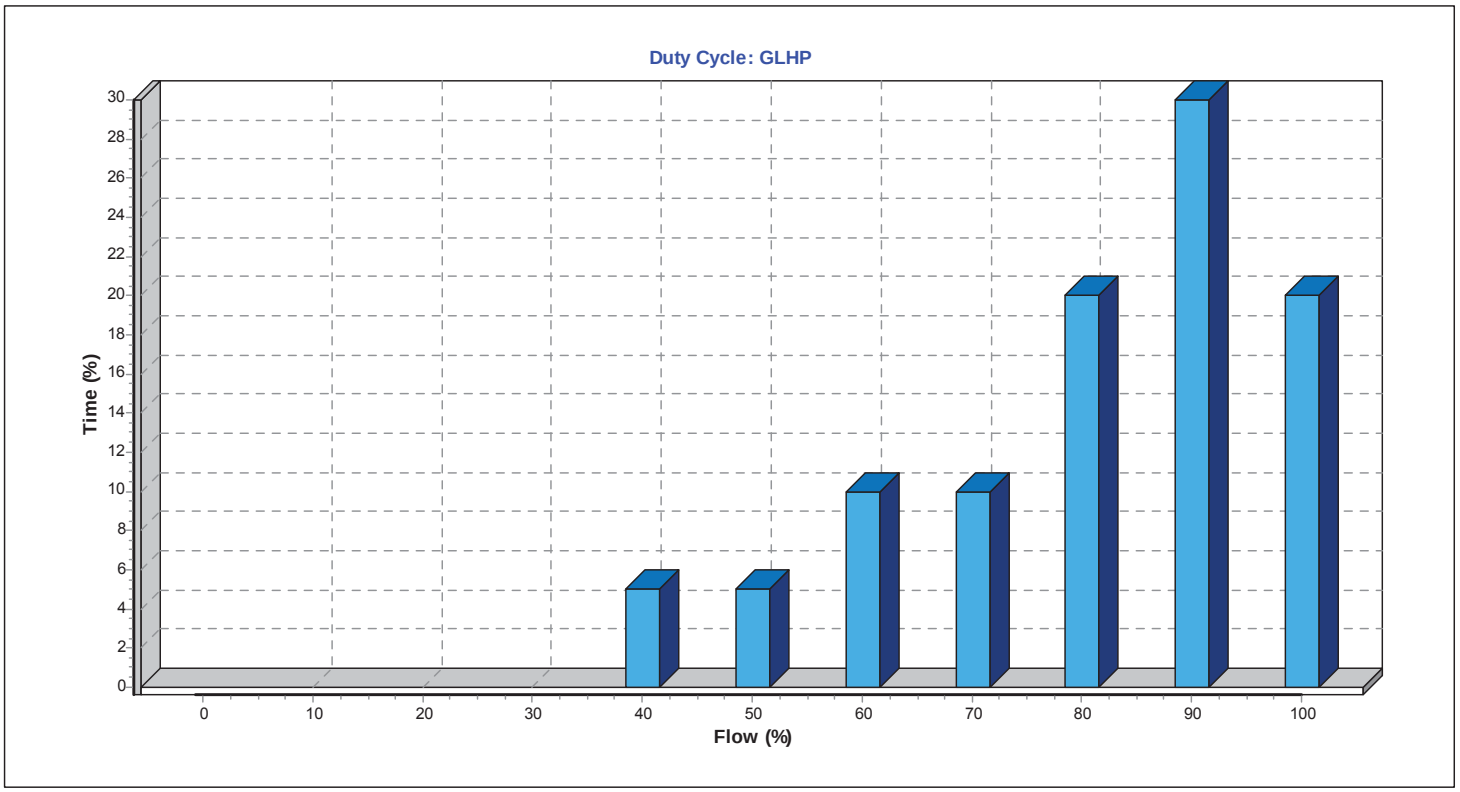
Carbon Dioxide (CO2) savings estimation based on electricity produced from Coal at 0.733 of CO2/Lbs

Weight Units: English

GLHP

Chart(s)





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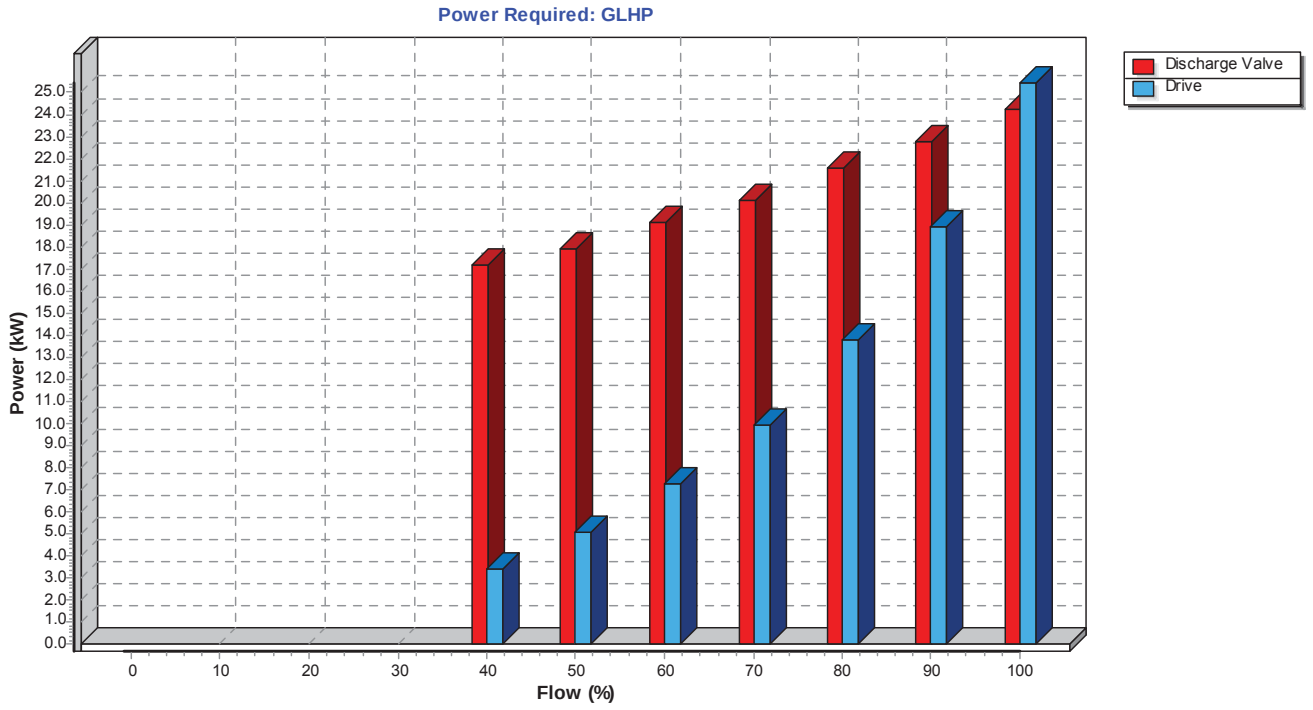

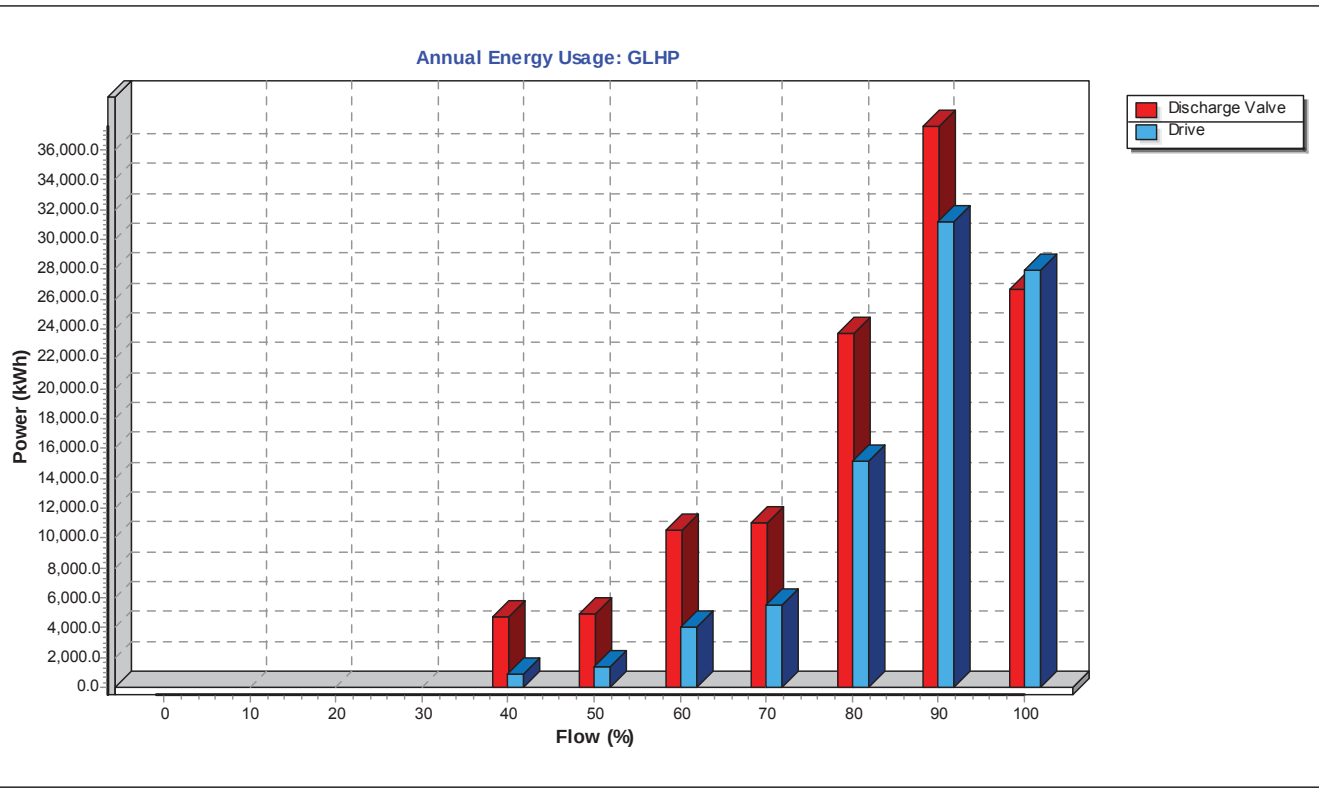

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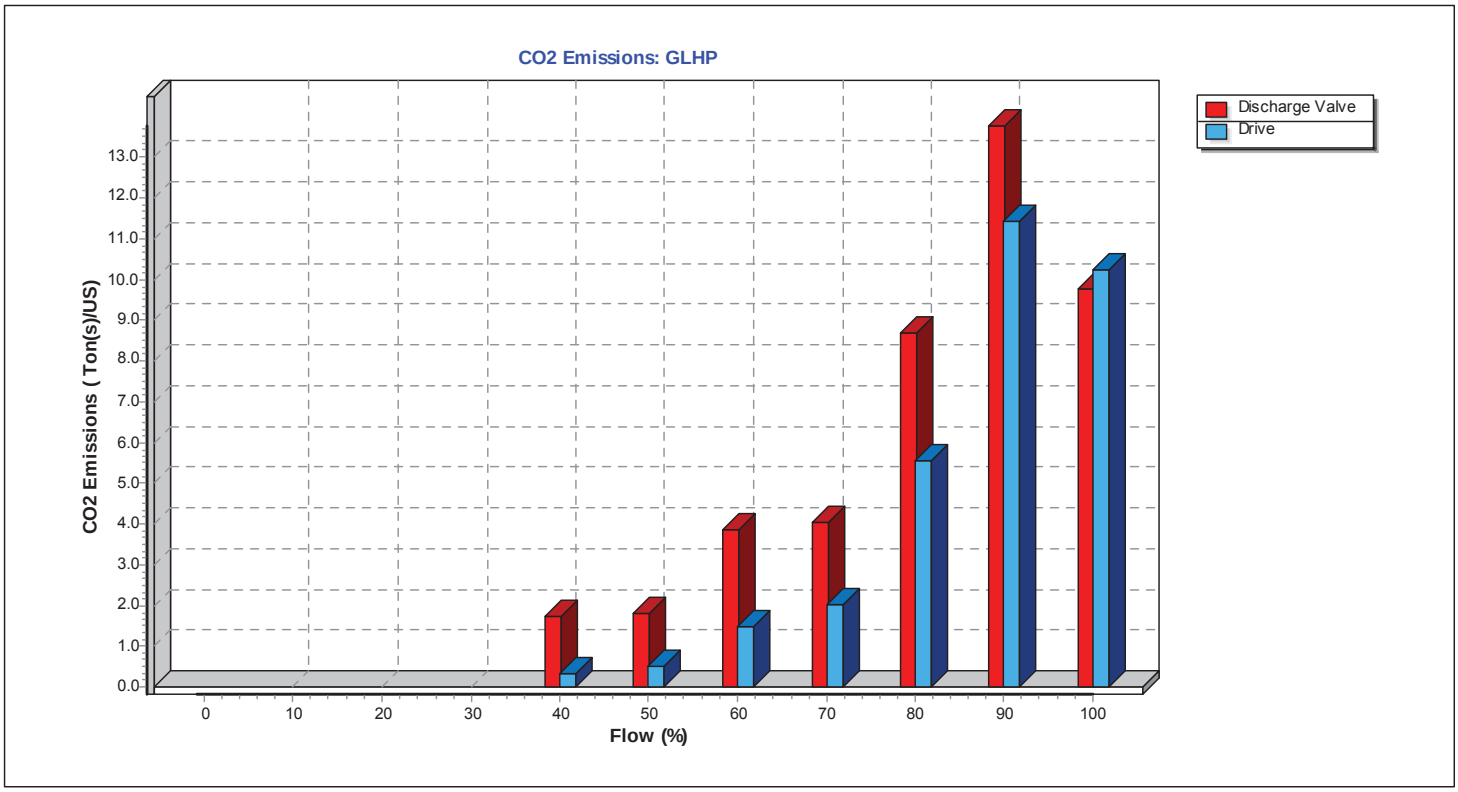

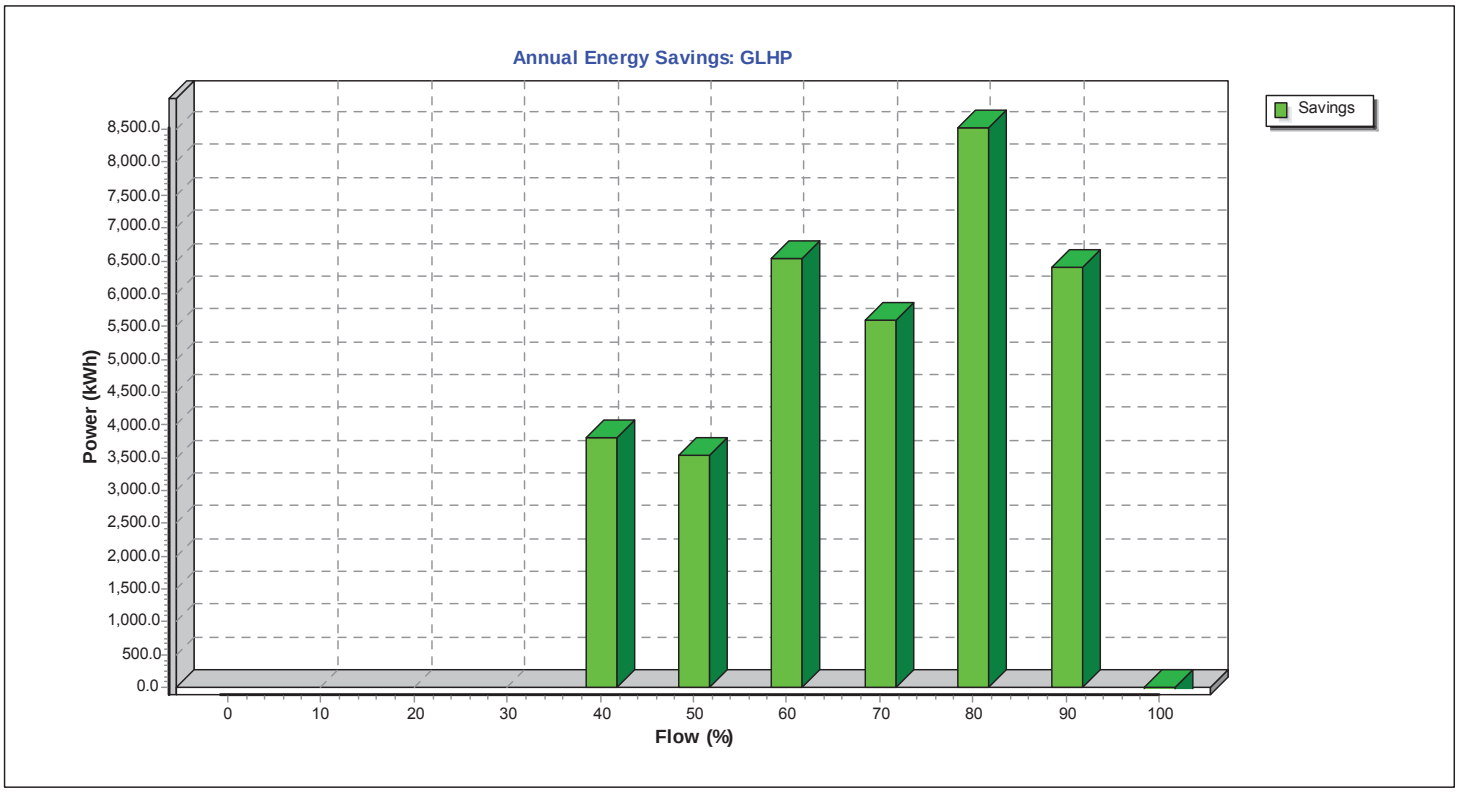

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in

Case No(s). 12-1828-EL-EEC

Summary: Application to Commit Energy Efficiency/Peak Demand Reduction Programs of The Toledo Edison Company and Millcreek-West Unity Local Schools electronically filed by Ms. Jennifer M. Sybyl on behalf of The Toledo Edison Company and Millcreek-West Unity Local Schools