Arcadia High School

School Energy Education Grant Program

I) Executive Summary

a. Goals
   i. Create policies which will reduce energy consumption and costs at Arcadia High School while maintaining building comfort levels and educational effectiveness and policies.
   ii. Include energy and energy efficiency topics in Arcadia High School's curriculum

b. Objectives
   i. Create and train an energy team that can analyze school energy usage and identify areas where reductions can be made.
   ii. Create an energy management policy for Arcadia High School
   iii. Create an energy education plan for Arcadia High School
   iv. Educate school board, administration, staff and students about energy conservation and its role in providing an effective educational and work environment.
   v. Implement curriculum that provides students with knowledge of energy and energy conservation and the skills to evaluate and make decisions about energy consumption.

c. Rationale
   i. With rising energy costs and reduced funding, it is imperative that Arcadia High School determine the most effective and efficient use of resources including energy. Furthermore, the efficient use of energy and natural resources is necessary to make responsible and meaningful contributions to our local community. Finally preparing our students to make informed decisions about energy and natural resources is beneficial to their learning experience as well as their ability to contribute to the community and world. Comprehensive energy management policy and education plans allow us to accomplish all of the above.

d. Plan Development Process
   i. Energy Team Created:
      1. Michele Butler (principal)
      2. Rick Nelson (Facility Director)
      3. Tom Nelson (Technology Director)
      4. Kevin Whalen (Ari-Science Teacher)
      5. Terry Vettrus (Special Education Teacher)
      6. Olga Dedkova-Hason (ELL Teacher)
      7. Ryan Ziegler (Technical Education Teacher)
      8. Alan Herman (English Teacher)
      9. Bill Steinke (Technical Education Teacher)
      10. Marie Lettner (Science & Mathematics Teacher)

ii. Energy Team Training

1. Michele Butler completed the Practical Energy Management in Schools training.
2. Rick Nelson will complete the Building Operator Certification program.
3. Alan Herman, Ryan Ziegler, Terry Vettrus, Olga Dedkova-Hasan, Kevin Whalen, Bill Steinke and Marie Lettner completed NRES 734: School Building Energy Efficiency Education class.
4. The entire team created the energy management policy and education plan
5. The team encountered a couple of challenges during the course of this work, including the resignation of our project manager and difficulties finding collaborative time to complete the work. Marie Lettner assumed the responsibility of project manager.
6. Another constraint encountered during this project, is our inability to program the HVAC system in house, thus any changes that are made to fresh air intake controls requires upward of $1700 in programming charges.
7. Arcadia High School would like to thank the KEEP organization for the wonderful trainings provided by Charlie Schneider and support from Melissa Rickert . We also appreciate the opportunity that KEEP has provided us to improve student learning as well as our ability to encourage that learning in an efficient and effective manner. This work would not have been possible without KEEP's funding.

II) Arcadia High School Energy Management Policy

a. Background

The school District of Arcadia does not currently have, nor ever had a School Energy Policy or Energy Education Plan. Faculty, administration, students, and school board members have verbally expressed the importance of energy conservation and education, but action has to be taken. Stakeholders agree that energy management is necessary in order for the School District of Arcadia to minimize the impact of energy cost increases will have on the current and future budgets. There is also stakeholder's consensus to maintain a reliable supply of energy to meet the functional needs of the District and ensure that energy is used efficiently. As an educational system, we have an obligation to model and instruct the students of our district on energy saving measures that will have long term effects.

b. Purpose

Energy management at the high school building will create energy savings. These savings will be accomplished via the following steps:

1. Reduce the energy consumption peak
2. Foster individual ownership and awareness (from students to staff)
3. Offer continual energy education
4. Monitor energy usage
5. Ensure that energy is being used efficiently and that conservation of energy has no educational impact

A strong commitment on the part of all staff and the administration is important to an effective energy management program. It will be the responsibility of each high school employee to actively participate in conservation efforts to reduce energy consumption. In turn, it will be the responsibility of the administration and the energy team to ensure that everyone receives information regarding energy conservation and education.

Instituted as part of the high school's plan to save energy, this policy is designed to save scarce resources without infringement of the educational mission of the high school. The building principal and energy team will share the accountability for ensuring that this policy is followed.

c. Policies

ARCADIA HIGH SCHOOL ENERGY PLAN

A. Heating and Air Conditioning

1. Classroom thermostats will be set at 68 degrees for heating and 76 degrees for cooling during the occupied times. For unoccupied times, heating will be set at 55 degrees and cooling will not occur.
2. Auditorium thermostats will be set as occupied or unoccupied.
3. Gymnasiums, locker room, and industrial/shop occupancies will not be air conditioned.
4. Operating schedules for the heating, ventilating, and air conditioning equipment will be optimized as follows:

a. For the heating season, the equipment will be started approximately two hours before classes start to allow the building to be at the occupied set point. The scheduled shut down time will be set the same as student release time.
b. For the cooling season, the equipment will be started two hours before classes start to allow the building to pre-cool.

5. HVAC coil cleaning will be scheduled annually to assure the highest operating efficiency possible.
6. Window blinds will be adjusted, when and where appropriate, to allow the sun to warm the building during the heating season or to block out the sun during the cooling season.
7. Windows will be kept closed if the air conditioning or heating systems are in operation.
8. Classroom doors will be kept closed.
9. Staff will not obstruct ventilation ducts or return grilles with books, charts, furniture, plants or any other objects or materials.
10. New equipment purchases will be energy efficient models that are Energy Star rated.
11. The use of portable electric heaters or any other auxiliary heating devices will not be permitted.
12. Employees and students are encouraged to wear appropriate clothing during the heating season and cooling season.
13. The Building Facilities Department may adjust set points to provide the best overall performance of the HVAC system.

B. Lighting

1. Lighting schedules will be optimized to reduce usage.
2. Lights will be turned off when space is not in use or natural day lighting is adequate.
3. Classroom lights will be turned off when the last person exits the room.
4. Cleaning staff will turn lights on only for the period when a specific area is being cleaned.
5. Hallway lighting will be turned on 30 minutes before classes begin and will be turned off after classes have ended.
6. Classroom lighting levels that are over lit will be adjusted to minimum levels (using single/dominate switch if available).
7. Gym lighting levels will be adjusted to appropriate levels for classes, events and practices (classes being at lower levels and events at highest levels).
8. Buildings will be identified for energy saving lighting projects.

C. Food Service

1. Run time of ovens, stoves, and fryers will be kept at the minimum levels.
2. Exhaust fans will run only when absolutely necessary.
3. Energy saving devices and/or practices will be identified.
4. Equipment will be energy efficient models and natural gas if possible.

D. Computers/Office Machines

1. Copiers, laminating machines, calculators, and other office machines will be turned off at the end of the day.
2. Computers, monitors, printers, and other peripheral equipment will be turned off at the end of the day or when not in use for long periods of time during the day.

3. District-wide software may be used to automatically shut down computers at the end of the day.
4. Computers will be energy efficient models.

E. Building Improvements

1. Building air leaks will be identified and sealed with caulking, energy efficient seals and/or insulation.
2. Building Facilities Department will be responsible for the development and implementation of long-range projects.

F. Other

1. The domestic hot water temperature set point will be no higher than 115 degrees. Food service operations requiring higher temperature levels by code shall use booster units or dedicated water heaters when possible.
2. The use of personal appliances such as electric coffee makers, microwaves, refrigerators, toaster ovens, pizza makers, and/or other cooking or refrigeration appliances is discouraged and may result in a charge per unit as determined by administration. The use of small fans, radios and desk lamps is allowed, but must be turned off when not in use. It is recommended that these items be Energy Star Rated and UL Approved.
3. It is recommended that energy efficient vending machines will be used.

G. Education

1. Staff and students will be provided on-going education on energy saving measures through the Energy Committee.
2. District will utilize appropriate curriculum materials designed to inform students regarding the wise use of energy.
3. Every staff person will be expected to contribute to energy efficiency.

III. Energy Education Plan

A. Philosophy Statement

Consistent with all curriculum at Arcadia High School, energy education curriculum will inspire learning and empower learners.

B. Goals

a. Learning about precious natural resources and the optimal use and conservation of those resources, particularly energy, will be a collaborative effort between all staff and students.
b. Energy conservation will serve as a link between state standards, curricular benchmarks and authentic interdependent and self-directed learning.
c. Student learning will be assessed and the effectiveness of energy curriculum will be driven by data from those assessments.

C. Curricular Framework

Attached in following pages by curricular area

This was a 3 day unit with ELL Summer school kids (5-8). THEME: WE NEED ENERGY

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
ENERGY FLOW IN ECOSYSTEMS	STUDENTS USE POPCORN AND 3 SIZES OF CUPS TO IMITATE ENERGY TRANSFER IN ECOSYSTEMS	OUTSIDE THE BUILDING ON A GRASS FIELD	SC **A 8.1** DEVELOP THEIR UNDERSTANDING OF THE SCIENTIFIC THEMES TO FRAME QUESTIONS ABOUT SCIENCE RELATED ISSUES D.8.9 EXPLAIN THE BEHAVIORS OF VARIOUS FORMS OF ENERGY BY USING THE MODELS IF ENERGY TRANSMISSION IN REAL LIFE SITUATIONS	FORMATIVE: QUESTIONS BEFORE AND AFTER GAME ORGANIZM TALLY CHART TO BE FILLED OUT DURING AND AFTER GAME SUMMATIVE: DESIGN YOUR OWN FOOD CHAIN ON A PAPER PLATE EXPLAIN THE ENERGY TRANSFER	WISCONSIN K-12 EDUCATION PROGRAM AVTIVITY GUIDE

Introduction to Technology Education

Units: Energy Conservation & Consumption, Alternative Forms, and Cost of Lightling

Key Themes: Alternative Energy Forms Presentations

At Watt Rate? (Keep theme)

Key Concepts	Activities – Classroom connections	Site connections-Use of building	Alignment with state standards	Assessment	Resources
Alternative Energy-Define what is energy -Different forms -Current practices & uses	-Students discuss what is energy. -Students research on alternative energy source and create a power point presentation	Discuss building practices and use of energy	B.4.2 Illustrate how they use energy in their Daily lives. B.4.9 Distinguish between renewable and nonrenewable resources	Presentation	Newspapers Magazines Internet Keep student hand book
At Watt Rate? Energy terms Calculating lighting costs Terminology of items on a utility bill	-Discuss erngy costs -Calculating costs -Discussing utility bills	-Classroom lighting costs & district wide calculation	B.4.2 Illustrate how they use energy int heir daily lives. B.8.17 Explain how human resources can impact the environment	Activities "The Cost of Lighting" packet. -Calculating lighting costs in rooms and home	-Keep student Handbook -Packaging incandescent & CFL's

Advanced Chemistry

Unit: Thermochemistry

Keep Theme: We need Energy

Roasted Peanuts (pg 88) Students investigate how much energy is stored in foods by burning a peanut and calculating how many calories of heat are released.

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
-Definition of energy -Energy flow in living systems	-Students use calorimetry to burn nuts and measure the resulting energy	-performed in chemistry lab -recycled tin used to build calorimeters for burning the peanuts	- SC-D.12.3 Structures of Atoms and Matter: Explain exchanges of energy in chemical interactions and exchange of mass and energy in atomic/nuclear reactions SC-D.12.10 Conservation of Energy and the Increase in Disorder: Using the science themes, illustrate the law of conservation of energy during chemical and nuclear reactions	-laboratory writeup -unit exam	-wisconsin K-12 Energy Education Program Activity Guide -Wisconsin K12 Energy Education Program Student Book

Understanding Energy Use in My Adult Life Unit Goal: Students will be able to define and give examples of energy resources; students will be able to share how they personally use energy in their daily lives; students will understand a personal utility bill; students will be able to determine how energy use affects their monthly budget; students will develop an action plan of strategies to reduce monthly energy expenses

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
We need energy Developing Energy Resources Consumption of Energy resources Effects of Energy Resource Development	Energy Use at home (Sparks 269 Intro Energy Resources Sparks 277 (Use pie pan activity and clapping At Watt Rate p69 Reading Energy Bills 192 Don't Throw Energy Away List of electricity use in the home by room Visit Arcadia Recycling Center Interview adults about energy savings tips Personal action plan to reduce energy bills/and Go Green Posters	Brainstorm for Go Green Ideas for AHS Posters on hallway walls	B.4.1 B.4.2 B.4.3 B.4.8 B.4.10 D.1 D.2	Participation/completion of classroom activities Personal Action Plan Go Green Poster	Sparks pages Hand Crank for light bulb Energy Bill from home Light Bulb Comparison sheet Xcel Energy Savings Tips flyer Budget planning Guide from D Ramsey website Focus on Energy website and fact sheets

Advanced Chemistry

Unit: Nuclear Chemistry

Keep Theme: Effects of Energy Resource Development

Dealing with Nuclear Waste.

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
-Quality of the environment -Management of energy resource use -Future outlooks for the development and use of energy resources	-study the mathematics of logarithmic growth and decay -What is Nuclear Waste -The half-life of radioactive material -radioactive decay graph	-use radon test kit to measure radon levels in high school -Determine closest nuclear reactors in Wisconsin or Minnesota	**Science - C) Science Inquiry** SC-C.12.6 SC-C.12.7 **Science - D) Physical Science** SC-D.12.2 SC-D.12.3 **Science - H) Science In Social And Personal Perspectives** SC-H.12.2 SC-H.12.5	-Nuclear energy presentation -unit exam	-Nuclear energy presentation selection list and rubric -Wisconsin K-12 Energy Education Program Activity Guide

SC-C.12.6: Present the results of investigations to groups concerned with the issues, explaining the meaning and implications of the results, and answering questions in terms the audience can understand
SC-C.12.7: Evaluate articles and reports in the popular press, in scientific journals, on television, and on the Internet, using criteria related to accuracy, degree of error, sampling, treatment of data, and other standards of experimental design
SC-D.12.2: Structures of Atoms and Matter: Explain the forces that hold the atom together and illustrate how nuclear interactions change the atom
SC-D.12.3: Structures of Atoms and Matter: Explain exchanges of energy in chemical interactions and exchange of mass and energy in atomic/nuclear reactions
SC-H.12.2: Evaluate proposed policy recommendations (local, state and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long-term
SC-H.12.5: Investigate how current plans or proposals concerning resource management, science knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region

Physics

Unit: Thermal Energy

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
-Thermal energy, temperature, heat transfer Heat calculations Conductors Insulators	-insulating a beaker of hot water to keep it from cooling off outside on a cold day -investigating conduction, convection and radiation -shoe box solar cookers	-how do you keep the warm inside a building -how can natural heating and cooling be used to minimize energy usage	**Science - C) Science Inquiry** SC-C.12.5 SC-C.12.6 **Science - D) Physical Science** SC-D.12.3 SC-D.12.11 **Science - H) Science In Social And Personal Perspectives** SC-H.12.2	-Unit test -solar cooker lab writeup -formative writing prompts	-smart board notes -Wisconsin K12 Energy Education Program Activity Guide. Shoebox Solar Cooker, page 150

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
renewable energy, classroom efficiency, energy energy use,	Designing a new energy efficient new Elementary –Middle school building.	:Our school district is proposing the building of a new combination Elementary-Middle school. This lesson would use our desired location and requirements	D.12.8 Use cost benefit analysis to evaluate environmental quality	Peer evaluation of the plans that were made with cutouts supplied in the lesson on the different layouts. Peer evaluation would use the following rubric.	-A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide Copyright 2009 URL's -US Environmental Protection Agency - http://www.epa.gov/
classroom efficiency, energy energy use	:As a result of this activity, the student will be able to develop a strategy to heat the new school building	By comparing energy use in new facilities, the students would gain a broad picture of Energy usage in our school and adaptations that we need to make in our daily lives.	C.12.2 Practice Skills relating to communication through individual,group and team processes *employ strategies to improve reading & listening	Assessment: Persuasive Presentation Rubric (Attached)	-A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
classroom efficiency, energy troubleshooting, instructional delivery devices energy use, energy use design	Agriscience Equipment inventory (Our impact on school energy use) Objective: As a result of this activity, the student will be able to list all the electrical equipment used in the Arcadia Agriscience department to gain an awareness of all the energy used during a school year.	Rationale: A modern well equipped Agriscience department relies on energy usage to complete tasks every day in the average school year. Students will gain a greater appreciation of this usage by inventorying the equipment present	A.8.4 Identify environmental issue questions to develop answers, draw conclusions and revise personal understanding	Students complete "Is your Classroom energy efficient? Checklist " page38 Keep text Energy & your School with a 100 percent accuracy Students create custom energy efficiency checklist for just the Arcadia Agriscience department	**-Text** : *Principles of Environmental Science: Inquiry & Applications.* William P. Cunningham & Mary Ann Cunningham, Fifth Edition 2008 ISBN 978-0-07-338319-4 -A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide
renewable energy, classroom efficiency, energy troubleshooting, instructional delivery devices energy use,	Agriscience Equipment Troubleshooting (How do we change our impact on school energy use) Objective: As a result of this activity, the student will be able ů2 list alternatives for each of our energy uses in the Arcadia agriscience	Rationale: Students will be able to make better energy use decisions when they are shown the alternatives for electrical energy usage in the agriscience department.	A.8.4 Identify environmental issue questions to develop answers, draw conclusions and revise personal understanding	Students list 2 alternatives for each electrical usage of the equipment in the Agriscience department.	**-Text** : *Principles of Environmental Science: Inquiry & Applications.* William P. Cunningham & Mary Ann Cunningham, Fifth Edition 2008 ISBN 978-0-07-338319-4 -A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide -US Environmental Protection Agency - http://www.epa.gov/ -US Geological Service – http://www.usgs.org -National Oceanographic and Atmospheric Association – http://www.noaa.gov/

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
renewable energy, classroom efficiency, energy troubleshooting, instructional delivery devices energy use,	Title: Head to head comparisons – Textbook to electronic media for instruction	Rationale: As our society moves to more electronic delivery of information and lessons, the student must be able to compare energy costs to the traditional textbook. Description: Student to publish a newsletter comparing use of e textbooks to paper textbooks	C.12.2 Practice Skills relating to communication through individual,group and team processes *employ strategies to improve reading & listening D.12.8 Use cost benefit analysis to evaluate environmental quality	**Newsletter Rubric—Electronic media Versus Textbook** (Attached)	**-Text** : *Principles of Environmental Science: Inquiry & Applications.* William P. Cunningham & Mary Ann Cunningham, Fifth Edition 2008 ISBN 978-0-07-338319-4 -A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide . URL's -http://highered.mcgraw-hill.com/sites/007282339 /student_view0/index.html http://www.mhhe.com/biosci/esp/2001_es/default.htm#ok -http://highered.mcgraw-hill.com/sites/0072823399/student_view0/esp_student_tutorial.html -US Environmental Protection Agency - http://www.epa.gov/ -US Geological -National Oceanographic and Atmospheric Association - http://www.noaa.gov/

Environmental Science Lesson Plan

Key Concepts	Activities – Classroom connections	Site connections- Use of building	Alignment with state standards	Assessment	Resources
renewable energy, classroom efficiency, energy energy use,	Designing a new energy efficient new Elementary –Middle school building.	Our school district is proposing the building of a new combination Elementary-Middle school. This lesson would use our desired location and requirements	D.12.8 Use cost benefit analysis to evaluate environmental quality	Peer evaluation of the plans that were made with cutouts supplied in the lesson on the different layouts. Peer evaluation would use the following rubric.	-A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide Copyright 2009 URL's -US Environmental Protection Agency - http://www.epa.gov/
classroom efficiency, energy energy use	As a result of this activity, the student will be able to develop a strategy to heat the new school building	By comparing energy use in new facilities, the students would gain a broad picture of Energy usage in our school and adaptations that we need to make in our daily lives.	C.12.2 Practice Skills relating to communication through individual, group and team processes *employ strategies to improve reading & listening	Assessment: Persuasive Presentation Rubric (Attached)	-A School Building Energy Efficiency Education Supplement to the KEEP Activity Guide

D. Staff Development Plan

Staff Member	Title/Sector Represented	KEEP Courses Taken
Michele Butler	High School Principal	PEM schools
Ryan Ziegler	Teacher-Technical Education	Energy in the Classroom Energy and your school
Bill Steinke	Teacher-Technical Education	Energy in the Classroom Energy and your school
Marie Lettner	Teacher-Science/Math	Energy in the Classroom Energy and your school
Terry Vettrus	Teacher-Special Education	Energy in the Classroom Energy and your school
Kevin Whalen	Teacher-AgriScience	Energy and your school
Alan Herman	Teacher-English	Energy and your school
Rick Nelson	Facilities Director	Building Operator Certification (April class cancelled, scheduled for May in Green Bay
Tom Nelson	Technology Director	N/A
Jerry Sorenson	School Board President/community member	N/A
Monica Herman	Community member	N/A

The teachers identified represent all grade levels and curricular areas at the high school. Furthermore, all of the teachers on the energy committee have taken at least one KEEP course to enhance their energy literacy.

E. Involving Building Occupants

a. A presentation will be given to the school board to make the board and community members aware of the energy initiatives that Arcadia High School is undertaking.

b. A presentation will be given to the entire high school staff to inform and engage them in supporting the energy and energy education plans.
c. Annual Earth Day will be planned by AP Environmental Science(during the years that the class is offered) and will involve all student and staff.

IIIV) Monitoring & Reporting

a. Energy Management
   i. Monthly electric bills for the 2010-2011 school have been compiled by Ryan Ziegler, they will serve as a base line for future comparisons.
   ii. Ryan Ziegler will continue to receive monthly electric bills and Marie Lettner will help record, track and compare future years electric bills to this years.
   iii. Information that will be entered on a spread sheet is the total electric bill, the demand charge, the total kilowatts used and the price per kilowatt hour.
   iv. Data will be entered on the spread sheet monthly and reviewed two times per year by the energy team.
   v. Results will be documented and submitted to the facilities director, the building principal and the energy team.
b. Energy Education
   i. The energy team will be responsible for monitoring energy education in the school.
   ii. The team has made one set of Energy Education in the Classroom and Energy in the school building manuals available to the staff in our LMC professional archives. The availability of these manuals will be communicated during a presentation given by the team at a staff meeting.
   iii. The team will continue to use the lessons that they have developed and will report back to the team if they make any changes to those lessons or omit them from their curriculum.

V) Sustaining Energy Initiatives

a. The energy committee will pursue approval for the energy management plan.

b. The energy committee will continue to incorporate energy lessons that have been written as well as include future lessons as appropriate to meet District benchmarks and educational initiatives

c. The energy committee will encourage the rest of the staff to consider energy curriculum in their lesson planning.

d. The energy committee will pursue energy savings by reducing hallway and classroom lighting per the information in appendix E.

E. The energy committee will pursue energy savings by purchasing a gas fueled on demand water heater for the kitchen to replace the electric unit currently in use. The energy committee will write a grant through KEEP to assist in the funding of this project. (See appendix E for details)

F. The energy committee will pursue energy savings through HVAC programming that will allow fresh air intake to be reduced when the gym and auditorium are not being used. Funding for this project needs to be determined. (See appendix E for details)

G. Administration at Arcadia High School is committed to making resources available for energy conservation and supporting the Energy Committee's pursuit of educationally friendly energy conservation and the savings associated with those savings.

VI) Appendix

A. Energy Audit Report
B. AP Environmental Survey and Results
C. Electric Bill Archives and analysis
D. Energy Team's presentation to Staff
E. Energy Saving Project details

APPENDIX A

Energy Audit Report

focus on energy

The power is within you.

August 24, 2010

Louie Ferguson
Arcadia Elementary School
358 E River St
Arcadia, Wisconsin 54612

Re: Energy Audit Result

Dear Mr. Ferguson:

Thank you for participating in the Focus on Energy Schools and Government Program. Focus on Energy works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. Focus information, resources and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled. Its efforts help Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect our environment and control the state's growing demand for electricity and natural gas.

Not only can Focus on Energy help you reduce costs and save energy, but by making energy efficient improvements, you can improve occupant comfort and productivity and enhance your reputation as an environmentally friendly organization. The following energy survey is the first step in understanding your energy savings potential. Based on our site assessment, we have identified some opportunities for you to address; it examines miscellaneous systems and operations as well as overall energy consumption at your facility. It also gives us a better understanding of the opportunities to determine what next steps should be considered to accomplish your energy efficiency objectives.

For some it is getting a quote or estimating the costs for a specific upgrade; for others it is integrating the opportunities into an overall facility plan that can now include the following energy efficient recommendations. In either case, Wisconsin Focus on Energy staff is available to answer additional questions and/or to help facilitate the implementation of energy efficient measures.

Please contact me with any questions regarding our energy survey or potential projects. Again, thank you for your participation in the Schools and Government Program; we appreciate your support and interest to control energy consumption at your facility.

Sincerely,

John B. Heck

John B. Heck
Energy Advisor

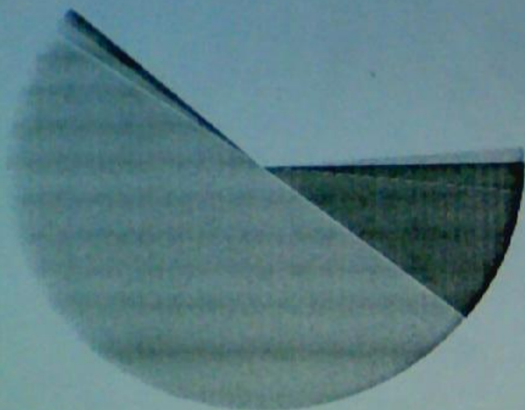
focus on energy

The power is within you.

Typical End Use Profile

The information below indicates how energy is typically used in a facility like yours. The cost estimates are based on the energy use estimates and your energy rates. These are estimates only, your actual use may differ.

Electric



Natural Gas

Legend:

- Office Equipment (2.0%)
- Lighting (49.0%)
- Domestic Hot Water (1.0%)
- Food Service (1.0%)
- Plug Loads/Office Equipment (8.8%)
- Motors - Non HVAC (1.0%)
- HVAC (37.3%)

Legend:

- Domestic Hot Water (10.0%)
- Food Service (1.0%)
- HVAC (89.0%)

Typical Facility Annual Energy Usage

	Electric %	Natural Gas %	Electric kWh	Natural Gas Therms	Electric Cost	Natural Gas Cost
Pool	0.0%	0.0%	0	0	$0	$0
Office Equipment	2.0%	0.0%	14,195	0	$1,136	$0
Plug Loads/Office Equipment	9.0%	0.0%	63,878	0	$5,110	$0
Lighting	50.0%	0.0%	354,880	0	$28,390	$0
Motors - Non HVAC	1.0%	0.0%	7,098	0	$568	$0
Domestic Hot Water	1.0%	10.0%	7,098	8,940	$568	$6,187
HVAC	38.0%	89.0%	269,709	79,570	$21,577	$55,062
Food Service	1.0%	1.0%	7,098	894	$568	$619
Total	100.0%	100.0%	709,760	89,404	$56,781	$61,868

Facilities of this type use 5.44 kWh/sq.ft./yr. and 0.53 therms/sq.ft./yr.

Your facility uses 6.75 kWh/sq. ft./yr and 0.85 therms/sq. ft./yr and 108.02 kBtu/sq. ft./yr

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Energy Conservation Opportunities
Estimated Savings Summary

Opportunity Description	Electric Energy (kWh/yr)	Fuel Energy (therms/yr)	Payback (yrs)	Cost savings	Priority
1.0 Lighting - Compact Fluorescent Lamps Replacement	2,300		1-2	$184	High
2.0 Lighting - LED Exit Lighting	3,400		1-5	$272	High
3.0 HVAC - Minimum Temperature Setting in Unoccupied Spaces		1,600	0-1	$1,107	High
4.0 HVAC - Building Scheduling - Adjust Occupied/Unoccupied Schedule	2,700	4,000	1-2	$2,984	High
5.0 Lighting - High Performance Linear Fluorescent	78,000		3-8	$6,240	High
6.0 Domestic Hot Water - Water Heater - Upgrade High Efficient		270	5-7	$187	Medium
7.0 HVAC - Linkageless Boiler Control		3,200	1-2	$2,214	Medium
8.0 HVAC - Door Sweeps Installation		4	1-2	$3	Medium
9.0 Lighting - Occupancy Sensor for Lighting	35,000		3-5	$2,800	Medium
10.0 Plug Loads/Office Equipment - LCD Computer Monitor Replaces CRT Monitor	3,800		4-5	$304	Medium
11.0 HVAC - Burner Replacement-High Efficiency		2,400	5-7	$1,661	Medium
12.0 HVAC - Boiler - Steam to Hot Water Conversion		10,000	10-15	$6,920	Medium
TOTALS	**125,200**	**21,474**		**$24,876**	

The summary list above includes a number of recommended energy conservation measures for your facility. This list may include overlapping conservation measures. For example, replacement of a boiler with a high efficiency boiler would negate the savings of replacing the burner in the current boiler.

The summary list indicates that if all measures are implemented the total kWh savings is 125,200 which equals 18% of the current annual kWh usage of 709,760 kWh, and 21,474 therms which equals 24% of the current annual therm usage of 89,404 therms.

Be aware that the total savings and percentage of savings is an estimate based on average savings for specific measures which may require adjustments based on possible overlapping conservation measures.

Wisconsin Focus on Energy Program

The Wisconsin Focus on Energy program is designed to assist Wisconsin natural gas and electric utility customers in the identification and implementation of cost effective, energy efficient facility improvements. These services range from assistance in the initial identification of projects through the bidding and installation. Wisconsin Focus on Energy provides an unbiased consultant's perspective when offering assistance.

Wisconsin Focus on Energy is considered a public benefit. Any comments or concern about the program are encouraged, as we hope to continue to better serve the businesses of Wisconsin. We here at Wisconsin Focus on Energy thank you for becoming a partner and holding an interest in energy efficiency.

Participation in the program is voluntary. Wisconsin Focus on Energy staff pledge to work with participants to the extent that the opportunities exist and that the partner wants to proceed toward implementation. Opportunities presented within the scope of this preliminary report are best opinions of savings and costs. However, further technical assistance is available for detailed studies that might be required for capital investment and decision-making. For more information please visit our website at www.focusonenergy.com

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UTILITY BILLING HISTORY

Electricity

Billing Month	Account Number	kW	kWh	Total Amount	$/kWh
24-May-2010	61371000	229	709,760	$56,574	$0.080
TOTAL			709,760	$56,574	

Average Electricity Rate: $0.080

Natural Gas

Billing Month	Account Number	Therm	Total Amount	$/therm
14-Jun-2010	101903200	89,404	$61,845	$0.69
TOTAL		89,404	$61,845	

Average Gas Rate: $0.69

See the attached detailed breakdown showing more specific utility information attached at the end of this report.

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1. Lighting - Compact Fluorescent Lamps Replacement

Replace incandescent lamps with self ballasted screw in CFL (Compact Fluorescent Lamps): Self ballasted compact fluorescent lamps use up to 75% less electric energy than incandescent lamps with comparable light output ratings. A variety of models, sizes, shapes, wattages and capabilities are available for direct replacement of incandescent lamps. Compact fluorescent lamps last up to 10 times longer than a standard life incandescent lamp. Other CFL options include multi-level and dimmable models and some cold cathode (instant on) models. CFLs generally require some time to reach full light output levels, contain small amounts of mercury and require responsible disposal. CFLs also generate up to 75% less heat than the equivalent light output incandescent lamp.

EXISTING CONDITIONS	
Location	
Miscellaneous	
End Use	Lighting
Type	Incandescent
Recommendation:	
Compact Fluorescent Lamps Replacement	
% ECM Opportunity	10
% savings electric	60.00000
% savings gas	0.00000
Priority	
Priority Rationale:	
	Low Cost/No Cost
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL	
Location	
Miscellaneous	
Electric Energy Savings (kWh/yr)	2,300
Gas Energy Savings (therm/yr)	
Electric Cost Savings ($/yr)	$184
Gas Cost Savings ($/yr)	
Total Cost Savings ($/yr)	$184
Payback (yrs)	1-2
Electric GHG Savings (tons/yr)	2
Gas GHG Savings (tons/yr)	

2. Lighting - LED Exit Lighting

Retrofit existing exit lighting with LED units. Exit signs that contain conventional light bulbs should be retrofitted with LED ("light emitting diode") bulbs. LEDs will last approximately 30 years and use a fraction of the energy (1 or 2 watts) of conventional exit signs. Exit signs must remain illuminated 24 hours a day, 365 days a year, so this step will result in substantial long-term energy savings. Maintenance costs will also be reduced because bulb changes will be dramatically reduced. A typical LED exit light retrofit will pay for itself within 4 years.

EXISTING CONDITIONS	
Location	
End Use	Lighting
Type	Exit
Recommendation:	
LED Exit Lighting	
% ECM Opportunity	100
% savings electric	95.00000
% savings gas	0.00000
Priority	
Priority Rationale:	
	Acceptable Payback Period
Grants Available?	No

RECOMMENDATION SAVINGS POTENTIAL	
Location	
Electric Energy Savings (kWh/yr)	3,400
Gas Energy Savings (therm/yr)	
Electric Cost Savings ($/yr)	$272
Gas Cost Savings ($/yr)	
Total Cost Savings ($/yr)	$272
Payback (yrs)	1-5
Electric GHG Savings (tons/yr)	3
Gas GHG Savings (tons/yr)	

3. HVAC - Minimum Temperature Setting in Unoccupied Spaces

Maintain minimum temperatures in unoccupied spaces. Often, storage and other unoccupied areas are kept at higher temperatures than necessary during winter months. Buildings should install controls (or adjust existing ones) to reduce the heating temperature in these areas.

EXISTING CONDITIONS

Location	
Throughout	
End Use	HVAC
Type	Controls
Recommendation:	
Minimum Temperature Setting in Unoccupied Spaces	
% ECM Opportunity	100
% savings electric	0.00000
% savings gas	2.00000
Priority	High
Priority Rationale:	
	Low Cost/No Cost
Grants Available?	No

RECOMMENDATION SAVINGS POTENTIAL

Location	
Throughout	
Electric Energy Savings (kWh/yr)	
Gas Energy Savings (therm/yr)	1,600
Electric Cost Savings ($/yr)	
Gas Cost Savings ($/yr)	$1,107
Total Cost Savings ($/yr)	$1,107
Payback (yrs)	0-1
Electric GHG Savings (tons/yr)	
Gas GHG Savings (tons/yr)	9

4. HVAC - Building Scheduling - Adjust Occupied/Unoccupied Schedule

Adjust the occupied/unoccupied schedule for the various air handling systems. Buildings have basically two modes of operations, occupied and unoccupied. When a building goes to occupied mode, the outside air dampers open and the temperature goes to the daytime level. When the building returns to the unoccupied mode, the outside air dampers close and the temperature may drop. Going to the occupied mode too soon or going into the unoccupied mode too late will cost the school significant dollars. Having the occupied/unoccupied times reflect the true occupancy of the space will yield the best savings potential.

EXISTING CONDITIONS

Location	
End Use	HVAC
Type	Controls
Recommendation:	
Building Scheduling - Adjust Occupied/Unoccupied Schedule	
% ECM Opportunity	100
% savings electric	1.00000
% savings gas	5.00000
Priority	High
Priority Rationale:	
	High O&M Cost
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Electric Energy Savings (kWh/yr)	2,700
Gas Energy Savings (therm/yr)	4,000
Electric Cost Savings ($/yr)	$216
Gas Cost Savings ($/yr)	$2,768
Total Cost Savings ($/yr)	$2,984
Payback (yrs)	1-2
Electric GHG Savings (tons/yr)	2
Gas GHG Savings (tons/yr)	23

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5. Lighting - High Performance Linear Fluorescent

Convert all T-12 ballasts and lamps to T-8 technology proactively instead of waiting for T-12 system failure. Additionally, replace ALL yellowed lenses. Lighting systems lose efficacy as lenses yellow. T-8 lighting systems consume approximately 33% less electricity than T-12 lighting systems for the same light output. T-8 lighting upgrades can have simple payback periods as short as 1 year and Focus on Energy provides prescriptive incentives for T-8 conversion. Proactive conversion is recommended because the older T-12 system may have up to 12 years of life left and waste energy every day.

EXISTING CONDITIONS

Location

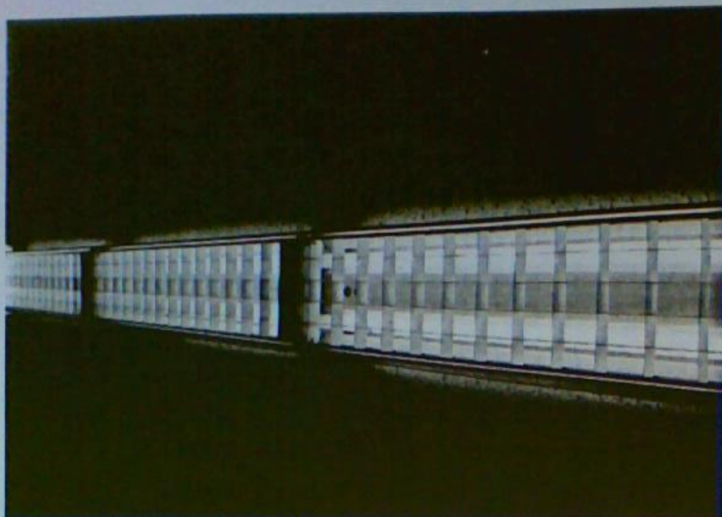
End Use	Lighting
Type	Fluorescent
Recommendation:	
High Performance Linear Fluorescent	
% ECM Opportunity	85
% savings electric	40.00000
% savings gas	0.00000
Priority	High
Priority Rationale:	Acceptable Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location

Electric Energy Savings (kWh/yr)	78,000
Gas Energy Savings (therm/yr)	
Electric Cost Savings ($/yr)	$6,240
Gas Cost Savings ($/yr)	
Total Cost Savings ($/yr)	$6,240
Payback (yrs)	3-8
Electric GHG Savings (tons/yr)	65
Gas GHG Savings (tons/yr)	

Various lighting scenes with yellowing lighting and T12 bulbs with poor lighting and energy efficiency



Lighting located in the east classrooms showing the yellowing of fixtures with T12 bulbs with inefficient lighting and energy efficiency.

6. Domestic Hot Water - Water Heater - Upgrade High Efficient

Install a high efficiency hot water heating system. Many existing hot water heating systems are standard efficiency (as opposed to high efficiency) units. In recent years, technology advancements have led to the creation of high efficiency units. Sealed combustion hot water systems now offer efficiencies of up to 96%. These units also offer high output and quick recovery. Replacing older units with newer models will reduce hot water related energy costs substantially. It can be quite cost-effective to take this action.

EXISTING CONDITIONS

Location	
Boiler Room	
End Use	Domestic Hot Water
Type	
Recommendation:	
Water Heater - Upgrade High Efficient	
% ECM Opportunity	100
% savings electric	0.00000
% savings gas	3.00000
Priority	High
Priority Rationale:	Acceptable Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Boiler Room	
Electric Energy Savings (kWh/yr)	
Gas Energy Savings (therm/yr)	270
Electric Cost Savings ($/yr)	
Gas Cost Savings ($/yr)	$187
Total Cost Savings ($/yr)	$187
Payback (yrs)	5-7
Electric GHG Savings (tons/yr)	
Gas GHG Savings (tons/yr)	2

7. HVAC - Linkageless Boiler Control

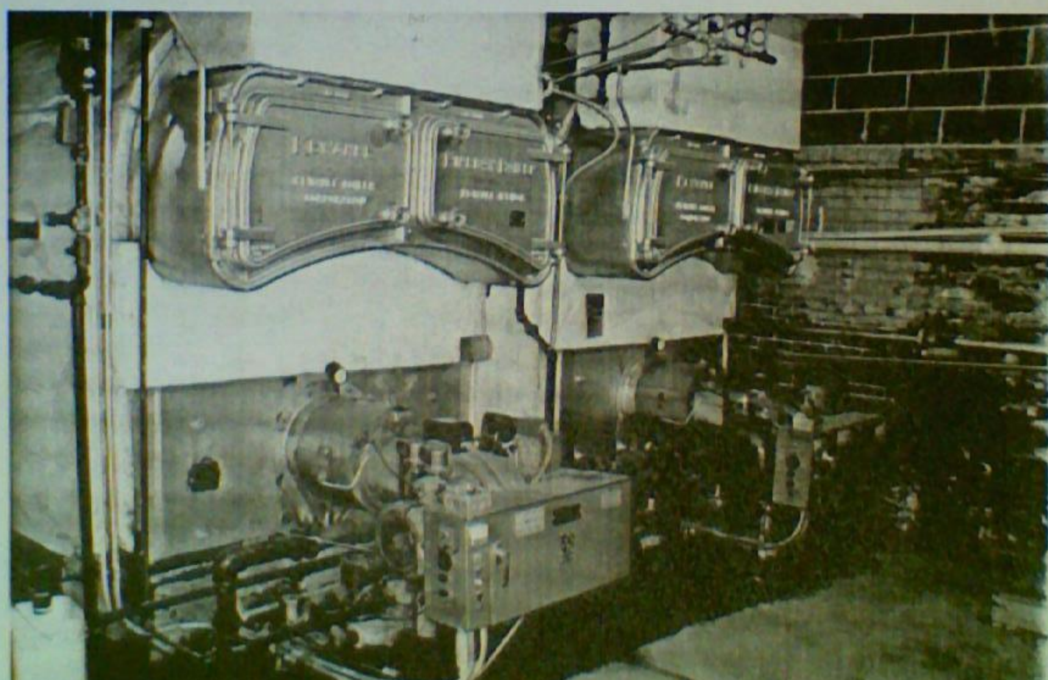
Linkageless Boiler Control. Linkageless boiler controls replace the common linkage controls which rely on a series of links and fasteners to modulate air and fuel ratios. The linkage-based systems tend to accumulate error due to what is referred to as slop in the links. The slop becomes more prominent with time. Due to the tendency for the linkage-based systems to fall out of tune, a larger safety cushion must be built in to the excess air during boiler tuning to prevent the boiler from entering dangerous combustion conditions in the worst-slop scenario. Increased excess air results in decrease boiler efficiency. Linkageless systems replace the traditional linkage controls with individual servo motors and digital controls with feedback sensors that can continuously monitor combustion conditions and make very accurate corrections without any loss of accuracy over time. This allows much tighter control of excess air and improved boiler efficiency.

EXISTING CONDITIONS

Location	
Throughout	
End Use	HVAC
Type	Controls
Recommendation:	
Linkageless Boiler Control	
% ECM Opportunity	100
% savings electric	0.00000
% savings gas	4.00000
Priority	Medium
Priority Rationale:	Acceptable Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Throughout	
Electric Energy Savings (kWh/yr)	
Gas Energy Savings (therm/yr)	3,200
Electric Cost Savings ($/yr)	
Gas Cost Savings ($/yr)	$2,214
Total Cost Savings ($/yr)	$2,214
Payback (yrs)	1-2
Electric GHG Savings (tons/yr)	
Gas GHG Savings (tons/yr)	19



Steam boilers located in the Oldest Boiler Room

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8. HVAC - Door Sweeps Installation

Reduce energy losses by installing door sweeps. Exterior door sweeps reduce air conditioning costs by preventing conditioned air from escaping or unconditioned air from entering spaces. Interior doors should not have door sweeps installed because gaps under doors enable proper ventilation.

EXISTING CONDITIONS

Location	
Throughout	
End Use	HVAC
Type	Building Shell
Recommendation:	
Door Sweeps Installation	
% ECM Opportunity	100
% savings electric	0.00000
% savings gas	0.00500
Priority	Medium
Priority Rationale:	Low Cost/No Cost
Grants Available?	No

RECOMMENDATION SAVINGS POTENTIAL

Location	
Throughout	
Electric Energy Savings (kWh/yr)	
Gas Energy Savings (therm/yr)	4
Electric Cost Savings ($/yr)	
Gas Cost Savings ($/yr)	$3
Total Cost Savings ($/yr)	$3
Payback (yrs)	1-2
Electric GHG Savings (tons/yr)	
Gas GHG Savings (tons/yr)	

9. Lighting - Occupancy Sensor for Lighting

Install wall mount occupancy sensors to control the lighting system. In classrooms, offices and other similar spaces, occupancy sensors reduce lighting energy consumption by about 10% where installed. Occupancy sensors can sense occupants' motion or thermal energy and turns lights on or off appropriately. Occupancy sensors must be selected, installed and calibrated properly to assure desired operation. An essential part of a successful installation of occupancy sensors is the final commissioning. Verify that sensors are properly positioned in the room and adjustable features such as sensitivity and time delays have been optimized to the room and occupant needs. Make sure that the maintenance staff and room occupants understand how the controls work and save energy, so that they do not override or bypass the settings.

EXISTING CONDITIONS

Location	
Throughout	
End Use	Lighting
Type	Fluorescent
Recommendation:	
Occupancy Sensor for Lighting	
% ECM Opportunity	100
% savings electric	15.00000
% savings gas	0.00000
Priority	Medium
Priority Rationale:	Acceptable Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Throughout	
Electric Energy Savings (kWh/yr)	35,000
Gas Energy Savings (therm/yr)	
Electric Cost Savings ($/yr)	$2,800
Gas Cost Savings ($/yr)	
Total Cost Savings ($/yr)	$2,800
Payback (yrs)	3-5
Electric GHG Savings (tons/yr)	29
Gas GHG Savings (tons/yr)	

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10. Plug Loads/Office Equipment - LCD Computer Monitor Replaces CRT Monitor
PCs and monitors often represent more than 40 percent of the total IT energy consumed. Upgrading PCs and replacing CRT monitors with LCD monitors can significantly reduce the amount of energy you use. Beyond the energy consumption reduction, users will benefit from increased comfort and less eye fatigue.

EXISTING CONDITIONS

Location	
Computer	
End Use	Plug Loads/Office Equipment
Type	
Recommendation:	
LCD Computer Monitor Replaces CRT Monitor	
% ECM Opportunity	100
% savings electric	6.00000
% savings gas	0.00000
Priority	Medium
Priority Rationale:	Acceptable Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Computer	
Electric Energy Savings (kWh/yr)	3,800
Gas Energy Savings (therm/yr)	
Electric Cost Savings ($/yr)	$304
Gas Cost Savings ($/yr)	
Total Cost Savings ($/yr)	$304
Payback (yrs)	4-5
Electric GHG Savings (tons/yr)	3
Gas GHG Savings (tons/yr)	

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11. HVAC - Burner Replacement- High Efficiency

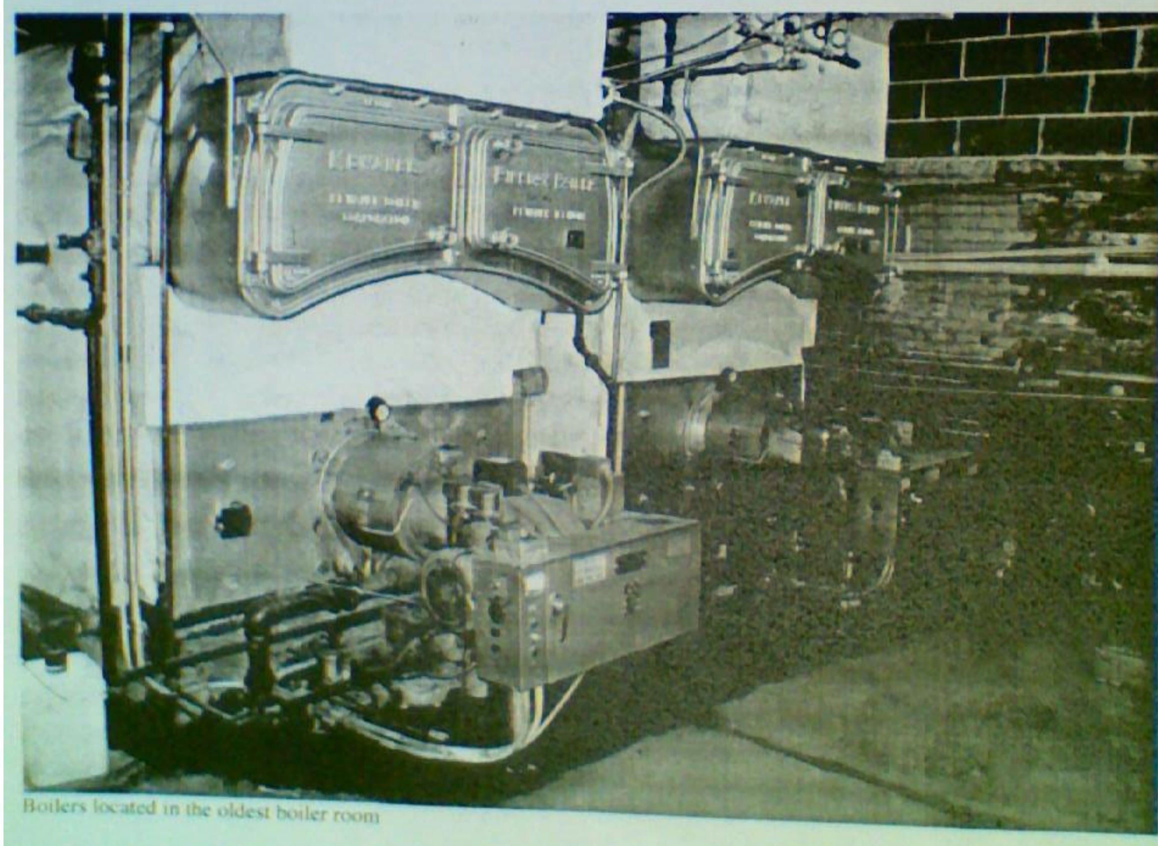
Install new burners on the current boilers. New, high efficiency burners can be installed in existing boiler systems to improve combustion efficiencies. These high efficiency burners mix the air and fuel more effectively and allow for better fuel utilization. Additionally, new burners with a large turndown ratio can increase a boiler system's efficiency over a range of operating conditions.

EXISTING CONDITIONS

Location	
Boiler Room	
End Use	HVAC
Type	Boilers, Burners, and Furnaces
Recommendation:	
Burner Replacement- High Efficiency	
% ECM Opportunity	100
% savings electric	0.00000
% savings gas	3.00000
Priority	Medium
Priority Rationale:	Long Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Boiler Room	
Electric Energy Savings (kWh/yr)	
Gas Energy Savings (therm/yr)	2,400
Electric Cost Savings ($/yr)	
Gas Cost Savings ($/yr)	$1,661
Total Cost Savings ($/yr)	$1,661
Payback (yrs)	5-7
Electric GHG Savings (tons/yr)	
Gas GHG Savings (tons/yr)	14



Boilers located in the oldest boiler room

12. HVAC - Boiler - Steam to Hot Water Conversion

Convert the boiler system to hot water. Hot water boilers are more energy efficient (and have higher AFUE ratings) than steam systems. However, they are costly to replace. So, the most cost-effective time to make this steam-to-hot water conversion is when it is time to replace a steam system's main boiler. A new hot water boiler and connecting piping will cost less than a steam boiler and its piping. These cost savings will balance with the added cost to adapt the system to hot water and probable changes to condensate return piping. Hot water systems offer greater control: they can adjust the water temperature based on the outside air temperature (in steam systems, the heat output is constant whether the outside temperature is 40 degrees or 10 below zero).

In this building it is possible to install high efficiency boilers in the new boiler room, eliminate the older boilers and connect piping from the new boilers to the steam converter in the older boiler room. This would leave just the oldest part of the building with steam heat. The steam system could later be replaced or if this section of the building is not longer used the remaining hot water system would be intact.

EXISTING CONDITIONS

Location	
Boiler Room	
End Use	HVAC
Type	Boilers, Burners, and Furnaces
Recommendation:	
Boiler - Steam to Hot Water Conversion	
% ECM Opportunity	100
% savings electric	0.00000
% savings gas	13.00000
Priority	Medium
Priority Rationale:	Long Payback Period
Grants Available?	Yes

RECOMMENDATION SAVINGS POTENTIAL

Location	
Boiler Room	
Electric Energy Savings (kWh/yr)	
Gas Energy Savings (therm/yr)	10,000
Electric Cost Savings ($/yr)	
Gas Cost Savings ($/yr)	$6,920
Total Cost Savings ($/yr)	$6,920
Payback (yrs)	10-15
Electric GHG Savings (tons/yr)	
Gas GHG Savings (tons/yr)	59

Steam converter in Oldest Boiler Room

Hot water boilers in New Boiler Room

Middle and Elementary School Utility Data for the Past Two Years

Old Boiler Room	Amount	New Boiler Room	Amount	Kitchen Hot Water	Amount	Actual KW	Actual KWH	KWH Charge	Demand	Cust Demand	Cust Charge	Gas Date	Gas Account #	Therms	Gas Cost	Elect Date	Elect Account#	KW	KWH	Elect C
1508	1004.08	716	476.74	289	241.15	210.4	59680	3383.85	1050.2	364.5	75	6/14/10	101903200	2513	1,721.97	5/31/10	61371000	210.4	59680	4873
2699	1750.3	558	361.86	307	246.9	190.56	61920	3343.68	952.8	364.5	75	5/14/10	101903200	3564	2,359.06	4/30/10	61371000	190.56	61920	4735
4647	3412.59	2234	1640.57	306	269.24	208.76	71040	4077.69	1043.8	364.5	75	4/14/10	101903200	7187	5,322.40	3/31/10	61371000	208.76	71040	5560
9399	7575.04	4527	3648.5	286	270.08	211.32	63200	3469.68	1056.6	364.5	75	3/14/10	101903200	14212	11,493.62	2/28/10	61371000	211.32	63200	4965
9688	8136.62	4738	4017.06	301	292.89	220.92	68800	4114.24	1104.6	364.5	75	2/14/10	101903200	14727	12,446.57	1/31/10	61371000	220.92	68800	5658
13616	10060.15	6706	4954.71	310	272.22	229.32	61280	3174.3	1146.6	364.5	75	1/14/10	101903200	20632	15,287.08	12/31/09	61371000	229.32	61280	476
7378	4838	5575	1491.79	282	226.44	227.4	68800	3962.88	1137	364.5	75	12/14/09	101903200	13235	6,556.23	11/30/09	61371000	227.4	68800	5539
6834	3357.55	2739	1345.68	312	192.13	216.44	67200	3427.2	1082.2	364.5	75	11/14/09	101903200	9885	4,895.36	10/31/09	61371000	216.44	67200	494
1692	820.68	577	279.87	286	169.02	222.84	69760	3871.68	1114.2	364.5	75	10/14/09	101903200	2555	1,269.57	9/30/09	61371000	222.84	69760	5425
0	0	0	0	196	128.67	186.64	38080	2212.44	933.2	351	75	9/14/09	101903200	196	128.67	8/31/09	61371000	186.64	38080	3571
0	0	0	0	163	97.82	81.44	33440	1738.88	407.2	351	75	8/14/09	101903200	163	97.82	7/31/09	61371000	81.44	33440	2572
337	153.98	2	0.91	196	111.98	197.76	46560	2546.83	988.8	351	75	7/14/09	101903200	535	266.87	6/30/09	61371000	197.76	46560	3961
57798	**41108.99**	**28372**	**18217.69**	**3234**	**2518.54**		**709760**	**39323.35**	**12017.2**	**4333.5**	**900**			**89404**	**61845.22**				**709760**	**56574**
1376	649.44	453	213.8	286	168.52	194.52	64960	3293.47	972.6	351	75	6/14/09	101903200	2115	1,031.76	5/31/09	61371000	194.52	64960	469
3274	1600.53	1810	884.84	341	247.12	198.36	59520	2827.2	991.8	351	75	5/14/09	101903200	5425	2,732.49	4/30/09	61371000	198.36	59520	4
8316	5462.74	3430	2253.15	326	278.85	214.44	70560	3344.55	1072.2	360	75	4/14/09	101903200	12072	7,994.74	3/31/09	61371000	214.44	70560	485
9712	7336.17	4234	3198.24	317	297.71	209.96	66400	3359.84	1049.8	360	75	3/14/09	101903200	14263	10,832.12	2/28/09	61371000	209.96	66400	484
13615	11644.57	6318	5412.91	363	376.14	225.48	61600	2926	1127.4	360	75	2/14/09	101903200	20296	17,433.62	1/31/09	61371000	225.48	61600	44
12415	10756.82	5965	5168.3	306	316.84	229.96	63040	3152	1149.8	360	75	1/14/09	101903200	18686	16,241.96	12/31/08	61371000	229.96	63040	47
9558	7527.04	4359	3432.76	296	262.28	209.4	59680	3019.8	1047	360	75	12/14/08	101903200	14213	11,222.08	11/30/08	61371000	209.4	59680	45
4653	3887.51	2392	1998.48	335	299.45	206.76	66240	3206.01	1033.8	360	75	11/14/08	101903200	7380	6,185.44	10/31/08	61371000	206.76	66240	467
1053	937.75	4	3.56	318	299.15	217.64	63840	3230.3	1088.2	363	75	10/14/08	101903200	1375	1,240.46	9/30/08	61371000	217.64	63840	47
23	22.47	0	0	191	194.95	121.12	36800	1847.36	605.6	363	75	9/14/08	101903200	214	217.42	8/31/08	61371000	121.12	36800	289
0	0	1	1.31	160	210.43	79.52	32960	1634.82	397.6	363	75	8/14/08	101903200	161	211.74	7/31/08	61371000	79.52	32960	247
2	2.81	0	0	165	232.36	77.6	31040	1682.37	388	363	75	7/14/08	101903200	167	235.17	6/30/08	61371000	77.6	31040	250
63997	**49827.85**	**28966**	**22567.35**	**3404**	**3183.8**		**676640**	**33523.72**	**10923.8**	**4314**	**900**			**96367**	**75579**				**676640**	**4964**

8/26/2010

APPENDIX B

AP Environmental Survey

Temperature Readings of Arcadia High School

Student	Temperature	Room	Time	Date
Coltan Taylor	**68 ***	**243**	**8:14**	**2/8**
Coltan Taylor	**66.5***	**Commons**	**8:20**	**2/8**
Kaylene	**70***	**157**	**8:55**	**2/8**
Reid	**66***	**Band**	**8:05**	**2/10**
Reid	**68***	**Band**	**8:35**	**2/10**
Cadyn	**66.5***	**153**	**9:46**	**2/10**
Payton	**63***	**239**	**1:30**	**2/10**
Payton	**70***	**161**	**2:30**	**2/10**
Francis	**65***	**239**	**9:50**	**2/11**
Danielle	**69.5***	**211**	**10:41**	**2/11**
Francis	**62**	**128**	**2:30**	**2/11**

Conclusion: Minimum required temperature was maintained 91% of the readings. Sampling height was desk level with infrared measurement (Raytek MT Model 102051)

Survey of students based on temperature affecting learning (253 responses) inconclusive due to contradictions on survey.

Questions-

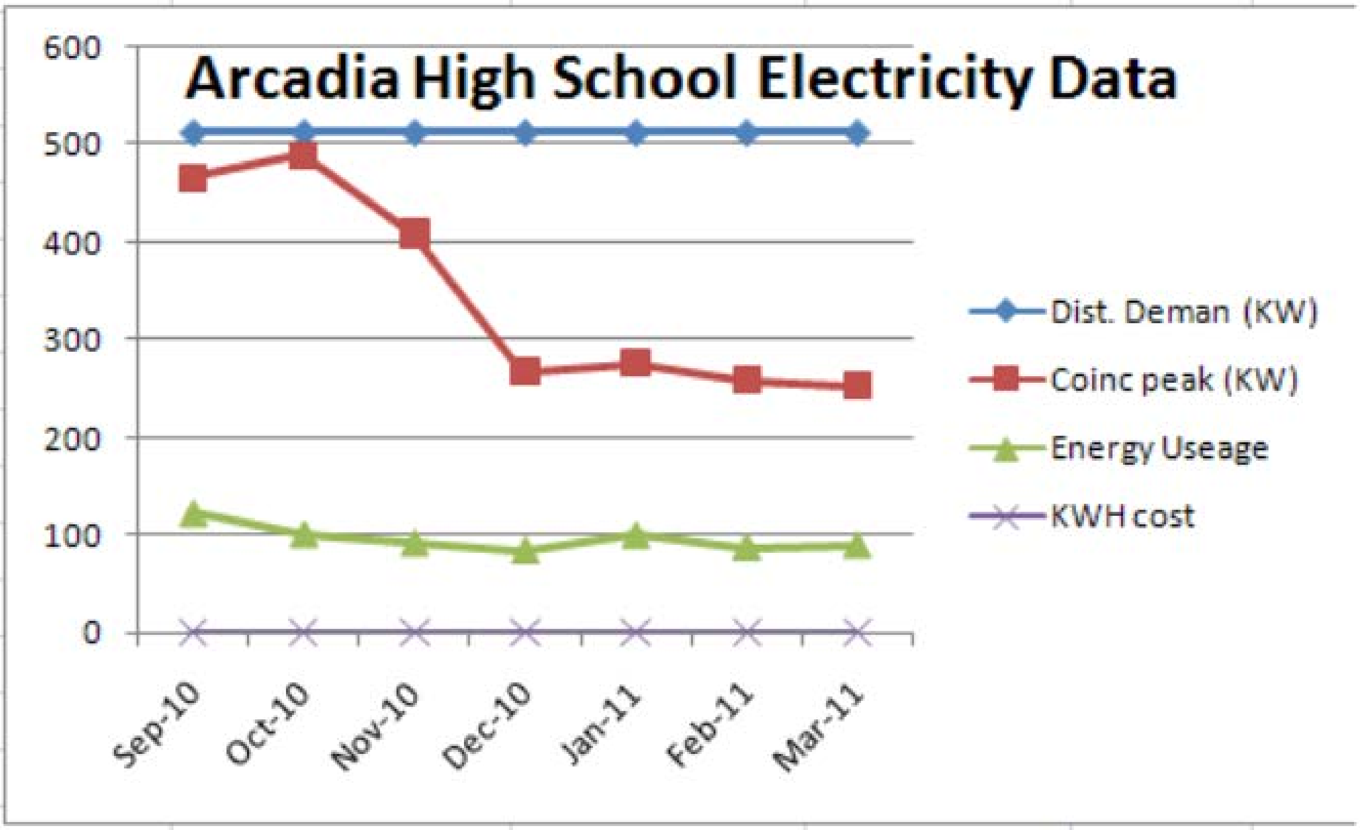
1. **On the average, the temperature of the school is: A. Too hot B. Too cold C. Comfortable**
2. **Has the temperature ever affected your ability to learn?**
3. **What do you think the legal temperature of a school is supposed to be ?**

APPENDIX C

Energy Bills

2010-2011 School Year

Month/yr	Dist. Deman (KW)	Coinc peak (KW)	Energy Useage	KWH cost
Sep-10	513	465.6	122.8	0.0498
Oct-10	513	489.6	100.8	0.0498
Nov-10	513	409.6	91.6	0.0498
Dec-10	513	267.2	84	0.0498
Jan-11	513	275.2	100	0.0498
Feb-11	513	257.6	87.6	0.0498
Mar-11	513	252.8	89.6	0.0498



ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER
FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: September-10

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge		
Account No.	06-1371	Middle School	@ $75.00/Account =	$	75.00
Account No.	06-16821	High School	@ $75.00/Account =	$	75.00
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
			Customer Charges =	$	150.00

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge		
Account Ref.	Middle School	242	kW @ $1.50/kW =	$	363.00
Account Ref.	High School	513	kW @ $1.50/kW =	$	769.50
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
			Distribution Demand Charges =	$	1,132.50

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment			
Account Ref.	Middle School	91%	-2	kW @ $5.00/kW =	$	(10.00)
Account Ref.	High School	86%	22	kW @ $5.00/kW =	$	110.00
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
				Power Factor Adjustment =	$	100.00

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 673.60 KW 9/2/2010 @ 13:30

		Coincident Demand	Demand Charge		
Account Ref.	Middle School	208	kW @ $5.00/kW =	$	1,040.00
Account Ref.	High School	465.6	kW @ $5.00/kW =	$	2,328.00
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-

Total Coincident Demand = 673.6 kW

Coincident Demand Charges = $ 3,368.00

ENERGY CHARGES

		Energy Usage	Energy Charge	
Account Ref.	Middle School	61,440	kWh @ $0.0498/kWh =	$ 3,059.71
Account Ref.	High School	122,800	kWh @ $0.0498/kWh =	$ 6,115.44
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -

Total Energy Usage = 184,240 kWh Subtotal = $ 9,175.15

Power Cost Adjustment Clause (PCAC) * $ 0.003900 /kWh x Total Energy Usage = $ 718.54

Energy Charges = $ 9,893.69

TOTAL POWER COSTS

Distribution Demand Charge =	$	1,132.50
Coincident Demand Charge =	$	3,368.00
Power Factor Adjustment =	$	100.00
Energy Charge =	$	9,893.69
Customer Charge =	$	150.00
Total =	$	14,644.19

TOTAL POWER COST $ 14,644.19

Savings Due to Conjunctive Metering $ 62.00

ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER
FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: October-10

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge	
Account No.	06-1371	Middle School	@ $75.00/Account =	$ 75.00
Account No.	06-18821	High School	@ $75.00/Account =	$ 75.00
Account No.			@ $75.00/Account =	$ -
Account No.			@ $75.00/Account =	$ -
Account No.			@ $75.00/Account =	$ -
Account No.			@ $75.00/Account =	$ -
			Customer Charges =	$ 150.00

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge	
Account Ref.	Middle School	242	kW @ $1.50/kW =	$ 363.00
Account Ref.	High School	513	kW @ $1.50/kW =	$ 769.50
Account Ref.			kW @ $1.50/kW =	$ -
Account Ref.			kW @ $1.50/kW =	$ -
Account Ref.			kW @ $1.50/kW =	$ -
Account Ref.			kW @ $1.50/kW =	$ -
			Distribution Demand Charges =	$ 1,132.50

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment		
Account Ref.	Middle School	92%	-4	kW @ $5.00/kW =	$ (20.00)
Account Ref.	High School	88%	11	kW @ $5.00/kW =	$ 55.00
Account Ref.				kW @ $5.00/kW =	$ -
Account Ref.				kW @ $5.00/kW =	$ -
Account Ref.				kW @ $5.00/kW =	$ -
Account Ref.				kW @ $5.00/kW =	$ -
				Power Factor Adjustment =	$ 35.00

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 683.52 KW 10/11/10 @ 13:15

		Coincident Demand	Demand Charge	
Account Ref.	Middle School	193.92	kW @ $5.00/kW =	$ 969.60
Account Ref.	High School	489.6	kW @ $5.00/kW =	$ 2,448.00
Account Ref.			kW @ $5.00/kW =	$ -
Account Ref.			kW @ $5.00/kW =	$ -
Account Ref.			kW @ $5.00/kW =	$ -
Account Ref.			kW @ $5.00/kW =	$ -
Total Coincident Demand =		683.52	kW	
			Coincident Demand Charges =	$ 3,417.60

ENERGY CHARGES

		Energy Usage	Energy Charge	
Account Ref.	Middle School	59,520	kWh @ $0.0498/kWh =	$ 2,964.10
Account Ref.	High School	100,800	kWh @ $0.0498/kWh =	$ 5,019.84
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
	Total Energy Usage =	160,320	kWh Subtotal =	$ 7,983.94

Power Cost Adjustment Clause (PCAC) $ 0.000900 /kWh x Total Energy Usage = $ 144.29

Energy Charges = $ 8,128.22

TOTAL POWER COSTS

Distribution Demand Charge =	$ 1,132.50
Coincident Demand Charge =	$ 3,417.60
Power Factor Adjustment =	$ 35.00
Energy Charge =	$ 8,128.22
Customer Charge =	$ 150.00
Total =	$ 12,863.32

TOTAL POWER COST $ 12,863.32

Savings Due to Conjunctive Metering $ 77.40

ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER
FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: November-10

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge		
Account No.	06-1371	Middle School	@ $75.00/Account =	$	75.00
Account No.	06-18821	High School	@ $75.00/Account =	$	75.00
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
			Customer Charges =	$	150.00

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge		
Account Ref.	Middle School	242	kW @ $1.50/kW =	$	363.00
Account Ref.	High School	513	kW @ $1.50/kW =	$	769.50
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
			Distribution Demand Charges =	$	1,132.50

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment			
Account Ref.	Middle School	91%	-2	kW @ $5.00/kW =	$	(10.00)
Account Ref.	High School	90%	0	kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
				Power Factor Adjustment =	$	(10.00)

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 608 KW 11/09/2010 @ 14:00

		Coincident Demand	Demand Charge		
Account Ref.	Middle School	198.4	kW @ $5.00/kW =	$	992.00
Account Ref.	High School	409.6	kW @ $5.00/kW =	$	2,048.00
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Total Coincident Demand =		608	kW		
			Coincident Demand Charges =	$	3,040.00

ENERGY CHARGES

		Energy Usage	Energy Charge		
Account Ref.	Middle School	66,400	kWh @ $0.0498/kWh =	$	3,306.72
Account Ref.	High School	91,600	kWh @ $0.0498/kWh =	$	4,561.68
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
	Total Energy Usage =	158,000	kWh Subtotal =	$	7,868.40
Power Cost Adjustment Clause (PCAC)	$	0.004900	/kWh x Total Energy Usage =	$	774.20
			Energy Charges =	$	8,642.60

TOTAL POWER COSTS

Distribution Demand Charge =	$	1,132.50
Coincident Demand Charge =	$	3,040.00
Power Factor Adjustment =	$	(10.00)
Energy Charge =	$	8,642.60
Customer Charge =	$	150.00
Total =	$	12,955.10
TOTAL POWER COST	$	12,955.10

Savings Due to Conjunctive Metering $ 105.00

ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER
FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: December-10

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge		
Account No.	06-1371	Middle School	@ $75.00/Account =	$	75.00
Account No.	06-18821	High School	@ $75.00/Account =	$	75.00
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
			Customer Charges =	$	150.00

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge		
Account Ref.	Middle School	235	kW @ $1.50/kW =	$	352.50
Account Ref.	High School	513	kW @ $1.50/kW =	$	769.50
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
			Distribution Demand Charges =	$	1,122.00

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment		
Account Ref.	Middle School	90%	0 kW @ $5.00/kW =	$	-
Account Ref.	High School	90%	0 kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
			Power Factor Adjustment =	$	-

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 480.32 KW 12/21/10 @ 10:30

		Coincident Demand	Demand Charge		
Account Ref.	Middle School	213.12	kW @ $5.00/kW =	$	1,065.60
Account Ref.	High School	267.2	kW @ $5.00/kW =	$	1,336.00
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-

Total Coincident Demand = 480.32 kW

Coincident Demand Charges = $ 2,401.60

ENERGY CHARGES

		Energy Usage	Energy Charge		
Account Ref.	Middle School	59,360	kWh @ $0.0498/kWh =	$	2,956.13
Account Ref.	High School	84,000	kWh @ $0.0498/kWh =	$	4,183.20
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
	Total Energy Usage =	143,360 kWh	Subtotal =	$	7,139.33

Power Cost Adjustment Clause (PCAC) $ 0.000700 /kWh x Total Energy Usage = $ 100.35

Energy Charges = $ 7,239.68

TOTAL POWER COSTS

Distribution Demand Charge =	$	1,122.00
Coincident Demand Charge =	$	2,401.60
Power Factor Adjustment =	$	-
Energy Charge =	$	7,239.68
Customer Charge =	$	150.00
Total =	$	10,913.28

TOTAL POWER COST $ 10,913.28

Savings Due to Conjunctive Metering $ 138.40

ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER
FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: January-11

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge		
Account No.	06-1371	Middle School	@ $75.00/Account =	$	75.00
Account No.	06-18821	High School	@ $75.00/Account =	$	75.00
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
			Customer Charges =	$	150.00

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge		
Account Ref.	Middle School	228	kW @ $1.50/kW =	$	342.00
Account Ref.	High School	513	kW @ $1.50/kW =	$	769.50
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
			Distribution Demand Charges =	$	1,111.50

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment			
Account Ref.	Middle School	91%	2	kW @ $5.00/kW =	$	(10.00)
Account Ref.	High School	89%	3	kW @ $5.00/kW =	$	15.00
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
				Power Factor Adjustment =	$	5.00

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 480 KW 1/17/2011 @ 10:15

		Coincident Demand	Demand Charge		
Account Ref.	Middle School	204.8	kW @ $5.00/kW =	$	1,024.00
Account Ref.	High School	275.2	kW @ $5.00/kW =	$	1,376.00
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-

Total Coincident Demand = 480 kW

Coincident Demand Charges = $ 2,400.00

ENERGY CHARGES

		Energy Usage	Energy Charge		
Account Ref.	Middle School	69,600	kWh @ $0.0498/kWh =	$	3,466.08
Account Ref.	High School	100,000	kWh @ $0.0498/kWh =	$	4,980.00
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
	Total Energy Usage =	169,600	kWh Subtotal =	$	8,446.08

Power Cost Adjustment Clause (PCAC) $ 0.005000 /kWh x Total Energy Usage = $ 848.00

Energy Charges = $ 9,294.08

TOTAL POWER COSTS

Distribution Demand Charge =	$	1,111.50
Coincident Demand Charge =	$	2,400.00
Power Factor Adjustment =	$	5.00
Energy Charge =	$	9,294.08
Customer Charge =	$	150.00
Total =	$	12,960.58

TOTAL POWER COST $ 12,960.58

Savings Due to Conjunctive Metering $ 70.00

ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER
FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: February-11

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge	
Account No.	06-1371	Middle School	@ $75.00/Account =	$ 75.00
Account No.	06-18821	High School	@ $75.00/Account =	$ 75.00
Account No.			@ $75.00/Account =	$ -
Account No.			@ $75.00/Account =	$ -
Account No.			@ $75.00/Account =	$ -
Account No.			@ $75.00/Account =	$ -
			Customer Charges =	$ 150.00

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge	
Account Ref.	Middle School	228	kW @ $1.50/kW =	$ 342.00
Account Ref.	High School	513	kW @ $1.50/kW =	$ 769.50
Account Ref.			kW @ $1.50/kW =	$ -
Account Ref.			kW @ $1.50/kW =	$ -
Account Ref.			kW @ $1.50/kW =	$ -
Account Ref.			kW @ $1.50/kW =	$ -
			Distribution Demand Charges =	$ 1,111.50

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment		
Account Ref.	Middle School	92%	-4	kW @ $5.00/kW =	$ (20.00)
Account Ref.	High School	89%	3	kW @ $5.00/kW =	$ 15.00
Account Ref.				kW @ $5.00/kW =	$ -
Account Ref.				kW @ $5.00/kW =	$ -
Account Ref.				kW @ $5.00/kW =	$ -
Account Ref.				kW @ $5.00/kW =	$ -
				Power Factor Adjustment =	$ (5.00)

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 459.2KW 2/17/2011 @ 11:00

		Coincident Demand	Demand Charge	
Account Ref.	Middle School	201.6	kW @ $5.00/kW =	$ 1,008.00
Account Ref.	High School	257.6	kW @ $5.00/kW =	$ 1,288.00
Account Ref.			kW @ $5.00/kW =	$ -
Account Ref.			kW @ $5.00/kW =	$ -
Account Ref.			kW @ $5.00/kW =	$ -
Account Ref.			kW @ $5.00/kW =	$ -

Total Coincident Demand = 459.2 kW

Coincident Demand Charges = $ 2,296.00

ENERGY CHARGES

		Energy Usage	Energy Charge	
Account Ref.	Middle School	59,360	kWh @ $0.0498/kWh =	$ 2,956.13
Account Ref.	High School	87,600	kWh @ $0.0498/kWh =	$ 4,362.48
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -
Account Ref.			kWh @ $0.0498/kWh =	$ -

Total Energy Usage = 146,960 kWh Subtotal = $ 7,318.61

Power Cost Adjustment Clause (PCAC) $ 0.000300 /kWh x Total Energy Usage = $ 44.09

Energy Charges = $ 7,362.70

TOTAL POWER COSTS

Distribution Demand Charge =	$ 1,111.50
Coincident Demand Charge =	$ 2,296.00
Power Factor Adjustment =	$ (5.00)
Energy Charge =	$ 7,362.70
Customer Charge =	$ 150.00
Total =	$ 10,915.20

TOTAL POWER COST $ 10,915.20

Savings Due to Conjunctive Metering $ 144.00

ARCADIA ELECTRIC UTILITY

EXPERIMENTAL CONJUNCTIVE METERING RIDER FOR LARGE POWER SERVICE Cp-2

ARCADIA PUBLIC SCHOOLS

BILLING MONTH: March-11

Conjunctive Metering Accounts and Customer Charges

Accounts Included in Bill		Account Reference	Customer Charge		
Account No.	06-1371	Middle School	@ $75.00/Account =	$	75.00
Account No.	06-18821	High School	@ $75.00/Account =	$	75.00
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
Account No.			@ $75.00/Account =	$	-
			Customer Charges =	**$**	**150.00**

DISTRIBUTION DEMAND CHARGES

		Distribution Demand	Demand Charge		
Account Ref.	Middle School	228	kW @ $1.50/kW =	$	342.00
Account Ref.	High School	513	kW @ $1.50/kW =	$	769.50
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
Account Ref.			kW @ $1.50/kW =	$	-
			Distribution Demand Charges =	**$**	**1,111.50**

POWER FACTOR ADJUSTMENT

		Power Factor	Power Factor Adjustment			
Account Ref.	Middle School	92%	-4	kW @ $5.00/kW =	$	(20.00)
Account Ref.	High School	89%	3	kW @ $5.00/kW =	$	15.00
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
Account Ref.				kW @ $5.00/kW =	$	-
				Power Factor Adjustment =	**$**	**(5.00)**

COINCIDENT DEMAND CHARGES (CONJUNCTIVE BILLING)

Coincident Peak Occurred at: 458.24 KW 3/3/2011

		Coincident Demand	Demand Charge		
Account Ref.	Middle School	205.44	kW @ $5.00/kW =	$	1,027.20
Account Ref.	High School	252.8	kW @ $5.00/kW =	$	1,264.00
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-
Account Ref.			kW @ $5.00/kW =	$	-

Total Coincident Demand = 458.24 kW

Coincident Demand Charges = $ 2,291.20

ENERGY CHARGES

		Energy Usage	Energy Charge		
Account Ref.	Middle School	65,760	kWh @ $0.0498/kWh =	$	3,274.85
Account Ref.	High School	89,600	kWh @ $0.0498/kWh =	$	4,462.08
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
Account Ref.			kWh @ $0.0498/kWh =	$	-
	Total Energy Usage =	155,360	kWh Subtotal =	$	7,736.93

Power Cost Adjustment Clause (PCAC) $ 0.002700 /kWh x Total Energy Usage = $ 419.47

Energy Charges = $ 8,156.40

TOTAL POWER COSTS

Distribution Demand Charge =	$	1,111.50
Coincident Demand Charge =	$	2,291.20
Power Factor Adjustment =	$	(5.00)
Energy Charge =	$	8,156.40
Customer Charge =	$	150.00
Total =	$	11,704.10

TOTAL POWER COST $ 11,704.10

Savings Due to Conjunctive Metering $ 38.80

APPENDIX D
Energy Presentation

Energy Cost & Usage Reduction

Arcadia High School

Money Isn't All You're Saving

- **Introduce team**
- **Background**
  - Current electricity costs
  - Breakdown of costs
  - Peak demand
  - Focus on energy
- **Goals**
- **How to meet Goals**

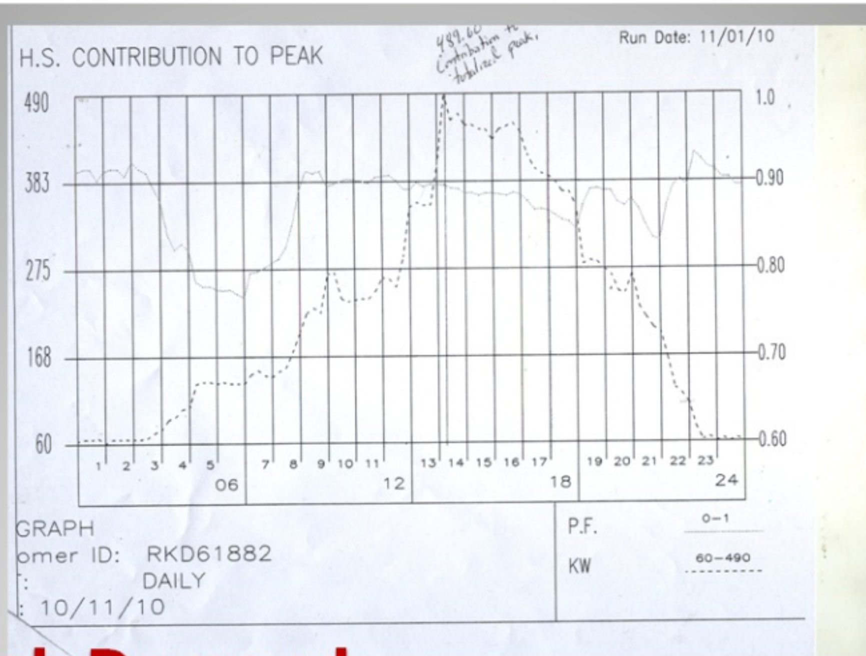
Energy Cost & Usage Reduction

Michele Butler
Olga Dedkova-Hasan
Alan Herman
Monica Herman
Marie Lettner
Rick Nelson
Tom Nelson
Jerry Sorenson
Bill Steinke
Terry Vettrus
Kevin Whalen
Ryan Ziegler

Energy Team

- In an electricity grid, electricity consumption and production must balance. Electric utilities must plan for the electricity needs of their customers. When customers have extreme spikes in their demand, the electric company scrambles to meet the demand during those peaks, often by purchasing expensive electricity from the grid. This expense is passed onto large use customers via a demand charge

Peak Demand



Peak Demand

- Use of a 100 watt light bulb off-peak
- (\$0.05/kwhr)(100 watts)(1 kw/1000 watts)(15 min)(1hr/60 min) = \$.00125

- Use of a 100 watt light bulb during peak
- Demand charge + kwhr charge
- (\$5.00/kw)(100 watts)(1 kw/1000 watts)= \$0.5 + \$0.00125 = \$0.50125

Peak Demand

Focus on energy

Welcome to Wisconsin's Focus on Energy

Focus on Energy works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. Focus information, resources and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled. Its efforts help Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect our environment and control the state's growing demand for electricity and natural gas.

Schools and Government

You're in the business of helping your community. Budgets are tight and every dollar saved is one that can be reinvested. That's why Focus on Energy is here—your schools and government facilities can do more with us. You'll be able to save energy and, therefore, save money.

Focus on Energy is your source for objective, third-party information and advice to help you make smart energy decisions that save money. Our expertise extends to a variety of school and government facilities, including:

Churches coupled with schools	**Public healthcare facilities**
City & county building & infrastructure	**State government facilities**
K-12 public & private schools	**Tribes of Wisconsin**
Private, public, and technical colleges	

Not only can we provide you with free resources, technical expertise, and financial incentives, but we can also help you:

- Implement federal and state energy-efficiency programs
- Select ENERGY STAR® and other energy-saving equipment
- Research and explore new technologies
- Learn about the benefits of renewable energy
- Promote energy education in schools through the K-12 Energy Education Program (KEEP)
- Complete an assessment of your energy use and opportunities

Focus on energy

-If we've done our job you won't even know that we've been here.

Goals

- Increase energy conservation awareness at Arcadia High School
- Create an energy usage plan for Arcadia High School
- Reduce current electricity usage by 10%
- Reduce current electricity bills by 10%
- Reduce peak demand by 10%

How to meet goals – Classroom Lighting

- **Classroom Lighting Study**

- Facts:
- Both switches on (all rooms- 8 hr/day) is: $5730.00/yr
- Switch A only (all rooms – 8 hr/day) is: $3210.00/yr
- Switch B only (all rooms – 8 hr/day) is: $2520.00/yr
- Both switches on (all rooms-6 hr/day) is: $4297.00/yr
- Switch A only (all rooms -6 hr/day) is: $2407.00/yr
- Switch B only (all rooms – 6 hr/day) is: $1890.00/yr

- **Recommendations:**
- Operate classrooms preferably with one switch only (dominate lighting switch)
- Attempt to turn lights off during prep.
- Turn lights off when leaving the room for more than one minute. (According to *Myth Busters,* anytime you leave the room for more than twenty-three seconds it is financially advantageous to turn off the lights.)
- Use savings to reconfigure light switches to operate 1/3 and 2/3 lighting (for three-bulb fixtures) or ½ and ½ (for four-bulb fixtures).
- Empty classrooms have no need for illumination—build awareness and take ownership.

How to meet goals - Classroom Lighting

Facts:

Hallway Lighting (180 days-16 hr/day) = $2154.90/yr

Options:

Reduce hours of lighting(16 to 10) =$1346.81/yr

Reduce #bulbs lit by ½ =$ 1068.2784/yr

Reduce hours & bulbs =$ 667.674/yr

How to meet goals - Hallway Lighting

Click to add title

APPENDIX E
Energy Saving Project Details

Yearly Hallway Lighting Costs

Location	#of fixtures	fixture wattage	hours used per day	days per year	cost per kw-hr	Yearly cost =
LMC hall	20	0.06	16	180	0.07	241.92
Ag hall	9	0.06	16	180	0.07	108.864
Gym hall	7	0.089	16	180	0.07	125.5968
Gym hall	19	0.06	16	180	0.07	229.824
Music hall	12	0.06	16	180	0.07	145.152
Auditorium hall	11	0.06	16	180	0.07	133.056
Auditorium hall	7	0.089	16	180	0.07	125.5968
Entry Way	2	0.06	16	180	0.07	24.192
Career Center	7	0.089	16	180	0.07	125.5968
Candy vending	1	0.06	16	180	0.07	12.096
2nd floor hall	19	0.06	16	180	0.07	229.824
Business hall	9	0.06	16	180	0.07	108.864
TPC	9	0.06	16	180	0.07	108.864
stairwells	4	0.06	16	180	0.07	48.384
Ag/tech entry	3	0.06	16	180	0.07	36.288
gym entry	2	0.06	16	180	0.07	24.192
teacher workroom	10	0.06	16	180	0.07	120.96
teacher hallway	7	0.06	16	180	0.07	84.672
teacher lunch	2	0.06	16	180	0.07	24.192
teacher lunch	4	0.12	16	180	0.07	96.768
					Total yearly cost of lighting	2154.9024

Lighting Reduction – Reduce hours lit from 16 to 10

Option A

		Reducing	Hours	of	lighting	
Location	#of fixtures	fixture wattage	hours used per day	days per year	cost per kw-hr	Yearly cost =
LMC hall	20	0.06	10	180	0.07	151.2
Ag hall	9	0.06	10	180	0.07	68.04
Gym hall	7	0.089	10	180	0.07	78.498
Gym hall	19	0.06	10	180	0.07	143.64
Music hall	12	0.06	10	180	0.07	90.72
Auditorium hall	11	0.06	10	180	0.07	83.16
Auditorium hall	7	0.089	10	180	0.07	78.498
Entry Way	2	0.06	10	180	0.07	15.12
Career Center	7	0.089	10	180	0.07	78.498
Candy vending	1	0.06	10	180	0.07	7.56
2nd floor hall	19	0.06	10	180	0.07	143.64
Business hall	9	0.06	10	180	0.07	68.04
TPC	9	0.06	10	180	0.07	68.04
stairwells	4	0.06	10	180	0.07	30.24
Ag/tech entry	3	0.06	10	180	0.07	22.68
gym entry	2	0.06	10	180	0.07	15.12
teacher workroom	10	0.06	10	180	0.07	75.6
teacher hallway	7	0.06	10	180	0.07	52.92
teacher lunch	2	0.06	10	180	0.07	15.12
teacher lunch	4	0.12	10	180	0.07	60.48
					Total yearly cost of lighting	1346.814
					Savings	808.0884

Lighting reduction – reduce the number of bulbs lit in each fixture by 1/2

Option B

Location	#of fixtures	fixture wattage	hours used per day	days per year	cost per kw-hr	Yearly cost =
		Reducing	the number of	fixtures lit	by 1/2	
LMC hall	10	0.06	16	180	0.07	120.96
Ag hall	5	0.06	16	180	0.07	60.48
Gym hall	4	0.089	16	180	0.07	71.7696
Gym hall	8	0.06	16	180	0.07	96.768
Music hall	6	0.06	16	180	0.07	72.576
Auditorium hall	5	0.06	16	180	0.07	60.48
Auditorium hall	3	0.089	16	180	0.07	53.8272
Entry Way	1	0.06	16	180	0.07	12.096
Career Center	4	0.089	16	180	0.07	71.7696
Candy vending	1	0.06	16	180	0.07	12.096
2nd floor hall	9	0.06	16	180	0.07	108.864
Business hall	4	0.06	16	180	0.07	48.384
TPC	4	0.06	16	180	0.07	48.384
stairwells	4	0.06	16	180	0.07	48.384
Ag/tech entry	1	0.06	16	180	0.07	12.096
gym entry	1	0.06	16	180	0.07	12.096
teacher workroom	5	0.06	16	180	0.07	60.48
teacher hallway	3	0.06	16	180	0.07	36.288
teacher lunch	1	0.06	16	180	0.07	12.096
teacher lunch	2	0.12	16	180	0.07	48.384
					Total yearly cost of lighting	1068.2784
					Savings	1086.624

Option C

		Reducing	the number of	fixtures lit	by 1/2 & hours	
Location	#of fixtures	fixture wattage	hours used per day	days per year	cost per kw-hr	Yearly cost =
LMC hall	10	0.06	10	180	0.07	75.6
Ag hall	5	0.06	10	180	0.07	37.8
Gym hall	4	0.089	10	180	0.07	44.856
Gym hall	8	0.06	10	180	0.07	60.48
Music hall	6	0.06	10	180	0.07	45.36
Auditorium hall	5	0.06	10	180	0.07	37.8
Auditorium hall	3	0.089	10	180	0.07	33.642
Entry Way	1	0.06	10	180	0.07	7.56
Career Center	4	0.089	10	180	0.07	44.856
Candy vending	1	0.06	10	180	0.07	7.56
2nd floor hall	9	0.06	10	180	0.07	68.04
Business hall	4	0.06	10	180	0.07	30.24
TPC	4	0.06	10	180	0.07	30.24
stairwells	4	0.06	10	180	0.07	30.24
Ag/tech entry	1	0.06	10	180	0.07	7.56
gym entry	1	0.06	10	180	0.07	7.56
teacher workroom	5	0.06	10	180	0.07	37.8
teacher hallway	3	0.06	10	180	0.07	22.68
teacher lunch	1	0.06	10	180	0.07	7.56
teacher lunch	2	0.12	10	180	0.07	30.24
					Total yearly cost of lighting	667.674
					Savings	1487.2284

Switching from Electric to Gas Booster Heater

Electric booster heaters are often used in facilities that wash dishes. These units sit close to the dishwasher, and heat water before it enters the unit to make sure water temperatures meet required levels. These units typically range in size from 5kW to 50kW. Often these units do not use much electricity (measured in kilowatt-hours, kWh), however they can result in a large charge for electric demand (measured in kilowatts, kW). If your facility is assessed a demand charge (look at your utility bills to determine this) you may wish to replace the electric booster heaters with a natural gas unit.

EXISTING	Example	
Size of Booster Heater (kW):	30	
Estimated Load Factor:	65%	65%
Months/yr Unit Operates:	9	
Hours per Year Unit Operates:	400	
kW	**19.5**	**NA**
kWh/yr	**7,800**	**NA**
Average kW Rate	$6.50	$6.50
Average kWh Rate	*$0.080*	$0.080
Annual Energy and Demand Cost	**$1,765**	**NA**
PROPOSED		
Gas Fired Unit Efficiency:	80.0%	80.0%
Avg Gas Use (th/yr)	**333**	**NA**
Average therm Rate	$0.950	$0.950
Annual Energy Cost	**$316**	**NA**
SAVINGS		
th/yr	**-333**	**NA**
kW	**19.5**	**NA**
kWh/yr	**7,800**	**NA**
Annual Cost Savings	**$1,449**	**NA**
Project cost Estimate	$5,500	
Incentive	$0	
Simple Payback	3.8	NA

Red triangles in the upper right corner means there is a comment explaining the cell.

Yellow cells indicate that information from your facility is required for calculations.

Bill Steinke

Ryan Ziegler

NRES 734 Action Plan

Arcadia High School

Technology Education 7-12

Air Handling Efficiency

1. Action Plan Summary:

Project Purpose:

The purpose of this plan is to conserve energy usage for the Arcadia High School. Our plan is focusing on two major areas in the HVAC system. The first issue is how the system is programmed to bring fresh air into the building. The second issue deals with the efficiency of the motor that runs the squirrel cage fan in the air handling unit.

Implementation:

The planning stages for these projects will be completed by the end of Dec. 2010. The implementation stage will start in Jan. 2011 and continue through Dec. 2011, because of items not in the current budget year.

Results:

Listed below are the results found to create a baseline for figures. These are the figures we tested for and calculated using industry standards.

- Arcadia High School monthly two year average power factor is 88%
- Air handling unit motors are operating between 60-66% power factor
- 20HP motors average 8kw
- 7.5HP motors average 5kw
- HVAC system operated 7:00am-4:00pm Mon. thru Fri. all year=261 days of operation.(some exceptions would be weekend activities and night events)
- Variable Frequency Drivers(VFD's) should add 25% efficiency
- New AC 3 phase motors save 2% electrical cost over current models
- Current electrical rates $.07 kwh(demand rate)

Option 1: Install VFD’s only

- 6 motors @ 8kw   5 motors @5kw
- 657kwh per day, 171,477kwh per year of operation
- Cost per day= $50.00, Cost per year of operation= $12,003.39
- VFD’s project a 25% savings
- VFD’s cost per day= $34.50, cost per year of operation= $9,002.54
- Cost savings per day= $15.50, cost savings per year of operation= $3,000.85

Option 2: Install VFD’s and New Motors

- New motors and VFD’s would be 27% more efficient
- New motors cost per day= $33.57, cost per year operation= $8762.47

Option 3: Adjusting Power Factor

- At this point we have not yet researched best method to raise power factor. Arcadia Electric Utility pays back on 90% power factor and better. They however charge extra on anything below 90%. Our high school over the past two years has a monthly average of 88%. This is costing the district money. It will be interesting to research this and see if it could become a viable option for the energy committee to pursue.

<u>Total Budget:</u>

Option 1:(Motors & VFD’s& Programming) $40,300

Option 2:(VFD’s & Programming) $19,600

2. <u>Introduction of Audience:</u>

We have recently received an energy grant to look at how energy efficiency our high school is. We have created an energy group to help accomplish this goal. The group consists of high school teachers, maintenance supervisor, technology director, and principal.   Our group members have teamed up to research different ways to save energy throughout the school (lighting, demand/peak, HVAC, computers). Arcadia High School has 350 students and 60 staff members and contains 149,000 square feet.

3. Statement of problem or need:

Currently, with the school district beginning the process of looking at ways to save energy there are plenty of opportunities. Currently, the high schools have changed the gym lighting to fluorescents and have purchased a new shoulder boiler to assist the existing boilers. We have two buildings, but we are just focusing on the high school HVAC system and with the efficiency of the motor that runs the squirrel cage fan in the air handling unit. By looking at these two issues we are hoping that there will be enough savings for the school that any initial cost will be repaid in a 3-5 year plan. The date will be at the end of the report.

4. Project goals and objectives:
   a. Program air handling units to run at different settings, instead of on/off.
   b. Install variable frequency drives (VFD) on air handler motors.
   c. Increase the power factor efficiency of the air handler motors.

5. Methods and Timeline:
   a. Contact electric motor engineer for prices and ideas on electric motors and variable frequency drives.-Nov. 2010
   b. Arcadia Electric Utility metering air handler unit motors(kwh,kw,power factor)-Nov. 2010
   c. Present findings and options to energy committee-Dec. 2010
   d. Present findings and recommend option to school board-Jan/Feb. 2011.
   e. Install VFD or new motors or both-July/August 2011
   f. Research on how to raise power factor efficiency in electric motors- time permitting 2011

6. Evaluation Criteria and Process:

We will measure the success of our project based on examination of the final utility bills and actual testing of the equipment. By looking at our monthly utility bills we should see a decrease in amount of energy used. After installing the VFD's and/or new motors we will again set up a kw meter and compare the results to the pre-installation of new devices.

As for the HVAC system we will look at what it is costing to run at "full" capability and the savings it would save if it was reprogrammed to have an "event" (example basketball game or in the auditorium the play) and "classroom" (set for 30 students to be using the area) settings. By finding out what our cost is now and calculating what it would cost to have these different settings we could then establish the amount over time that would be saved and if it is feasible to spend $ 2000.00 for reprogramming of the HVAC system. By looking at the data we will be able to calculate how long it will take for the initial cost to be repaid by the amount saved on energy.

7. Budget:

a. 6 new 20hp motors $2,200.00 installed each
b. 5 new 7.5hp motors $1,500.00 installed each
c. VFD's $1,600.00 each motor
d. $ 2000.00 to reprogram HVAC system
e. Power factor is something we discovered when testing the motors usage. So at this point we have not had time to research product cost and feasibility of savings.

Measure Name	Air Reduction			
Column	1	2	3	4
		Outside Air Reduction		
		EXISTING		
CFM of Outside Air	2,140	4,200	3,690	3,690
AHU Motor Size (hp)	20	20	0	0
AHU Motor Efficiency	91%	91%	0%	0%
AHU Motor Load Factor	65%	65%	0%	0%
Hrs/Wk OA is Supplied	45.0	45.0	0.0	0.0
Wks/Yr OA is Supplied	52.0	52.0	0.0	0.0
Heating Balance Point (F)	60	60		
Nearest City	Eau Claire	Eau Claire		
Heating Degree Hours	**173,310**	**173,310**		
Heating System Efficiency	85%	85%	0%	0%
Is the facility cooled?	Yes	No	No	No
Cooling Balance Point	60	60		
Nearest City	Eau Claire	Eau Claire		
Cooling Degree Hours	**28,965**	**0**		
EER of Cooling System	9.1	9.1	0.0	0.0
Conversion Factor (btu/therm)	100,000	100,000	100,000	100,000
Existing Gas Use (th/yr)	**1,212.17**	**2,379.03**		
Current Gas Rate ($/th)	$0.69	$0.69	$0.65	$0.65
Existing Electric Use (kWh/yr)	**27,599**	**24,938**		
Current Electric Rate ($/kWh)	$0.08	$0.08	$0.09	$0.09

Annual Energy Cost	**3,044.32**	**3,636.57**		
PROPOSED				
CFM of Outside Air	225	225	0	0
Hrs/Wk OA is Supplied	45.0	45.0	0.0	0.0
Wks/Yr OA is Supplied	52.0	52.0	0.0	0.0
Proposed Gas Use (th/yr)	**127.45**	**127.45**		
Proposed Electric Use (kWh/yr)	**25,217**	**24,938**		
Annual Energy Cost	**$2,105.30**	**$2,082.98**		
SAVINGS				
th/yr	**1,084.72**	**2,251.58**		
kWh/yr	**2,382**	**0**		
Annual Cost Savings	**$939.02**	**$1,553.59**		
Project cost Estimate	$1,000.00	$1,000.00	$0.00	$0.00
Simple Payback	**1.1**	**0.6**		

These spreadsheets are meant as a rough estimate of energy use and savings potential. Focus On Energy nor its contractors can guarantee the results calculated by this tool.

For a reasonableness check, contact a Preferred Ally or your Focus On Energy Energy Advisor.

To add a note, hold Ctrl key and click on field.

Save Quit Add Del Print