April 2009

SUMMARY
ENERGY EFFICIENT
SCHOOL PARTNERSHIP REPORT
WHITESBORO ISD
WHITESBORO, TEXAS

ENERGY EFFICIENT SCHOOL PARTNERSHIP SERVICE
MS. GLENDA BALDWIN
STATE ENERGY CONSERVATION OFFICE
COMPTROLLER OF PUBLIC ACCOUNTS
111 EAST 17TH STREET
AUSTIN, TEXAS 78774
PHONE: (512) 463-1731

ESTES, McCLURE & ASSOCIATES, INC.
ENGINEERING AND CONSULTING
3608 WEST WAY
TYLER, TEXAS 75703
PHONE: (903) 581-2677
jmcclure@estesmcclure.com

James D. McClure, P.E.
Texas P.E. 30580

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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 small to mid-size 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.

One of the first steps toward energy-efficient school operation is identifying the current energy performance of District facilities. An energy performance summary is included in Section 2 and more detailed data by month for each school is in the Appendix of this report.

Successful school energy management programs include the following:

- Identify the Need – District Energy Evaluation
- Appoint an Energy Manager & Provide Training
- Adopt a District Energy Policy
- Write and Energy Management Plan & Present to the School Board
- Implement Energy Accounting System
- Conduct Energy Audits
- Establish Energy Committees
- Adopt Building Operating Procedures & Guidelines
- Involve School Personnel & Students
- Obtain Publicity
- Create Competition & Incentives
- Communicate Success
- Give Personal Contact and Feedback from Energy Accounting
- Energy Procurement

Whitesboro ISD has an Energy Manager, Ken Carden. Mr. Carden is an electrician and has large industrial experience in plant operations and maintenance.

The following are energy management items that the district has accomplished or has planned.

- Use sleep-mode for computers
- Attended recent energy management workshop sponsored by SECO.
- High School, Middle School, and Intermediate School has central DDC energy management controls.
- Primary School has programmable thermostats. They are checked monthly for proper settings and operation.
- Plan in place with resources to clean HVAC coils.
- HVAC filters monitored and replaced in-house as needed.
- Installed thermostat lock boxes for gym HVAC.
- Some exit signs have been changed from incandescent lamps to very low wattage LED type fixtures. Plans are to continue this work district-wide. New exit lights for the Middle

School have been purchased and will be installed this summer.

- Energy efficient lighting retrofits for fluorescent fixtures. The district has been replacing T12 lamps/magnetic ballasts with energy efficient T8 lamps/electronic ballasts. The High School was reported to be 100 percent T8/electronic, Middle School about 50 percent complete. Intermediate School about 50 percent complete. Lamps and ballasts have already been purchased for completing the Middle School this summer.
- Metal halide lamps in some areas have already been replaced with compact fluorescent lights.
- Joined Watt-Watchers, recently received their packet and plan to get started at the Primary School.
- Plan to connect electric water coolers to timers.

The above work and energy management is cost effective for the district. For example the district purchased the new energy efficient lamps and ballasts and Mr. Carden installed them.

The schools appeared to be maintained and clean.

We estimate that as much as $10,000 per year may be saved by incorporating the M&O's procedures and gym lighting retrofits. The gym lighting for middle school and high school is estimated to cost about $16,000 if school district labor is used.

James D. McClure, P.E. visited the District, met with Mr. Carden, and observed the schools. We view this preliminary report and the presentation to Whitesboro ISD as a beginning, not an end. We hope to be an ongoing partner in assisting the District to reduce energy usage cost, reduce emissions to the environment by energy efficiency and other strategies, reduce maintenance service calls and costs, and to improve the learning environment for students and staff. Your personal contact at SECO is Ms. Glenda Baldwin (Phone: (512) 463-1731); your contact at Estes, McClure & Associates, Inc. is James McClure, P.E., and 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.

2.0 DISTRICT ENERGY AND COST PERFORMANCE

Whitesboro ISD has four campuses (High School, Middle School, Intermediate School, and Primary School). The Administration offices are located at the Primary School.

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 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. Since the cost of electricity varies by school and natural gas is so much less than the cost of electricity, this index is a true value of the actual energy use on a square foot basis. The energy cost index (ECI) and the energy use index (EUI) are determined by the following formulas.

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

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

SCHOOLS	**ECI**	**EUI**	**Kwh per Sq.Ft.**	**1000 Mcf per Sq Ft.**	**Cost per Student**	**Total Utility Cost**	**Area (Sq. Ft.)**	**Student Count**
High School	$1.71	66,602	14.1	18.0	$393	$210,833	123,105	537
Middle School	$1.61	48,093	9.8	14.4	$398	$135,067	83,894	339
Intermediate School	$2.13	56,285	12.1	14.6	$280	$89,971	49,279	321
Primary School	$1.35	47,986	8.0	19.9	$228	$90,552	67,277	398

3.0 ENERGY ACCOUNTING

3.1 Monitoring and Tracking

Recommend that the District track utility usage and costs on a monthly basis for each meter and campus. This could be accomplished using a spread sheet. Monitoring and tracking is useful in providing feedback to administration and campuses as well as energy management activities (eg. Checking for errors, unusual energy usage patterns, etc.).

3.2 Utility Providers and Rates

The High School is provided electricity by Cooke County Electric Cooperative. The Middle School, Intermediate School and Primary School are provided electricity by the City of Whitesboro. Natural gas is provided by Atmos Energy Company which was formerly TXU Gas Company. Water is provided to the district by the City of Whitesboro.

4.0 RECOMMENDED M&O PROCEDURES

1. Turn off computers weekends, holidays, and summer when not in use. The sleep mode is used during the week already.

2. Turn off lights when areas/rooms are unoccupied.
    - Coordinate with custodial staff to ensure after hours only the lights are on in areas being cleaned.
    - After school clean large areas with more lighting first (eg. gymnasium, cafeterias, etc.) and quickly turn the lights off when completed.
    - Coordinate with each school staff to turn off lights if their room or office is unoccupied.
    - Turn off or only use partial lighting in unoccupied cafeterias during the school day.
    - One classroom with lights turned off for one hour per day will save the district about $ 20/school year.

3. Utilize available daylighting..
    - Observe each school for areas where daylighting is adequate without having the lights on. For example in the Middle School cafeteria there are four rows of compact fluorescent lights. Two rows could be turned off on sunny days.

4. Eliminate small personal refrigerators, microwaves, and floor heaters in the classroom unless needed for instructional purposes or special needs. A small refrigerator costs about $20 - $25/school year to operate and small heater about $24 per school year.

5. Evaluate the summer operations for each campus. The summer operation of the air conditioning of the schools should be evaluated by the District. Practices such as group cleaning, centralized summer school, and four day work weeks have been successful in other District's. The air conditioning systems should be operated a sufficient amount to control humidity in the buildings.

6. Provide motion sensors to control lighting in rooms used intermittently (eg. File rooms, resource rooms, offices, teachers lounge, etc.). For this approach to be cost effective the lights would need to have the lighting time reduced about 3 hours/day and 1 ½ hours/day if the labor is done by the district.

7. Provide schools with energy check list or guidelines for regular school days, holidays, partial occupancy, summer operations, etc. Provide for teachers, custodians, kitchen staff, library, athletics, etc.

8. Periodically inspect and clean as necessary the RSI "wheel" inside the outside air unit attached to rooftop HVAC units at the Primary School.

9. Periodically attend the North Texas Energy Managers Network meetings Ken Carden has been added to the notification list.

10. Sample costs for small appliances

User	Est. Annual Cost*
Mini refrigerator	$ 24
Personal space heater	$ 35
Coffee maker, left on all day	$ 15+
Microwave oven	$ 2
Computer	
On 24 hours/day	$ 80
Using sleep mode after hours	$ 25

*Based on 180 day school year, $0.12 per kwh

11. Potential Savings From Changing Thermostat Settings

Cooling energy costs decrease about 1.5% for each degree above 72°. Therefore, for typical elementary school w/ RTUs, the annual savings per degree amounts to approximately 2000 kwh, or $220 to $300 at current rates.

Heating (gas) energy costs increase about 1% for each degree above 68°F. Therefore, for a typical elementary school with gas heating, the annual savings per degree is about 6 mcf, or $60 at current natural gas rates.

12. Energy Tracking and Monitoring

Set up a spread sheet to track energy costs and usage by month for each electric and natural gas meter.

13. Conduct periodic energy audits at various times (eg. Weekends, regular operation, nights, etc.) to verify lights off, computers off, etc.

5.0 RETROFIT OPPORTUNITIES

The District is aware of retrofit opportunities and has taken steps to implement several projects. The following are provided to be helpful in identifying energy cost savings for some projects.

Replace Gym Lighting

Replace gym lighting with energy saving T5HO fixtures. An existing 400 watt metal halide lamp will consume about 458 watts for the fixture compared to 351 watt/fixture for a six lamp T5HO energy efficient fixture. Also typically additional significant savings is obtained because the fixtures are instant on and off and require no warm up time, like the metal halide fixtures. This typically results in the lights being turned off more hours when gym is unoccupied.

High School – Two Gyms

Estimated Cost $15,000
(For Outside Contractor)

Estimated Cost $9,000
(District Provides Labor)

Estimated Savings $1470/yr

Middle School

Estimated Cost $12,000
(For Outside Contractor)

Estimated Cost $7,200
(District Provides Labor)

Estimated Savings $1650/yr

6.0 OTHER TOPICS

The following projects produce energy savings with paybacks greater than 10 years. They also result in reducing outdoor emissions and improving indoor air quality.

Replace Mulitzone Air-Conditioning at Middle School

The Middle School has several multizone type packaged air-conditioning units located on the roof. They are about 14 years old. As the units continue to age there will be higher rates of component failures, increasing inefficiency, and more service calls. Although there probably is a few years life remaining, it is recommended that the District begin planning or budgeting for replacement. The estimated cost for replacement with same type of systems is about $1,000,000 and energy savings would not be significant.

Other options will be discussed in the report review that would save some energy but the installation of a completely different system type would result in major electrical system rework, the construction of closets for the classroom units and some equipment located on the ground. The cost would likely be more.

Energy Management Control System for Primary School

The school has programmable thermostats for the packaged rooftop air-conditioning units. Providing a modern central control Direct Digital Control EMCS will provide better control of units, allow control of the separate RSI outside air units (eg. 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.

7.0 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.

Grants

Possible Stimulus

Bond Issue

8.0 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.

TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

METER/ACCT#: 0080, 0090, 2555 (ELEC) 242185, 242186 (GAS) **DISTRICT: WHITESBORO ISD**

(area served by meter)

BUILDING: INTERMEDIATE SCHOOL **FLOOR AREA:** 42,279 square feet **STUDENTS:** 321

		ELECTRICITY DATA			*WATER*		*NATURAL GAS/OTHER FUEL*	
MONTH	**YEAR**	**CONSUMPTION KWH**	**REP COSTS $**	**BILLED KW**	**WATER CONSUMPTION**	**WATER COSTS $**	**CONSUMPTION UNITS (MCF)**	**COSTS**
AUG	2007	36,480	$5,601	184	0	$0	7	$119
SEP	2007	56,280	$8,497	242	0	$0	9	$130
OCT	2008	51,840	$8,171	301	0	$0	15	$171
NOV	2008	37,760	$6,162	232	0	$0	18	$233
DEC	2008	34,280	$6,224	281	0	$0	98	$1,020
JAN	2008	35,560	$6,494	297	0	$0	121	$1,165
FEB	2008	42,920	$10,025	609	0	$0	139	$1,299
MAR	2008	36,280	$5,640	191	0	$0	126	$1,075
APR	2008	36,360	$5,179	137	0	$0	40	$465
MAY	2008	36,320	$5,959	219	0	$0	28	$341
JUN	2008	66,800	$8,677	150	0	$0	14	$220
JUL	2008	40,400	$7,054	219	0	$0	0	$50
TOTAL		511,280	$83,683	3,062	0	$0	616	$6,288

Annual Total Electricity Cost	=	$83,683	Per Year
Annual Total Energy Cost	=	$89,971	Per Year
Total KWH x 0.003413	=	1,745.0	x 10^6
Total MCF x 1.03	=	634.7	x 10^6
Total Other x _____	=		x 10^6
Total Site BTU's/yr	=	2,379.7	x 10^6
Cost per KWH	=	$0.164	Per Year
Cost per student	=	$280.28	Per Year

Energy Use Index:

Total Site BTU's/yr = 56,285 BTU/sq.ft./yr
Total Area (sq.ft.)

Energy Cost Index:

Total Energy Cost/yr = $2.13 $/sq.ft./yr
Total Area (sq.ft)

kwh per square foot = 12.1

1,000 mcf / square foot = 14.6