JULY, 2009

ENERGY EFFICIENT
SCHOOL PARTNERSHIP REPORT
QUITMAN ISD
QUITMAN, 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 Quitman 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's schools ranged from 0.87 to 1.04.The energy costs for the Quitman ISD campuses are 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 Quitman Junior High/High School, Morris Gym and Quitman Elementary. 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 control system. **We estimate that as much as $37,950 may be saved annually if these projects are implemented. The estimated cost of these projects totals $373,750 yielding an average simple payback of 9.8 years**. 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.

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

1. Appointing an energy coordinator
2. Establishing criteria for building operations

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

1. Establish an Energy Policy and Guidelines.
2. Give feedback to principals on their campuses energy use.
3. Upgrade existing lighting to new energy efficient lighting in gyms.

4. Have all district computers be able to sleep and hibernate.
5. Evaluate energy management control systems schedule.

We view the completion of this report and the presentation to Quitman 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 Gary Bristow, 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. Gary Bristow, P.E. coordinated with Mr. Herb Willis accompanied Mr. Bristow on the site visits. 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

Quitman ISD has two main campuses, which serve kindergarten through 12th grade, plus several auxiliary buildings. The student enrollment is approximately 1100 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 June 2008 through May 2009.

FACILITY	UTILITY COST	AREA (SQ. FT.)	ECI ($/FT^2)	EUI (BTU/FT^2)	AVG. ELEC. COST ($/KWH)
Jr.High/High School	$135,425	130,000	$1.04	47,144	0.0878
Elementary	$82,369	95,000	$0.87	34,294	0.0900
Morris Gym	$17,737	15,000	$1.18	57190	0.109

3.0 ENERGY ACCOUNTING

3.1 Monitoring and Tracking

Quitman ISD tracks utility costs on a monthly basis using a spreadsheet. Utility bills should be reviewed monthly to make sure no errors have occurred.

3.2 Utility Providers and Rates

Quitman ISD is provided electricity by Wood County Electric Cooperative. Atmos Energy provides natural gas.

3.3 Deregulation Recommendations

Quitman ISD is served by a cooperative that has not opted into deregulation.

3.4 Energy Bonus

All 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.

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 Elementary School. 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.

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.

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.

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, 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.

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.

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.

Verify Energy Management Control Scheduling

The District should verify all energy management control system scheduling. The District should make sure that the scheduling in the system correlates with the actual use of the building.

Develop Checklist For Routine Energy Management Observations

Turn Off Boilers During Summer

Turn off the boilers during the summer months to conserve natural gas. This also provides an opportunity to clean and service the equipment.

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.

Reduce Unnecessary Air Conditioning Usage in Summer

Electricity usage in the summer appears high unless summer classes were conducted. It was reported that spaces containing computers were air conditioned. Eliminate or reduce summer air conditioning in computer labs to the levels recommended by the computer manufacturers for shutdown conditions.

5.0 MECHANICAL SYSTEMS

The mechanical systems and energy management control systems for the schools walked during the evaluation are described in this section. The systems are all in good condition.

High School

The main HVAC system for the Jr. High/High School is a central four pipe chilled water system with a water cooled screw chiller, an evaporative cooling towere and natural gas fired boilers. All of the equipment except the chillers is less than 10 years old. The chiller should have several years of useful life remaining provided it is properly maintained. Air distribution is provided by fan coil units. Some areas including the administration and library are served by packaged rooftop

Elementary

The elementary school is served by split system heat pump units. The equipment is in good condition.

6.0 RETROFIT OPPORTUNITIES

The following recommended retrofit opportunities and energy savings are for the schools 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
Junior High/ High School	$ 24,000	$ 2,800	8.6 years
Elementary School	$ 15,000	$ 1,800	8.3 years
Morris Gym	$ 24,000	$ 2,400	10.0 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.

Each of the campuses has T8 lighting in the newer additions and renovated areas.

	Estimated Cost	Estimated Energy Savings (year)	Simple Payback
Junior High/ High School	$ 33,750	$ 5,700	5.9 years
Elementary School	$ 24,000	$ 3,500	6.9 years
Morris Gym	$ 2,000	$ 250	8.0 years

Replace Energy Management Controls (EMCS)

Both of the schools have energy management control systems in place. However, the systems do not function properly and in some cases have been replaced with programmable thermostats. During the walk through the building was unoccupied and several systems were operating. Providing a modern central control Direct Digital Control EMCS will provide better control of units, allow control of the separate RSI outside air units (e.g. during occupied, unoccupied, morning start-up, after hours with lower occupancy) and reduce maintenance work load of checking and re-setting individual thermostats. There will be some energy savings but the project would not be justified only on energy savings unless many of the programmable thermostats are being overridden and allowed to run after hours or weekends.

	Estimated Cost	Estimated Energy Savings (year)	Simple Payback
Jr. High/High School	$ 145,000	$ 13,500	10.7 years
Elementary	$ 106,000	$ 8,000	13.3 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 Quitman 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 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.

7.7 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
Quitman Independent School District

Recognizing our responsibility as Trustees of the Quitman 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: _____

TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

METER/ACCT#: _____ Electric **DISTRICT:** **Quitman ISD**

_____ Gas/Fuel

BUILDING: **Quitman Junior High/High School** **FLOOR AREA:** **130,000** Square Ft.

		ELECTRICITY DATA					*NATURAL GAS/OTHER FUEL*	
			DEMAND			TOTAL ALL		
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	ELECTRICAL COSTS $	CONSUMPTION UNITS (MCF)	COSTS
JAN	2009	80,971	0	0	na	$9,754	351	$2,346
FEB	2009	104,986	0	0	na	$9,145	162	$972
MAR	2009	94,657	0	0	na	$8,465	131	$646
APR	2009	102,073	0	0	na	$9,402	32	$207
MAY	2009	114,094	0	0	na	$10,268	13	$227
JUN	2008	128,092	0	0	na	$12,219	11	$235
JUL	2008	149,003	0	0	na	$13,073	11	$255
AUG	2008	145,262	0	0	na	$13,876	13	$227
SEP	2008	138,986	0	0	na	$13,302	39	$499
OCT	2008	152,863	0	0	na	$9,854	23	$310
NOV	2008	119,815	0	0	na	$7,934	175	$2,205
DEC	2008	91,201	0	0	na	$7,643	277	$2,363
TOTAL		1,422,003	---	---	na	$124,935	1,238	$10,491

Annual Total Energy Cost = $135,425 Per Year

Total KWH x 0.003413 = 4,853.3 x 10^6

Total MCF x 1.03 = 1,275.4 x 10^6

Total Other x _____ = _____ x 10^6

Total Site BTU's/yr = 6,128.7 x 10^6

Energy Use Index:

Total Site BTU's/yr / Total Area (sq.ft.) = 47,144 BTU/sq.ft./yr

Energy Cost Index:

Total Energy Cost/yr / Total Area (sq.ft) = $1.04 $/sq.ft./yr

Name of Electric Utility: Wood County Electrci Coop

Rate Schedule: _____

Name of Gas/Fuel Utility: Atmos

Rate Schedule: _____