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Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

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SECO
State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY:

This **Energy Efficient Partnership Service** is provided to public school districts and hospitals as a portion of the state's ***Schools/ Local Government Energy Management Program***; a program sponsored by the **State Energy Conservation Office (SECO)**, a division of the **State of Texas Comptroller of Public Accounts**.

SECO
State Energy Conservation Office

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The service assists these public, non-profit institutions to take basic steps towards energy efficient facility operation. Active involvement in the partnership from the entire administration and staff within the agencies and institutions is critical in developing a customized blueprint for energy efficiency for their facilities.

In February 2010, **SECO** received a request for technical assistance from *Bruce Tabor*, Superintendent for Ezzell I.S.D. **SECO** responded by sending ESA **Energy Systems Associates, Inc.**, a registered professional engineering firm, to prepare this preliminary report for the school district. This report is intended to provide support for the district as it determines the most appropriate path for facility renovation, especially as it pertains to the energy consuming systems around the facility. It is our opinion that significant decreases in annual energy costs, as well as major maintenance cost reductions, can be achieved through the efficiency recommendations provided herein.

This study has focused on energy efficiency and systems operations. To that end, an analysis of the utility usage and costs for **Ezzell ISD,** (hereafter known as EISD) was completed by ESA **Energy Systems Associates, Inc**., (hereafter known as *Engineer*) to determine the annual energy cost index (ECI) and energy use index (EUI) for each campus or facility. A complete listing of the Base Year Utility Costs and Consumption is provided in Section 3.0 of this report.

Following the utility analysis and a preliminary consultation with *Mr. Tabor*, a walk-through energy analysis was conducted throughout the campus. Specific findings of this survey and the resulting recommendations for both operation and maintenance procedures and cost-effective energy retrofit installations are identified in Section 6.0 of this report.

We estimate that as much as **$1,650** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$15,360**, yielding an average simple payback of **9-1/3** years.

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1*	$51,150	$2,500	20-1/2 Years
HVAC ECRM #2	$ 12,500	$ 1,250	10 Years
Lighting ECRM #1	$ 2,200	$ 200	11 Years
Lighting ECRM #2	$ 660	$ 200	3-1/3 Years
TOTAL PROJECTS (Lighting and HVAC 2)	$ 15,360	$ 1,650	9-1/3 Years

*The payback for this project is longer than the life expectancy for the units. The reasons for the high payback likely involve good energy management practices keeping the units off during temperate weather. Due to the high payback period, we are not including the costs or savings the in final project summary. The project remains listed in the chart because the units are nearing the end of their normal life expectancy; we would be negligent to not bring the district's attention to the need to consider budgeting for their replacement in order to avoid emergency replacement costs.

The total utility cost for EISD in 2009 was $13,362. The projected savings of $1,650 would represent a decrease in utility expenditures for the district of 12%. Although additional savings from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Internal Rate of Return (IRR), for this retrofit program has been calculated and shown in Section 7.0 of this report.

Our final "summary" comment is that **SECO** views the completion and presentation of this report as a beginning, rather than an end, of our relationship with EISD. We hope to be ongoing partners in assisting you to implement the recommendations listed in this report. Please call us if you have further questions or comments regarding your Energy Management Issues.

2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities. After receipt of the PEASA, an initial visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state to review the program elements that SECO provides to school districts and determine which elements could best benefit the district. A summary of the *Partner's* most recent twelve months of utility bills was provided to the engineer for the preliminary assessment of the Energy Performance Indicators. After reviewing the utility bill data analysis and consultation with SECO to determine the program elements to be provided to EISD, ESA returned to the facilities to perform the following tasks:

1. Analyze systems for code and standard compliance in areas such as cooling system refrigerants used, outside air quantity, and lighting illumination levels.
2. Develop an accurate definition of system and equipment replacement projects along with installation cost estimates, estimated energy and cost savings and analyses for each recommended project.
3. Develop a prioritized schedule for replacement projects.
4. Developing and drafting an overall Energy Management Policy.
5. Assist in the development of guidelines for efficiency levels of future equipment purchases.

3.0 ENERGY PERFORMANCE INDICATORS:

In order to easily assess the *Partner's* energy utilization and current level of efficiency, there are two key "Energy Performance Indicators" calculated within this report.

1. Energy Utilization Index

The Energy Utilization Index (EUI) depicts the total annual energy consumption per square foot of building space, and is expressed in "British Thermal Units" (BTUs).

To calculate the EUI, the consumption of electricity and gas are first converted to equivalent BTU consumption via the following formulas:

ELECTRICITY Usage

[Total KWH /yr] x [3413 BTUs/KWH] = __________ BTUs / yr

NATURAL GAS Usage

[Total MCF/yr] x [1,030,000 BTUs/MCF] = ________ BTUs / yr

After adding the BTU consumption of each fuel, the total BTUs are then divided

by the building area.

EUI = [Electricity BTUs + Gas BTUs] divided by [Total square feet]

2. Energy Cost Index

The Energy Cost Index (ECI) depicts the total annual energy cost per square foot of building space.

To calculate the ECI, the annual costs of electricity and gas are totaled and divided by the total square footage of the facility:

ECI = [Electricity Cost + Gas Cost] divided by [Total square feet]

These indicators may be used to compare the facility's current cost and usage to past years, or to other similar facilities in the area. Although the comparisons will not provide specific reasons for unusual operation, they serve as indicators that problems may exist within the energy consuming systems.

THE CURRENT ENERGY PERFORMANCE INDICATORS FOR :

EZZELL ISD

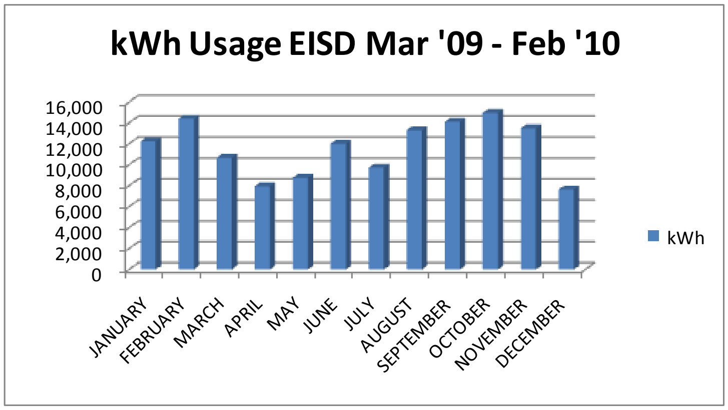
CAMPUS	ENERGY UTILIZATION INDEX (EUI) (Btu/sf-year)	ENERGY COST INDEX (ECI) ($/sf-year)
2009 Ezzell K-12	**37,929**	**$1.07**

OWNER: **EZZELL ISD** **BUILDING:** **K-12**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	12,240				1,103	0	$0
FEBRUARY	2010	14,400				1,390	0	0
MARCH	2009	10,680				1,024	0	0
APRIL	2009	7,940				768	0	0
MAY	2009	8,780				844	0	0
JUNE	2009	12,000				1,143	0	0
JULY	2009	9,720				924	0	0
AUGUST	2009	13,320				1,279	0	0
SEPTEMBER	2009	14,100				1,355	0	0
OCTOBER	2009	14,960				1,401	0	0
NOVEMBER	2009	13,500				1,276	0	0
DECEMBER	2009	7,620				855	0	0
TOTAL		**139,260**				**$13,362**	**0**	**$0**

Annual Total Energy Cost =	$13,362	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	37,929 BTU/s.f.yr
Total KWH x 0.003413 =	475.29	x 106		
Total MCF x 1.03 =	0.00	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$1.07 $/s.f. yr
Total Other x ____		x 106		
Total Site BTU's/yr	475.29	x 106		
Floor area:	12,531	s.f.		
Electric Utility	**Account #**	**Meter#**		
Guadalupe Valley Electric Coop	Single	Single		

Charting the annual electricity consumption reveals that the district does not experience a significant decrease in consumption for June and July as would be expected for periods of vacationing students. While it is acknowledged that summer months do represent custodial and administrative occupancy periods, the lack of a decrease in consumption for these months may indicate an opportunity for improved coordination and zoning of June and July Administrative and Custodial activities in order to reduce consumption during these time periods. The district conditions their spaces with packaged heat pump units; control is provided with conventional thermostats. The lack of a decrease in consumption during summer months implies that more units than necessary are being operated for floor maintenance activities.



The second observation apparent from the consumption chart is that the electric heat used during the winter is having more of an impact on the utility budget than is the cooling consumption during the warmer months. This is contrary to curves generated by most South and Central Texas schools. One possible cause for this profile is that the electric heat may be undersized for the demand and therefore operates many more hours than should be necessary to satisfy comfort in the colder months.

Ezzell ISD is served by Guadalupe Valley Electric Coop. The rate schedule analysis for the district is shown below. A copy of the rate schedule is included in Appendix II.

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

ELECTRIC COOPERATIVE: Guadalupe Valley Electric Cooperative

Electric Rate: Single Phase General Service

Customer Charge	=	$15.00 per meter
Demand Charge	=	$0.00 per kW
Energy Charge		
First 3,000 kWh	=	$.02638 per kWh
Above 3,000 kWh	=	$ 0.0160 per kWh
Power Cost Recovery Factor	=	Varies per wholesale power costs

Average Savings for consumption = **$0.09595/kWh** (per billing analysis period)

Average Savings for demand = **= $0.00/kW**

5.0 CAMPUS DESCRIPTIONS:

Ezzell ISD consists of three main educational buildings which are located on one K-8 campus at 20500 FM 531 in Ezzell, Texas. The campus totals 12,531 square feet. The buildings are single story, CMU block or siding-clad cavity wall construction with low-sloping metal roofs. The original building construction was in the 1930s; other buildings were added in 1975 and 1981. The facilities are occupied from mid- August through late May on a weekday schedule of 7:15 A.M. to 4:00 P.M. Most windows are non-tinted, single pane, double hung type, but appear to be in fair condition. Weatherstripping at most doors is missing or needing replaced.

HVAC System Description:

The majority of the campus is conditioned with packaged heat pump units. All but one of these units was manufactured in 1990-1993. The single exception is a Lennox L-series packaged heat pump installed behind the Kitchen in 2005. Many of the units do not have coil guards and have sustained coil fin damage due to weather, vandalism, or grounds maintenance equipment (see Figure 1). *We recommend that future HVAC equipment purchases require heavy-duty coil guards are included with the product installation to prevent this type of damage.* Sustaining damage to just 10% of the coil fins on the condenser coil can diminish operating efficiency up to 30%.

Figure 1: Packaged heat pump coil fin damage

The ductwork penetrations into the building vary from flex duct material partially shielded with sheet metal enclosures to rigid duct coated with duct sealant. *We recommend the district budget to replace all of the heat pump split systems except for the 2005 Lennox unit.* For this unit, we recommend combing the damaged coil fins straight and installing a hail guard to prevent coil fin damage in the future. *Ductwork penetrations that are not fully sealed between the interior and exterior of the building should be corrected at the time the new units are installed.*

Figure 2: 1989 Split System Units

There are three 1989 heat pump split systems unit at one classroom building (see figure 2). These 21 year old units have served their full 15-20 year life expectancy and are no longer operating with any significant degree of efficiency. *We recommend that they be replaced with new high efficiency R410a heat pump split systems. At the time these are replaced, we recommend the units be supplied with concrete maintenance pads that will minimize potential damage to the units from grounds maintenance equipment being utilized against the unit shell.*

The remainder of the HVAC system consists of packaged heat pump units that distribute and return air from the building through sidewall ductwork (see Figure 3). Some of these duct connections are appropriately sealed to resist air and animal intrusion; others are not. *We recommend that all of the duct connections between the interior and exterior of the building be sealed appropriately. Additionally, we recommend the units be supplied with heavy-duty coil guards to prevent coil fin damage as the units are located in the proximity of passing students and yard maintenance equipment.* Most of the units do not currently have condensate drain lines; at least one unit serving the Kitchen has a drain connection that is improperly plumbed (the outlet is plumbed upside down and is higher in elevation than the drain connection) likely forcing condensate to collect in the drain pan or overflow into the unit itself (see Figure 4).

Figure 3 Packaged Heat Pumps

Figure 4 Condensate Drain Plumbing

The current HVAC inventory for EISD is as follows:

Ezzell ISD K-8 Facility						
Unit *	**Make**	**Model**	**Serial**	**Age**	**Electrical****	**Notes / Recommendations**
1	Lennox	HP18-311U-7P	5189G09522	1989	208/1/18	Replace
2	Lennox	HP18-311U-7P		1989	208/1/18	Replace
3	Lennox	HP18-311U-7P		1989	208/1/18	Replace
4				~2009	120/1	Window Unit - no coil guard - portable
5	Carrier	~ 5 ton	W056049	~1990	230/1/23.4	Replace packaged heat pump
6	Carrier	~ 5 ton		~1990	230/1/23.4	Replace packaged heat pump
7	Ruud	USND-036-J		1992	230/1/21.4	has flex duct conxn w/ bldg
8	Ruud	USNE-036-J		1993	230/1/20.2	Replace
9	Lennox	THA060S2BNF	5606E01661	2006	230/1/25	Needs coil guard - comb fins
10	Lennox	CHP20-651	5694H100I4	1994	230/1/28.8	Replace
11	Lennox	CHA16-036-1P	5603J09361	2003	230/1/17.7	Replace - fins terribly damaged
12	Carrier	50MH036340	1428626		230/1/24	Replace
13	Lennox	CHA16-036-1P	5605K09105	2005	230/1/17.7	Comb fins - install hail guard
* Units have numbered by surveyor and do not reflect area assignment by district						
**Electrical characteristics are for compressor only - volts / phase / running load amps						

<u>Control System Description:</u>

The district utilizes conventional thermostats to control the district's HVAC equipment. *We recommend the district consider replacing the existing thermostats with IP-addressable programmable thermostats when the HVAC units are renovated*. These units are connected to a Local Area Network (LAN) connection which allows them to be monitored and programmed over the district's local network. Software is available to allow global changes to all thermostats on the network which would greatly simplify making changes to the occupied schedules.

Lighting System Description:

The district is currently illuminated with mostly T12 linear fluorescent fixtures. There are also some incandescent fixtures utilized at the district. The district already has plans in place to renovate the system with compact fluorescent, T8 lamps and electronic ballasts in all locations except for the gymnasium. Test room renovations have already been performed in two classrooms; in addition to new lamps and ballasts, the district has and will introduce dual fixture switching so that the room may be partially dimmed as appropriate for videos and demonstrations. This renovation will allow the district to comply with the requirements of Senate Bill 300 which mandates school districts install the most efficient lamps and ballasts possible in their existing lighting system.

The gymnasium currently utilizes 11 each 2-lamp F96T12 fixtures (see Figure 5). *We recommend these fixtures be replaced with new 4-lamp T8 high-bay fixtures to significantly improve the quality of light in the space and generate energy savings.* The new fixtures will eliminate the lamp flickering and ballast hum that is currently extremely prevalent in the gym.

Figure 5 Existing Gym Lighting

The district's exit lighting is largely incandescent fixtures containing two each 15 watt lamps. We recommend the district renovate these fixtures with new LED lamps or replace them with new LEC (Light Emitting Capacitor) technology. The new LEC fixtures consume just ¼ of a watt of power and cost less than $1.00 per year to operate.

Kitchen Cooling System Description:

Currently, the district does not have a traditional walk-in cooler/freezer unit in the Kitchen. Instead, they have a retail commercial cooler (115V/1/12A, R404A refrigerant), two each upright residential freezers, an upright combination refrigerator/freezer, and a top door floor freezer. Cumulatively, the power required to operate these units is approximately 4.416 kW. In addition to the large power requirement of many smaller units, all of the condensers are necessarily located inside the Kitchen and cafeteria spaces, resulting in the air conditioning system having to overcome all of the heat rejected by the refrigerator/freezer units. *We recommend the district replace all of the individual units with a new combination walk-in freezer-cooler unit.* The district expressed a desire to locate a new combination unit in the existing storeroom behind the Kitchen, but the most widely available smallest sizes of combination units (12'x6'x7'-6") will not easily fit into the available space without architectural modifications to the space. A second option is to locate the new unit behind the Kitchen loading dock, outside of the building. In either case the condensers should be located exterior to the building so that all rejected heat remains exterior to the conditioned space. The power requirements for the new combination unit will approximate 1.52 kW, significantly less than the 4.416kW utilized by the existing multiple systems.

6.0 RECOMMENDATIONS

A. MAINTENANCE AND OPERATIONS PROCEDURES

HVAC	• Comb fins on damaged condensing units • Install hail guards to protect fins in future • Provide maintenance pads to keep weeds from CUs
Lighting	• Renovate existing incandescent exit fixtures with new LED lamps
Building Envelope	• Check weatherstrip at all exterior doors, replace as needed

Maintenance and Operation procedures are strategies that can offer significant energy savings potential, yet require little or no capital investment by the district to implement. Exact paybacks are at times difficult to calculate, but are typically always less than one year. The difficulties with payback calculation are often related to the fact that the investigation required to make the payback calculation, for example measuring the air gap between exterior doors and missing or damaged weatherstripping so that exact air losses may be determined, is time and cost prohibitive when the benefits of renovating door and weather weatherstripping are well documented and universally accepted.

HVAC M&O

At EISD, the HVAC M&O opportunities revolve around combing the condenser fins [combs available for less than $10]. The installation of coil guards and concrete maintenance pads prevents future fin combing, which is ultimately a combination of deferred labor savings for eliminating the need for maintenance personnel to perform the task and energy savings resulting from the units maintaining optimum operating efficiency.

Lighting M&O

The existing exit lamps are incandescent. Replacing these lamps with new LED lamps will significantly reduce energy consumption and reduce the frequency of required lamp maintenance.

Envelope M&O

As discussed previously, calculating paybacks for missing or damaged weatherstripping is tedious and serves little purpose. It was noted there were several exterior doors around the district that suffered from missing or absent weatherstripping and we recommend that these situations be addressed as the opportunity arises.

B. CAPITAL EXPENSE PROJECTS

HVAC	•Replace 1989-1993 S/Ss and packaged units •Replace existing multiple units with new combination walk-in cooler/freezer unit
Lighting	•Renovate Gym F96T12 fixtures with T8 •Replace incandescent exit fixtures with LEC fixtures
Controls	•Install IP Addressable Programmable thermostats at all HVAC units

<u>HVAC and Controls ECRMs</u>

ECRM #1: Plan to replace 1989-1993 packaged and split system heat pumps. Provide new IP addressable programmable thermostats with new unit installations.

There are three (3) 1989 split system units and seven (7) packaged heat pump units that should be replaced. District should plan to include new concrete maintenance pads and heavy-duty coil guards with the new units to prevent the coil fin damage prevalent on the existing units. Some units have ductwork penetrations into the building that are not well-sealed and should be repaired. The total cooling capacity represented by these 10 units is 34-1/2 tons.

Estimated Installed Cost	=	$51,150
Estimated Energy Cost Savings	=	$ 2,500
Simple Payback Period	=	20-1/2 years

Note: This payback is longer than most HVAC replacement projects of 20+ year old units typically generate. The reasons for this longer payback involve the reduced operating hours the district must be using during moderate weather periods. At the current age of the units, the plan for their replacement must begin in order to avoid emergency replacement costs that will likely result in the next few years if the units are not replaced. However, due to the prolonged payback period, we are not including this project in the final summary of recommended projects.

ECRM #2: Replace existing multiple single refrigerator/freezer units with new combination walk-in freezer/cooler.

There are currently five (5) individual refrigerators and freezer units utilized in the Kitchen. Consolidating these units to a single combination walk-in freezer/cooler will save significant amounts of energy and will eliminate the rejection of freezer/refrigerator heat into the conditioned spaces of the Kitchen and Cafeteria.

Estimated Installed Cost	=	$12,500
Estimated Energy Cost Savings	=	$ 1,250
Simple Payback Period	=	10 years

<u>LIGHTING ECRMs</u>

ECRM #1: Renovate existing F96T12 gymnasium lighting with new T8 high-bay fluorescent fixtures.

Existing lighting at the gymnasium is 11 each F96T12 2-lamp surface strip fixtures. We recommend replacing these units with 11 each new 3-lamp T8 high-bay linear fluorescent fixtures that include wireguards and shrink-wrap protective T8 lamps.

Estimated Installed Cost	=	$ 2,200
Estimated Energy Cost Savings	=	$ 200
Simple Payback Period	=	11 years

ECRM #2: Replace existing incandescent exit fixtures with new LEC units

The existing exit fixtures utilize two each 15 watt lamps. New LEC units consume just ¼ watt of electricity.

Estimated Installed Cost	=	$ 660
Estimated Energy Cost Savings	=	$ 200
Simple Payback Period	=	3-1/3 years

SUMMARY TABLE:

If all of the recommended projects were completed at one time, the overall project finances would be as follows (excluding HVAC ECRM #1):

Estimated Installed Cost	=	$ 15,360
Estimated Energy Cost Savings	=	$ 1,650
Simple Payback Period	=	9-1/3 years

Should the district desire to implement these projects in stages and not all at once, we recommend the following implementation schedule:

1. HVAC ECRM #2 — Utilizing multiple individual freezers and refrigerators takes up excessive floor space, uses excessive energy, and forces the air conditioners to overcome rejected heat in the conditioned space.

2. Lighting ECRM #2 — If the existing exit fixtures are not retrofit with LED lamps, then we recommend they be replaced with the new LEC technology fixtures. Problems with frequent lamp replacement are eliminated and the energy savings available is significant.

2. Lighting ECRM #1 — The existing gym lights are antiquated. The new fixtures will provide a higher quality of light, without lamp flicker and ballast hum.

3. HVAC ECRM #1 — The majority of the existing split systems and packaged heat pumps have surpassed or are approaching the end of their 15-20 year life expectancy. They have sustained significant coil fin damage and are not operating efficiently. New units with coil guards and concrete maintenance pads will operate more efficiently and reduce maintenance expenses. New IP Addressable thermostats will allow the operating hours of the new system to be monitored and controlled over the school's intranet.

7.0 FINANCIAL EVALUATION

Financing of these projects may be provided using a variety of methods as Bond Programs, municipal leases, or state financing programs like the SECO LoanSTAR Program.

If the project was financed with in-house funds, the internal rate of return for the investment would be as follows:

Year 1		$ 1,650.00	0	$1,650
Year 2		$ 1,650.00	0	$1,650
Year 3		$ 1,650.00	0	$1,650
Year 4		$ 1,650.00	0	$1,650
Year 5		$ 1,650.00	0	$1,650
Year 6		$ 1,617.00	($25)	$1,592
Year 7		$ 1,584.00	($25)	$1,559
Year 8		$ 1,551.00	($25)	$1,526
Year 9		$ 1,518.00	($25)	$1,493
Year 10		$ 1,485.00	($25)	$1,460
Year 11		$ 1,452.00	($25)	$1,427
Year 12		$ 1,419.00	($25)	$1,394
Year 13		$ 1,386.00	($25)	$1,361
Year 14		$ 1,353.00	($25)	$1,328
Year 15		$ 1,320.00	($25)	$1,295
			Internal Rate of Return	**5.60%**

More information regarding financial programs available to EISD can be found in:

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

APPENDICES

APPENDIX I - SUMMARY OF FUNDING AND PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

Several options are available for funding retrofit measures which require capital expenditures.

LoanSTAR Program:

The Texas LoanSTAR program is administered by the State Energy Conservation Office (SECO). It is a revolving loan program available to all public school districts in the state as well as other institutional facilities. SECO loans money at 3% interest for the implementation of energy conservation measures which have a combined payback of eight years or less. The amount of money available varies, depending upon repayment schedules of other facilities with outstanding loans, and legislative actions. Check with Eddy Trevino of SECO (512-463-1876) for an up-to-date evaluation of prospects for obtaining a loan in the amounts desired.

TASB (Texas Association of School Boards) Capital Acquisition Program:

TASB makes loans to school districts for acquiring personal property for “maintenance purposes”. Energy conservation measures are eligible for these loans. The smallest loan TASB will make is $100,000. Financing is at 4.4% to 5.3%, depending upon length of the loan and the school district’s bond rating. Loans are made over a three year, four year, seven year, or ten year period. The application process involves filling out a one page application form, and submitting the school district’s most recent budget and audit. Contact Cheryl Kepp at TASB (512-467-0222) for further information.

Loans on Commercial Market:

Local lending institutions are another source for the funding of desired energy conservation measures. Interest rates obtainable may not be as attractive as that offered by the LoanSTAR or TASB programs, but advantages include “unlimited” funds available for loan, and local administration of the loan.

Leasing Corporations:

Leasing corporations have become increasingly interested in the energy efficiency market. The financing vehicle frequently used is the municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase agreement. 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.

Bond Issue:

The Board may choose to have a bond election to provide funds for capital improvements. Because of its political nature, this funding method is entirely dependent upon the mood of the voters, and may require more time and effort to acquire the funds than the other alternatives.

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

State Purchasing:

The General Services Commission has competitively bid contracts for numerous items which are available for direct purchase by school districts. Contracts for this GSC service may be obtained from Sue Jager at (512) 475-2351.

Design/Bid/Build (Competitive Bidding):

Plans and specifications are prepared for specific projects and competitive bids are received from installation contractors. This traditional approach provides the district with more control over each aspect of the project, and task items required by the contractors are presented in detail.

Design/Build:

These contracts are usually structured with the engineer and contractor combined under the same contract to the owner. This type team approach was developed for fast-track projects, and to allow the contractor a position in the decision making process. The disadvantage to the district is that the engineer is not totally independent and cannot be completely focused upon the interest of the district. The district has less control over selection of equipment and quality control.

Purchasing Standardization Method:

This method will result in significant dollar savings if integrated into planned facility improvements. For larger purchases which extend over a period of time, standardized purchasing can produce lower cost per item expense, and can reduce immediate up-front expenditures. This approach includes traditional competitive bidding with pricing structured for present and future phased purchases.

Performance Contracting:

Through this arrangement, an energy service company (ESCO) using in-house or third party financing to implement comprehensive packages of energy saving retrofit projects. Usually a turnkey service, this method includes an initial assessment of energy savings potential, design of the identified projects, purchase and installation of the equipment, and overall project management. The ESCO guarantees that the cost savings generated will, at a minimum, cover the annual payment due over the term of the contract. The laws governing Performance Contracting for school districts are detailed in the Texas Education Code, Subchapter Z, Section 44.901. Senate Bill SB 3035, passed by the seventy-fifth Texas Legislature, amends some of these conditions. Performance Contracting is a highly competitive field, and interested districts may wish to contact Theresa Sifuentes of State Energy Conservation Office, (SECO), at 512-463-1896 for assistance in preparing requests for proposals or requests for qualifications.

Solution Center

How to Finance Your Energy Program

Cost and financing issues are pivotal factors in determining which energy-efficiency measures will be included in your final energy management plan. Before examining financing options, you need to have a reasonably good idea of the measures that may be implemented. For this purpose, you will want to perform cost/benefit analyses on each candidate measure to identify those with the best investment potential. This document presents a brief introduction to cost/benefit methods and then suggests a variety of options for financing your program.

Selecting a Cost/Benefit Analysis Method

Cost/benefit analysis can determine if and when an improvement will pay for itself through energy savings and to help you set priorities among alternative improvement projects. Cost/benefit analysis may be either a simple payback analysis or the more sophisticated life cycle cost analysis. Since most electric utility rate schedules are based on both consumption and peak demand, your analyst should be skilled at assessing the effects of changes in both electricity use and demand on total cost savings, regardless of which type of analysis is used. Before beginning any cost/benefit analyses, you must first determine acceptable design alternatives that meet the heating, cooling, lighting, and control requirements of the building being evaluated. The criteria for determining whether a design alternative is "acceptable" includes reliability, safety, conformance with building codes, occupant comfort, noise levels, and space limitations. Since there will usually be a number of acceptable alternatives for any project, cost/benefit analysis allows you to select those that have the best savings potential.

Simple Payback Analysis

A highly simplified form of cost/benefit analysis is called simple payback. In this method, the total first cost of the improvement is divided by the first-year energy cost savings produced by the improvement. This method yields the number of years required for the improvement to pay for itself.

This kind of analysis assumes that the service life of the energy-efficiency measure will equal or exceed the simple payback time. Simple payback analysis provides a relatively easy way to examine the overall costs and savings potentials for a variety of project alternatives. However, it does not consider a number of factors that are difficult to predict, yet can have a significant impact on cost savings. These factors may be considered by performing a life-cycle cost (LCC) analysis.

Simple Payback

As an example of simple payback, consider the lighting retrofit of a 10,000-square-foot commercial office building. Relamping with T-8 lamps and electronic, high-efficiency ballasts may cost around $13,300 ($50 each for 266 fixtures) and produce annual savings of around $4,800 per year (80,000 kWh at $0.06/kWh). This simple payback for this improvement would be

$$\frac{\$13,300}{\$4,800/\text{year}} = 2.8 \text{ years}$$

That is, the improvement would pay for itself in 2.8 years, a 36% simple return on the investment (1/2.8 = 0.36).

Life-Cycle Cost Analysis

Life-cycle cost analysis (LCC) considers the total cost of a system, device, building, or other capital equipment or facility over its anticipated useful life. LCC analysis allows a comprehensive assessment of all anticipated costs associated with a design alternative. Factors commonly considered in LCC analyses include initial capital cost, operating costs, maintenance costs, financing costs, the expected useful life of equipment, and its future salvage values. The result of the LCC analysis is generally expressed as the value of initial and future costs in today's dollars, as reflected by an appropriate discount rate.

The first step in this type of analysis is to establish the general study parameters for the

continued

How to Finance Your Energy Program *continued*

Financing Mechanisms

Capital for energy-efficiency improvements is available from a variety of public and private sources, and can be accessed through a wide and flexible range of financing instruments. While variations may occur, there are five general financing mechanisms available today for investing in energy-efficiency:

- **Internal Funds.** Energy-efficiency improvements are financed by direct allocations from an organization's own internal capital or operating budget.
- **Debt Financing.** Energy-efficiency improvements are financed with capital borrowed directly by an organization from private lenders.
- **Lease or Lease-Purchase Agreements.** Energy-efficient equipment is acquired through an operating or financing lease with no up-front costs, and payments are made over five to ten years.
- **Energy Performance Contracts.** Energy-efficiency measures are financed, installed, and maintained by a third party, which guarantees savings and payments based on those savings.
- **Utility Incentives.** Rebates, grants, or other financial assistance are offered by an energy utility for the design and purchase of certain energy-efficient systems and equipment.

These financing mechanisms are not mutually exclusive (i.e., an organization may use several of them in various combinations). The most appropriate set of options will depend on the size and complexity of a project, internal capital constraints, in-house expertise, and other factors. Each of these mechanisms is discussed briefly below, followed by some additional funding sources and considerations.

Internal Funds

The most direct way for the owner of a building or facility to pay for energy-efficiency improvements is to allocate funds from the internal capital or operating budget. Financing internally has two clear advantages over the other options discussed below -- it retains internally all savings from increased energy-efficiency, and it is usually the simplest option administratively. The resulting savings may be used to decrease overall operating expenses in future years or retained within a revolving fund used to support additional efficiency investments. Many public and private organizations regularly finance some or all of their energy-efficiency improvements from internal funds.

In some instances, competition from alternative capital investment projects and the requirement for relatively high rates of return may limit the use of internal funds for major, standalone investments in energy-efficiency. In most organizations, for example, the highest priorities for internal funds are business or service expansion, critical health and safety needs, or productivity enhancements. In both the public and private sectors, capital that remains available after these priorities have been met will usually be invested in those areas that offer the highest rates of return. The criteria for such investments commonly include an annual return of 20 percent to 30 percent or a simple payback of three years or less.

Since comprehensive energy-efficiency improvements commonly have simple paybacks of five to six years, or about a 12 percent annual rate of return, internal funds often cannot serve as the sole source of financing for such improvements. Alternatively, however, internal funding can be used well and profitably to achieve more competitive rates of return when combined with one or more of the other options discussed below.

Debt Financing

Direct borrowing of capital from private lenders can be an attractive alternative to using internal funds for energy-efficiency investments. Financing costs can be repaid by the savings that accrue from increased energy-efficiency. Additionally, municipal governments can often issue bonds or other long-term debt instruments at substantially lower interest rates than can private corporate entities. As in the case of internal funding, all savings from efficiency improvements (less only the cost of financing) are retained internally.

Debt financing is administratively more complex than internal funding, and financing costs will vary according to the credit rating of the borrower. This approach may also be restricted by formal debt ceilings imposed by municipal

How to Finance Your Energy Program *continued*

policy, accounting standards, and/or Federal or state legislation.

In general, debt financing should be considered for larger retrofit projects that involve multiple buildings or facilities. When considering debt financing, organizations should weigh the cost and complexity of this type of financing against the size and risk of the proposed projects.

Lease and Lease-Purchase Agreements

Leasing and lease-purchase agreements provide a means to reduce or avoid the high, up-front capital costs of new, energy-efficient equipment. These agreements may be offered by commercial leasing corporations, management and financing companies, banks, investment brokers, or equipment manufacturers. As with direct borrowing, the lease should be designed so that the energy savings are sufficient to pay for the financing charges. While the time period of a lease can vary significantly, leases in which the lessee assumes ownership of the equipment generally range from five to ten years. There are several different types of leasing agreements, as shown in the sidebar. Specific lease agreements will vary according to lessor policies, the complexity of the project, whether or not engineering and design services are included, and other factors.

Energy Performance Contracts

Energy performance contracts are generally financing or operating leases provided by an Energy Service Company (ESCo) or equipment manufacturer. The distinguishing features of these contracts are that they provide a guarantee on energy savings from the installed retrofit measures, and they provide payments to the ESCo from the savings, freeing the customer from any need of up-front payments to the ESCo. The contract period can range from five to 15 years, and the customer is required to have a certain minimum level of capital investment (generally $200,000 or more) before a contract will be considered.

Under an energy performance contract, the ESCo provides a service package that typically includes the design and engineering, financing, installation, and maintenance of retrofit measures to improve energy-efficiency. The scope of these improvements can range from measures that affect a single part of a building's energy-using

Types of Leasing Agreements

Operating Leases are usually for a short term, occasionally for periods of less than one year. At the end of the lease period, the lessee may either renegotiate the lease, buy the equipment for its fair market value, or acquire other equipment. The lessor is considered the owner of the leased equipment and can claim tax benefits for its depreciation.

Financing Leases are agreements in which the lessee essentially pays for the equipment in monthly installments. Although payments are generally higher than for an operating lease, the lessee may purchase the equipment at the end of the lease for a nominal amount (commonly $1). The lessee is considered the owner of the equipment and may claim certain tax benefits for its depreciation.

Municipal Leases are available only to tax-exempt entities such as school districts or municipalities. Under this type of lease, the lessor does not have to pay taxes on the interest portion of the lessee's payments, and can therefore offer an interest rate that is lower than the rate for usual financing leases. Because of restrictions against multi-year liabilities, the municipality specifies in the contract that the lease will be renewed year by year. This places a higher risk on the lessor, who must be prepared for the possibility that funding for the lease may not be appropriated. The lessor may therefore charge an interest rate that is as much as 2 percent above the tax-exempt bond rate, but still lower than rates for regular financing leases. Municipal leases nonetheless are generally faster and more flexible financing tools than tax-exempt bonds.

Guaranteed Savings Leases are the same as financing or operating leases but with the addition of a guaranteed savings clause. Under this type of lease, the lessee is guaranteed that the annual payments for leasing the energy-efficiency improvements will not exceed the energy savings generated by them. The owner pays the contractor a fixed payment per month. If actual energy savings are less than the fixed payment, however, the owner pays only the small amount saved and receives a credit for the difference.

How to Finance Your Energy Program *continued*

Bulk Purchasing. Large organizations generally have purchasing or materials procurement departments that often buy standard materials in bulk or receive purchasing discounts because of the volume of their purchases. Such organizations can help reduce the costs of energy-efficiency renovations if their bulk purchasing capabilities can be used to obtain discounts on the price of materials (e.g., lamps and ballasts). While some locales may have restrictions that limit the use of this option, some type of bulk purchasing can usually be negotiated to satisfy all parties involved.

Project Transaction Costs. Certain fixed costs are associated with analyzing and installing energy measures in each building included in a retrofit program. Each additional building, for example, could represent additional negotiations and transactions with building owners, building analysts, energy auditors, equipment installers, commissioning agents, and other contractors. Similarly, each additional building will add to the effort involved in initial data analysis as well as in tracking energy performance after the retrofit. For these reasons, it is often possible to achieve target energy savings at lower cost by focusing only on those buildings that are the largest energy users. One disadvantage with larger buildings is that the energy systems in the building can be more difficult to understand, but overall, focusing on the largest energy users is often the most efficient use of your financial resources.

Direct Value-Added Benefits. The primary value of retrofits to buildings and facilities lies in the reduction of operating costs through improved energy-efficiency and maintenance savings. Nevertheless, the retrofit may also directly help address a variety of related concerns, and these benefits (and avoided costs) should be considered in assessing the true value of an investment. A few examples of these benefits include the improvement of indoor air quality in office buildings and schools; easier disposal of toxic or hazardous materials found in energy-using equipment; and assistance in meeting increasingly stringent state or Federal mandates for water conservation. Effective energy management controls for buildings can also provide a strong electronic infrastructure for improving security systems and telecommunications.

Economic Development Benefits. In addition to direct savings on operating costs and the added-value benefits mentioned above, investments in energy-efficiency can also support a community's economic development and employment opportunities. Labor will typically constitute about 60 percent of a total energy investment, and about 50 percent of equipment can be expected to be purchased from local equipment suppliers; as a result, about 85 percent of the investment is retained within the local economy. Additionally, funds retained in urban areas will generally be re-spent in the local economy. The Department of Commerce estimates that each dollar retained in an urban area will be re-spent three times. This multiplier effect results in a three-fold increase in the economic benefits of funds invested in energy-efficiency, without even considering the savings from lower overall fuel costs.

For more information contact the Rebuild America Clearinghouse at 252-459-4664 or visit www.rebuild.gov

Rebuild America
U.S. Dept. of Energy

APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE

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gvec ELECTRIC TARIFF

SECTION III Rate Schedules	APPROVAL DATE 8/23/05	EFFECTIVE DATE 09/23/05	PAGE NO. 6

G-1 SINGLE PHASE GENERAL SERVICE

AVAILABILITY:

Available to single-phase Consumers.

TYPE OF SERVICE:

Single-phase, 60 Hertz, at available secondary voltage. Frequency and voltage shall be subject to reasonable variation.

RATE:

Service Availability Charge:	$15.00 per Meter per month
Energy Charge:	
First 3,000 kWh	$0.02638 per kWh
Over 3,000 kWh	$0.01600 per kWh

MINIMUM CHARGE:

The minimum charge shall be the higher of the following:

A. The Service Availability Charge; or

B. The amount specified in the contract.

GENERATION AND TRANSMISSION CHARGE:

The charge for each kilowatt-hour of energy sold by the Cooperative shall be calculated as follows:

The Cooperative shall compute the total cost of generation and transmission services by combining the total cost of generation and transmission and other relevant costs and factors, and dividing it by the number of kilowatt-hours sold as deemed appropriate by the Cooperative. The generation and transmission charge shall be held constant and be billed each month subject to the following provision:

Each month the Cooperative shall compute the current cost of generation and transmission services. Should such computations indicate that continued use of the generation and transmission charge would result in a substantial under or over recovery of the current generation and transmission costs, the Cooperative may modify the existing charge to recover such costs more appropriately.

gvec ELECTRIC TARIFF

SECTION III Rate Schedules	APPROVAL DATE 8/23/05	EFFECTIVE DATE 09/23/05	PAGE NO. 7

G-1 SINGLE PHASE GENERAL SERVICE

ADJUSTMENTS:

The foregoing charges shall be adjusted in accordance with the provisions on Sheets No. 5.

TERMS OF PAYMENT:

Each bill for electric service(s), regardless of the nature of the service(s), is due 16 days after issuance unless such day falls on a holiday or weekend, in which case payment is due on the next work day. If full payment is not received in the office of the Cooperative on or before the date such bill is due, a past due charge may apply and the Consumer's account will be considered delinquent and subject to disconnection in accordance with the Cooperative's Service Rules and Regulations.

APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

SECO
State Energy Conservation Office

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 Ezzell ISD, 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: [signature]
Date: 2/15/10
Name (Mr./Ms./Dr.) Bruce J Tabor
Title: Superintendent
Organization: Ezzell ISD
Phone: 361-798-4448
Street Address: 20500 FM 531
Fax: 361-798-9331
Mailing Address: Hallettsville, TX 77964
E-Mail: btabor@ezzellisd.org
County: LaVaca / ESA

Contact Information:

Name (Mr./Ms./Dr.): Bruce J Tabor
Title: Superintendent
Phone: 361.258-1880
Fax: 361-798-9331
E-Mail: btabor@ezzellisd.org
County: LaVaca

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.**

APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

ANNOUNCING!

TEMA

TEXAS ENERGY MANAGERS ASSOCIATION

A PROFESSIONAL ASSOCIATION FOR THOSE RESPONSIBLE FOR ENERGY MANAGEMENT IN TEXAS PUBLIC FACILITIES

- Networking
- Sharing Knowledge and Resources
- Training Workshops
- Regional Meetings
- Annual Conference
- Certification
- Legislative Updates
- Money-Saving Opportunities

WWW.TEXASEMA.ORG

Check the website for Membership and Association information.

Texas Energy Managers Association

SECO
State Energy Conservation Office

APPENDIX VI - UTILITY CHARTS ON CD