



**Susan Combs**  
Texas Comptroller of Public Accounts

# Facility Preliminary Energy Assessments and Recommendations

## Flatonia ISD

400 E. 4<sup>th</sup> Street  
Flatonia, Texas 78941

Prepared by:

### Texas Energy Engineering Services, Inc.

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## Schools & Hospitals Energy Management Program

### Flatonia ISD

400 E 4<sup>th</sup> Street

Flatonia, TX 78941

Contact Person: Dr. Alice Smith, Superintendent

Phone: 361.865.2941

## 1.0 EXECUTIVE SUMMARY

Flatonia Independent School District, now referred to as the District, requested that Texas Energy Engineering Services, Inc. (TEESI) perform a Preliminary Energy Assessment (PEA) of their facilities. This report documents that analysis.

This service is provided at no cost to the District through the Schools Energy Management and Technical Assistance Program as administered by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and Texas schools for the purpose of planning, funding, and implementing energy saving measures, which will ultimately reduce the District's annual energy costs.

The annual cost savings, implementation cost estimate and simple payback for all building energy retrofit projects identified in this preliminary analysis are summarized below. Individual building projects are summarized in Section 7.0 of this report.

Implementation Cost Estimate:	\$359,000
Annual Energy Cost Savings:	\$32,800
Simple Payback:	10.9

Recommendations and information of interest to the District is provided in this report regarding Energy Consumption and Performance (Section 3.0), Energy Accounting (Section 4.0), Energy Legislation Overview (Section 5.0), Recommended Maintenance & Operation Procedures (Section 6.0), Retrofit Opportunities (Section 7.0), Capital Improvement Projects (Section 8.0), Energy Management Policy (Section 9.0), and Funding Options for Capital Energy Projects (Section 10.0). A follow-up visit to the District will be scheduled to address any questions pertaining to this report, or any other aspect of this program.

SECO is committed to providing whatever assistance the District may require in planning, funding and implementing the recommendations of this report. The District is encouraged to direct any questions or concerns to either of the following contact persons:

SECO / Ms. Juline Ferris  
(512) 936-9283

TEESI / Saleem Khan  
(512) 328-2533

## 2.0 FACILITY DESCRIPTIONS

This section provides a brief description of the facilities surveyed. The purpose of the onsite survey was to evaluate the major energy consuming equipment in each facility (i.e. Lighting, HVAC, and Controls Equipment). A description of each facility is provided below. Please reference **Appendix C-1** for building grouping.

### Group 1: High School, Junior High, Old Elementary, New Elementary, Cafeteria, Field House

Buildings: High School, Junior High, and Gym  
 Stories: Single story buildings  
 Area: 51,586 SF  
 Bldg. Components: Brick buildings, flat built-up roof, slab on grade  
 Typical Lighting Fixtures: Primarily - T12 fluorescent fixtures with magnetic ballasts and T8 fluorescent fixtures with electronic ballasts in (four) 4 classrooms  
 Gym – High Intensity Discharge (HID) fixtures  
 HVAC: Primarily – Split-DX units  
 Gym – Heated only with Propane Gas Heaters  
 Controls: Standard thermostats

Building: Old Elementary  
 Stories: Single story building  
 Area: 21,586 SF  
 Bldg. Components: Brick building, flat built-up roof, slab on grade  
 Typical Lighting Fixtures: T8 fluorescent fixtures with electronic ballasts and T12 fluorescent fixtures with magnetic ballasts  
 HVAC: Split-DX units  
 Controls: Standard thermostats

Buildings: New Elementary and Cafeteria  
 Stories: Single story buildings  
 Area: 24,163 SF  
 Bldg. Components: Brick building, flat built-up roof, slab on grade  
 Typical Lighting Fixtures: Elementary – T8 fluorescent fixtures with magnetic ballasts  
 Cafeteria – HID fixtures  
 HVAC: Split-DX units  
 Controls: Standard thermostats

Buildings: Field House  
 Stories: Single story buildings  
 Area: 4,300 SF  
 Bldg. Components: Metal building, pitched metal roof, slab on grade  
 Typical Lighting Fixtures: T12 fluorescent fixtures with magnetic ballasts  
 HVAC: Split-DX and Propane Heaters  
 Controls: Standard thermostats

### Group 2: Maintenance, Administration, and Bus Barn

Buildings: Ag. Building, Maintenance, Administration, Bus Barn, and Coach's Office

Stories: Single story buildings

Area: 16,901 SF

Bldg. Components: Ag Building – concrete walls, flat built-up roof, slab on grade  
Maintenance – wood siding walls, pitched asphalt shingle, pier and beam  
Administration – metal building, metal roof, slab on grade  
Coach's Office – metal building, metal roof, pier and beam

Typical Lighting Fixtures: T12 fluorescent fixtures with magnetic ballasts

HVAC: Through the wall units

Controls: Standard thermostats

### 3.0 ENERGY CONSUMPTION AND PERFORMANCE

A site survey was conducted at several of the District's facilities. The facilities surveyed comprised a total gross area of approximately 118,536 square feet.

Annual electric and propane gas invoices for the buildings surveyed were \$140,355 for the 12 month period ending December 2009. A summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

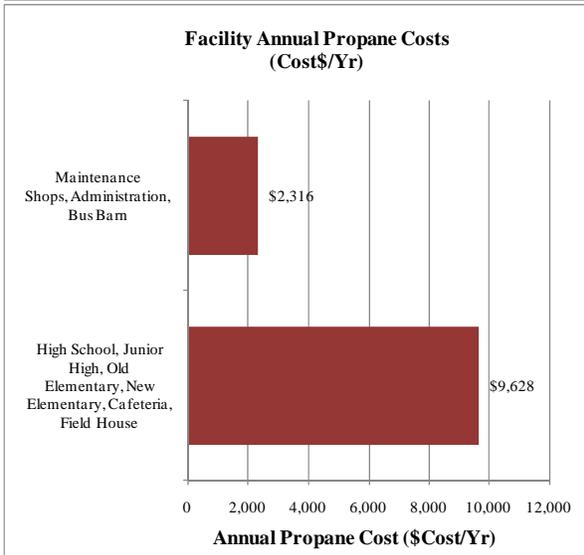
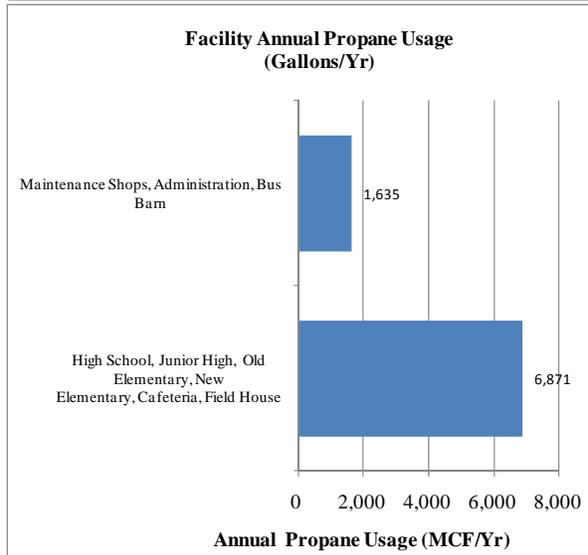
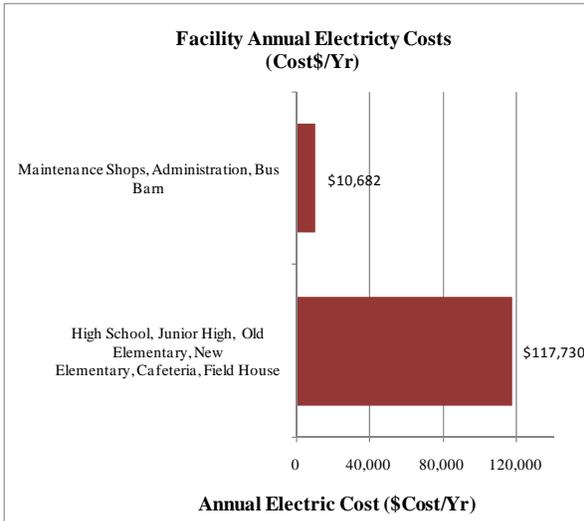
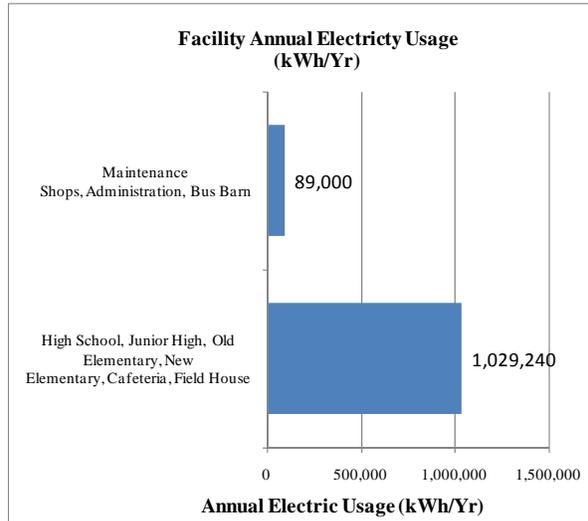
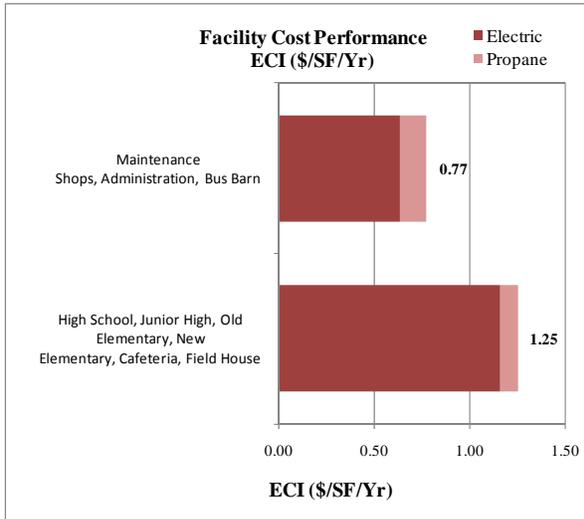
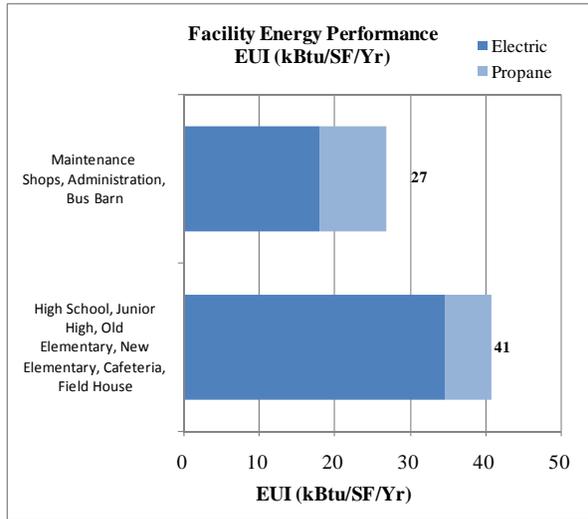
To help the District evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI represents a facility's annual energy usage per square foot, it is measured as thousand BTU's per square foot per year (kBTU/SF/Year). Similarly, ECI is measured as cost per square foot per year (\$/SF/Year). The EUI and ECI performance for selected facilities are listed below:

Energy Cost and Consumption Benchmarks												
Building	Electric			Propane			Total		EUI	ECI	SF*	
	KWH/Yr	MMBTU/Yr	\$Cost/Yr	Gal/Yr	MMBTU/Yr	\$Cost/Yr	\$Cost/Yr	MMBTU/Yr				
1	High School, Junior High, Old Elementary, New Elementary, Cafeteria, Field House	1,029,240	3,513	117,730	6,871	629	9,628	127,357	4,142	41	1.25	101,635
2	Maintenance Shops, Administration, Bus Barn	89,000	304	10,682	1,635	150	2,316	12,998	454	27	0.77	16,901
		KWH/Yr	MMBTU/Yr	\$Cost/Yr	Gal/Yr	MMBTU/Yr	\$Cost/Yr	\$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	\$/SF/Yr	SF*
		1,118,240	3,817	128,412	8,506	779	11,944	140,355	4,596	39	1.18	118,536

\* Total Square Footage does not include the Show Barn or Concession Building. Even though the electric meter serving the buildings in Group 1 also serves the Show Barn and Concession Building for benchmarking purposes the calculation of the EUI and ECI does include the Show Barn or Concession Bldg. square footage since it was identified these buildings have limited annual usage compared to the majority of the K-12 facilities.  
See Appendix C-1 for building groups.

Knowing the EUI and ECI of each facility is useful to help determine the District's overall energy performance. In addition, the District's EUI was compared to TEESI's database of Texas schools. See **Appendix D** to determine how these facilities' EUI compared to other schools in Texas.

The following charts summarize the data presented in the previous table. See **Appendix C** for further detail.



## 4.0 ENERGY ACCOUNTING

### UTILITY PROVIDERS

The City of Flatonia provides electric service and Sharp Propane provides propane service to the District.

### MONITORING AND TRACKING

An effective energy tracking system is an essential tool by which an energy management program's activities are monitored. The system should be centralized and available for all engaged staff members to use in verifying progress toward established targets, milestones, and verify progress.

The District should consider consolidating the tracking and recording of all the Districts utility accounts (i.e., Electricity, Natural Gas, Propane, Water, etc.) into an electronic spreadsheet similar to the chart shown on the following page. Along with total utility costs (\$), utility consumption should be recorded as well (i.e., kWh, MCF, gallons, etc.). The District can use this data to track utility consumption patterns and budget utility expenses. Having this historical data improves the District's awareness of their energy performance and will help in tracking their energy reduction goals.

The steps below are essential for an effective energy management tracking system:

1. Perform regular updates. An effective system requires current and comprehensive data. Monthly updates should be strongly encouraged.
2. Conduct periodic reviews. Such reviews should focus on progress made, problems encountered, and potential rewards.
3. Identify necessary corrective actions. This step is essential for identifying if a specific activity is not meeting its expected performance and is in need of review.

In addition, having this historical utility data would facilitate **House Bill 3693** and **Senate Bill 12** reporting requirements. Please see Section 5.0 for additional information regarding these requirements.

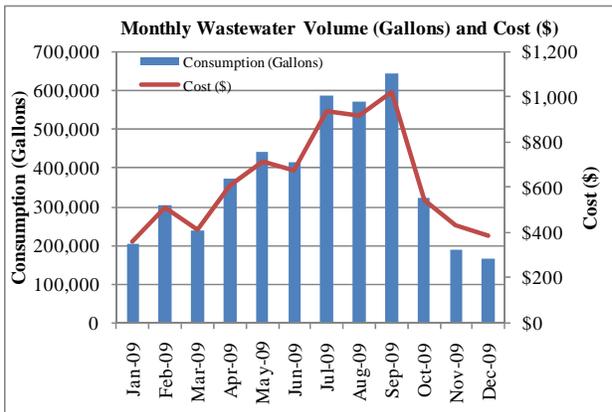
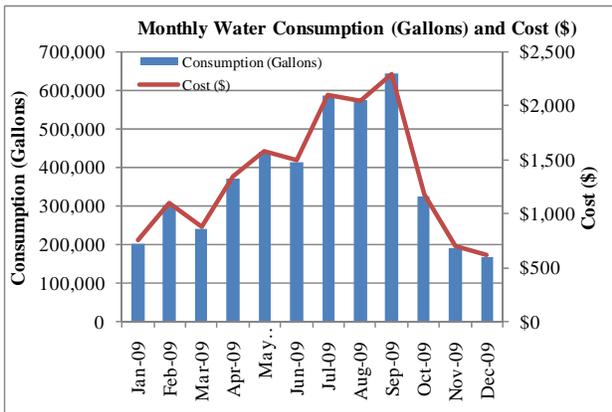
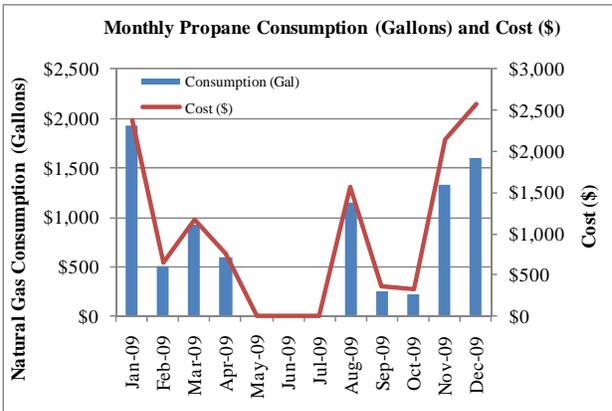
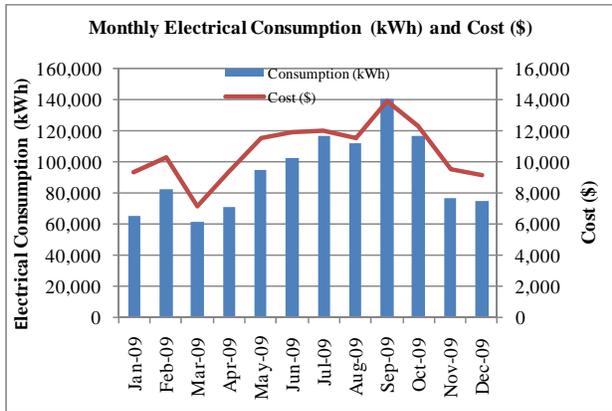
Furthermore, below is a sample format the District can customize to help summarize their overall utility usage and costs.

The data presented below is a summation of the data provided by the District. This data below includes only selected utility accounts and is for reference purposes only and does not represent the District’s total utility data. See **Appendix C** for further detail regarding each utility account represented in the table below.

Flatonia ISD - Sample Utility Data Input Form

MONTH	ELECTRICITY			PROPANE			WATER/WASTEWATER				
	KWH	COST \$	\$/KWH	MCF	COST \$	\$/GAL	GAL	COST \$	\$/GAL	COST \$	\$/GAL
								WATER	WATER	SEWER	SEWER
Jan-09	65,600	9,364	\$0.1427	\$1,925	\$2,370	\$1.2	203,000	\$754	\$0.00371	\$360	\$0.00177
Feb-09	82,320	10,319	\$0.1253	\$510	\$647	\$1.3	303,000	\$1,104	\$0.00364	\$510	\$0.00168
Mar-09	62,080	7,215	\$0.1162	\$925	\$1,166	\$1.3	239,000	\$880	\$0.00368	\$414	\$0.00173
Apr-09	70,920	9,354	\$0.1319	\$600	\$759	\$1.3	371,000	\$1,342	\$0.00362	\$612	\$0.00165
May-09	94,680	11,537	\$0.1219	\$0	\$0	\$0.0	440,000	\$1,584	\$0.00360	\$716	\$0.00163
Jun-09	102,880	11,968	\$0.1163	\$0	\$0	\$0.0	415,000	\$1,496	\$0.00360	\$678	\$0.00163
Jul-09	117,360	11,997	\$0.1022	\$0	\$0	\$0.0	587,000	\$2,098	\$0.00357	\$936	\$0.00159
Aug-09	112,640	11,595	\$0.1029	\$1,147	\$1,574	\$1.4	573,000	\$2,049	\$0.00358	\$915	\$0.00160
Sep-09	140,720	13,974	\$0.0993	\$250	\$367	\$1.5	644,000	\$2,298	\$0.00357	\$1,022	\$0.00159
Oct-09	117,320	12,333	\$0.1051	\$215	\$338	\$1.6	325,000	\$1,181	\$0.00363	\$543	\$0.00167
Nov-09	76,680	9,551	\$0.1246	\$1,328	\$2,139	\$1.6	189,000	\$705	\$0.00373	\$431	\$0.00228
Dec-09	75,040	9,205	\$0.1227	\$1,605	\$2,582	\$1.6	166,000	\$625	\$0.00376	\$385	\$0.00232
Total	1,118,240	\$128,412	\$0.1148	8,506	\$11,944	\$1.4	4,455,000	\$16,115	\$0.00362	\$7,522	\$0.00169

Gross Building Area: 118,536 SF



## 5.0 ENERGY LEGISLATION OVERVIEW

In 2001, the 77th Texas Legislature passed Senate Bill 5 (SB5), also known as the Texas Emissions Reduction Plan, to amend the Texas Health and Safety Code. The legislation required ambitious, fundamental changes in energy use to help the state comply with the federal Clean Air Act standards. It applied to all political subdivisions within 38 designated counties, later expanded to 41 counties.

In 2007, the 80th Texas Legislature passed Senate Bill 12 (**SB 12**) which among other things extended the timeline set in SB 5 for emission reductions. In the same period, the 80<sup>th</sup> Texas Legislature passed House Bill 3693 (**HB 3693**) which amended provisions of several codes relating primarily to energy efficiency.

In 2009, the 81<sup>st</sup> Texas Legislature passed Senate Bill 300 (**SB 300**). This bill specifically addressed the requirement for Texas Schools. This bill repealed the requirement in HB 3693 that school districts must establish a goal of reducing electric consumption by 5% each year for six years starting Fiscal Year (FY) 2007. SB300 instead requires that school districts establish a long-range energy plan to reduce the overall electricity use by 5% beginning FY 2008. Besides this change, other requirements set forth in SB12 and HB3693 applicable to schools still apply.

Following are key requirements established by the above energy legislation:

Per SB300 a district should establish a Long-Range Energy Plan to reduce the District's electric consumption by five percent (5%) beginning with the 2008 state fiscal year and to consume electricity in subsequent fiscal years in accordance with the plan. The Long-Range Energy Plan should include strategies in the plan for achieving energy efficiency that result in net savings or that can be achieved without financial cost to the district. The Plan should account for the initial, short-term capital costs and lifetime costs and savings that may occur from implementation of the strategy. Each strategy should be evaluated based on the total net costs and savings that may occur over a seven-year period following implementation of the strategy.

Record electric, water, and natural gas utility services (consumption and cost) in an electronic repository. The recorded information shall be on a publicly accessible Internet Web site with an interface designed for ease of navigation if available, or at another publicly accessible location. To help with the utility reporting process a sample input form can be found in **Appendix B** of this report.

Energy-efficient light bulbs for buildings, requires an institution to purchase commercially available light bulbs using the lowest wattages for the required illumination levels.

Installation of energy saving devices in Vending Machines with non-perishable food products.  
**Not required by School Districts but highly recommended.**

A summary description of SB 12, and HB 3693 are available in **Appendix A**.

## **6.0 RECOMMENDED MAINTENANCE & OPERATION PROCEDURES**

Sound Maintenance and Operation procedures significantly improve annual utility costs, equipment life, and occupant comfort. Generally, maintenance and operation procedural improvements can be made with existing staff and budgetary levels. Below are typical maintenance and operations procedures that have energy savings benefits. Please note that some of the recommendations noted below are currently being practiced by the District. With this in mind, the following maintenance and operation procedures should be encouraged/continued to ensure sustainable energy savings.

### **PUBLICIZE ENERGY CONSERVATION**

Promote energy awareness at regular staff meetings, on bulletin boards, and through organizational publications. Publicize energy cost reports showing uptrends and downtrends.

### **MANAGE SMALL ELECTRICAL EQUIPMENT LOADS**

Small electrical equipment loads consists of small appliances/devices such as portable heaters, microwaves, small refrigerators, coffee makers, stereos, cell phone chargers, desk lamps, etc. The District should establish a goal to reduce the number of small appliances and to limit their usage. For example, the use small space heaters should be discouraged; hence, all space heating should be accomplished by the District's main heating system. In addition, many small devices such as radios, printers, and phone chargers can consume energy while not in use. To limit this "stand-by" power usage these devices should be unplugged or plugged into a power strip that can act as a central "turn off" point while not in use. With an effective energy awareness campaign to encourage participation, managing small electrical loads can achieve considerable energy savings.

### **ESTABLISH HVAC UNIT SERVICE SCHEDULES**

Document schedules and review requirements for replacing filters, cleaning condensers, and cleaning evaporators. Include particulars such as filter sizes, crew scheduling, contract availability if needed, etc. Replace filters with standard efficiency pleated units. Generally, appropriate service frequencies are as follows -- filters: monthly; condensers: annually; evaporators: 5 years.

### **PRE-IDENTIFY PREMIUM EFFICIENCY MOTOR (PEM) REPLACEMENTS**

Pre-identify supply sources and PEM stock numbers for all HVAC fan and pump motors so that as failures occur, replacement with PEM units can take place on a routine basis. As funding allows, pre-stock PEM replacements according to anticipated demand, i.e., motors in service more than 10 years, motors in stressful service, and particular motor types that are in service at several locations.

### IMPROVE CONTROL OF INTERIOR & EXTERIOR LIGHTING

Establish procedures to monitor use of lighting at times and places of possible/probable unnecessary use: Offices and classes at lunchtime, maintenance shops, closets, exterior and parking lots during daylight hours, etc. Encouraging staff (i.e. Teacher, Custodial, maintenance, and students) to participate in the District's efforts to limit unnecessary lighting use would help improve this effort. For example, the pictures below provide examples of unnecessary lighting use.

Example 1 - Exterior Lights: The picture on the left is of exterior light on during daylight hours. Exterior lighting are typically controlled using light sensing photocells, timeclocks or manual switching. The first two control methods should be calibrated regularly (monthly) and scheduled appropriately (monthly to account changing dawn/dusk hours). If a manual switch controls the exterior lighting it is recommended the latter two control options be considered since manual switching requires persistent monitoring which is prone to control fatigue.

Example 2 - Cafeteria Lights - The second picture on the right is of the High Intensity Discharge (HID) Lights in the cafeteria. During the walkthrough the lights were on during an unoccupied period. The District should establish a procedure to reduce the time the cafeteria lighting is left on during unoccupied periods. If the lighting have multiple switching the District may keep only a fraction on to maintain adequate lighting levels or consider utilizing natural light from the windows. It is important to note that HID fixtures have a long re-strike time therefore the plan should include provision to allow for re-strike time. The District should consider converting the HID fixtures with fluorescent fixtures. The fluorescent fixtures will offer better control and allow for a tighter lighting schedule. With good energy awareness campaign, a collective effort, and good communication will help ensure the success of this no/low cost energy saving strategy.

Gymnasium



Exterior lighting on during daytime hours.

Cafeteria HID Lighting



Cafeteria lights on during unoccupied periods.

### TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Effective operation and maintenance of equipment is one of the most cost effective ways to achieve reliability, safety, and efficiency. Failing to maintain equipment can cause significant energy waste and severely decrease the life of equipment. Substantial savings can result from good operation and maintenance procedures. In addition, such procedures require little time and cost to implement. Examples of typical maintenance checklists for common equipment including, boilers, chillers, building controls, pumps, fans, and electric motors, are provided in **Appendix E**. These checklists from the Federal Energy Management Program (FEMP), a branch of the Department of Energy (DOE), are based on industry standards and should supplement, not replace those provided by the manufacturer.

### CONTROL OUTSIDE AIR INFILTRATION

Conduct periodic inspections of door and window weather-stripping, and schedule repairs when needed. Additionally, make sure doors and windows are closed during operation of HVAC systems (heating or cooling). Unintended outside air contributes to higher energy consumption and increases occupant discomfort.

### REPLACE INCANDESCENT LAMPS WITH COMPACT FLUORESCENTS

Replace existing incandescent lamps with compact fluorescent lamps as they burn out. Compact fluorescents use 50 to 75 percent less wattage for the same light output, with ten times the operating life of incandescents.

### ENERGY STAR POWER MANAGEMENT

ENERGY STAR Power Management Program promotes placing monitors and computers (CPU, hard drive, etc.) into a low-power “sleep mode” after a period of inactivity. The estimated annual savings can range from \$25 to \$75 per computer. ENERGY STAR recommends setting computers to enter system standby or hibernate after 30 to 60 minutes of inactivity. Simply touching the mouse or keyboard “wakes” the computer and monitor in seconds. Activating sleep features saves energy, money, and helps protect the environment.

### INSTALL ENERGY SAVING DEVICES ON VENDING MACHINE

Install energy saving devices on vending machines with non-perishable food items to reduce the equipment power usage. These devices shut the vending machines down during unoccupied periods. There are several commercially available devices that can be easily installed on existing vending machines. These devices typical have a motion sensor which powers down the equipment after periods of inactivity. For example if the motion sensor does not sense activity within 15 minutes the device will shutdown the vending machine and turn on once motion is sensed. These devices range in price from \$100 to \$250 and have a typical annual savings of \$20 to \$150 per vending machine.

### HAIL GUARDS ON CONDENSING AND PACKAGED ROOFTOP UNITS

When an HVAC unit is replaced the District should ensure the new unit be specified with hail guards. The hail guards protect the condensing unit's heat exchanger coils from hail damage. Damage to the condensing unit heat exchangers reduces the efficiency of the units. It is recommended if any existing unit(s) have damaged condensing coil fins the condensing fins should be straightened using a fin comb.

### INSTALL FLUSH VALVES ON OPEN TROUGH URINALS IN JH AND ELEM. WINGS

During the preliminary walkthrough, it was observed in two restrooms located in the Junior High and Elementary wings had open trough urinals. The trough urinal had open flush lines that were running water to flush the trough. It appears that the urinals are left continuously running during school hours. It is recommended a flushing mechanism such as manual flush valves or possibly motioning sensing flush valves be installed on each urinal to reduce unnecessary water usage. It is estimated that the District could save approximately \$200 per trough urinal by implementing a manual/automatic type flushing system. This savings is based on current water and wastewater rates and assuming the trough urinal are left running during school hours.

## 7.0 RETROFIT OPPORTUNITIES

Energy retrofit projects identified during the preliminary analysis are detailed below. Project cost estimates include complete design and construction management services.

### RETROFIT INTERIOR LIGHTING

The District had a combination of T8 and T12 Fluorescent fixtures (T12 being the majority). It is recommended the District replace the existing T-12 fluorescent lamps and magnetic ballasts with high efficiency T-8 fluorescent lamps and electronic ballasts. Typical four-foot, two-lamp magnetic ballast fixtures require 80 watts, while electronic ballasts and T-8 lamps in the same fixture configuration require only 50 watts. The table below indicates the facilities where T-12 fluorescent lamps and incandescent lamps were observed during the preliminary walkthrough. The cost and savings noted below are based on preliminary observations of the facilities. Exact cost, quantities, and lamp types can be identified through a detailed energy audit. In addition, a detailed lighting design calculation will help ensure the appropriate lighting replacement is selected. For example, a detailed design calculation may identify areas that could operate with fewer lamps per fixtures while still maintaining adequate lighting levels.

<b>LIGHTING RETROFIT</b>			
<b>Building</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
High School, Junior High, Old Elementary, Cafeteria, Field House	\$33,000	\$6,600	5.0
Maintenance Shops, Administration, Bus Barn	\$11,000	\$1,800	6.1
<b>TOTAL</b>	<b>\$44,000</b>	<b>\$8,400</b>	<b>5.2</b>

### GYMNASIUM HID TO FLUORESCENT FIXTURE LIGHTING RETROFIT

A preliminary walkthrough was conducted at the Flatonia Gymnasium. The gymnasium utilizes High Intensity Discharge (HID) fixtures to light the Gym. It is recommended that the District replace the existing HID fixtures with fluorescent fixtures suitable for gym applications. Fluorescent fixtures offer improved control, reduce energy consumption and improve lighting levels. In addition, due to the long re-strike times associated with HID fixtures, they cannot be effectively switched on/off during unoccupied periods. This causes the HID lamps to operate longer, which both consumes more energy and affects lamp life. The cost and savings estimates below are based on preliminary observations and analysis.

<b>HID GYM LIGHTING RETROFIT</b>			
<b>Building</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
High School (gym lights)	\$10,000	\$3,800	2.6
<b>TOTAL</b>	<b>\$10,000</b>	<b>\$3,800</b>	<b>2.6</b>

### INSTALLATION OF OCCUPANCY SENSORS FOR INDOOR LIGHTING CONTROL

It is recommended the District consider installing occupancy sensors to improve control of interior lighting. Occupancy sensors will help ensure lights are only on when the space is occupied. The following table below provides an estimated cost and energy saving for the installation of these types of sensors. Please note this estimation is based on a preliminary assessment exact sensor location, technology (Infrared, Ultrasonic, and Dual Technology) and quantity can be determined during a detailed energy assessment or design phase. In general, enclosed areas with intermittent use, are typically good candidates for occupancy sensors (i.e. hallways, specific classrooms, administration office, break rooms, etc.).

<b>MOTION SENSOR INSTALLATION</b>			
<b>Building</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
High School, Junior High, Old Elementary, New Elementary, Cafeteria, Field House	\$23,300	\$3,600	6.5
<b>TOTAL</b>	<b>\$23,300</b>	<b>\$3,600</b>	<b>6.5</b>

### REPLACE HVAC SYSTEMS

Replace existing HVAC units with new high efficiency units at the facilities indicated in the table below. The existing systems are inefficient and are beyond their useful life (averaging 20 plus years). Units to be replaced at the High School consist of 7 Split-DX systems totaling approximately 54.5 tons. Units to be replaced at the Junior High consist of 6 Split-DX systems totaling approximately 29 tons. Units to be replaced at the Old Elementary consist of 6 Split-DX systems totaling approximately 30.5 tons. The table below summarizes the estimated cost and savings for replacing the units identified in each school.

<b>HVAC REPLACEMENT</b>			
<b>Building</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
High School	\$87,200	\$4,800	18.0
Junior High	\$46,400	\$2,600	18.0
Old Elementary	\$48,800	\$2,700	18.0
<b>TOTAL</b>	<b>\$182,400</b>	<b>\$10,100</b>	<b>18.0</b>

### REPLACE GYMNASIUM PROPANE GAS HEATERS

The gymnasium is heated with four (4) propane gas heaters. It is recommended the gas heaters be replaced with new high efficiency units. The existing systems are inefficient and are beyond their useful life. The table below summarizes the estimated cost and savings for replacing the four (4) gas space heaters.

<b>GYM GAS SPACE HEATER REPLACEMENT</b>			
<b>Building</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
High School (gym heaters)	\$8,000	\$400	18.3
<b>TOTAL</b>	<b>\$8,000</b>	<b>\$400</b>	<b>18.3</b>

### INSTALL ENERGY MANAGEMENT SYSTEM (EMS)

Install Direct Digital Control (DDC) Energy Management System (EMS) to provide optimum scheduling and precise temperature supervision for the HVAC systems throughout each facility. The EMS will minimize the run time of the units while maintaining comfort throughout the facility. Additionally, EMS can remotely diagnose and document HVAC maintenance problems. Presently the District's HVAC systems are controlled using standard thermostats, installing an EMS will improve control and performance. The EMS systems proposed in the estimation below will have basic functions such as remote access capabilities, multiple scheduling, optimum start/stop features. The table below summarizes the estimated cost and saving for these projects.

<b>EMS UPGRADES AND INSTALLATION</b>			
<b>Building</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
High School, Junior High, Old Elementary, New Elementary, Cafeteria	\$91,300	\$6,500	14.0
<b>TOTAL</b>	<b>\$91,300</b>	<b>\$6,500</b>	<b>14.0</b>

The following table summarizes the implementation costs, annual savings and simple payback for the above projects:

<b>SUMMARY OF ENERGY COST REDUCTION MEASURES</b>			
<b>Project Description</b>	<b>Estimated Implementation Cost</b>	<b>Estimated Annual Savings (\$/yr)</b>	<b>Simple Payback (years)</b>
LIGHTING RETROFIT	\$44,000	\$8,400	5.2
HID GYM LIGHTING RETROFIT	\$10,000	\$3,800	2.6
MOTION SENSOR INSTALLATION	\$23,300	\$3,600	6.5
HVAC REPLACEMENT	\$182,400	\$10,100	18.1
GYM GAS SPACE HEATER REPLACEMENT	\$8,000	\$400	18.3
EMS UPGRADES AND INSTALLATION	\$91,300	\$6,500	14.0
<b>TOTAL:</b>	<b>\$359,000</b>	<b>\$32,800</b>	<b>10.9</b>

The above projects implementation costs and annual savings are estimated based on a preliminary examination of the facilities. Furthermore, maintenance cost savings are not included in this preliminary energy assessment. Final costs will be determined from detailed building assessments, engineering calculations, and contractor estimates

Project design (drawings and specifications), if authorized, would normally be accomplished by professional engineers. Project acquisition (competitive bidding) would be in accordance with District requirements, and construction management would be provided by the engineering group who prepared the drawings and specifications.

## **8.0 CAPITAL IMPROVEMENT PROJECTS**

This section is intended to describe capital improvement projects that have energy savings opportunities but cannot be justified solely based on the potential energy savings alone. The following is a capital improvement project recommended for the District.

### **REPLACE SINGLE PANE WINDOWS WITH NEW ENERGY EFFICIENT WINDOWS**

Replace existing single pane windows located throughout the District's main campus buildings (High School, Middle, and Old Elementary wing) with new energy efficient windows. The existing single pane windows are energy inefficient and are susceptible to unnecessary air infiltration due degradation of weather seals. Replacing these windows with new energy efficient windows will help improve the building envelope's thermal performance, reduce sound transmission and enhance occupant comfort. The new energy efficient windows shall meet ENERGY STAR qualifications. Typical window replacement costs may range from \$60 to \$70 per square foot of window system area.

## 9.0 ENERGY MANAGEMENT POLICY

By requesting this study, the District has demonstrated interest in taking a more aggressive approach to energy management. In order to establish an effective Energy Management Program it should have support from top management. An Energy Management Policy adopted by the school board sends a strong signal that energy management is an institutional priority. A formal Energy Management Policy can be as simple as a two-page document that clearly states the District's energy management objectives. The policy should cover items such as:

- who is accountable for energy management
- what your energy savings targets are
- how you will monitor, review and report on progress
- staffing and training to support the policy
- criteria for energy management investment
- working energy efficiency into new capital investments

Along with a clear energy **policy** an energy management **plan** should be developed to ensure sustained energy savings. The energy management plan is a document that details roles, responsibilities, and objectives. Following are key items that should be included in an energy management plan:

1. ESTABLISH ROUTINE ENERGY TRACKING AND REPORTING PROCEDURES  
Establishing a procedure to monitor energy usage and cost will help identify energy use patterns. The data will also help determine the effectiveness of the Energy Management Program.
2. ESTABLISH AN ENERGY MANAGEMENT STEERING COMMITTEE The Energy Management Steering Committee will include representatives from a cross section of the District. The steering committee will serve as a review board to evaluate all energy management recommendations before adoption and implementation. The steering committee will meet **quarterly or semiannually** to review the District's energy cost and consumption. Regular meetings will ensure the District's goals are being met prior to the end of the year.
3. PROMOTE ENERGY AWARENESS The energy management steering committee members shall establish a program to publicize the District's energy goals and progress on a **quarterly or semiannually** basis. For example, student drawn posters of the District's energy savings can be placed in hallways. This will encourage student involvement and act as an educational tool. Continuous promotion of the District's goals will ensure the sustainability of the energy management program and help achieve further energy savings.

4. ESTABLISH ACCEPTABLE EQUIPMENT PARAMETERS Establish a District-wide uniform temperature set point for all HVAC units. Having a standard setpoint will help keep HVAC runtimes to a minimum. The following are some suggested temperature settings, however, the district will need to monitor and ensure that other building parameters (humidity levels etc.) are within acceptable limits. Also, areas with special equipment (MDF/IDF, server rooms, etc.) or materials (wood flooring, paper storage, etc.) shall be maintained at the equipment supplier's recommended settings and settings appropriate to the material.

Occupied Cooling Temperature Setpoints:

Instructional Areas	73 F – 76 F
Admin Areas	72 F – 74 F

Unoccupied Cooling Temperature Setpoints:

Instructional Areas	85 F
Admin Areas	85 F

Occupied Heating Temperature Setpoints:

Instructional Areas	67 F – 69 F
Admin Areas	67 F – 69 F

Unoccupied Heating Temperature Setpoints:

Instructional Areas	55 F
Admin Areas	55 F

5. STAFF INCENTIVES AND RECOGNITION PROGRAM Establishing a student, staff, and campus incentive and recognition program would help promote and encourage support from staff and custodial members. The District may consider implementing a staff incentive and recognition program. Following are some program examples.

- ❖ The energy accounting system can be used to monitor cost savings and compare it to the base year consumption. An energy incentive plan consisting of a 50-50 sharing with the school campus and the Energy Management Program could be employed. The school would get 50% of the savings resulting from energy cost reduction. The school would be free to use the money for educational programs such as materials, supplies, etc. The other 50% would be used for continuing energy management efforts. The following is an example of the Building savings summary report.

## EXAMPLE:

## High School - Annual Total Electric Cost

Baseline (2006 - 07)	Current (2007 - 08)	Savings	50% Savings
\$248,483	\$240,483	\$8,000	\$4,000

In this example, the High School saved \$8,000 where 50% (\$4,000) will be assigned to the school. This money would be paid in October of the following fiscal year.

- ❖ An energy flag program will be implemented. There will be three energy flags, one flag per each grade level. This energy flags will be awarded to the schools exhibiting the greatest percentage reduction in energy costs. Energy flags will be awarded on a rotating basis each summer. In order to provide motivation, maintain enthusiasm, and recognize individuals doing their part to save the District taxpayers money through the Energy Management Program, the local media (including district newsletters) will be informed of the energy flag results. The energy flag will be awarded in January and August of each year based on the energy consumption of the previous four months.
  - ❖ The successes of the program should also be communicated to the public through the media to show what the District is doing to reduce costs to taxpayers.
6. NEW BUILDING AND CONSTRUCTION Ensure proper maintenance and operation of energy using equipment in new buildings by required adequate documentation of all systems and control strategies, specifying minimum content of M&O manuals; specifying contractor requirements for cleaning and adjusting equipment prior to occupancy; specifying on-site vendor training for M&O staff; and requiring as-built drawings.
7. ESTABLISH A WATER MANAGEMENT PROGRAM Along with saving energy the District shall a establish a program to reduce water consumption. The following conservation measures should be employed.
- a. Investigate the use of water conserving faucets, showerheads, and toilets in all new and existing facilities.
  - b. Utilize water-previous materials such as gravel, crushed stone, open paving blocks or previous paving blocks for walkways and patios to minimize runoff and increase infiltration.
  - c. Employ Xeriscaping, using native plants that are well suited to the local climate, that are drought-tolerant and do not require supplemental irrigation.
  - d. Utilize drip irrigation systems for watering plants in beds and gardens.
  - e. Install controls to prevent irrigation when the soil is wet from rainfall.
  - f. Establish a routine check of water consuming equipment for leaks and repair equipment immediately.

## 10.0 FUNDING OPTIONS FOR CAPITAL ENERGY PROJECTS

Institutional organizations 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 are 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 low interest rate (typically 3 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 ten years or less and must be analyzed in an Energy Assessment Report by a Professional Engineer. Upon final loan execution, the School District proceeds to implement funded projects through the traditional bid/specification process. Contact: Eddy Trevino (512/463-1080).

### Internal Financing

Improvements can be paid for by direct allocations of revenues from an organization's currently available operating or capital funds (bond programs). The use of internal financing normally requires the inclusion and approval of energy-efficiency projects within an organization's annual operating and capital budget-setting process. Often, small projects with high rate of return can be scheduled for implementation during the budget year for which they are approved. Large projects can be scheduled for implementation over the full time period during which the capital budgets is in place. Budget constraints, competition among alternative investments, and the need for higher rates of return can significantly limit the number of internally financed energy-efficiency improvements.

### 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 School 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 the lessee pays a nominal amount, usually a dollar, for title to the equipment.

### Performance Contracting with an Energy Service Company

Through this arrangement, an energy service company (ESCO) uses third party financing to implement a comprehensive package of energy management retrofits for a facility. This turnkey service includes an initial assessment by the contractor to determine the energy-saving potential for a facility, design work for identified projects, purchase and installation of equipment, and overall project management. The ESCO guarantees that the cost savings generated by the projects will, at a minimum, cover the annual payment due to the ESCO over the term of the contract.

### Utility Sponsored Energy Efficiency Incentive Programs

Many of the State's utilities offer energy efficiency incentive programs to offset a portion of the upfront cost associated with energy efficiency measures. The program requirements and incentives range from utility to utility. For example, CenterPoint Energy provides incentives for efficiency measures such as installation of high efficiency equipment, lighting upgrades, and building commissioning. These energy efficiency programs' incentives typically cover \$0.06/kWh and \$175/kW of verifiable energy and demand reductions, respectively. For further information, contact your utility provider to determine what programs are available in your area.

# APPENDICES

# APPENDIX A

## ENERGY LEGISLATION (SB 12, HB 3693 AND SB 300)

# How to comply with SB12 & HB 3693

## What you need to know about Texas Senate Bill 12

The passage of Senate Bill 12 (SB12) by the 80<sup>th</sup> Texas Legislature signified the continuance of Senate Bill 5 (SB5), the 77<sup>th</sup> Texas Legislature's sweeping approach in 2001 to clean air and encourage energy efficiency in Texas. SB12 was enacted on September 1, 2007 and was crafted to continue to assist the state and its political jurisdictions to conform to the standards set forth in the Federal Clean Air Act. The bill contains energy-efficiency strategies intended to decrease energy consumption while improving air quality.

**All political subdivisions in the 41 non-attainment or near non-attainment counties in Texas are required to:**

1) *Adopt a goal to reduce electric consumption by 5 percent each year for six years, beginning September 1, 2007\**

2) *Implement all cost-effective energy-efficiency measures to reduce electric consumption by existing facilities. (Cost effectiveness is interpreted by this legislation to provide a 20 year return on investment.)*

3) *Report annually to the State Energy Conservation Office (SECO) on the entity's progress, efforts and consumption data.*

**\*Note:** The recommended baseline data for those reporting entities will consist of the jurisdiction's 2006 energy consumption for its facilities and based on the State Fiscal Year (September 1, 2006 to August 31, 2007).

## What you need to know about Texas House Bill 3693

The passage of House Bill 3693 (HB3693) by the 80<sup>th</sup> Texas Legislature is intended to provide additional provisions for energy-efficiency in Texas. Adopted with an effective date of September 1, 2007, HB 3693 is an additional mechanism by which the state can encourage energy-efficiency through various means for School Districts, State Facilities and Political Jurisdictions in Texas.

HB 3693 includes the following state-wide mandates that apply differently according to the nature and origin of the entity:

### Record, Report and Display Consumption Data

All Political Subdivisions, School Districts and State-Funded Institutes of Higher Education, are mandated to record and report the entity's metered resource consumption usage data for electricity, natural gas and water on a publically accessible internet page.

**Note:** *The format, content and display of this information are determined by the entity or subdivision providing this information.*

### Energy Efficient Light Bulbs

All School Districts and State-Funded Institutes of Higher Education shall purchase and use energy-efficient light bulbs in education and housing facilities.

### Who must comply?

The provisions in this bill will apply to entities including: Cities and Counties; School Districts; Institutes of Higher Education; State Facilities and Buildings.

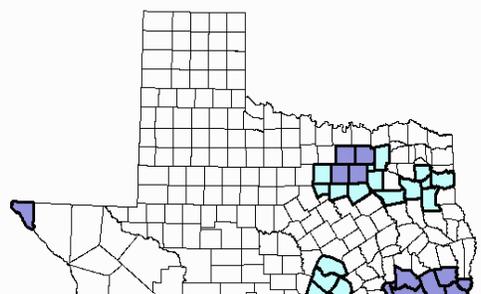
## How do you define energy-efficiency measures?

Energy-efficiency measures are defined as any facility modifications or changes in operations that reduce energy consumption. Energy-efficiency is a strategy that has the potential to conserve resources, save money\*\* and better the quality of our air. They provide immediate savings and add minimal costs to your project budget.

### Examples of energy-efficiency measures include:

- installation of insulation and high-efficiency windows and doors
- modifications or replacement of HVAC systems, lighting fixtures and electrical systems
- installation of automatic energy control systems
- installation of energy recovery systems or renewable energy generation equipment
- building commissioning
- development of energy efficient procurement specifications
- employee awareness campaigns

**\*\*SECO's Preliminary Energy Assessment (PEA) program is an excellent resource for uncovering those energy-efficiency measures that can benefit your organization.**



## What counties are affected?

All political jurisdictions located in the following  
Non-attainment and affected counties:

Bastrop Bexar Brazoria Caldwell Chambers Collin  
Comal Dallas Denton El Paso Ellis Fort Bend  
Galveston Gregg Guadalupe Hardin Harris Harrison  
Hays Henderson Hood Hunt Jefferson Johnson  
Kaufman Liberty Montgomery Nueces Orange Parker  
Rockwall Rusk San Patricio Smith Tarrant Travis  
Upshur Victoria Waller Williamson Wilson

## What assistance is available for affected areas?

The Texas Energy Partnership is a partner with Energy Star®, who partners across the nation with the goal of improving building performance, reducing air emissions through reduced energy demand, and enhancing the quality of life through energy-efficiency and renewable energy technologies.

To assist jurisdictions, the Texas Energy Partnership will:

- Present workshops and training seminars in partnership with private industry on a range of topics that include energy services, financing, building technologies and energy performance rating and benchmarking
- Prepare information packages – containing flyers, documents and national lab reports about energy services, management tools and national, state and industry resources that will help communities throughout the region
- Launch an electronic newsletter to provide continuous updates and develop additional information packages as needed

*Please contact Stephen Ross at 512-463-1770 for more information.*

## SECO Program Contact Information

**LoanSTAR;  
Preliminary Energy Assessments:**  
Theresa Sifuentes - 512-463-1896  
[Theresa.Sifuentes@cpa.state.tx.us](mailto:Theresa.Sifuentes@cpa.state.tx.us)

**Schools Partnership Program:**  
Glenda Baldwin - 512-463-1731  
[Glenda.Baldwin@cpa.state.tx.us](mailto:Glenda.Baldwin@cpa.state.tx.us)

**Engineering (Codes / Standards):**  
Felix Lopez - 512-463-1080  
[Felix.Lopez@cpa.state.tx.us](mailto:Felix.Lopez@cpa.state.tx.us)

**Innovative / Renewable Energy:**  
Pamela Groce - 512-463-1889  
[pam.groce@cpa.state.tx.us](mailto:pam.groce@cpa.state.tx.us)

**Energy / Housing  
Partnership Programs:**  
Stephen Ross - 512-463-1770  
[Stephen.Ross@cpa.state.tx.us](mailto:Stephen.Ross@cpa.state.tx.us)

**Alternate Fuels / Transportation:**  
Mary-Jo Rowan - 512-463-2637  
[Mary-Jo.Rowan@cpa.state.tx.us](mailto:Mary-Jo.Rowan@cpa.state.tx.us)

## **BILL ANALYSIS**

Senate Research Center

S.B. 300  
By: Patrick, Dan  
Education  
7/1/2009  
Enrolled

### **AUTHOR'S / SPONSOR'S STATEMENT OF INTENT**

Many independent school districts across Texas are reporting severe financial difficulties due to several factors, including the requirement to fulfill unfunded mandates. These mandates are particularly burdensome to fast-growth school districts. In a difficult economic climate and with dwindling resources, districts are forced to fulfill unnecessary mandates rather than focus on their basic mission, which is to educate students.

S.B. 300 amends current law relating to eliminating or modifying certain mandates on school districts.

### **RULEMAKING AUTHORITY**

This bill does not expressly grant any additional rulemaking authority to a state officer, institution, or agency.

### **SECTION BY SECTION ANALYSIS**

SECTION 1. Amends Section 11.1513(d), Education Code, as follows:

(d) Requires that the employment policy provide that not later than the 10th school day before the date on which a district fills a vacant position for which a certificate or license is required as provided by Section 21.003, other than a position that affects the safety and security of students as determined by the board of trustees, the district is required to provide to each current district employee notice of the position by posting the position on a bulletin board at certain locations or, rather than and, the district's Internet website, if the district has a website, and a reasonable opportunity to apply for the position.

SECTION 2. Amends Section 25.112, Education Code, by amending Subsection (d) and adding Subsections (e)-(g), as follows:

(d) Authorizes the commissioner of education (commissioner), on application of a school district (district), to except the district from the limit in Subsection (a) (relating to the prohibition of more than 22 students enrolled in an elementary school class) if the commissioner finds the limit works an undue hardship on the district. Provides that an exception expires at the end of the school year for which it is granted. Deletes existing text providing that an exception expires at the end of the semester for which it is granted, and prohibiting the commissioner from granting an exception for more than one semester at a time.

(e) Requires a district seeking an exception under Subsection (d) to notify the commissioner and apply for the exception not later than the later of October 1 or the 30th day after the first school day the district exceeds the limit in Subsection (a).

(f) Authorizes the commissioner, if a district repeatedly fails to comply with this section, to take any appropriate action authorized to be taken by the commissioner under Section 39.131 (Sanctions for Districts).

(g) Requires the Texas Education Agency, not later than January 1, 2011, to report to the legislature the number of applications for exceptions under Subsection (d) submitted by

each district and for each application indicate whether the application was granted or denied. Provides that this subsection expires February 1, 2011.

SECTION 3. Amends Section 34.0021, Education Code, by amending Subsections (a) and (b) and adding Subsection (c-1), as follows:

(a) Authorizes, rather than requires, each school district, pursuant to the safety standards established by the Department of Public Safety under Section 34.002, to conduct a training session for students and teachers concerning procedures for evacuating a school bus during an emergency.

(b) Provides that a school district that chooses to conduct a training session under Subsection (a) is encouraged to conduct the school bus emergency evacuation training session in the fall of the school year. Provides that the school district is also encouraged to structure the training session so that the session applies to school bus passengers, a portion of the session occurs on a school bus, and the session lasts for at least one hour. Deletes existing text requiring a school district to conduct the school bus emergency evacuation training at least twice each school year, with one training session occurring in the fall and one training session occurring in the spring. Deletes existing text requiring that a portion of the training session occur on a school bus and requiring the training session to last for at least one hour.

(c-1) Provides that a school district, immediately before each field trip involving transportation by school bus, is encouraged to review school bus emergency evacuation procedures with the school bus passengers, including a demonstration of the school bus emergency exits and the safe manner to exit.

SECTION 4. Amends Section 44.902, Education Code, as follows:

Sec. 44.902. New heading: LONG-RANGE ENERGY PLAN TO REDUCE CONSUMPTION OF ELECTRIC ENERGY. (a) Creates this subsection from existing text. Requires the board of trustees of a district to establish a long-range energy plan to reduce the district's annual electric consumption by five percent beginning with the 2008 state fiscal year and consume electricity in subsequent fiscal years in accordance with the district's energy plan. Deletes existing text requiring the board of trustees of a district to establish a goal to reduce the school district's annual electric consumption by five percent each state fiscal year for six years beginning September 1, 2007.

(b) Requires that the plan required under Subsection (a) include strategies for achieving energy efficiency that result in net savings for the district or can be achieved without financial cost to the district and for each strategy identified under Subdivision (1), the initial, short-term capital costs and lifetime costs and savings that may result from implementation of the strategy.

(c) Requires the board of trustees, in determining under Subsection (b) whether a strategy may result in financial cost to the district, to consider the total net costs and savings that may occur over the seven-year period following implementation of the strategy.

(d) Authorizes the board of trustees to submit the plan required under Subsection (a) to the State Energy Conservation Office for the purposes of determining whether funds available through loan programs administered by the office are available to the district.

SECTION 5. Repealer: Section 44.901(b) (regarding the requirement that the board of trustees establish a goal to reduce electric consumption by five percent each year for six years), Education Code.

SECTION 6. Provides that this Act applies beginning with the 2009-2010 school year.

SECTION 7. Effective date: upon passage or September 1, 2009.

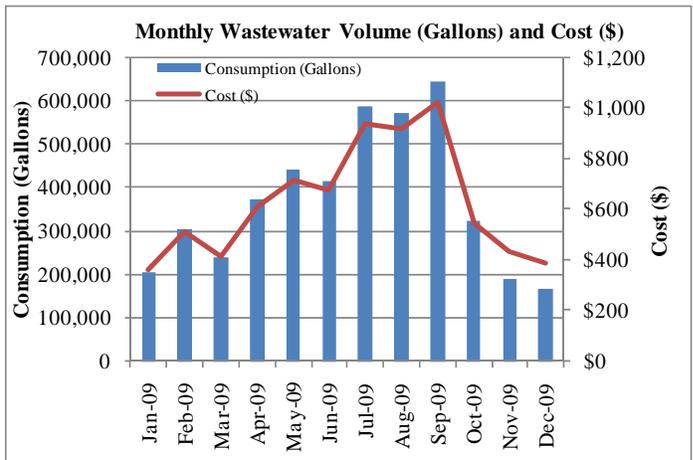
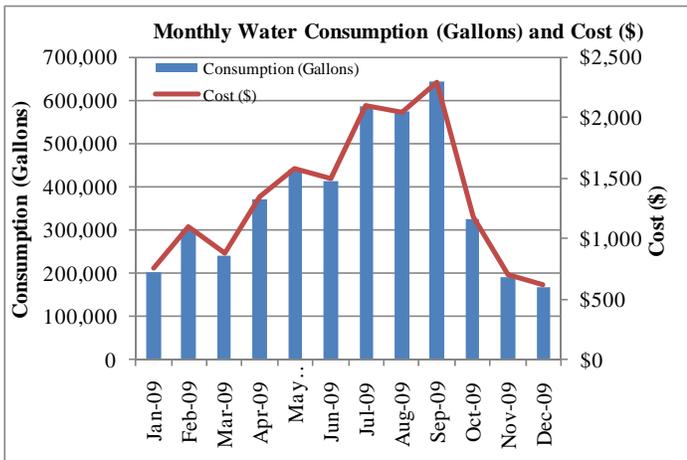
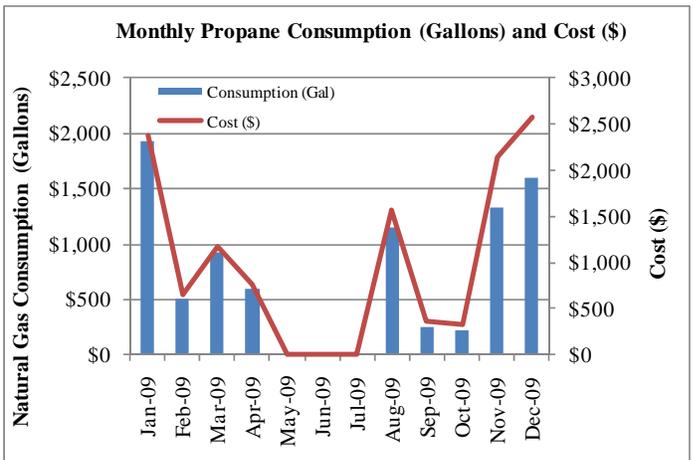
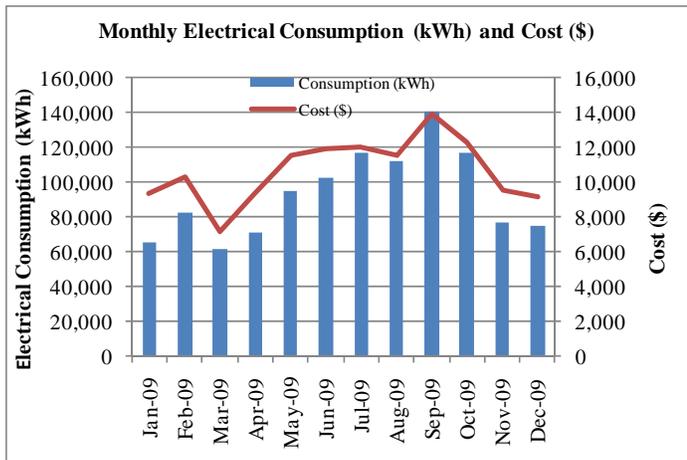
# APPENDIX B

## SAMPLE UTILITY DATA REPORTING FORM

Flatonia ISD - Sample Utility Data Input Form

MONTH	ELECTRICITY			PROPANE			WATER/WASTEWATER				
	KWH	COST \$	\$/KWH	MCF	COST \$	\$/GAL	GAL	COST \$	\$/GAL	COST \$	\$/GAL
								WATER	WATER	SEWER	SEWER
Jan-09	65,600	9,364	\$0.1427	\$1,925	\$2,370	\$1.2	203,000	\$754	\$0.00371	\$360	\$0.00177
Feb-09	82,320	10,319	\$0.1253	\$510	\$647	\$1.3	303,000	\$1,104	\$0.00364	\$510	\$0.00168
Mar-09	62,080	7,215	\$0.1162	\$925	\$1,166	\$1.3	239,000	\$880	\$0.00368	\$414	\$0.00173
Apr-09	70,920	9,354	\$0.1319	\$600	\$759	\$1.3	371,000	\$1,342	\$0.00362	\$612	\$0.00165
May-09	94,680	11,537	\$0.1219	\$0	\$0	\$0.0	440,000	\$1,584	\$0.00360	\$716	\$0.00163
Jun-09	102,880	11,968	\$0.1163	\$0	\$0	\$0.0	415,000	\$1,496	\$0.00360	\$678	\$0.00163
Jul-09	117,360	11,997	\$0.1022	\$0	\$0	\$0.0	587,000	\$2,098	\$0.00357	\$936	\$0.00159
Aug-09	112,640	11,595	\$0.1029	\$1,147	\$1,574	\$1.4	573,000	\$2,049	\$0.00358	\$915	\$0.00160
Sep-09	140,720	13,974	\$0.0993	\$250	\$367	\$1.5	644,000	\$2,298	\$0.00357	\$1,022	\$0.00159
Oct-09	117,320	12,333	\$0.1051	\$215	\$338	\$1.6	325,000	\$1,181	\$0.00363	\$543	\$0.00167
Nov-09	76,680	9,551	\$0.1246	\$1,328	\$2,139	\$1.6	189,000	\$705	\$0.00373	\$431	\$0.00228
Dec-09	75,040	9,205	\$0.1227	\$1,605	\$2,582	\$1.6	166,000	\$625	\$0.00376	\$385	\$0.00232
Total	1,118,240	\$128,412	\$0.1148	8,506	\$11,944	\$1.4	4,455,000	\$16,115	\$0.00362	\$7,522	\$0.00169

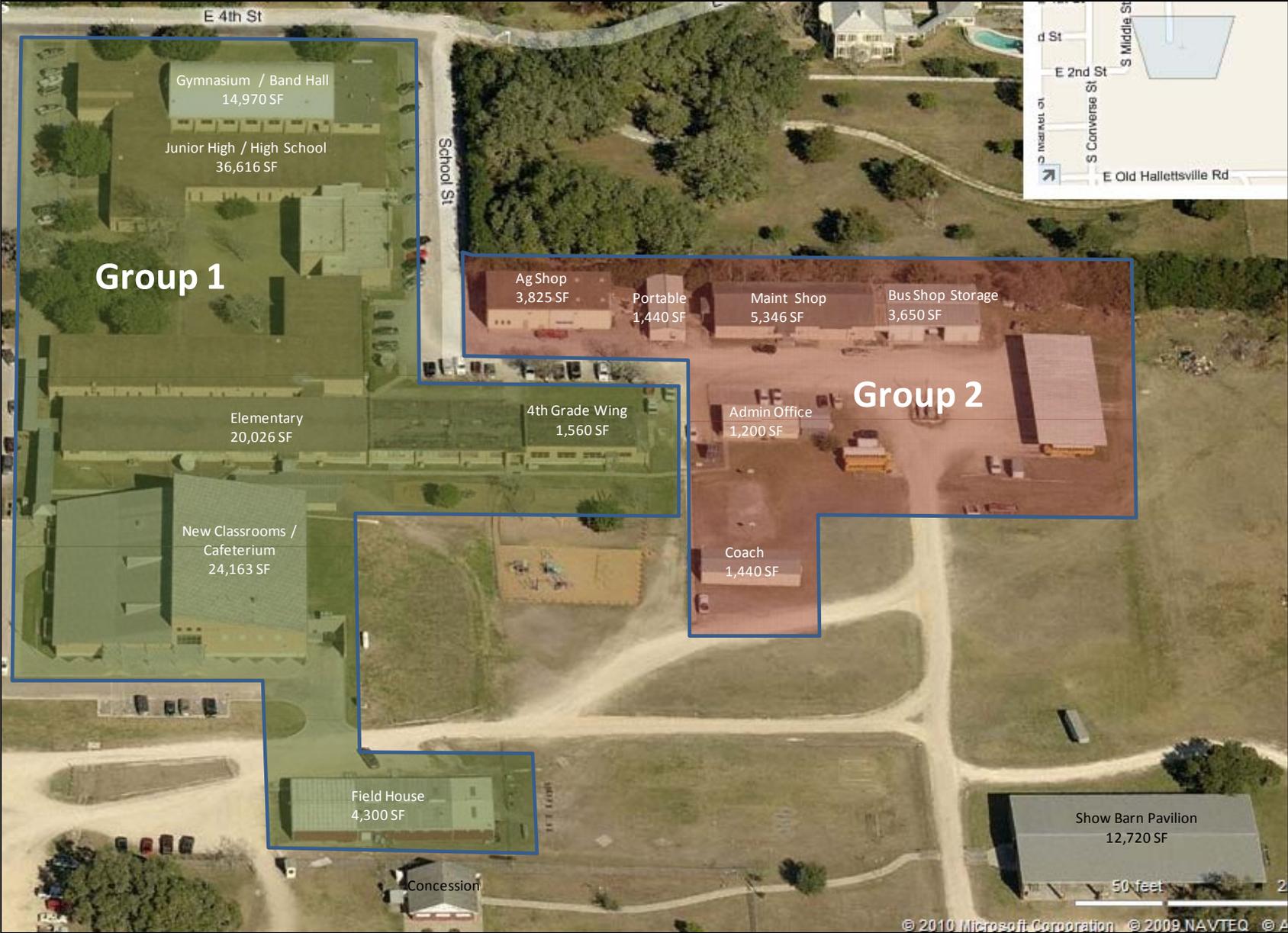
Gross Building Area: 118,536 SF



# APPENDIX C

## BASE YEAR CONSUMPTION HISTORY

**UTILITY DATA BUILDING GROUPS**



<b>Energy Cost and Consumption Benchmarks</b>												
		Electric			Propane			Total	Total	EUI	ECI	
	Building	KWH/Yr	MMBTU/Yr	\$Cost/Yr	Gal/Yr	MMBTU/Yr	\$Cost/Yr	\$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	\$/SF/Yr	SF*
1	High School, Junior High, Old Elementary, New Elementary, Cafeteria, Field House	1,029,240	3,513	117,730	6,871	629	9,628	127,357	4,142	41	1.25	101,635
2	Maintenance Shops, Administration, Bus Barn	89,000	304	10,682	1,635	150	2,316	12,998	454	27	0.77	16,901
		KWH/Yr	MMBTU/Yr	\$Cost/Yr	Gal/Yr	MMBTU/Yr	\$Cost/Yr	\$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	\$/SF/Yr	SF*
		1,118,240	3,817	128,412	8,506	779	11,944	140,355	4,596	39	1.18	118,536

\* Total Square Footage does not include the Show Barn or Concession Building. Even though the electric meter serving the buildings in Group 1 also serves the Show Barn and Concession Building for benchmarking purposes the calculation of the EUI and ECI does include the Show Barn or Concession Bldg. square footage since it was identified these buildings have limited annual usage compared to the majority of the K-12 facilities.

See Appendix C-1 for building groups.

Version 1

District: Flatonia

ACCOUNT# 13-1040-00 Electric  
163645 P 169950 P 113650 P Gas

BUILDING: High School, Junior High, Old Elementary, New Elementary, Cafeteria, Field House FLOOR AREA: 101,635

MONTH		YEAR		Electrical			Propane		
				CONSUMPTION	DEMAND		TOTAL ALL	CONSUMPTION	TOTAL
					METERED	CHARGED	COST OF		
KWH	KW	KW	DEMAND (\$)	COSTS (\$)	GALLONS	COSTS (\$)			
January	2009	60,480		328		8,576	1,575	1,946	
February	2009	74,880		356		9,330	310	392	
March	2009	56,520		295		6,537	925	1,166	
April	2009	64,800		277		8,547	400	505	
May	2009	87,120		364		10,601	0	0	
June	2009	94,680		317		10,974	0	0	
July	2009	108,360		263		11,001	0	0	
August	2009	102,600		270		10,524	945	1,295	
September	2009	131,400		418		13,033	250	367	
October	2009	108,720		392		11,415	215	338	
November	2009	70,560		367		8,763	1,075	1,729	
December	2009	69,120		274		8,427	1,175	1,890	
<b>TOTAL</b>		<b>1,029,240</b>				<b>117,730</b>	<b>6,870.5</b>	<b>9,628</b>	

**Energy Use Index:**

Annual Total Energy Cost = 127,357 \$/year      Total site BTU's/Yr ÷ Total Area (SF) = 41 kBTU/SF/year

Total KWH/yr x 0.003413 = 3,512.80 MMBTU/year

Total Gallons/yr x 0.0916 = 629.34 MMBTU/year

Total Other x \_\_\_\_\_ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 4,142 MMBTU/year

**Energy Cost Index:**

Total Energy Cost/Yr ÷ Total Area (SF) = 1.25 \$/SF/year

Electric Utility: City of Flatonia

Propane Utility: Sharp Propane

ACCOUNT# 13-1010-00 Electric  
68183 P Gas  
BUILDING: Maintenance Shops, Administration, Bus Barn FLOOR AREA: 16,901  
District: Flatonia

		ELECTRICAL				Propane		
		DEMAND			TOTAL ALL			
MONTH	YEAR	CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
		KWH	KW	KW	DEMAND (\$)	COSTS (\$)	GALLONS	COSTS (\$)
January	2009	5,120		36		788	350	425
February	2009	7,440		43		988	200	255
March	2009	5,560		33		678	0	0
April	2009	6,120		24		807	200	255
May	2009	7,560		32		936	0	0
June	2009	8,200		32		994	0	0
July	2009	9,000		33		996	0	0
August	2009	10,040		31		1,072	202	279
September	2009	9,320		30		941	0	0
October	2009	8,600		32		918	0	0
November	2009	6,120		34		788	253	410
December	2009	5,920		30		778	430	693
TOTAL		89,000				10,682	1,635.1	2,316

**Energy Use Index:**  
Annual Total Energy Cost = 12,998 \$/year      Total site BTU's/Yr ÷ Total Area (SF) = 27 kBTU/SF/year

Total KWH/yr x 0.003413 = 303.76 MMBTU/year  
Total Gallons/yr x 0.0916 = 149.78 MMBTU/year  
Total Other x \_\_\_\_\_ = 0.0 MMBTU/year  
Total Site MMBTU's/yr = 454 MMBTU/year

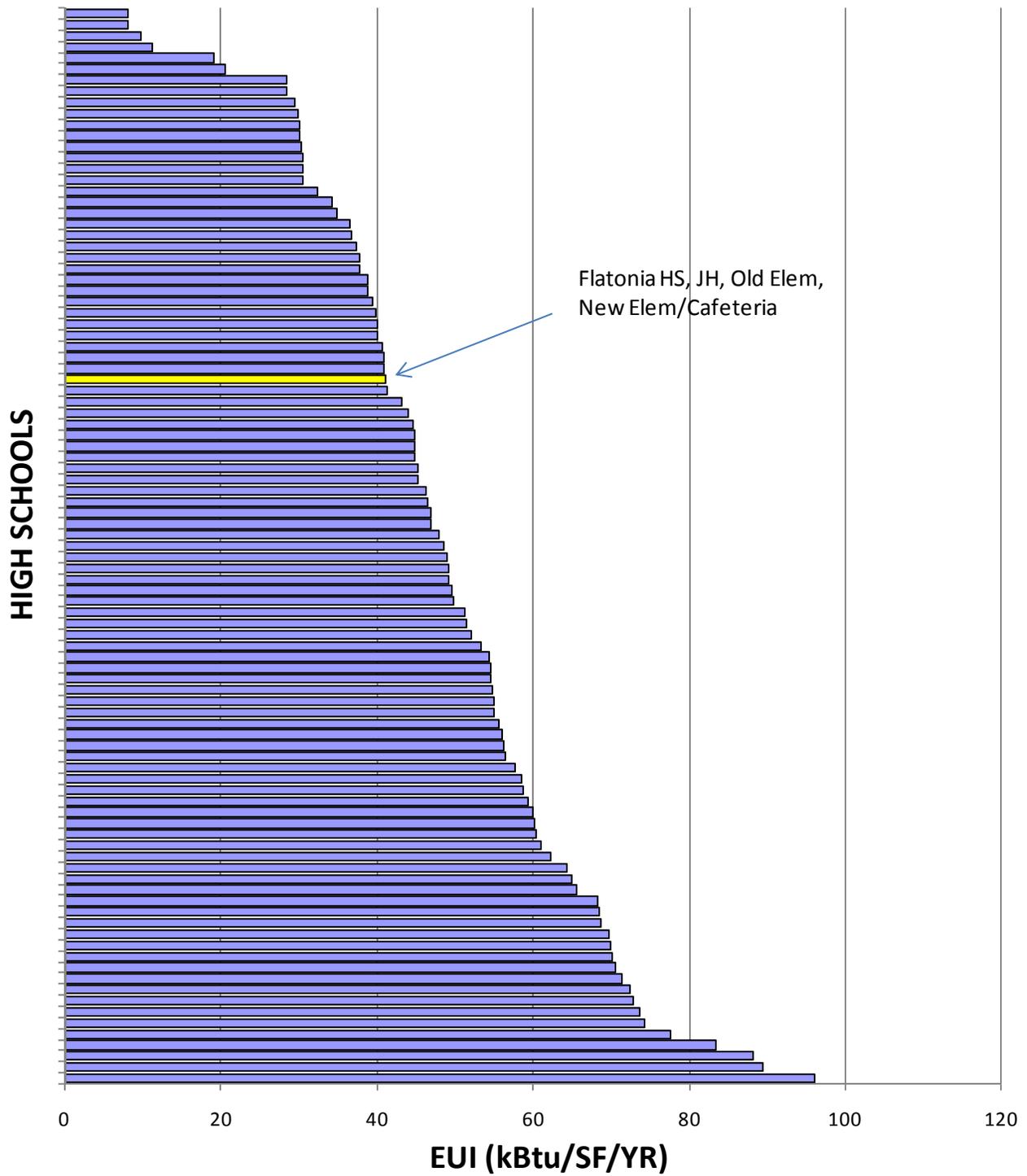
**Energy Cost Index:**  
Total Energy Cost/Yr ÷ Total Area (SF) = 0.77 \$/SF/year

Electric Utility: City of Flatonia      Gas Utility: Sharp Propane

# APPENDIX D

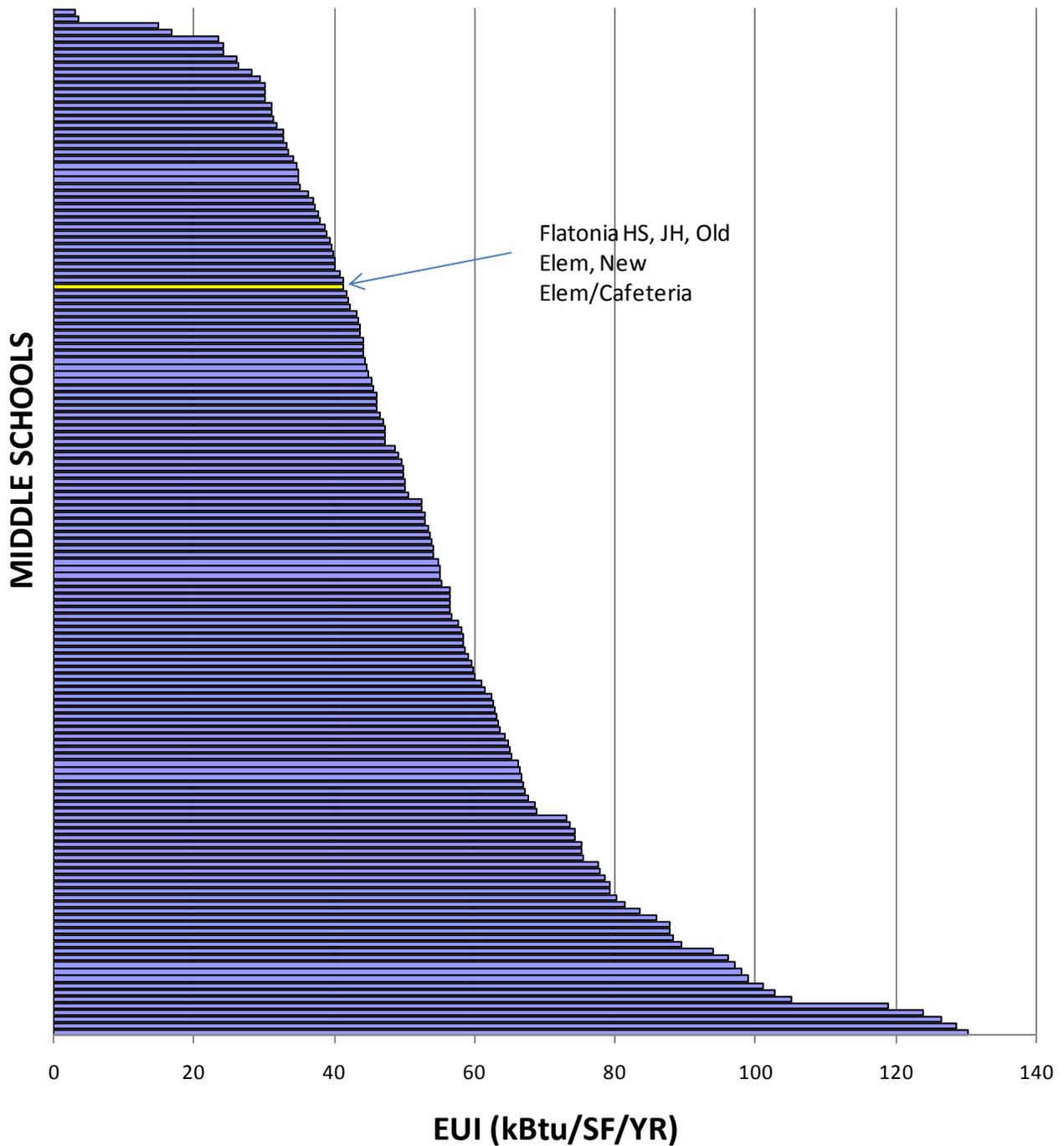
## ENERGY PERFORMANCE COMPARISON CHARTS

# TEESI Database of Texas Schools Energy Performance Comparison Chart • HIGH SCHOOLS •



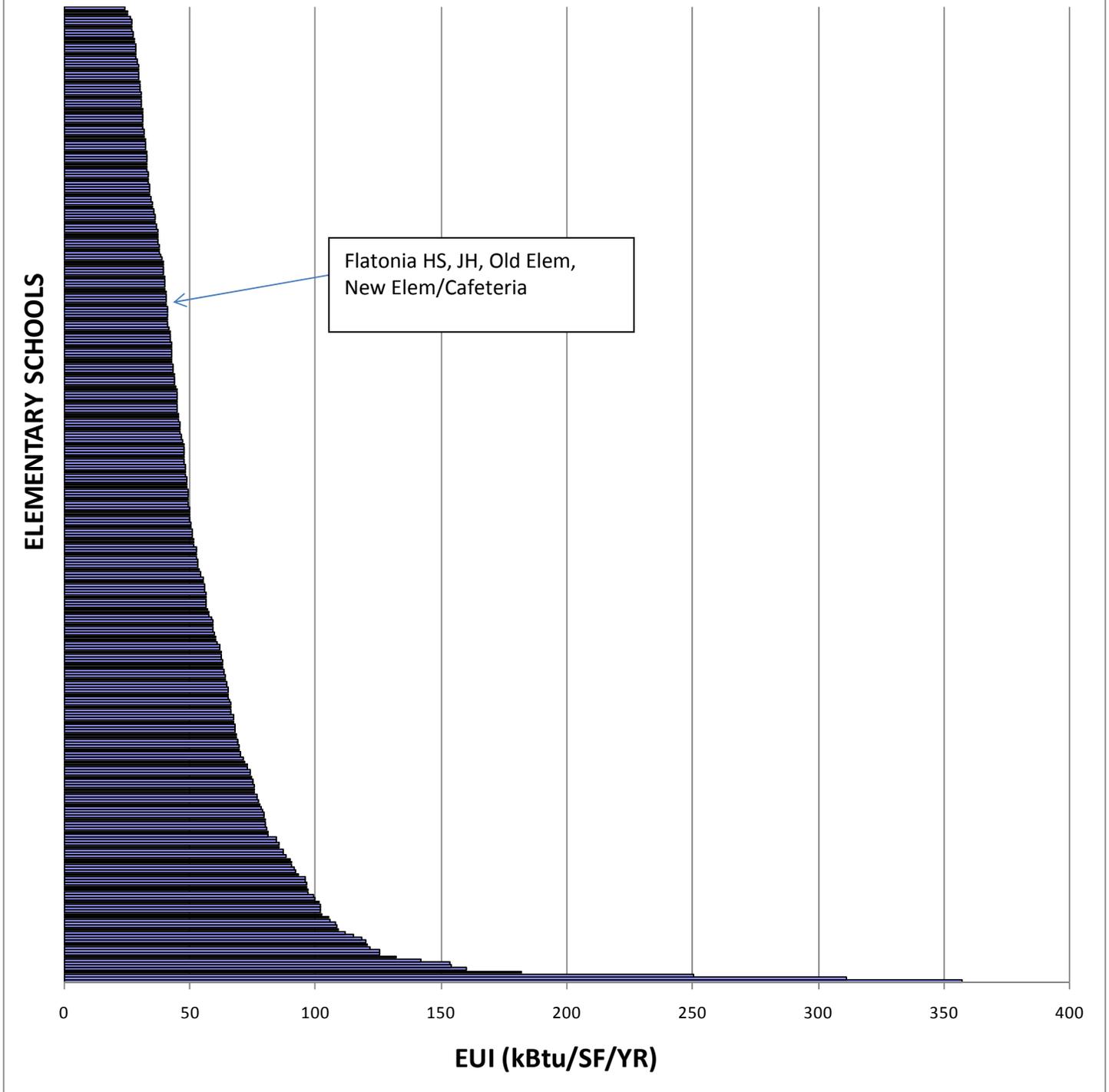
(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)

**TEESI Database of Texas Schools  
Energy Performance EUI Comparison Chart  
• MIDDLE SCHOOLS •**



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)

**TEESI Database of Texas Schools  
Energy Performance Comparison Chart  
• ELEMENTARY SCHOOLS •**



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)

# APPENDIX E

## TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

## Boilers Checklist

Description	Comments	Maintenance Frequency															
		Daily	Weekly	Monthly	Annually												
Boiler use/sequencing	Turn off/sequence unnecessary boilers	X															
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X															
Follow manufacturer's recommended procedures in lubricating all components	Compare temperatures with tests performed after annual cleaning	X															
Check steam pressure	Is variation in steam pressure as expected under different loads? Wet steam may be produced if the pressure drops too fast	X															
Check unstable water level	Unstable levels can be a sign of contaminants in feedwater, overloading of boiler, equipment malfunction	X															
Check burner	Check for proper control and cleanliness	X															
Check motor condition temperatures	Check for proper function	X															
Check air temperatures in boiler room	Temperatures should not exceed or drop below design limits	X															
Boiler blowdown	Verify the bottom, surface and water column blow downs are occurring and are effective	X															
Boiler logs	Keep daily logs on: <ul style="list-style-type: none"> <li>• Type and amount of fuel used</li> <li>• Flue gas temperature</li> <li>• Makeup water volume</li> <li>• Steam pressure, temperature, and amount generated</li> </ul> Look for variations as a method of fault detection	X															
Check oil filter assemblies	Check and clean/replace oil filters and strainers	X															
Inspect oil heaters	Check to ensure that oil is at proper temperature prior to burning	X															
Check boiler water treatment	Confirm water treatment system is functioning properly	X															
Check flue gas temperatures and composition	Measure flue gas composition and temperatures at selected firing positions - recommended O2% and CO2%  <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Fuel</td> <td style="width: 35%;">O2 %</td> <td style="width: 35%;">CO2%</td> </tr> <tr> <td>Natural gas</td> <td>1.5</td> <td>10</td> </tr> <tr> <td>No. 2 fuel oil</td> <td>2.0</td> <td>11.5</td> </tr> <tr> <td>No. 6 fuel oil</td> <td>2.5</td> <td>12.5</td> </tr> </table> Note: percentages may vary due to fuel composition variations	Fuel	O2 %	CO2%	Natural gas	1.5	10	No. 2 fuel oil	2.0	11.5	No. 6 fuel oil	2.5	12.5		X		
Fuel	O2 %	CO2%															
Natural gas	1.5	10															
No. 2 fuel oil	2.0	11.5															
No. 6 fuel oil	2.5	12.5															

Boilers Checklist (contd)

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Check all relief valves	Check for leaks		X		
Check water level control	Stop feedwater pump and allow control to stop fuel flow to burner. Do not allow water level to drop below recommended level.		X		
Check pilot and burner assemblies	Clean pilot and burner following manufacturer's guidelines. Examine for mineral or corrosion buildup.		X		
Check boiler operating characteristics	Stop fuel flow and observe flame failure. Start boiler and observe characteristics of flame.		X		
Inspect system for water/steam leaks and leakage opportunities	Look for: leaks, defective valves and traps, corroded piping, condition of insulation		X		
Inspect all linkages on combustion air dampers and fuel valves	Check for proper setting and tightness		X		
Inspect boiler for air leaks	Check damper seals		X		
Check blowdown and water treatment procedures	Determine if blowdown is adequate to prevent solids buildup			X	
Flue gases	Measure and compare last month's readings flue gas composition over entire firing range			X	
Combustion air supply	Check combustion air inlet to boiler room and boiler to make sure openings are adequate and clean			X	
Check fuel system	Check pressure gauge, pumps, filters and transfer lines. Clean filters as required.			X	
Check belts and packing glands	Check belts for proper tension. Check packing glands for compression leakage.			X	
Check for air leaks	Check for air leaks around access openings and flame scanner assembly.			X	
Check all blower belts	Check for tightness and minimum slippage.			X	
Check all gaskets	Check gaskets for tight sealing, replace if do not provide tight seal			X	
Inspect boiler insulation	Inspect all boiler insulation and casings for hot spots			X	
Steam control valves	Calibrate steam control valves as specified by manufacturer			X	
Pressure reducing/regulating valves	Check for proper operation			X	

Boilers Checklist (contd)

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Perform water quality test	Check water quality for proper chemical balance			X	
Clean waterside surfaces	Follow manufacturer's recommendation on cleaning and preparing waterside surfaces				X
Clean fireside	Follow manufacturer's recommendation on cleaning and preparing fireside surfaces				X
Inspect and repair refractories on fireside	Use recommended material and procedures				X
Relief valve	Remove and recondition or replace				X
Feedwater system	Clean and recondition feedwater pumps. Clean condensate receivers and deaeration system				X
Fuel system	Clean and recondition system pumps, filters, pilot, oil preheaters, oil storage tanks, etc.				X
Electrical systems	Clean all electrical terminals. Check electronic controls and replace any defective parts.				X
Hydraulic and pneumatic valves	Check operation and repair as necessary				X
Flue gases	Make adjustments to give optimal flue gas composition. Record composition, firing position, and temperature.				X
Eddy current test	As required, conduct eddy current test to assess tube wall thickness				X

## Chillers Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Semi-Annually	Annually
Chiller use/sequencing	Turn off/sequence unnecessary chillers	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Check setpoints	Check all setpoints for proper setting and function	X			
Evaporator and condenser coil fouling	Assess evaporator and condenser coil fouling as required		X		
Compressor motor temperature	Check temperature per manufacturer's specifications		X		
Perform water quality test	Check water quality for proper chemical balance		X		
Leak testing	Conduct leak testing on all compressor fittings, oil pump joints and fittings, and relief valves		X		
Check all insulation	Check insulation for condition and appropriateness		X		
Control operation	Verify proper control function including: <ul style="list-style-type: none"> <li>• Hot gas bypass</li> <li>• Liquid injection</li> </ul>		X		
Check vane control settings	Check settings per manufacturer's specification			X	
Verify motor load limit control	Check settings per manufacturer's specification			X	
Verify load balance operation	Check settings per manufacturer's specification			X	
Check chilled water reset settings and function	Check settings per manufacturer's specification			X	
Check chiller lockout setpoint	Check settings per manufacturer's specification				X
Clean condenser tubes	Clean tubes at least annually as part of shutdown procedure				X

## Building Controls Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Semi-Annually	Annually
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Verify control schedules	Verify in control software that schedules are accurate for season, occupancy, etc.	X			
Verify setpoints	Verify in control software that setpoints are accurate for season, occupancy, etc.	X			
Time clocks	Reset after every power outage	X			
Check all gauges	Check all gauges to make sure readings are as expected		X		
Control tubing (pneumatic system)	Check all control tubing for leaks		X		
Check outside air volumes	Calculated the amount of outside air introduced and compare to requirements		X		
Check setpoints	Check setpoints and review rational for setting		X		
Check schedules	Check schedules and review rational for setting		X		
Check deadbands	Assure that all deadbands are accurate and the only simultaneous heating and cooling is by design		X		
Check sensors	Conduct thorough check of all sensors - temperature, pressure, humidity, flow, etc. - for expected values			X	
Time clocks	Check for accuracy and clean			X	
Calibrate sensors	Calibrate all sensors: temperature, pressure, humidity, flow, etc.				X

# Pumps Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Pump use/sequencing	Turn off/sequence unnecessary pumps	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Check lubrication	Assure that all bearings are lubricated per the manufacture's recommendation			X	
Check packing	Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals.			X	
Motor/pump alignment	Aligning the pump/motor coupling allows for efficient torque transfer to the pump			X	
Check mountings	Check and secure all pump mountings			X	
Check bearings	Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary.				X
Motor condition	Checking the condition of the motor through temperature or vibration analysis assures long life				X

# Fans Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
System use/sequencing	Turn off/sequence unnecessary equipment	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Observe belts	Verify proper belt tension and alignment			X	
Inspect pulley wheels	Clean and lubricate where required			X	
Inspect dampers	Confirm proper and complete closure control; outside air dampers should be airtight when closed			X	
Observe actuator/linkage control	Verify operation, clean, lubricate, adjust as needed			X	
Check fan blades	Validate proper rotation and clean when necessary			X	
Filters	Check for gaps, replace when dirty - monthly			X	
Check for air quality anomalies	Inspect for moisture/growth on walls, ceilings, carpets, and in/outside of ductwork. Check for musty smells and listen to complaints.			X	
Check wiring	Verify all electrical connections are tight				X
Inspect ductwork	Check and refasten loose connections, repair all leaks				X
Coils	Confirm that filters have kept clean, clean as necessary				X
Insulation	Inspect, repair, replace all compromised duct insulation				X

## Electric Motors Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Motor use/sequencing	Turn off/sequence unnecessary motors	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Motor condition	Check the condition of the motor through temperature or vibration analysis and compare to baseline values		X		
Check lubrication	Assure that all bearings are lubricated per the manufacture's recommendation			X	
Check packing	Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals.			X	
Motor alignment	Aligning the motor coupling allows for efficient torque transfer to the pump			X	
Check mountings	Check and secure all motor mountings			X	
Check terminal tightness	Tighten connection terminals as necessary			X	
Cleaning	Remove dust and dirt from motor to facilitate cooling			X	
Check bearings	Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary.				X
Motor condition	Checking the condition of the motor through temperature or vibration analysis assures long life				X
Check for balanced three-phase power	Unbalanced power can shorten the motor life through excessive heat build up				X
Check for over-voltage or under-voltage conditions	Over- or under-voltage situations can shorten the motor life through excessive heat build up				X

# APPENDIX F

## LOANSTAR INFORMATION

# Texas LoanSTAR Program

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## **FACTS ABOUT LoanSTAR**

The State of Texas LoanSTAR (Saving Taxes and Resources) Program finances energy efficient facility up-grades for state agencies, public schools, institutions of higher education, local governments, municipalities, and hospitals. The program's revolving loan mechanism allows participants to borrow money and repay all project costs through the stream of **cost savings** produced.

## **ELIGIBLE PROJECTS**

Up-grades financed through the program include, but are not limited to, (1) energy efficient lighting systems; (2) high efficiency heating, ventilation and air conditioning systems; (3) energy management systems; (4) boiler efficiency improvements; (5) energy recovery systems; (6) building shell improvements; and (7) load management projects. The prospective borrower hires a Professional Engineer to analyze the potential energy efficient projects that will be submitted for funding through the Loan STAR Program. All engineering costs are covered under the program.

## **PROGRAM REQUIREMENTS**

Once the projects are analyzed and the prospective borrower agrees with the recommended projects, the engineer prepares an Energy Assessment Report (EAR) with the project descriptions and calculations. The EAR must be prepared according to the LoanSTAR Technical Guidelines. The EAR is reviewed and approved by the State Energy Conservation Office (SECO) technical staff before project financing is authorized. Projects financed by LoanSTAR must have an average simple payback of ten years or less. Borrowers do, however, have the option of buying down paybacks to meet the composite ten-year limit.

*To ensure up-grade projects are designed and constructed according to the EAR, SECO performs a review of the design documents at the 50% and 100% completion phases. On-site construction monitoring is also performed at the 50% and 100% completion phases.*

## **SAVINGS VERIFICATION**

To ensure that the Borrower is achieving the estimated energy savings, monitoring and verification is required for all LoanSTAR funded projects. The level of monitoring and verifications may range from utility bill analysis to individual system or whole building metering depending on the size and type of retrofit projects. If whole building metering is required, metering and monitoring cost can be rolled into the loan.

For additional information regarding the LoanSTAR program, please contact:

**Eddy Trevino**  
SECO, LoanSTAR Program Manager  
(512) 463-1080

# APPENDIX G

## REQUEST FOR ENERGY ASSISTANCE



RECEIVED  
JAN 28 2010

**Public Schools, Colleges and Non-Profit Hospitals**

**Preliminary Energy Assessment  
Service Agreement**

Investing in our public schools, colleges and non-profit hospitals through improved energy efficiency in public buildings is a win-win opportunity for our communities and the state. Energy-efficient buildings reduce energy costs, increase available capital, spur economic growth, and improve working and living environments. The Preliminary Energy Assessment Service provides a viable strategy to achieve these goals.

**Description of the Service**

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with \_\_\_\_\_, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

**Principles of the Agreement**

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- ✓ Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- ✓ SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- ✓ Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

**Acceptance of Agreement**

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: Dr. Alice Smith Date: 1/27/2010  
 Name (Mr./Ms./Dr.): Dr. Alice Smith Title: Superintendent  
 Organization: Flatomia S.D.D. Phone: 361-865-2941, ext. 511  
 Street Address: 400 E. 4th Street Fax: 361-865-2940  
 Mailing Address: P.O. Box 189 E-Mail: asmith@flatomia.txed.net  
Flatomia, TX 78941 County: Fayette - TESSI

**Contact Information:**

Name (Mr./Ms./Dr.): \_\_\_\_\_ Title: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-Mail: \_\_\_\_\_ County: \_\_\_\_\_

Please sign and mail or fax to: Juline Ferris, Schools and Education Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-936-9283. Fax 512-475-2569.