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ENERGY EFFICIENT
SCHOOL PARTNERSHIP REPORT
ZAVALLA ISD
ZAVALLA, TEXAS

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1.0 EXECUTIVE SUMMARY

The Energy Efficient School Partnership Service is provided by the State Energy Conservation Office (SECO), a division of the Comptroller of Public Accounts of the State of Texas. This service assists school Districts in taking basic steps toward energy-efficient facility operation. Active involvement by the District in the partnership is critical in developing a customized blueprint for energy efficiency.

The first step toward energy-efficient school operation is identifying the current energy performance of District facilities. To that end, an analysis of the utility bills for Zavalla ISD has been completed by Estes, McClure & Associates, Inc. to determine the annual energy cost (per square foot) and energy consumption (per square foot) of the campus. The energy cost for the District is $1.38. The energy cost for Zavalla ISD is as shown in Section 2 of this report.

As a result of the utility bill analyses and consultation with District staff, Estes, McClure & Associates, Inc. has also completed a walk-through energy evaluation for three campuses: The High School, Junior High, and the Elementary School which consists of six separate facilities. Specific findings and recommendations on operation and maintenance procedures and cost effective energy retrofits are identified in Sections 4 and 6 of this report. The cost effective energy retrofits identified for the schools that were visited are: provide energy efficient lamps and ballasts, replace gym lighting, replace exit lights, install energy management controls system, and install computer sleep and hibernation software. **We estimate that as much as $23,944 may be saved annually if these projects are implemented. The estimated cost of these projects totals $141,503 yielding an average simple payback of 5.91 years**. This estimate does not include the mechanical systems renovation cost. The HVAC recommendations can be seen in section 5 of this report. A more detailed discussion of these recommendations, along with potential sources of project financing, will be provided during the follow-up presentation to the District.

Zavalla ISD has been paying attention to energy use and has some strategies already in place. These include:

1. Retrofitting some campuses with energy efficient electronic ballasts and T-8 lamps

This report provides additional opportunities based on observations at the two campuses. The following are recommendations the District should consider in order to improve the efficiency of their campuses:

1. Establish an Energy Management Department or designate current staff member as Energy Manager.
2. Retrofit remaining campuses with energy efficient electronic ballasts and T-8 lamps.
3. Create a district energy conservation policy adopted by the school board.

4. Create district energy conservation guidelines.
5. Give feedback to principals on their campuses energy use.
6. Upgrade existing lighting to new energy efficient lighting in gyms.
7. Upgrade old HVAC to new high efficiency equipment.
8. Have all district computers be able to sleep and hibernate.

We view the completion of this report and the presentation to Zavalla ISD as a beginning, not an end. We hope to be an ongoing partner in assisting the District to implement the recommendations listed in this report. Your personal contact at SECO is Ms. Glenda Baldwin (Phone: (512) 463-1731); your contact at Estes, McClure & Associates, Inc. is Josh Gentry, P.E. (Phone: (903) 581-2677). Please call us if you have any questions or comments about this report or other energy management issues.

Prior to conducting the on-site school visit, Mr. Josh Gentry, P.E. coordinated with Mr. David Flowers. Mr. Flowers accompanied Mr. Gentry and Mr. Malek Bekka on the site visit. A copy of the Preliminary Energy Assessment Service Agreement, which authorizes this service, has been included in Appendix A of this report.

2.0 DISTRICT ENERGY AND COST PERFORMANCE

Zavalla ISD has three main campuses, which serve kindergarten through 12th grade. The student enrollment as listed on the Zavalla ISD website is approximately 490 students.

The energy use performance or energy use index (EUI) and the energy cost performance or energy cost index (ECI) is provided below. Other detailed data is shown on the Base Year Energy Consumption History table provided in Appendix B of this report.

The energy cost index is a valuable tool for comparing the energy cost ($) of different schools and campuses in a given area. The energy use index allows for comparison of schools on a quantity (BTU) basis. The energy use index (EUI) is useful because it combines different forms of energy (MCF, KW, etc.) into one unit of measure (BTU) on a per square foot basis. The benefit of the EUI is because it is independent of energy price and price changes. The energy cost index (ECI) and the energy use index (EUI) are determined by the following formulas.

$$ECI = \frac{\text{Annual Electrical Cost + Annual Natural Gas Cost}}{\text{Total Area of School}}$$

$$EUI = \frac{\text{Annual Electrical BTUs + Annual Natural Gas BTUs}}{\text{Total Area of School}}$$

The following table is a summary of utility costs from July 2008 through June 2009 school year. This table does not include gas usage.

FACILITY	UTILITY COST	AREA (SQ. FT.)	ECI ($/FT^2)	EUI (BTU/FT^2)	AVG. ELEC. COST ($/KWH)
ZAVALLA ISD	$140,765	102,214	$1.38	30,534	0.154

3.0 ENERGY ACCOUNTING

3.1 Monitoring and Tracking

Zavalla ISD should consider tracking utility costs on a monthly basis. Utility bills should be reviewed monthly to make sure no errors have occurred.

3.2 Utility Providers and Rates

Zavalla ISD is provided electricity by Direct Energy, TXU Energy and Hudson energy. A propane tank provides gas to the Zavalla ISD campuses.

3.3 Deregulation Recommendations

The average cost of electricity is $0.154 per KWH. This is an above average rate for current market conditions and should be evaluated to determine options for Zavalla ISD. Zavalla ISD should continue to monitor electric deregulation activity. We recommend that a detailed analysis be performed before any long-term agreements for electricity are signed.

3.4 Energy Bonus

During the walk through evaluation of the school it was noticed that the District had some LCD flat panel monitors in some computer areas. LCD flat panel monitors use approximately one-half as much energy as conventional CRT type monitors. By using the flat panel monitor versus a regular monitor, the district is saving approximately $5 a year per monitor.

Most vending machines observed during the site visit appeared to be delamped. By having the coke machines delamped the District is saving approximately $80 a year per machine.

The District has upgraded some of its T-12 lighting to the newer T-8 lighting throughout the District. By upgrading the lighting the District is saving energy and should consider replacing the remaining T-12 lighting.

3.5 Equipment Records

The Zavalla ISD maintenance department should begin to document the equipment inventory, age, type, etc. for each campus. This is useful for maintenance, master planning, and energy management. This information has been included in Appendix E, and can be maintained by District staff.

4.0 RECOMMENDED M & O PROCEDURES

The following are recommended maintenance and operation procedures. These procedures are no-cost or low-cost recommendations, which can save energy dollars. During the energy evaluation walk through, some of the items listed may or may not have been seen.

Maximize Use of Day Lighting

Utilize day lighting where available by turning off the lights. Daylighting is available in hallways and common areas, especially at the High School lobby. The staff should be directed to turn these lights off except on dark days. Another option is to install light sensors to control the lights in daylit areas.

Keep Classroom Doors Closed

The exterior doors should be kept closed when the HVAC units are operating. The classroom doors leading into non-air conditioned hallways should be kept closed as much as possible. In addition to saving energy, this will provide for a more comfortable environment.

Turn Off Interior Lights in Unoccupied Areas

The District should continue to encourage all staff to keep lights off in areas that are unoccupied for significant periods of time. The District may wish to install a motion sensor in the common areas such as break rooms so that the lights are off when the building is unoccupied. Encourage staff to use only lights needed for a task.

Maintain Filter Replacement Schedule

Maintain the filters by changing them monthly or quarterly basis. The coils should be cleaned on a regular schedule. As a result, the indoor air quality will be improved along with keeping the HVAC system cleaner and extending the life of the equipment. Dirty filters were located in both Gymnasiums.

Limit Usage of Refrigerators, Floor Heaters, and Microwaves in the Classrooms

Individual refrigerators, floor heaters, and microwaves should be limited or restricted in the classrooms. The cost to operate this equipment can be considerable. Some Districts also do not allow use of this equipment because of potential pest infestation, while other Districts charge the teachers a $30 annual permit fee to offset the utility costs in operating this equipment.

Weatherstrip Exterior Doors

The exterior doors should be sealed so that no daylight can be seen through the doors.

Turn Off Equipment

Turn off computers, printers, copy machines and all other office equipment at night and during the day if not in use for extended time periods. Computers and monitors were observed to be off during walk-throughs.

Also, the computer monitors should be set to sleep mode when not being used for extended periods during the day. A free program on the Watt Watchers web site can be downloaded in order to make your monitors sleep. More information is listed in Appendix C of this report.

Involve Students and Teachers in an Energy Conservation Program

Direct involvement of students and teachers in a program such as “Watt Watchers” has proven to be effective at developing awareness and reducing energy consumption. It is recommended that the District consider implementing a program such as “Watt Watchers”. Information on this program is included in Appendix D of this report.

Keep Insulation on Piping

Some of the insulation on the piping throughout the District needs to be added or simply put back on. The insulation should be inspected and replaced when needed.

Turn Off Lights in Trophy Cases

Most trophy cases are near where there is natural light or in a well lit hall. Turn off trophy case lights to save more energy and take advantage of the existing lighting. Trophy lighting was observed off during walk-throughs.

Turn Off Exterior Lights During Daylight Hours

Turn off exterior lights during daylight hours. These lights should be kept off during the daytime. Another option would be to install photocells on these lights so that they automatically turn on when it starts to get dark outside. Timeclocks and/or timeclocks with photocells were observed for controlling lighting during walk-throughs.

Keep Ceiling Tile and Insulation in Place

Ceiling tiles along with batt insulation should be replaced in their proper position after above ceiling work has been completed. This will help insure that the building is properly insulated.

Repair Coil Fins and Panels on Rooftop Units

Some of the RTU access panels are loose, damaged, or poorly secured. This is permitting improper uncontrolled air movement. Straighten the bent fins on the coils to restore proper air flow. Repair and re-secure the unit panels properly. Also consider the installation of hail guards.

Evaluate the Summer Operations for Each Campus

The summer operation of the air conditioning of the schools should be evaluated by the District. Review of the utility bills show significant usage during the summer. Practices such as group cleaning, centralized summer school, and four-day work weeks have been successful in other Districts. The air conditioning systems should be operated a sufficient amount to control humidity in the buildings during unoccupied times.

De-lamp Soft Drink Machines

Soft drink vending machines consume electrical energy to refrigerate the drinks and to illuminate the display. A typical soft drink vending machine costs approximately $250 per year to operate.

De-lamping and disconnecting the ballasts will save approximately $80 per year per machine. The lamps in the soft drink machine operate 24 hours per day, 365 days per year. These lamps should be removed. They do not serve a purpose except to illuminate the advertisement on the front of the machine. Soft drink machines with lamps on were observed at the Elementary Gymnasium during the walk-throughs.

Clean Energy Intensive Areas First

The District's custodians should clean energy intensive areas first and then move onto the smaller energy use areas. An example would be to clean areas such as the gymnasiums, large multi-purpose rooms, library, or similar rooms first and then turn their lights off immediately.

Use Window Coverings

Use window blinds as necessary for optimum energy savings and daylighting. During the unoccupied hours of the heating season, the window blinds should be lowered for maximum heat retention. Conversely, the blinds should be raised during occupied hours in the heating season. During the cooling season, the blinds should be kept closed as much as possible.

Lock Out Programmable Thermostats

The programmable thermostats in the District should be locked out to prevent tampering. This can be done by removing the thermostat from the base and setting the lock-out switch. These thermostats can still be overridden by the teachers to provide air conditioning when needed.

Reset Programmable Thermostats

The programmable thermostats in the District should be reset. Reset the thermostats to turn off at approximately 4:00 pm in unoccupied areas. The building will stay conditioned for some time after the HVAC units have been turned off.

Clean Return Air Grilles

The return air grilles should be kept clean. Dirty grilles can result in reduced energy efficiency and reduced quality of the indoor air. These should be cleaned when the filters are changed.

Provide New Windows

The windows are original to the school. Some have been covered up with opaque panels. New double pane windows will reduce energy costs and emissions but will have relatively long payback.

Provide New Roof

Recommend roofing specialist/consultant inspect the roof for integrity of roof and insulation as well as adequacy of roof insulation. During the walk-through it was observed that the trees are leaving a significant amount of debris on the roof. This can cause damage to the roof over time.

Clean Gutters

The gutters at the High School are completely filled with debris. It is recommended that the gutters be cleaned. Clogged gutters prevent proper water flow to the ground and could cause damage to the surrounding areas over time.

Turn Off Pilot Lights for Gas Heaters

Pilot lights for gas heaters in the gym and shop areas should be extinguished after the heating season. A significant amount of gas is used for these pilot lights especially in older heating units.

Clean Mechanical and Electrical Rooms

Mechanical and electrical rooms should not be used as storage rooms. Assign specific responsibility and accountability to the principal of each school for keeping "stuff" out of these rooms. Cluttered mechanical and electrical rooms result in reduced energy efficiency, deterioration of the components and equipment, increased cost of maintenance, and reduced quality of the indoor air in the classrooms.

Cover Ventilation Fans During Winter Months

The ventilation fans in the gymnasium should be covered during the winter months to keep the heat from escaping.

Disconnect Abandoned Ballasts

These ballasts will still continue to consume electrical energy and produce heat that the air-conditioning system must remove. These abandoned ballasts should be disconnected from electrical power.

Keep Heater/Air Conditioning Air Returns Clear of Obstructions

Several classroom low wall closet plenum return air grilles were observed to be blocked by materials or equipment on the floor. Instruct staff to refrain from placing any objects near return air grilles which might restrict air flow.

Summer Energy Management

The district should make sure the HVAC units are turned off during the summer months. The district should setback or turn off all HVAC equipment that is not used during the summer. The custodial staff should be scheduled to minimize the amount of HVAC equipment that operates at any given time. In addition, the school might want to turn off water coolers, vending machines and other equipment not used during the summer months. This also provides an opportunity for cleaning and maintenance of this equipment.

During the walk-throughs, the Art room thermostat was set at 72 degrees while unoccupied. This was true also for the Cafeteria building which was set to 74 degrees while unoccupied. Another solution to this problem would be to install an

energy management controls system which could monitor and control all building temperatures from a central workstation.

5.0 MECHANICAL SYSTEMS

The mechanical systems and energy management control systems for the schools walked during the evaluation are described in this section. Also listed in this section of the report, is a schedule of replacement costs and a yearly plan to change out the HVAC systems.

High School

The HVAC systems for the High School are concentric rooftop units. The equipment is controlled by both manual and programmable thermostats. The programmable thermostats were not programmed at the time of the site visit and therefore were not serving their purpose for the facility. The District should consider replacing the thermostats with an Energy Management Control System (EMCS). An EMCS would provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Junior High

The HVAC systems for the Junior High are split system furnaces. There are no outside air dampers for the units. The units vary in age as some date back to 1994. These units are approaching the end of their useful life and the District should consider replacing these units with new single zone high-efficiency equipment within the next four years. The equipment is controlled by manual thermostats located in each space. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

New Gymnasium

The HVAC systems for New Gymnasium are split system heat pumps. There is a motorized damper on the outside air ductwork. All equipment was installed when the gymnasium was built in 1998. The District should consider planning the replacement of these units with new single zone high-efficiency equipment in six to seven years. The equipment is controlled by manual thermostats located in each space. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Agricultural Shop and Art Room

There is no air conditioning supplied to the Agricultural Shop. The HVAC systems for the Art room are split system heat pumps. The units were manufactured nine years ago and are in good condition. The equipment is controlled by manual thermostats located in each space. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Home Economics

The HVAC systems for the Home Economics building are split system heat pumps. The condensing units are located on the ground and the air handlers are located in closets. Room 201 and 202 are served by a single unit and the equipment for the building is controlled by manual thermostats. The units were manufactured in 1993 and are approaching the end of their useful life. The District should consider replacing these units with new single zone high-efficiency equipment within the next two years. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Elementary School Cafeteria

The HVAC systems for the Elementary Cafeteria consist of split system heat pumps. The condensing units are located on the ground and the air handlers are located above ceiling. The equipment is controlled by manual thermostats. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Kindergarten Building

The HVAC systems for the Kindergarten Building are split system heat pumps. The condensing units are located on the ground and the air handlers are located in closets. The equipment varies in age as some date back to 1986. These older units are beyond their expected useful life and the District should consider replacing these units with new single zone high-efficiency equipment. The equipment is controlled by manual thermostats. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for

the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Jones/Thigpen Building

The HVAC system for the Jones/Thigpen Building is a split system heat pump. The condensing unit is located on the ground and the air handler is located in a closet. Both classrooms in the building are served by a single split system unit. The unit was manufactured nine years ago and is in adequate condition. The unit is controlled by a manual thermostat. There is no Energy Management Control System in place. The District should consider the installation of an Energy Management Control System (EMCS) for the building. An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

5th Grade Building

The HVAC systems for the 5th Grade Building are split system furnaces. The condensing units are located on the ground and the air handlers are located above ceiling. There are no outside air dampers for the units. The units vary in age as some are original to the building which was built in 1996. The equipment is approaching the end of their useful life and the District should consider replacing these units with new single zone high-efficiency equipment within the five years. The equipment is controlled by both manual and programmable thermostats. The programmable thermostats were not programmed at the time of the site visit and therefore were not serving their purpose for the facility. The District should consider replacing the thermostats with an Energy Management Control System (EMCS). An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Principal/Elementary Building

The HVAC systems for the Principal/Elementary Building are split system heat pumps. The condensing units are located on the ground and the air handlers are located above ceiling. The HVAC units were manufactured in 1998 and appear to be in adequate condition. The District should consider replacing these units with new single zone high-efficiency equipment within the seven years. The equipment is controlled by programmable thermostats. The programmable thermostats were not programmed at the time of the site visit and therefore were not serving their purpose for the facility. The District should consider replacing the thermostats with an Energy Management Control System (EMCS). An EMCS could provide energy savings through scheduling, setback and optimized start of the HVAC system as well as maintenance savings associated with diagnosing and troubleshooting mechanical problems.

Location	Number of Units to be Replaced	2010	2011	2012	2013	2014	2015	2016
High School	4	$0	$151,424	$0	$0	$0	$0	$0
Junior High	6	$0	$0	$74,800	$0	$0	$0	$0
New Gym	8	$0	$0	$0	$0	$0	$0	$398,569
Art Room	0	$0	$0	$0	$0	$0	$0	$0
Home Economics	1	$0	$18,928	$0	$0	$0	$0	$0
Elementary Cafeteria	0	$0	$0	$0	$0	$0	$0	$0
Kindergarten	3	$32,760	$0	$0	$0	$0	$0	$0
Jones/Thigpen	0	$0	$0	$0	$0	$0	$0	$0
5th Grade	6	$0	$0	$0	$0	$131,023	$0	$0
Principal/Elementary	5	$0	$0	$0	$0	$0	$0	$95,213
TOTALS		**$32,760**	**$170,352**	**$74,800**	**$0**	**$131,023**	**$0**	**$493,782**

The table above is a schedule of replacement costs and a seven year plan to change out the HVAC systems. The future values are based on a 4% a year inflation rate.

6.0 RETROFIT OPPORTUNITIES

The following recommended retrofit opportunities and energy savings are for all facilities audited.

Replace Gym Lighting

In all gyms, the District should consider replacing the existing metal halide fixtures with energy saving T5HO fixtures. An existing 400 W metal halide fixture consumes about 458 watts per fixture as compared to the T5HO 4-lamp fixture, which consumes approximately 234 watts per fixture, and the 6-lamp T5HO fixture which consumes approximately 351 watts. Also, additional savings may be realized because the fixtures are instant on and off requiring no warm up time and, therefore, are more likely to be turned off when not in use.

	Estimated Cost	Estimated Energy Savings (year)	Simple Payback
5th Grade Gymnasium	$ 3,674	$ 515	7.13 years
High School/Junior High	$ 6,531	$ 1,387	4.71 years
New Gym	$ 11,430	$ 2,310	4.95 years
Total	$ 21,635	$ 4,212	5.13 years

Provide Energy Efficient Lamps and Ballasts

Retrofit the existing fluorescent lamps and ballasts in the four-foot and eight-foot fixtures with new energy efficient electronic ballasts and T8 lamps throughout the campus. Existing ballast with two 34-watt lamps consumes approximately 72 watts while new electronic ballast with two T8 lamps will consume approximately 53 watts. This is a savings of 19 watts for every two lamps installed. In addition to the energy savings realized, there will also be maintenance savings since the ballasts have a 25-year rated life. All light fixtures should be cleaned when this work is accomplished.

One four-lamp electronic ballast can be used in four-lamp fixtures which are not double switched. The three-lamp fixtures can also utilize one ballast. This represents a significant cost savings when replacing ballasts. The four-lamp ballasts are wired in parallel such that if one lamp fails then the other three lamps will continue to operate. In addition to the energy savings realized, there will also be maintenance savings since the ballasts have a 25-year life.

All schools throughout the district, that have T12 lighting, should be budgeted for and upgraded to the T8 lamps and electronic ballasts. The ballasts for the T12 fixtures are no longer being manufactured (as of 05/01/05). Also the ballasts are no longer sold in bulk for new construction (as of 07/01/05). Manufacturers can no longer have T12 ballasts shipped in fixtures (as of 04/06/06) and as of 06/30/10 you will no longer be able to buy replacement ballasts. With these new standards all T12 lighting should be scheduled to be upgraded to the newer technology.

Also if the District has any mercury vapor lamps, the District needs to schedule to have them replaced. As of 2008 mercury vapor ballasts are no longer manufactured or imported according to the 2005 Energy Policy Act.

The District should also make sure that when replacing the old T12 ballasts to make sure and dispose of the PCB ballasts correctly. In Appendix F of this report is a paper about removing PCBs from light fixtures.

The estimated cost below is for all campuses in the District.

	Estimated Cost	Estimated Energy Savings (year)	Simple Payback
Cafeteria	$ 2,616	$ 391	6.69 years
Library	$ 969	$ 304	3.19 years
Kindergarten	$ 2,725	$ 413	6.60 years
Principal	$ 2,350	$ 328	7.17 years
Thigpen	$ 682	$ 104	6.55 years
High School/Junior High	$ 16,126	$ 2,860	5.64 years
Total	$ 25,468	$ 4,400	5.78 years

Install Computer Sleep and Hibernation Software

The District should install sleep and hibernation software to there currently 800-900 computers. A typical 17" CRT monitor uses 70-80 watts when on, but only 3-4 watts in sleep mode, a 95% reduction in energy use. Assuming this typical monitor is in use eight hours a day and asleep for the other sixteen hours, during the school year, utilizing sleep mode could save about $20/monitor/year. Another $4 savings could be realized by controlling any monitors that are left on during the summer. A free program on the Watt Watchers web site can be downloaded in order to make your monitors sleep. More information is listed in Appendix D of this report.

A computer can be set to hibernate. All data and current settings are saved before the computer "goes to sleep". In this mode it consumes only a few watts, compared to 60-

100 watts in normal operation. The potential savings is around $20 per school year (based on eight hours use and 16 hours of hibernation).

A free program on the Watt Watchers web site can be downloaded in order to make your monitors sleep and your computer hibernate. More information on the sleep is good program is listed in Appendix C of this report. There are also programs on the market that will allow your IT department to “wake up” the computers in order to install updates and then to put the back to “sleep” all remotely.

Install Energy Management Controls (EMCS)

Zavalla ISD does not have an energy management control system in place. Some schools have programmable thermostats for the split system air-conditioning units. These thermostats were not programmed during the site visit. Providing a modern central control Direct Digital Control EMCS will provide better control of units, (e.g. during occupied, unoccupied, morning start-up, after hours with lower occupancy) and reduce maintenance work load and cost associated with diagnosing and troubleshooting mechanical problems.

	Estimated Cost	Estimated Energy Savings (year)	Simple Payback
District	$ 94,400	$ 10,500	9.0 years

Replace Exit Lights

Replace the incandescent lamps in the remaining exit signs with new energy efficient LED bulbs. Where warranted, replace the entire fixture with a new LED fixture. In addition to energy savings, these bulbs have a 30-year life which also helps to defray maintenance costs.

Estimated Cost - $75/Sign Estimated Savings - $24/Year

7.0 OTHER TOPICS

7.1 Energy Policy

Successful energy management programs require a strong signal from the board that energy efficiency is a district priority. A district energy policy has been adopted by the school board. We recommend that the policy be periodically reviewed and updated as needed. The board policy should include the following items.

- Statement of concern regarding the overall energy usage, costs, and benefits to the district from reducing costs.
- Statement acknowledging the importance and cost effectiveness of developing an energy management plan.
- Statement of commitment to energy conservation and cost control.
- Preliminary implementation considerations such as:

  Authorizing the position of a part-time energy manager or assigning the responsibility to a present employee.

  Delegating authority to the energy manager.

  Requiring that an energy management plan be submitted for the school board and/or administration's approval.

- Establishment of reporting requirements (e.g., monitoring of utility usage and cost).

A recommended board policy is included in Appendix G. Commitment from upper management is a common factor in school districts having very effective energy programs.

7.2 Energy Management Program

An energy management program evaluation form is included in Appendix H of this report to assist Zavalla ISD in assessing each of their buildings.

Also the steps to a successful energy management program are:

- Identify the need
- Appoint an energy manager and provide training
- Adopt a district energy policy

- Write and energy management plan and present to school board
- Implement energy accounting system
- Conduct energy audits
- Establish energy committees
- Adopt building operating procedures and guidelines
- Involve school personnel and students
- Obtain publicity
- Create competition and incentives
- Communicate success
- Give personal contact and feedback from energy accounting
- Energy procurement

Included in Appendix I is a published paper titled, “Energy Conservation in Schools: Promoting the Great Need.”

7.3 Master Plan

A master plan for air-conditioning and lighting systems for the district’s facilities is recommended. This master plan would address and document the following by facility.

- Type of equipment
- Age of equipment
- Efficiency of equipment and systems
- Refrigerant phase-out planning
- Service condition of equipment
- Condition of interface (e.g. condensate, electrical, gas piping, curbs, etc.)
- Controls - type and condition
- Comfort
- Maintenance cost problems
- Outside air
- Parts availability
- Lighting levels

The above evaluation of each building should be summarized in a report including the following.

- Comprehensive evaluation of each building
- Repair, replacement, retrofit options
- Budgets for repair, replacement, retrofit options, along with the advantages and disadvantages of each
- Recommended approach and recommended work
- Priority of work and cost by building, based upon overall needs
- Short term and long range planning

- Phasing of work by priority and need.

7.4 Energy Related to Technology

When technology is added, requirements for electrical and air-conditioning also increase. Energy consumption and energy budgets also are impacted. A technology master plan should take these issues into consideration and make allowances for them through flexible planning. Successful integration of technology into new or existing facilities requires advance planning. Planning issues include the following:

- Available budgets
- Needs
- Space for technology equipment
- Technology equipment room(s)
- Quantity and location of computers and other equipment
- Furniture layout/arrangement flexibility
- Location of TV/monitors
- Timing of information
- Electrical power for technology equipment
- Cooling for electronic equipment and added cooling load
- Positive pressure in electronic equipment room to prevent infiltration of dust, contaminants, etc.
- No high voltage equipment in technology room, no motors, no transformers, etc.
- No water piping over technology equipment
- Energy management planning (e.g. energy cost, operation of computers, after hours, etc.)

Detailed understanding and planning of technology impacts on the building infrastructure is mandatory for successful technology implementation.

7.5 Water Efficiency Guidelines

Guidelines to saving water are included in Appendix J of this report. These guidelines were prepared by the State Energy Conservation Office under the directive of the 77th Legislature.

7.6 Replacement of HVAC Units

The District should plan to replace units as they approach the end of their practical, useful life. These units should be replaced with new high efficiency equipment. The new equipment should have a minimum SEER of 13. There are also several two-compressor or two-speed units on the market now, which offer SEER's up to 17. In addition to the energy savings from operating a more efficient unit, the District should keep in mind that there will also be maintenance savings.

When replacing old HVAC units, the District should also consider if there is enough cooling for the space. Also, the District should make sure that the HVAC meets the current code requirements.

7.7 Refrigerants

Phase out of certain types of refrigerants used in HVAC equipment are required by federal laws. More explanation on the phase out of CFC and HCFC refrigerants can be seen in Appendix K.

7.8 Operational Guidelines

The school district has adopted operational guidelines. Sample operational guidelines are included in Appendix L for additional reference. We recommend that the guidelines be periodically reviewed and updated as needed.

8.0 FUNDING OPTIONS

School districts have traditionally tapped bond money, maintenance dollars, or federal grants to fund energy efficient equipment change-outs or additions such as energy efficient lighting systems, high efficiency air conditioning units, and computerized energy management control systems. Today, a broader range of funding options is available. A number of these are listed below.

Texas LoanSTAR Program

The LoanSTAR (Saving Taxes and Resources) Program, which is administered by the State Energy Conservation Office, finances energy-efficient building retrofits at a current interest rate of 3.0 percent. The program's revolving loan mechanism allows borrowers to repay loans through the stream of cost savings realized from the projects. Projects financed by LoanSTAR must have an average simple payback of 10 years or less and must be analyzed in an Energy Assessment Report by a Professional Engineer who meets criteria. Upon final loan execution, the District proceeds to implement funded projects through the traditional bid/spec process. For more information contact Theresa Sifuentes at 512/463-1896 for more information.

Capital Acquisition Program or Municipal Financing Program

This program also offers loans to purchase and install energy-saving equipment. The minimal loan amount is $100,000 and interest rates range from 3.0% to 5.0%, depending upon current financial market conditions, the length of the loan, and the District's bond rating. Loan terms are set at three year, four year, seven year, or ten year periods and are not related to project payback. The application procedure is simple: completion of a one-page form and submission of the most recent budget and audit. For more information call 512/467-0222 or visit www.firstpublic.com.

Private Lending Institutions or Leasing Corporations

Banks, leasing corporations, and other private lenders have become increasingly interested in the energy efficiency market. The financing vehicle frequently used by these entities is a municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase arrangement. Ownership of the financed equipment passes to the District at the beginning of the lease, and the lessor retains a security interest in the purchase until the loan is paid off. A typical lease covers the total cost of the equipment and may include installation costs. At the end of the contract period a nominal amount, usually a dollar, is paid by the lessee for title to the equipment.

9.0 PROCUREMENT METHODS

School Districts have several options available for procurement methods. The following are some of the options available.

State Purchasing

The Texas Building and Procurement Commission has competitively bid contracts for numerous items that are available for direct purchase by District. For example, electronic ballasts and T-8 lamps are available. For more information call 512/475-2351 or visit the web site at http://www.gsc.state.tx.us/stpurch/index.html.

Competitive Bidding

Plans and specifications are prepared for specific projects and competitive sealed bids are received from contractors. This traditional approach provides the District with more control and projects are specifically defined. Competitive pricing is achieved because the contractors are competing for the same equipment and work. This method results in lower cost and better quality.

Design/Build

Design/Build contracts are usually structured where the Engineer and Contractor are under the same contract to the District. This team approach was developed for fast-track projects, and to have a contractor involved in decisions during the process of preparing plans/specifications. The disadvantage is that the District does not have the independence of the Engineer to totally represent the District. There is less control and protection for the District in substitution of equipment and in quality control.

Purchasing Standardization Management

Purchasing Standardization Management will result in significant dollar savings if integrated into facility improvements that are being planned. For example, District have standardized purchasing of District-wide energy management controls, air conditioning equipment, etc. This approach includes the traditional competitive bidding with pricing structured for present and future, or phased purchasing.

Energy Conservation Policy
for
_____Independent School District

Recognizing our responsibility as Trustees of the _____Independent School District, we believe that every effort should be made to conserve energy and our natural resources. We also believe that this commitment will be beneficial to our students and taxpayers in prudent financial management and the saving of energy.

The fulfillment of this policy is the joint responsibility of the trustees, administrators, teachers, students and the support personnel. Cooperation shall be experienced on all levels for the success of this policy.

The District will maintain accurate records of energy consumption and cost of energy on a monthly basis. Information will be furnished to the media on the goals and progress of the Energy Conservation Program.

In compliance with Senate Bill 12, as passed by the 80th Texas Legislature, the District sets a goal to reduce its annual electric consumption by five percent each year for the next five years, beginning September 1, 2007. Reporting will be in accordance with House Bill 3693.

An energy audit will be conducted annually at each campus and recommendations will be made for updating the energy program. Energy conservation guidelines and procedures will be reviewed and accepted or rejected by the Board of Trustees.

Adopted this _____day of _____, 2008

President of the Board: _____

ATTEST: _____

METER/ACCT#: 156112583 (area served by meter)

DISTRICT: ZAVALLA ISD

BUILDING: DISTRICT

FLOOR AREA: 102,214 square feet **STUDENTS:** 490

		ELECTRICITY DATA			*WATER*		*NATURAL GAS/OTHER FUEL*	
MONTH	**YEAR**	**CONSUMPTION KWH**	**REP COSTS $**	**BILLED KW**	**WATER CONSUMPTION**	**WATER COSTS $**	**CONSUMPTION UNITS (MCF)**	**COSTS**
JUL	2008	76,000	$11,479	0	89000	$436	0	$0
AUG	2008	88,000	$13,564	0	63340	$394	0	$0
SEP	2008	88,000	$13,516	0	129990	$561	0	$0
OCT	2008	80,000	$12,865	0	120380	$543	0	$0
NOV	2008	78,000	$12,252	0	90870	$470	0	$0
DEC	2008	76,000	$11,615	0	129590	$584	0	$0
JAN	2009	79,605	$12,164	0	105200	$1,107	0	$0
FEB	2009	76,323	$11,545	0	98720	$501	0	$0
MAR	2009	65,621	$10,242	0	127210	$582	0	$0
APR	2009	51,437	$8,760	0	123060	$574	0	$0
MAY	2009	81,761	$11,883	0	281040	$970	0	$0
JUN	2009	73,232	$10,877	0	108970	$480	0	$0
TOTAL		913,979	$140,765	0	1,467,370	$7,201	0	$0

Annual Total Electricity Cos	=	$140,765	Per Year	Energy Use Index:	
Annual Total Energy Cost	=	$140,765	Per Year	Total Site BTU's/yr 30,518	BTU/sq.ft./yr
Total KWH x 0.003413	=	3,119.4	x 10^6	Total Area (sq.ft.)	
Total MCF x 1.03	=	0.0	x 10^6	Energy Cost Index:	
Total Other x _____	=		x 10^6	Total Energy Cost/yr $1.38	$/sq.ft./yr
Total Site BTU's/yr	=	3,119.4	x 10^6	Total Area (sq.ft)	
Cost per KWH	=	$0.154	Per Year	kwh per square foot = 8.9	
Cost per student	=	$287.27	Per Year	1,000 mcf / square foot 0.0	

	KWH	KWH	KWH	KWH	KWH	KWH	KWH	KWH	KWH
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									
JAN	4542	33345	12660	2310	603	339	370	2980	6834
FEB	3,330	31,860	11088	1,101	819	321	414	3426	6150
MAR	1,854	30,600	8820	663	696	195	371	2700	5550
APR	1149	21,735	5280	363	690	87	401	2460	4716
MAY	1950	40,320	5988	579	774	306	388	4528	9732
JUN	2433	40,005	3912	1,107	249	951	197	3688	9252

	BILLED KW	BILLED KW	BILLED KW	BILLED KW	BILLED KW	BILLED KW	BILLED KW	BILLED KW	BILLED KW
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									

	COLWELL ST	E MAIN ST PAD E	EC/AG/GYM	CAFETERIA	E MAIN ST CAFÉ	E MAIN ST BUILD C	SPECIAL ED	BLDG B	BLDG D
	ENERGY $	ENERGY $	ENERGY $	ENERGY $	ENERGY $	ENERGY $	ENERGY $	ENERGY $	ENERGY $
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									
JAN	$624.10	$4,668.35	$1,875.53	$467.64	$87.60	183.34	58.2	580.3	1182.02
FEB	481.87	$4,353.87	$1,652.12	$340.59	113.51	163.99	62.38	570.39	982
MAR	326.96	$4,177.91	$1,396.60	$250.91	98.1	151.72	57.03	474.29	899.45

APR	255.38	$3,364.40	$952.97	$225.70	97.33	118.49	60.83	438.49	808.24
MAY	318.12	$5,338.11	$993.16	$257.76	106.79	135.45	58.61	664.89	1345.32
JUN	$369.13	$5,233.63	$782.48	$284.93	41.38	200.79	34.83	575.42	1294.71

	WATER COMP	WATER COMP	WATER COMP	WATER COMP	WATER COMP	WATER COMP	WATER COMP	TOTAL
JUL	440	30	11540	67860	0	9130		89000
AUG	1180	30	9450	0	5200	47480		63340
SEP	1790	240	24570	46090	0	57300		129990
OCT	2400	280	14950	35090	0	67660		120380
NOV	2160	250	13110	0	0	75350		90870
DEC	1510	30	27730	6600	0	93720		129590
JAN	2150	90	10820	15390	3350	73400		105200
FEB	2390	160	6410	30730	10400	48630		98720
MAR	2570	10	9930	41660	10350	62690		127210
APR	2940	600	8620	0	21800	89100		123060
MAY	820	70	185480	22360	44600	27710		281040
JUN	390	15110	6440	80940	200	5890		108970

	WATER $	WATER $	WATER $	WATER $	WATER $	WATER $	WATER $	TOTAL
JUL	$40.00	$40.00	$79.32	$168.22	40	68.3		$435.84
AUG	$40.00	$40.00	$69.66	$18.00	52	174.7		$394.36
SEP	$40.00	$40.00	$117.42	$124.68	40	199.25		$561.35
OCT	$41.50	$40.00	$93.38	$102.68	40	225.15		$542.71
NOV	$40.60	$40.00	$86.77	$18.00	40	244.37		$469.74
DEC	$43.00	$43.00	$128.33	$32.95	43	293.3		$583.58
JAN	$86.56	$86.00	$207.23	$100.46	91.06	535.8		$1,107.11
FEB	$44.46	$43.00	$59.74	$95.96	76.9	180.58		$500.64
MAR	$54.14	$43.00	$74.70	$117.82	76.66	215.73		$582.05
APR	$46.53	$43.00	$69.14	$20.00	113.5	281.75		$573.92
MAY	$40.00	$40.00	$519.70	$77.22	167.5	125.28		$969.70
JUN	$40.00	$93.78	$56.87	$194.38	40	54.49		$479.52

	MCF	MCF	MCF	MCF	MCF	MCF	MCF	TOTAL
JAN								0
FEB								0
MAR								0
APR								0
MAY								0
JUN								0
JUL								0
AUG								0

SEP								0
OCT								0
NOV								0
DEC								0

	$	$	$	$	$	$	$	TOTAL
JAN								0
FEB								0
MAR								0
APR								0
MAY								0
JUN								0
JUL								0
AUG								0
SEP								0
OCT								0
NOV								0
DEC								0

KWH	KWH	KWH	TOTAL	
			76,000	11400
			88,000	13200
			88,000	13200
			80,000	12000
			78,000	11700
			76,000	11400
171	211	15240	79,605	11940.75
255	183	17376	76,323	11448.45
627	201	13344	65,621	9843.15
1077	255	13224	51,437	7715.55
771	465	15960	81,761	12264.15
540	542	10356	73,232	10984.8

BILLED KW	BILLED KW	BILLED KW	TOTAL
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0

ALLFIELD ALL FIELD GH 63 CAFÉ

ENERGY $	ENERGY $	ENERGY $	TOTAL
		11479.32	$11,479.32
		13564.12	$13,564.12
		13516.35	$13,516.35
		12864.98	$12,864.98
		12252.36	$12,252.36
		11615.42	$11,615.42
305.9	38.15	2092.82	$12,163.95
427.44	33.24	2363.64	$11,545.04
478.27	35.56	1895.55	$10,242.35

529.37	42.38	1866.36	$8,759.94
491.81	68.22	2105.21	$11,883.45
458.45	78.15	1523.56	$10,877.46