Ohio | Public Utilities Commission

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

Case No.: 13-0728-EL-EEC

Mercantile Customer: **TriHealth Bethesda Oak Hospital**

Electric Utility: **Duke Energy**

Program Title or Description: **VFD**

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: **TriHealth – Bethesda Oak Hospital**

Principal address: **619 Oak Street Cincinnati, Ohio 45206**

Address of facility for which this energy efficiency program applies:

619 Oak Street Cincinnati, Ohio 45206

Name and telephone number for responses to questions:

Grady Reid Jr 513-287-1038

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. (**Refer to Appendix A for 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: **Duke Energy**

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)).
The following new equipment was installed starting July 2012 and was finished September 2012.

2 VFDs on two 75HP Supply Fan Motors

□ 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): _____.

□ 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: 75,423 kWh
Refer to Appendix B for calculations and supporting document

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.

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: _____kWh

Please describe the less efficient new equipment that was rejected in favor of the more efficient new equipment.

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?

New VFD equipment was installed between July 2012 and September 2012

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

-1.97 kW
Refer to Appendix B for calculations and supporting documentation.

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 **$5900. Refer to Appendix C for documentation.** (Rebate shall not exceed 50% project cost.

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 **3.85** (Skip to Subsection 2.) **Refer to Appendix D for calculations and supporting documents.**

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 **$30,313.**

The utility's program costs were **$1,983.**

The utility's incentive costs/rebate costs were **$5900.**

Refer to Appendix D for calculations and supporting documents.

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.

Refer to Offer Letter following this application

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.

DUKE ENERGY
Mercantile Self Direct Program
139 East Fourth Street
Cincinnati, OH 45202
513 629 5572 fax

February 5, 2013

Mr. Rick Volk
TriHealth – Bethesda Oak Hospital
619 Oak Street
Cincinnati, Ohio 45206

Subject: Your Application for a Duke Energy Mercantile Self-Direct Rebate

Dear Mr. Volk:

Thank you for your Duke Energy Mercantile Self Direct rebate application. As noted in the Energy Conservation Measure (ECM) chart on page two, a total rebate of $5900.00 has been proposed for your variable frequency drive project completed in the 2012 calendar year. **All Self Direct Rebates are contingent upon approval by the Public Utilities Commission of Ohio (PUCO).**

At your earliest convenience, please indicate if you accept this rebate by

- providing your signature on page two
- completing the PUCO-required affidavit on page three.

Please return the documents to my attention via fax at 513-629-5572 or e-mail to SelfDirect@Duke-Energy.com. Upon receipt, Duke Energy will submit the necessary documentation to PUCO. Following PUCO's approval, Duke Energy will remit payment.

At Duke Energy, we value your business and look forward to working with you on this and future energy efficiency projects. We hope you will consider our Smart $aver® incentives, when applicable. Please contact me if you have any questions.

Sincerely,

Grady Reid, Jr
Product Manager
Mercantile Self Direct Rebates

cc: Mike Heath – Duke Energy
Rob Jung - Ecova
Steve Rohrs - Pathian

Please indicate your response to this rebate offer within 30 days of receipt.

☒ Rebate is accepted. ☐ Rebate is declined.

By accepting this rebate, TriHealth affirms its intention to commit and integrate the energy efficiency projects listed on the following pages into Duke Energy's peak demand reduction, demand response and/or energy efficiency programs.

Additionally, TriHealth also agrees to serve as joint applicant in any future filings necessary to secure approval of this arrangement as required by PUCO and to comply with any information and reporting requirements imposed by rule or as part of that approval.

Finally, TriHealth affirms that all application information submitted to Duke Energy pursuant to this rebate offer is true and accurate. Information in question would include, but not be limited to, project scope, equipment specifications, equipment operational details, project costs, project completion dates, and the quantity of energy conservation measures installed.

If rebate is accepted, will you use the monies to fund future energy efficiency and/or demand reduction projects?

☒ YES ☐ NO

If rebate is declined, please indicate reason (optional):

Rick Volk Rick Volk 4/29/2013

Customer Signature Printed Name Date

Proposed Rebate Amounts

Measure ID	Energy Conservation Measure (ECM)	Proposed Rebate Amount
ECM-1	Installed 75 HP VFDs (Qty – 2)	$5900.00
Total		$5900.00

Ohio | Public Utilities Commission

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

Case No.: ___-___-EL-EEC

State of OHIO :

Rick Vance, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

   Tri Health Inc

   [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.

3. I am aware of fines and penalties which may be imposed under Ohio Revised Code Sections 2921.11, 2921.31, 4903.02, 4903.03, and 4903.99 for submitting false information.

Rick Vance Supervisor
Signature of Affiant & Title

Sworn and subscribed before me this 28th day of FEBRUARY, 2013 Month/Year

Signature of official administering oath

Anthony W Waldbillig Notary Public
Print Name and Title

My commission expires on ANTHONY W. WALDBILLIG Notary Public, State of Ohio My Commission Expires 11-20-2013

04900675 01		
BETHESDA HOSPITAL		
619 OAK		
CINCINNATI, OH 45206		
combined consumption		
Date	Days	Actual KWH
11/28/2012	33	959,568
10/26/2012	29	1,034,724
9/27/2012	30	1,245,689
8/28/2012	29	1,268,030
7/30/2012	32	1,581,650
6/28/2012	29	1,243,097
5/30/2012	30	1,217,933
4/30/2012	32	1,052,923
3/29/2012	29	1,003,433
2/29/2012	29	849,842
1/31/2012	32	919,824
12/30/2011	30	884,801
Total		**13,261,514**

Appendix B - TriHealth Bethesda Oak Energy Savings Achieved

	Baseline Used			Post Project Actual				Savings	
	Description	Annual kWh	Summer Coincident kW	Description	Annual kWh	Summer Coincident kW	Hours of Operation	Annual kWh	Summer Coincident kW[1]
ECM - 1	AHU 40 with 2 - 75HP supply fan motors and volume controls via Inlet Guide Vanes	151,053	59.0	Installed 2 VFDs on 2 - 75HP supply fan motors	79,646	61.0	3,120	71,407	-2.0

1 Summer coincident demand savings were calculated by DSMore software based on a representative loadshape and the modeled energy (kWh) savings.

After consideration of line losses, total energy savings are **75,423 kWh** and **-1.97 summer coincident kW**. These values may also reflect minor DSMore modeling software rounding error.

DETAILED CALCULATIONS

Dec 2012 V1

Salesforce Opportunity Name	*0*	Application #	TRI01	Rev.	0
Project Name	*TriHealth - Mercantile Self Direct Custom - Bethesda Oak - IGV to VFD*		*TRI01-TriHealthBO-Hptl-DY IGV to VFD*	State	OH

Measure Description

Replacing Inlet Guide Vanes (IGV) volume controls with VFDs on two 75-hp supply fan motors at TriHealth Bethesda Oak. The customer also implemented supply air static pressure reset controls and the proposed duty cycle reflects the upgrade.

Baseline

The baseline usage of the fan motors appears to be 1% of total usage, which is within expectation. Baseline was calculated using the existing motor efficiency and duty cycle. The fans run approximately 3,120 hours annually.

Savings Calculation Methodology

Savings were submitted using the ABB ACH550 Energy Savings Estimator, which was verified reasonable using the in-house VFD calculator tool because the retrofit is from IGV to VFD (see attached reference). The change in duty cycle is due to programmed supply air static pressure reset controls also implemented at the site. Tool output details and efficiency used were verified with the tool and outlined in the Savings Calculations section below.

Incremental Measure Cost (IMC)

IMC = project cost for this retrofit. The total project cost of $33,500 was quoted for two 75-hp supply fans and two 30-hp return fans. $22,500 was listed for the measure cost in the application, which is approximately proportional to the size of fans retrofitted.

IMC Calculation

IMC ($)	Baseline Cost ($)	Measure Cost ($)
$22,500.00	$0.00	$22,500.00

Attached Files

- ☑ Equipment Specs
- ☑ Calculations
- ☑ Cost Documentation

TRI01 Custom Spec.pdf | TRI01 Custom Quote.pdf | TRI01 Custom ABB Calculations.pdf.pd | TRI01 AESC Tool Savings.xls | TRI01 Custom Email Comm.pdf

References to source documents/back up files as appropriate

TRI01 Custom Quote.pdf
TRI01 Custom Spec.pdf
TRI01 Custom AESC Tool Savings.xls
TRI01 Custom Email Comm.pdf
TRI02 Custom ABB Calculations.pdf

Savings Calculations

	Peak kW	kWh	AESC tool	
Baseline	58.89	151,053	184,493	1.05% Billed
Proposed	60.72	79,646	113,979	
Savings	**-1.83**	**71,407**	70,515	**1.25%** difference

Tool Outputs:

1) "Cost per Hour" and "Operating Cost" correspond to kW and kWh because 100 cents per kWh was entered to the tool.

Baseline

ABB Energy Calculation Overview

AIR Flow	Annual Operating Time %	hrs/year	Operational Shaft HP	x1 Cost per Hour	x1 Operating Cost
100	14	436.80	75.00	$58.89	$25,723.15
90	26	811.20	67.50	$53.01	$43,001.71
80	28	873.60	60.00	$47.12	$41,164.03
70	32	998.40	52.50	$41.23	$41,164.03
60	0	0.00	45.00	$35.34	$0.00
50	0	0.00	37.50	$29.45	$0.00
40	0	0.00	30.00	$23.56	$0.00
30	0	0.00	22.25	$17.47	$0.00
20	0	0.00	15.00	$11.78	$0.00
10	0	0.00	7.21	$5.66	$0.00
TOTAL :	100	3,120.00			$151,053

Help | Close

Efficiency used by the tool

Program Setup — Preferences | Efficiency Setup | Custom Efficiency | Report Layout

Efficiency Setup — Reset

Efficiency VFD / Inverter	Flow	EFF. Damp /Valve	EFF. Inlet Vane	EFF. Valve
0.970	100 %	1.000	1.000	1.000
	90 %	0.768	0.810	0.768
	80 %	0.573	0.640	0.573
	70 %	0.410	0.490	0.410
	60 %	0.279	0.360	0.279
	50 %	0.177	0.250	0.177
	40 %	0.101	0.160	0.101
	30 %	0.049	0.091	0.049
	20 %	0.018	0.040	0.018
	10 %	0.003	0.010	0.003

Go Back | Next Page | Ok | Cancel

Proposed

ABB Energy Calculation Overview

AIR Flow	Annual Operating Time %	hrs/year	Operational Shaft HP	x1 Cost per Hour	x1 Operating Cost
100	5	156.00	75.00	$60.72	$9,472.32
90	16	499.20	54.67	$44.26	$22,094.59
80	24	748.80	38.40	$31.09	$23,280.19
70	21	655.20	25.73	$20.83	$13,647.82
60	18	561.60	16.20	$13.11	$7,362.58
50	16	499.20	9.38	$7.59	$3,788.93
40	0	0.00	4.80	$3.89	$0.00
30	0	0.00	2.03	$1.64	$0.00
20	0	0.00	0.60	$0.49	$0.00
10	0	0.00	0.08	$0.06	$0.00
TOTAL :	100	3,120.00			$79,646

Help | Close

Appendix C -Cash Rebate Calculation

TriHealth Bethesda Oak - VFD

Measure	Quantity	Cash Rebate Rate	Rebate	Cash Rebate
Installed VFDs on two 75-HP supply fan motors	2	50% of incentive that would be offered by the Smart $aver Custom program	$2,950	**$5,900**
			Total	**$5,900**

Appendix D -UCT Value

TriHealth Bethesda Oak - VFD

Measure	Total Avoided Cost	Program Cost	Total Incentive	Quantity	Measure UCT
Installed VFDs on two 75-HP supply fan motors	$30,313	$1,983	$5,900	2	**3.85**
Totals	**$30,313**	**$1,983**	**$5,900**	**2**	

Total Avoided Supply Costs	$30,313	***Aggregate Application UCT***	***3.85***
Total Program Costs	$1,983.00		
Total Incentive	$5,900		

Ohio Mercantile Self Direct Program

Application Guide & Cover Sheet

Questions? Call 1-866-380-9580 or visit www.duke-energy.com.

Email this form along with completed Mercantile Self Direct Prescriptive or Custom applications, proof of payment, energy savings calculations and spec sheets to SelfDirect@Duke-Energy.com. You may also fax to 1-513-629-5572.

Mercantile customers, defined as using at least 700,000 kWh annually are eligible for the Mercantile Self Direct program. Please indicate mercantile qualification:

- ☒ a single Duke Energy Ohio account
- ☐ multiple accounts in Ohio (energy usage with other utilities may be counted toward the total)

Please list Duke Energy account numbers below (attach listing of multiple accounts and/or billing history for other utilities as required):

Account Number	Annual Usage	Account Number	Annual Usage
0490067501	13,704,046		

Self Direct rebates are available for completed Custom projects that have not previously received a Duke Energy Smart $aver® Custom Incentive. Self Direct incentives are applicable to Prescriptive measures that were installed more than 90 days prior to submission to Duke Energy and have not previously received a Duke Energy Prescriptive rebate.

Self Direct Program requirements dictate that certain projects that may be Prescriptive in nature under the Smart $aver program must be evaluated using the Custom process. Use the table on page two as a guide to determine which Self Direct program fits your project(s). Apply for Self Direct projects using the appropriate application forms in conjunction with this cover sheet. Where Mercantile Self Direct Prescriptive applications are listed, please refer to the measure list on that application. If your measure is not listed, you may be eligible for a Self Direct Custom rebate. Self Direct Custom applications, like Smart $aver Custom applications, should include detailed analysis of pre-project and post-project energy usage and project costs. Please indicate which type of rebate applications are included in the table provided on page two.

Please check each box to indicate completion of the following program requirements:

☐ All sections of appropriate application(s) are completed	☐ Proof of payment.*	☐ Manufacturer's Spec sheets	☐ Energy model/calculations and detailed inputs for Custom applications

* If a single payment record is intended to demonstrate the costs of both Prescriptive & Custom projects, please include an additional document with an estimated breakout of costs for each Prescriptive and Custom energy conservation measure.

Application Type	Replaced equipment at end of lifetime or because equipment failed**	Replaced fully operational equipment to improve efficiency***	New Construction
Lighting	MSD Custom Part 1 ☐ Custom Lighting Worksheet ☐	MSD Prescriptive Lighting ☐	MSD Prescriptive Lighting ☐
		MSD Custom Part 1 ☐ Custom Lighting Worksheet ☐	MSD Custom Part 1 ☐ Custom Lighting Worksheet ☐
Heating & Cooling	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Prescriptive Heating & Cooling ☐
			MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐
Window Films, Programmable Thermostats, & Guest Room Energy Management Systems	MSD Custom Part 1 ☐ MSD Custom General and/or EMS Worksheet(s) ☐	MSD Prescriptive Heating & Cooling ☐	MSD Custom Part 1 ☐ MSD Custom General and/or EMS Worksheet(s) ☐
Chillers & Thermal Storage	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Prescriptive Chillers & Thermal Storage ☐
			MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐
Motors & Pumps	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Prescriptive Motors, Pumps & Drives ☐
			MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐
VFDs	Not Applicable	MSD Prescriptive Motors, Pumps & Drives ☒	MSD Custom Part 1 ☐ MSD Custom VFD Worksheet ☒
		MSD Custom Part 1 ☐ MSD Custom VFD Worksheet ☐	
Food Service	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Prescriptive Food Service ☐
			MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐
Air Compressors	MSD Custom Part 1 ☐ MSD Custom Compressed Air Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom Compressed Air Worksheet ☐	MSD Prescriptive Process ☐
			MSD Custom Part 1 ☐ MSD Custom Compressed Air Worksheet ☐
Process	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	MSD Prescriptive Process ☐	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐
		MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐	
Energy Management Systems	MSD Custom Part 1 ☐ MSD Custom EMS Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom EMS Worksheet ☐	MSD Custom Part 1 ☐ MSD Custom EMS Worksheet ☐
Chiller Tune-ups	MSD Prescriptive Chiller Tune-ups ☐		
Behavioral* & No/Low Cost**	MSD Custom Part 1 ☐ MSD Custom General Worksheet ☐		

** Under the Self Direct program, failed equipment and equipment at the end of its useful life are evaluated differently than early replacement of fully functioning equipment. **All equipment replacements due to failure or old age will be evaluated via the Custom program.**

*** Please ensure that you include the age of the replaced equipment for measures classified as "Early Replacement" in your application as well as the estimated date that you would have otherwise replaced the existing equipment if you had not chosen a more energy efficient option.

**** Behavioral energy efficiency and demand reduction projects must be both measurable and verifiable. Provide justification with your application.

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

Proposed energy efficiency measures may be eligible for Self-Direct Custom rebates if they clearly reduce electrical consumption and/or demand as compared to the appropriate baseline.

Before you complete this application, please note the following important criteria:

- Submitting this application does not guarantee a rebate will be approved.
- Rebates are based on electricity conservation only.
- Electric demand and/or energy reductions must be well documented with auditable calculations.
- Incomplete applications cannot be reviewed; all fields are required.

Refer to the complete list of Instructions and Disclaimers, beginning on page 6.

Notes on the Application Process

If you have any questions concerning how to complete any portion of the application or what supplementary information is required, please contact your Duke Energy Ohio, Inc account manager or the Duke Energy Smart $aver® team at 1-866-380-9580.

Every application must include calculations of the baseline electrical usage and the electrical usage of the proposed high-efficiency equipment/system. Monthly calculations are best. You, the Duke Energy Ohio customer, or your equipment vendor / engineer should perform these calculations and submit them to Duke Energy for review. *We strongly encourage the use of modeling software (such as eQuest or comparable) for complex projects.*

Upon receipt of your application, an acknowledgement email will be sent to you with an estimated response time based on an initial assessment of your application. The application review may include some communication to resolve any questions about the project or to request additional information. Applications that are received complete without missing information have a faster review time.

There are two ways to submit your completed application.

Email your scanned form to: SelfDirect@duke-energy.com

Or, fax your form to 513-629-5572

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

1. Contact Information (Required)

Duke Energy Customer Contact Information						
Company Name	TriHealth-Bethesda Oak					
Address	619 Oak Street					
Project Contact	Rick Volk					
City	Cincinnati	State	Ohio	Zip Code	45206	
Title	Maintenance Supervisor					
Office Phone	513-872-2809	Mobile Phone		Fax		
E-mail Address	rick_volk@trihealth.com					

Equipment Vendor / Contractor / Architect / Engineer Contact Information					
Company Name	Pathian				
Address	11260 Chester Road, Suite 545				
City	Cincinnati	State	Ohio	Zip Code	45246
Project Contact	Steve Rohrs				
Title	Mechanical Engineer				
Office Phone	513-737-7430	Mobile Phone	513-325-9055	Fax	513-737-1549
E-mail Address	srohrs@pathian.com				
Describe Role	Energy Engineer				

Payment Information					
Payee Legal Company Name (as shown on Federal income tax return):	TriHealth Hospitals				
Mailing Address	619 Oak Street				
City	Cincinnati	State	Ohio	Zip Code	45206
Type of organization (check one) ☐ Individual/Sole Proprietor ☒ Corporation ☐ Partnership ☐ Unit of Government ☐ Non-Profit (non-corporation)					
Payee Federal Tax ID # of Legal Company Name Above:	31-127019				
Who should receive incentive payment? (select one) ☒ Customer ☐ Vendor (Customer must sign below)					
If the vendor is to receive payment, please sign below: N/A -> Owner I hereby authorize payment of incentive directly to vendor: Customer Signature Rick Volk Date 12/21/12 (mm/dd/yyyy)					

2. Project Information (Required)

A. Please indicate project type:
- ☐ New Construction
- ☐ Expansion at an existing facility
- ☐ Replacing equipment due to equipment failure
- ☐ Replacing equipment that is estimated to have remaining useful life of 2 years or less
- ☒ Replacing equipment that is estimated to have remaining useful life of more than 2 years
- ☐ Behavioral, operational and/or procedural programs/projects

B. Please describe your project, or attach a detailed project description that describes the project.

Currently AHU 40 has two 75 HP supply fan motors that have volume controls via Inlet Guide Vanes. The IGV's will be removed and a VFD will be installed. In addition to the VFD, the unit will be resequenced to reset the supply air static pressure in the duct, by looking at the time of day, OA enthalpy, and night setback based on a photocell contact closure.

C. When did you start and complete implementation?
Start date 07/ 2012 (mm/yyyy) End date 09/ 2012 (mm/yyyy)

D. Are you also applying for Self-Direct Prescriptive incentives and, if so, which one(s)[1]?
Yes, the return fan for this unit has two 30 HP motors that fall under the prescriptive incentive.

E. Please indicate which worksheet(s) you are submitting for this application (check all that apply):
- ☐ Lighting
- ☒ Variable Frequency Drive (VFD)
- ☐ Compressed Air
- ☐ Energy Management System (EMS)
- ☐ General (for projects not easily submitted using one of the above worksheets)

F. Please tell us if there is anything about your electrical energy projections (either for the baseline or the proposed project) that you are either unsure about or for which you have made significant assumptions. Attach additional sheets as needed.

[1] If your project involves some equipment that is eligible for prescriptive incentives and some equipment that is likely eligible for custom incentives, and if it is feasible to separate the equipment for the energy analysis, then the equipment will be evaluated separately. If it is not feasible to separate the equipment for analysis, then the equipment will be evaluated together in the custom application.

Required: Attach a supplier or contractor invoice or other equivalent information documenting the Implementation Cost for each project listed in your application. (Note: self-install costs cannot be included in the Implementation Cost)

3. Signature (Required – must be signed by Duke Energy customer)

Customer Consent to Release of Personal Information

I, (insert name) RICK VOLK [redacted], do hereby consent to Duke Energy disclosing my Duke Energy Ohio, Inc Account Number and Federal Tax ID Number to its subcontractors solely for the purpose of administering Duke Energy Ohio's Mercantile Self-Direct Program. I understand that such subcontractors are contractually bound to otherwise maintain my Duke Energy Ohio, Inc Account Number and Federal Tax ID Number in the strictest of confidence.

I realize that under the rules and regulations of the public utilities commission, I may refuse to allow Duke Energy Ohio, Inc to release the information set forth above. By my signature, I freely give Duke Energy Ohio, Inc permission to release the information designated above.

Application Signature

I certify that I meet the eligibility requirements of the Duke Energy Ohio, Inc Mercantile Self Direct Custom Incentives Program and that all information provided within this application is correct to the best of my knowledge. I agree to the terms and conditions set forth for this program. I certify that the numbers, energy savings, and responses shown on this form are correct. Further, I certify that the taxpayer identification number is current and correct. I am not subject to backup withholding because: (a) I am exempt from backup withholding; or (b) I have not been notified by the IRS that I am subject to backup withholding as a result of a failure to report all interest or dividends; or (c) the IRS has notified me that I am no longer subject to backup withholding. I am a U.S. citizen (includes a U.S. resident alien).

Rick Volk
Duke Energy Ohio, Inc Customer Signature

Print Name Rick Volk

Date 12/21/12

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

Duke Energy®

Checklist for completing the Application

INCOMPLETE APPLICATIONS WILL RESULT IN DELAYS IN DUKE ENERGY PROCESSING YOUR APPLICATION AND NOTIFYING YOU CONCERNING AY REBATES. Before submitting the application and the required supplementary information, use the following checklist to ensure that your application is complete and the information in the application is accurate. (Note: this checklist is for your use only – do not submit this checklist with your application)

Section No. & Title	Have You:
1. Contact Information	☑ Completed the contact information for the Duke Energy customer? ☐ Completed the contact information for the equipment vendor / project engineer that can answer questions about the technical aspects of the project, if that is a different person than above?
2. Project Information	☑ Answered the questions A-E, including providing a description of your project. ☑ Completed and attached the lighting, compressed air, VFD, EMS and/or General worksheet(s)?
3. Signature	☑ Signed your name? ☑ Printed your name? ☑ Entered the date?
Supplementary information (Required)	☐ Attached a supplier or contractor's invoice or other equivalent information documenting the Implementation Cost for projects listed in your application? (Note: self-install costs cannot be included in the Implementation Cost) ☑ (If submitting the General Worksheet) attached calculations documenting the energy usage and energy savings for **each** project listed in your application?

If you have any questions concerning how to complete any portion of the application or what supplementary information is required, please contact:

- your Duke Energy account manager
  or,
- the Duke Energy Smart $aver® team at 1-866-380-9580.

Instructions/Terms/Conditions

Note: Please keep for your records- do not submit with the application

1. Energy service companies or contractors may assist in preparing the application, but an authorized representative of the customer must sign this application to be eligible to participate in the Mercantile Self Direct Program. Completion of this application does not guarantee the approval of a Self Direct Custom Rebate.

2. Once all documentation requested in this application is received by *Duke Energy Ohio, Inc,* and any follow-up information requested by *Duke Energy* is received, the rebate amount for each Energy Conservation Measure (ECM) will be communicated to the customer. The rebate amount will be based on ECM energy savings and ECM incremental installation cost.

3. All rebates require approval by the Public Utilities Commission of Ohio. *Duke Energy Ohio, Inc* will submit an application for rebate on the customer's behalf upon customer attestation to program terms, conditions and requirements as outlined in the rebate offer letter and upon customer completion of attestation documents required by the Public Utilities Commission of Ohio.

4. *Duke Energy Ohio, Inc* will issue a Self Direct Custom Rebate check, based on the approved rebate amount for each ECM, upon receiving approval from the Public Utilities Commission of Ohio. *Duke Energy* Ohio, Inc does not guarantee PUCO approval.

5. With the application, the customer must provide a list of all sites where the ECMs were installed. *Duke Energy Ohio, Inc* requests that sites of similar size, hours of operation and energy consuming characteristics be grouped together in one application for the determination of the rebate amount. The application should identify the site where each unique ECM was installed.

6. Based on the information submitted with the application and the information gathered both before and after the initial installation of the ECM, *Duke Energy Ohio, Inc* will calculate the rebate amount for each ECM.

7. *Duke Energy Ohio, Inc* may conduct random site inspections of a sample of the locations where the ECMs are installed to verify installation and operability of the ECMs and to obtain information needed to calculate the Approved Incentive Amount.

8. Customers are encouraged to retain copies of all forms, invoices and supporting documentation for their records.

9. Approved rebates are valid for 6 months from the date communicated to the customer by *Duke Energy Ohio, Inc,* subject to the expiration of measure eligibility based on project completion dates and application submission deadlines as defined by PUCO. Customers are encouraged to execute their rebate offer contracts and PUCO-required affidavits promptly to ensure eligibility is not forfeited.

10. *Duke Energy Ohio, Inc* reserves the right to recover all unrecoverable costs associated with the project approval if the customer decides not to execute the rebate contract, after the project is approved by *Duke Energy Ohio, Inc.*

11. Projects financially supported by other funding sources will be evaluated on a case-by-case basis for potential partial funding from *Duke Energy Ohio, Inc.*

12. Participants must be *Duke Energy Ohio, Inc* nonresidential, mercantile customers with the project sites in the *Duke Energy Ohio, Inc* service territory.

13. Customers or trade allies may not use any *Duke Energy* logo without prior written permission.

14. Only trade allies registered with *Duke Energy* are eligible to participate.

15. All equipment must be new. Used or rebuilt equipment is not eligible for incentives. All old existing equipment must be removed on retrofit projects.

16. Disclaimers: *Duke Energy Ohio, Inc*
    a. does not endorse any particular manufacturer, product or system design within the program;
    b. will not be responsible for any tax liability imposed on the customer as a result of the payment of incentives;
    c. does not expressly or implicitly warrant the performance of installed equipment. (Contact your contractor for details regarding equipment warranties.);
    d. is not responsible for the proper disposal/recycling of any waste generated or obsolete or old equipment as a result of this project;
    e. is not liable for any damage caused by the installation of the equipment nor for any damage caused by the malfunction of the installed equipment; and
    f. reserves the right to change or discontinue this program at any time. The acceptance of program applications is determined solely by *Duke Energy Ohio, Inc.*

The General Worksheet is part 2 of the application. Do not submit this file without submitting a completed Part1 Custom Application document file, which can be found at www.duke-energy.com. This worksheet is for all projects that are not easily submitted through one of the other worksheets

Before you complete this application, please note the following important criteria:

- Incentive approval is required PRIOR to equipment purchase, or any other activity which would indicate that the Duke Energy customer has already decided to proceed.
- Submitting this application does not guarantee an incentive will be approved.
- Incentives are based on electricity conservation only.
- Electric demand and/or energy reductions must be well documented with auditable calculations.
- Simple payback without incentive must be greater than 1 year.
- Incomplete applications will not be reviewed; all fields are required.

Refer to the complete list of Instructions and Disclaimers, found in the Custom Application Part 1 document.

Please enter your information and data into the cells that are shaded.
Cells in white are locked and cannot be written over.

Duke Energy Customer Contact Information (Match the information in Application Part 1):

Name	TriHealth Hospitals - Bethesda Oak Facility
Company	TriHealth

Equipment Vendor / Project Engineer Contact Information

Name	Pathian - Steve Rohrs
Company	Pathian

Before proceeding with the custom application, please verify that your project is not on the prescriptive incentive application.
The prescriptive incentive applications can be found at:

KY	http://www.duke-energy.com/kentucky-business/energy-management/energy-efficiency-incentives.asp
	Kentucky only: custom incentives only available to K-12 school facilities; prescriptive incentives available for those not on rate TT.
OH	http://www.duke-energy.com/ohio-business/energy-management/energy-efficiency-incentives.asp
NC	http://www.duke-energy.com/north-carolina-business/energy-management/energy-efficiency-incentives.asp
SC	http://www.duke-energy.com/south-carolina-business/energy-management/energy-efficiency-incentives.asp

Prescriptive incentives are already pre-approved and the application is submitted after project implementation.
Take note of the equipment eligibility on the prescriptive application before planning to utilize the prescriptive application.

List of Sites (Required)

App No.
Rev.

Provide a list of sites addressed by this custom incentive application

Site ID (see note 1)	Duke Energy Electric Account Number(s) (see note 2)	Facility Address	List of Proposed Projects at each site	Annual Hours of Operation	Gross Square Footage
225	12345678 01	*Example: 123 Main Street, Anywhere USA 12345*	*Project Name(s)*	*5,840*	*42,000*
	5090204901	*375 Dixmyth Ave, Cincinnati OH, 45220*	*AHU 40 Supply fan upgrade*	*3,120*	*659,809*

1 **Site ID**
Can be a store number, building name or other way to identify the location. If there is only one site involved in this application, then a Site ID is not necessary.

2 **Account Numbers**
Must match the facility of the proposed project(s). If there are multiple meters at a site, only include the meters that pertain to the project(s).

Duke Energy

Conditioned Square Footage	Facility Age (years)
38,000	12
659,809	54

GENERAL CUSTOM APPLICATIONS WORKSHEET - **CUSTOM GENERAL APPLICATION PART1** Rev 5/11

Duke Energy

For each project, answer the following questions (use one worksheet per project)

App No.	0
Rev.	0

Project Name: AHU 40 Supply fan upgrade

How would you classify this project? (Place an x in all boxes that apply.)

Lighting		Heating/Cooling		Air Compressor		Energy Management	x
VFD	x	Motors/Pumps		Process		Other, describe below:	

Brief Project Description

Describe the Baseline (see note 3) Equipment/System	Describe the Proposed High Efficiency Project
Currently AHU 40 has two 75 HP Supply fan motors that has volume control via Inlet Guide Vanes.	The IGV's will be removed and a VFD will be installed. In addition to the VFD, the unit will be resequenced to reset the supply air static pressure in the duct, by looking at time of day, OA enthalpy, and night setback based on a photocell contact closure.

If Existing Equipment is the Baseline, how many years of useful life remain or how many years until replacement? 20

Detailed Project Description Attached? Yes (Required)

Operating Hours (see note 4)

24 x 7	Weekday		Saturday		Sunday		Weeks of Use in Year (see note 5)	Total Annual Hours of Use
	Start Hour	End Hour	Start Hour	End Hour	Start Hour	End Hour		
No							*52*	*3,120*

Energy Savings

	Baseline (see Note 3)	Proposed	Savings	Describe how energy numbers were calculated
Annual Electric Energy	302,128 kWh	159,342 kWh	142,786 kWh	
Electric Demand	14 kW	3 kW	11 kW	
Calculations attached	Yes	Yes	(Required)	Current control method vs new control method. See project description

Simple Payback

Average electric rate ($/kWh) on the applicable accounts (see note 6)			$0.07
Estimated annual electric savings			$9,995
Other annual savings in addition to electric savings, such as operations, maintenance, other fuels			
Incremental cost to implement the project (equipment & installation) (see note 7)			$22,500.00
Copy of vendor proposal is attached (see note 8)			Yes
Simple Electric Payback in years (see note 9)	2.251121058	Total Payback in years	2.251121058

cost for project: is35,500

22.5 is just 2 VFD's @ 75HP

150 HP x 50 $/HP = $7500

3 Baseline
Retrofit projects: the existing equipment is the baseline unless that equipment must be replaced for some reason anyway.
New construction projects or where the existing equipment must be replaced anyway: the baseline is the standard option in today's market, taking into account any applicable organizational, local, state or federal codes or standards currently in effect.

4 Operating Hours
Describe when the equipment is typically used. If the project is proposed for more than one site, provide any variations in operating hours between the sites on a separate sheet.

5 Weeks of Use in Year
If the equipment is not in use 52 weeks during the year (for example, during holiday or summer break), provide an explanation of when usage is not expected and why: typical extended office operational hours

6 Average electric rate ($/kWh)
If you do not know your average electric rate, use $0.10/kWh.

7 Incremental cost to implement the project
Costs exclude self installation costs. Retrofit projects, incremental cost is the total cost of the proposed project. New construction or where the existing equipment must be replaced anyway, then incremental cost is the premium of the proposed high efficiency project over baseline.

8 Copy of vendor proposal is attached
Vendor proposal of proposed system is always required.
New construction projects or where the existing equipment must be replaced anyway, vendor proposal of baseline must also be attached.

9 Simple Electric Payback
If the simple electric payback is less than 1 year, then no incentive can be approved. Double check average electric rate for correct payback.

ACH550 Energy Savings Estimator

To: Pathian
Mechanical Engineer Steve Rohrs

Prepared by:

Fan Application

Project Name: Bethesda Oak AHU 40 SF

Total Annual Hours of Operation: 3,120 Hours

Operation / Motor / VFD Data

Cost per kWh:	7.00 ct.
Motor Horse Power:	150.0 HP
Motor Efficiency:	95.0 %
Drive Efficiency:	97.0 %
Power Company Incentive:	0.0 $/HP
ABB ACH550 Drive Cost:	$0

2 fan motors @ 75 HP EA

Annual Energy Cost per Control Method

No Speed Control	$25,725
ABB ACH550 Drive:	$11,154
Outlet Damper Control	$21,724
Inlet Vane Control	$18,550

New controls

Annual Energy Savings per Control

No Speed Control	$14,571
Outlet Damper Control	$10,570
Inlet Vane Control	$7,396

Duty Cycle

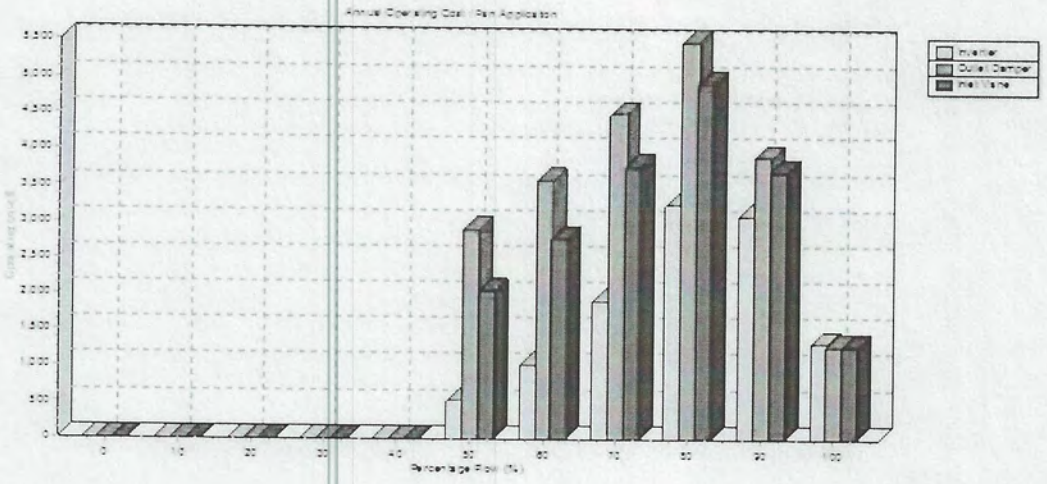
% Flow	Time (Hrs)	Time (%)
100%	156.0 Hrs	5 %
90%	499.2 Hrs	16 %
80%	748.8 Hrs	24 %
70%	655.2 Hrs	21 %
60%	561.6 Hrs	18 %
50%	499.2 Hrs	16 %
40%	0.0 Hrs	0 %
30%	0.0 Hrs	0 %
20%	0.0 Hrs	0 %
10%	0.0 Hrs	0 %

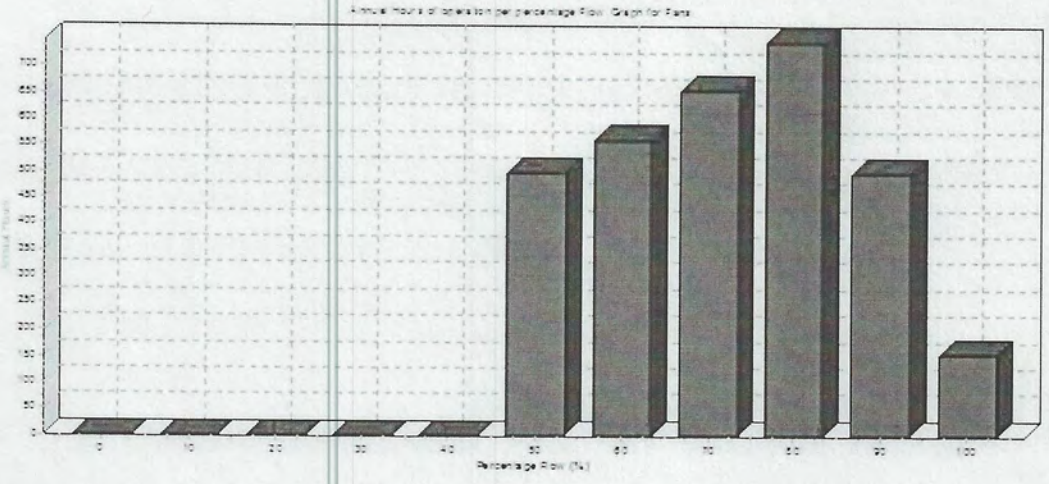
Payback Period ABB ACH550 Drive

No Control	Immediate
Outlet Damper	Immediate
Inlet Vane	Immediate

Includes Company Incentive

ABB ACH550 Energy Savings Estimator





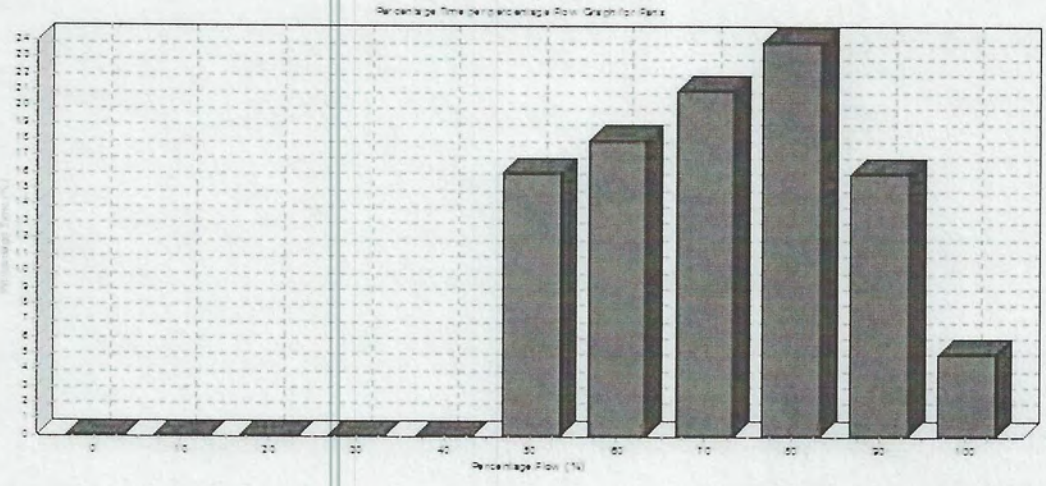


ABB ACH550 Energy Savings Estimator

ACH550 Energy Savings Estimator

To: Pathian
Mechanical Engineer Steve Rohrs

Prepared by:

Fan Application

Project Name: Bethesda Oak AHU 40 SF

Total Annual Hours of Operation: 3,120 Hours

Operation / Motor / VFD Data

Cost per kWh:	7.00 ct.
Motor Horse Power:	150.0 HP
Motor Efficiency:	95.0 %
Drive Efficiency:	97.0 %
Power Company Incentive:	0.0 $/HP
ABB ACH550 Drive Cost:	$0

2@75HP
old program

Annual Energy Cost per Control Method

No Speed Control	$25,725
ABB ACH550 Drive:	$15,458
Outlet Damper Control	$23,283
Inlet Vane Control	$21,149

Annual Energy Savings per Control

No Speed Control	$10,267
Outlet Damper Control	$7,825
Inlet Vane Control	$5,692

Duty Cycle

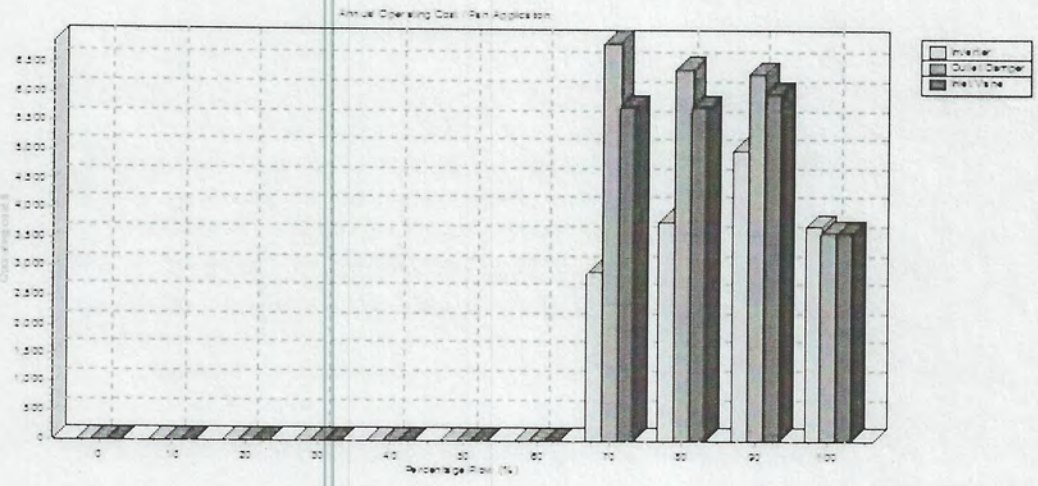
% Flow	Time (Hrs)	Time (%)
100%	436.8 Hrs	14 %
90%	811.2 Hrs	26 %
80%	873.6 Hrs	28 %
70%	998.4 Hrs	32 %
60%	0.0 Hrs	0 %
50%	0.0 Hrs	0 %
40%	0.0 Hrs	0 %
30%	0.0 Hrs	0 %
20%	0.0 Hrs	0 %
10%	0.0 Hrs	0 %

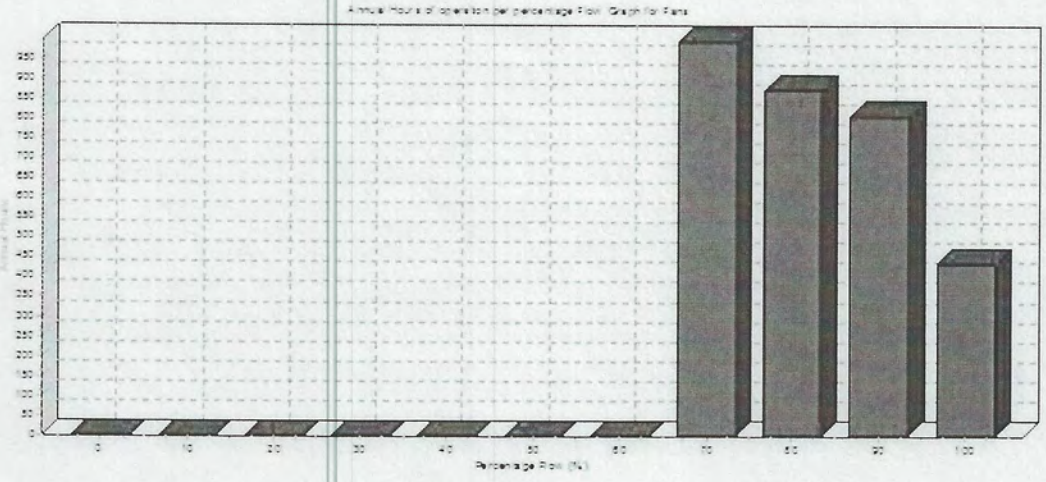
Payback Period ABB ACH550 Drive

No Control	Immediate
Outlet Damper	Immediate
Inlet Vane	Immediate

Includes Company Incentive

ABB ACH550 Energy Savings Estimator





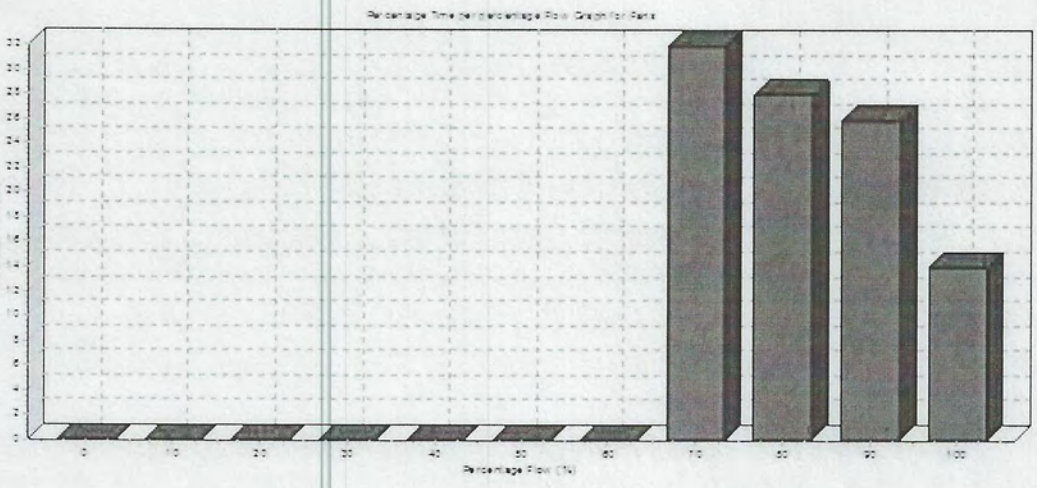


ABB ACH550 Energy Savings Estimator

Pathian
INCORPORATED
Revolutionizing an Industry

INVOICE

Date:2/24/2012
INVOICE # 1-211

TO

Rick Volk
Bethesda Oaks Hospital
619 Oak St
Cincinnati, OH 45206

Salesperson	Job	Payment Terms	Due Date
	Furnush and Install SAF VFD: PO #135582-0-119		2/24/2012

Description	Qty.	Unit Price	Line Total	
Furnush and Install SAF & RAF VFD's AC-40: PO #135582-0-119	1	$35,500.00	$35,500.00	

Subtotal	$35,500.00
Sales Tax	$0.00
Total	$35,500.00
Payments	$0.00
Balance	$35,500.00

Thank you for your business!

Make all checks payable to Pathian Incorporated

2929 Audubon

Fairfield Township, OH 45011

Phone: (513) 746-8951
Fax: (513) 737-1549
dbuchanan@pathian.com

VSD Calculation

Inputs

Nominal HP	100	
Load	0.85	*at full flow
BHP	85	
Number	1	
Efficiency	94	
Hours	8760	
Measured kW	74.6	*at full flow

Retrofit: Fan with Inlet Guide Vanes to VSD

Calculated Fields

Electric HP	90.42553
FL kW	74.6
kWh Savings	197,984

Existing Curve	7
Proposed Curve	10

	Exisitng					Proposed				
% Flow	% Hours	%Power	kW	kWh	% Speed	% Hours	%Power	kW	kWh	Savings
20		47%			20		5%			
25		51%			25		6%			
30		55%			30		8%			
35		57%			35		11%			
40		58%			40		14%			
45		59%			45		17%			
50		60%			50	16	21%	15.666	21,957	
55		61%			55		26%			
60		63%			60	18	32%	23.872	37,641	
65		66%			65		38%			
70	32	69%	51.330	143,889	70	21	44%	32.824	60,383	83,506
75		72%			75		50%			
80	28	75%	56.121	137,654	80	24	57%	42.522	89,398	48,256
85		79%			85		64%			
90	26	85%	63.650	144,968	90	16	73%	54.458	76,328	68,640
95		92%			95		86%			
100	14	100%	74.600	91,489	100	5	105%	78.330	34,309	57,181
			Total kWh	518,000				Total kWh	320,017	197,984

		Baseline	Proposed
1	Direct Drive to VSD	2	9
2	Pos Disp Pump to VSD	3	9
3	Centrifugal Pump to VSD	4	8
4	Centrifugal Pump with Bypass to VSD	5	8
5	Fan with Bypass to VSD	5	10
6	Fan with Outlet Dampers to VSD	6	10
7	Fan with Inlet Guide Vanes to VSD	7	10

ID	Strategy	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
1	2	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	3	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	4	0	0	0	0.632112	0.648488	0.665742	0.683876	0.71	0.72	0.74	0.76	0.79	0.81	0.83	0.86	0.89	0.93	0.94	0.96	1
4	5	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	6	0	0	0	0.576577	0.612613	0.648649	0.684685	0.720721	0.756757	0.783784	0.81982	0.846847	0.864865	0.891892	0.918919	0.936937	0.954955	0.963964	0.981982	1
6	7	0	0	0	0.46789	0.513761	0.550459	0.568807	0.577982	0.587156	0.59633	0.605505	0.633028	0.66055	0.688073	0.715596	0.752294	0.788991	0.853211	0.917431	1
7	8	0	0	0	0.05	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.3	0.35	0.41	0.48	0.57	0.66	0.78	0.9	1.05
8	9	0	0	0	0.21	0.26	0.31	0.36	0.41	0.46	0.51	0.56	0.61	0.66	0.71	0.76	0.82	0.87	0.93	0.98	1.05
9	10	0	0	0	0.05	0.06	0.08	0.11	0.14	0.17	0.21	0.26	0.32	0.38	0.44	0.5	0.57	0.64	0.73	0.86	1.05