Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

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Aubrey Independent School District

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SECO
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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**.

Program Administrator:	Stephen Ross
Phone:	512-463-1770
Address:	State Energy Conservation Office LBJ State Office Building 111 E. 17th Street Austin. Texas 78774

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 April 2012, **SECO** received a request for technical assistance from **Mr. H.L. Brockett**, Assistant Superintendent at **Aubrey I.S.D.** **SECO** responded by sending **ESA, A Terracon Company**, 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 **Aubrey ISD,** (hereafter known as AISD) was completed by **ESA-Terracon,** (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. Jason Massengale**, Director of Maintenance for the district, 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 7.0 of this report.

We estimate that as much as **$9,980** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$61,860**, yielding an average simple payback of **6-1/4** years.

Table 1: Summary of Recommended Energy Cost Reduction Measures (ECRMs)

MEASURE	DESCRIPTION OF RECOMMENDATION	LOCATION OF ECRM	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
LIGHTING ECRM 1	REPLACE GYMNASIUM METAL HALIDE FIXTURES	ES / HS	$45,500	$7,500	6 Yrs
LIGHTING ECRM 2	REPLACE HS CAFETERIA T12 FIXTURES	HS	$16,000	$2,300	7 Yrs
CONTROLS ECRM 1	VENDING MACHINE CONTROLS	HS	$360	$180	2 Yrs
TOTAL PROJECTS	**-**	**-**	**$ 61,860**	**$ 9,980**	**6-1/4 years**

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 8.0 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 AISD. 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.

*ESA Energy Systems Associates, Inc., James W. Brown (512) 258-0547
A Terracon Company

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 AISD, ESA returned to the facilities to perform the following tasks:

1. Designing and monitoring customized procedures to control the run times of energy consuming systems.
2. Analyze systems for code and standard compliance in areas such as cooling system refrigerants used, outside air quantity, and lighting illumination levels.
3. 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.
4. Develop a prioritized schedule for replacement projects.
5. Developing and drafting an overall Energy Management Policy.
6. 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 AISD ENERGY PERFORMANCE INDICATORS:

The EUIs and ECIs for educational school facilities in the AISD area are shown in the chart below:

School Classification	EUI (BTUs/sf-yr)	ECI ($/sf-yr)
Aubrey High School	42,490	$0.85
Brockett Elementary School	43,875	$0.83
Average AISD Facilities	**43,183**	**$0.84**

Aubrey ISD purchases electricity from CoServ Electric Cooperative. The energy history spreadsheets are shown on the next few pages.

The rate schedule analysis for the district is shown in Section 4.0.

A copy of the rate schedule is included in Appendix II.

OWNER: **Aubrey ISD** **BUILDING:** **Aubrey High School**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	COSTS $
JANUARY	2011	91,200		289	3,631	7,963	301	1,797
FEBRUARY	2011	111,720		305	3,747	9,045	339	1,882
MARCH	2011	101,520		307	3,880	8,697	114	726
APRIL	2011	103,080		270	3,739	8,630	72	499
MAY	2011	102,120		263	4,053	8,898	31	229
JUNE	2011	110,160		252	4,136	9,361	12	100
JULY	2011	110,880		340	4,775	10,034	9	75
AUGUST	2011	128,760		354	4,891	10,991	20	180
SEPTEMBER	2011	170,520		376	6,252	14,317	21	174
OCTOBER	2011	139,560		376	6,027	12,076	63	398
NOVEMBER	2011	115,080		296	4,369	9,365	203	1,405
DECEMBER	2011	100,560		328	4,375	8,393	413	2,505
TOTAL		**1,385,160**	**3,756**	**3,756**	**53,875**	**$117,770**	**1,598**	**$9,970**

Annual Total Energy Cost =	$127,740	Per Year
Total KWH x 0.003413 =	4,727.55	x 106
Total MCF x 1.03 =	1,645.94	x 106
Total Other x ____		x 106
Total Site BTU's/yr	6,373.49	x 106
Floor area:	150,000	s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) — 42,490 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) — $0.85 $/s.f. yr

OWNER: Aubrey ISD **BUILDING:** Brockett Elementary School

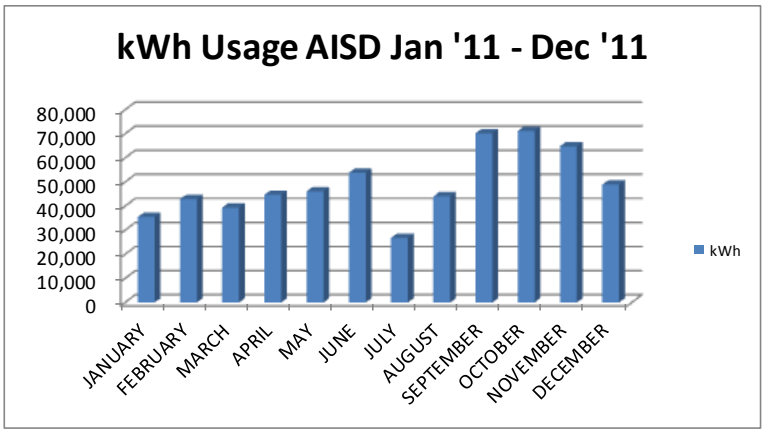
MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	35,440		133	1,769	3,477	240	1,436
FEBRUARY	2011	42,880		133	1,741	3,799	275	1,527
MARCH	2011	39,360		142	1,909	3,801	103	661
APRIL	2011	44,640		146	1,972	4,113	54	375
MAY	2011	46,120		195	2,818	5,028	22	168
JUNE	2011	53,840		133	2,373	4,947	8	70
JULY	2011	26,800		133	1,883	3,184	7	60
AUGUST	2011	44,000		133	1,883	3,994	12	123
SEPTEMBER	2011	70,160		266	3,755	7,097	12	109
OCTOBER	2011	71,200		182	3,036	6,142	19	151
NOVEMBER	2011	64,800		171	2,316	5,146	207	1,365
DECEMBER	2011	48,880		164	2,100	4,074	287	1,743
TOTAL		588,120	1,931	1,931	27,555	$54,802	1,246	$7,788

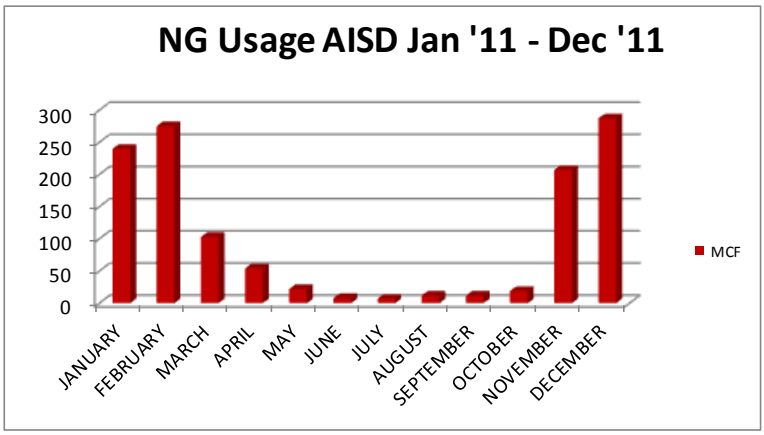
Annual Total Energy Cost =	$62,590	Per Year
Total KWH x 0.003413 =	2,007.25	x 106
Total MCF x 1.03 =	1,283.38	x 106
Total Other x ____		x 106
Total Site BTU's/yr	3,290.63	x 106
Floor area:	75,000	s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 43,875 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $0.83 $/s.f. yr

The consumption profile for Brockett Elementary is excellent. Note the significant decrease in electrical consumption for July and August. This is indicative of a district that is adjusting their operational run times according to the seasonal student occupancy requirements and not just allowing equipment to operate during the summer as it is programmed to operate during the school year. The gas consumption profile also indicates an efficient pattern. There is little to no gas use in the non-heating months.





4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

ELECTRICITY PROVIDER: **CoServ Electric Cooperative**

Rate Code: **Public Building, Time of Use**

Public Buildings Time-of-Use: Available to members receiving or eligible to receive service under the Public Building rate upon request by the member.

Customer Charge	$40.00 per meter
Demand Charge	
On Peak	
May-October	$8.10 per kW
November-April	$6.65 per kW
Intermediate Peak (IP)	$2.70 per kW
Noncoincident Peak (NIP)	$3.30 per kW
Energy Charge	$0.076062 per kWh

Average Savings for consumption: = energy charge + power cost adjustment factor

= $0.0.076062 per kWh + $0.030292 per kWh (average for 2011)

= **$ 0.106354 per kWh**

Average Savings for demand = **Varies per season and per period as described above**

NATURAL GAS PROVIDER:

GAS PROVIDER: **Atmos**

The average savings per unit of commodity cost is represented by the average cost per MCF of purchased natural gas in the district by analyzing the utility history for the schools surveyed in this report.

Total cost for natural gas at the two facilities in the analyzed billing cycle: $17,758

Total quantity purchased during the analyzed billing cycle: 2,844 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $17,785 / 2,844 MCF

Average cost per MCF = $6.24

5.0 CAMPUS DESCRIPTIONS:

Facility	Approximate Square Footage	Basic HVAC Cool/Heat	Basic Lighting System Description	Basic Control System Description	Weekly Operating Hours
Brockett Elementary School	75,000	Packaged Rooftop Unit	T8	Alerton DDC	45
Aubrey High School	150,000	Rooftop Unit / Water Source Heat Pump	T8	Alerton DDC	45

6.0 ENERGY RECOMMENDATIONS:

LIGHTING ECRM 1: REPLACE METAL HALIDE GYMNASIUM FIXTURES WITH T5 FLUORESCENT

The gymnasiums at both the High School and Brockett Elementary utilize 250 watt or 400 watt metal halide light fixtures. Metal halide fixtures have an inherently long re-strike characteristic which means it can take 10-15 minutes for fixtures to produce full light output when they are turned on. This characteristic encourages staff to leave these fixtures on throughout the day even if the space is unoccupied to prevent classes from waiting for the lights to completely warm up for class. The maintenance staff reported that the district was considering installing multiple lamp compact fluorescent (CFL) fixtures in place of the existing metal halides. Other districts have utilized these fixtures, but some found the multiple lamp CFL fixture to be extremely maintenance intensive. The issue other districts have experienced is that group re-lamping of a fixture is expensive and replacing individual lamps as they burn out presents a repeating cycle for maintenance staff to return to the same space, and at times, the same fixture, to replace a few more lamps. With typical ceiling heights of 25-30' in these spaces, the staging efforts required to replace just a few lamps is expensive and frustrating to maintenance personnel. *We recommend the district replace the metal halide fixtures with T5 linear fluorescent fixture and install long range occupancy sensors to ensure the fixtures do not stay operating when the space is unoccupied.*

Facility	***Number/Wattage of existing fixtures***	***Estimated Cost***	***Estimated Payback***
Brockett ES	*15 250w MH*	*$6,000*	*5 Years*
Aubrey HS	*56 400w MH*	*$22,000*	*6 Years*
Aubrey HS	*48 400w MH*	*$17,500*	*6 Years*
Total	-	*$ 45,500*	

Estimated Cost: $45,500 Estimated Savings: $7,500 Estimated Payback: 6 Years

LIGHTING ECRM 2: REPLACE EXISTING CAFETERIA U-LAMP T12 FIXTURES WITH NEW T8

The cafeteria at the High School currently utilizes T12 U-lamp fixtures. The U-lamps are expensive to purchase and the T12 components are significantly less energy efficient than T8 lamps powered by electronic ballasts. T12 components offer about 20% less light output while consuming approximately 18% more energy than T8 components. We recommend the district replace the existing fixtures with new 3-lamp F17T8 fixtures.

Estimated Cost: $16,000 Estimated Savings: $2,300 Estimated Payback: 7 Years

CONTROLS ECRM 1: VENDING MACHINE CONTROLS

Some vending machines were noted to be in use around the district. Vending machine controls can be installed to control existing advertising lighting and compressors that refrigerate food or drink. Using a motion sensor mounted on top of the machine, the vending machines will allow lights to operate whenever it determines occupants are in the area and cycles the compressor on and off to maintain food or beverages at a maximum programmed temperature when it determines there is no activity in the area. *We recommend HISD install vending machine controls on all vending machines.* For the two vending machines noted (one at the High School cafeteria and one at the High School gymnasium) where controls can be installed, the estimated cost and energy savings is as follows.

Estimated Cost: $360 Estimated Savings: $180 Estimated Payback: 2 Years

CONTROLS ECRM 2: INCORPORATE ADMINISTRATION BUILDING INTO MONITORED CONTROL SYSTEM

The Administration Building is currently the only building in the district that is not monitored and controlled via a building automation system. *We recommend the district add this facility to the existing energy management system or install IP Addressable Programmable thermostats in the Administration Building that will allow the units to be monitored and controlled remotely at the same control center that the monitors the existing facilities.* This project will facilitate incorporating schedule changes and tracking operating hours without maintenance personnel having to travel to the Administration Building and perform the re-programming task at each individual controller. This facility was not analyzed at the time of this survey; further analysis will be necessary before project costs and projected energy savings can be estimated.

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Replace damaged or missing hot water piping insulation at water heaters

Lighting

- De-lamp 4-lamp corridor fixtures at High School
- Daylighting strategies at Elementary and High Schools
- Turn off scoreboards when not in use

Envelope

- Replace weatherstripping at exterior doors

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 #1

During the survey, it was noted that the water heater hot water piping had damaged or missing insulation. The majority of the energy losses in a hot water system occur through heat losses through piping. *We recommend the district replace the damaged or missing insulation to minimize energy losses in the hot water system.*

Lighting M&O #1

In one of the High School corridors, there are light fixtures currently utilizing 4-lamps per fixture and are spaces in the lay-in ceiling at 6' centers. The Illumination Engineering Society of North America (IESNA) recommends school corridors have between 10 and 20 footcandles of light. *We recommend the district de-lamp the fixtures to 2-lamp operation. Light levels will lower in these areas, but still provide more light than the recommended light levels offered by IESNA.*

Energy consumption in the corridor fixtures will also decrease and offer significant energy savings given the typical long operating hours of corridor fixtures.

Lighting M&O #2

It was noted during the survey that several daylighting opportunities exist within the buildings. As shown in the picture to the right, the lobby up-light fixtures are operating despite the natural daylight filling the space through the windows and doors. Daylighting strategies involve allowing the natural sunlight to illuminate a space and minimizing or eliminating the contribution of light fixtures when the levels of natural light are adequate. Most commonly, photocells are incorporated into the lighting circuit supplying the fixtures in question which keep the light fixtures turned off when the daylight contribution is sufficient. Alternatively, training can be provided to teachers and custodial staff to not turn on these fixtures during the day; reserve these fixtures until night time activities occur. Other areas noted to have this opportunity are the Elementary School Lobby and the above-classroom-door-can-lights in the Elementary classroom wings.

Lighting M&O #3

The scoreboards in the gymnasium were turned on at the time of the survey. There was no activity in the gymnasium at the time; therefore *we recommend the district keep scoreboards turned off except when a competitive event requires it to operate.*

Envelope M&O #1

It was noted during the survey that some of the exterior doors had damaged or missing weatherstripping. This condition allows conditioned air to escape and dirt and contaminants to freely enter the building. *We recommend the district replace the damaged or missing weatherstripping.*

8.0 FINANCIAL EVALUATION

Financing of these projects may be provided using a variety of methods such 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:

Proposal:	Perform recommended ECRMs			
Assumptions:				
1. Equipment will last at least 15 years prior to next renovation				
2. No maintenance expenses for first five years (warranty period)				
3. $500 maintenance expense next 5 years				
4. $1,000 maintenance expense next 5 years				
5. Savings decreases 5% per year after year 5				
Cash Flow	**Project Cost**	**Project Savings**	**Maintenance Expense**	**Net Cash Flow**
Time 0	($61,860)		0	($61,860)
Year 1		$ 9,980.00	0	$9,980
Year 2		$ 9,980.00	0	$9,980
Year 3		$ 9,980.00	0	$9,980
Year 4		$ 9,980.00	0	$9,980
Year 5		$ 9,980.00	0	$9,980
Year 6		$ 9,481.00	($500)	$8,981
Year 7		$ 8,982.00	($500)	$8,482
Year 8		$ 8,483.00	($500)	$7,983
Year 9		$ 7,984.00	($500)	$7,484
Year 10		$ 7,485.00	($500)	$6,985
Year 11		$ 6,986.00	($1,000)	$5,986
Year 12		$ 6,487.00	($1,000)	$5,487
Year 13		$ 5,988.00	($1,000)	$4,988
Year 14		$ 5,489.00	($1,000)	$4,489
Year 15		$ 4,990.00	($1,000)	$3,990
			Internal Rate of Return	**10.79%**

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

9.0 GENERAL COMMENTS

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. All estimations provided in this report were based upon information provided to ESA by the District and their respective utility providers. While cost saving estimates have been provided, they are not intended to be considered a guarantee of cost savings. No guarantees or warranties, expressed or implied, are intended or made. Changes in energy usage or utility pricing from those provided will impact the overall calculations of estimated savings and could result in different or longer payback periods.

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 Eddy Trevino 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

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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

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.

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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

202.14 Optional Public Building Time-Of-Use.

A. Availability.
This Optional Time-Of-Use rate is offered to customers receiving or eligible to receive service under the Public Building rate upon request by the customer. The Customer must establish usage during the on-peak hours before billing under this rate becomes effective. The Cooperative reserves the right to discontinue this Optional Time-Of-Use rate to additional customers if in the Cooperative's judgment, system load characteristics no longer warrant such option.

B. Monthly Rate.

(1) Customer Charge: $40.00 per month, provided, however, that if the Customer's billing period is at any time twenty-seven (27) days or less, the Customer Charge for such billing period shall be prorated based on the actual number of days in such billing period, divided by twenty-eight (28).

This charge is for the availability of electric service;
And

(2) On-Peak Demand Charge:

May through October	$8.10 per kW of Billing Demand
November through April	$6.65 per kW of Billing Demand

And

(3) Intermediate-Peak Demand Charge:

All Months	$2.70 per kW of Billing Demand

And

(4) Non-Coincident Peak (NCP) Demand Charge:

All Months	$3.30 per kW of Billing Demand

And

(5) Energy Charge: $0.076062 per kWh

This charge for the delivery of energy shall be applied to all kWh usage during a billing period.

C. On-Peak Billing Demand.
For the calendar months of May through October, the On-Peak Billing Demand shall be the maximum kilowatt demand measured for any period of fifteen (15) consecutive minutes during the billing period for the three and one-half (3½) hours from 4:30 p.m., CT, to 8:00 p.m., CT, but not less than fifty percent (50%) of the On-Peak Demand measured in the preceding eleven (11) months.

For the calendar months of November through April, the On-Peak Billing Demand shall be the maximum kilowatt demand measured for any period of fifteen (15) consecutive minutes during the billing period for the two (2) hours from 6:00 a.m., CT, to 8:00 a.m., CT, and for the three and one-half (3½) hours from 4:30 p.m., CT, to 8:00 p.m., CT, but not less than fifty percent (50%) of the On-Peak Demand measured in the preceding eleven (11) months.

D. Intermediate Peak Demand.
The Intermediate Peak Billing Demand shall be the maximum kilowatt demand measured for any period of fifteen (15) consecutive minutes during the billing period for one and one-half (1½) hours from 3:00 p.m., CT, to 4:30 p.m., CT, but not less than fifty percent (50%) of the Intermediate Demand measured in the preceding eleven (11) months.

E. Noncoincident Peak (NCP) Billing Demand.
The NCP Billing Demand shall be the maximum kilowatt demand measured for any period of fifteen (15) consecutive minutes during the billing period, but not less than fifty percent (50%) of the NCP Demand measured in the preceding May to October billing periods, or 35 kilowatts, whichever is greater.

F. Minimum Monthly Charge.
Each billing period the Customer shall be obligated to pay the following charges as a minimum, whether or not any energy is actually used:

(1) The Customer Charge and Demand Charge;

APPENDIX III - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

SECO
State Energy Conservation Office

Local Governments and Municipalities

Preliminary Energy Assessment Service Agreement

Investing in our communities 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: [signature] Date: April 18, 2012
Name (Mr./Ms./Dr.) James Monaco Title: Supt
Organization: Aubrey ISD Phone: 940.668 0060
Street Address: c/o Tisdell Fax: 940.365.2627
Mailing Address: Aubrey, TX 76227 E-Mail: jmonaco@aubreyisd.net
County: Denton

Contact Information:

Name (Mr./Ms./Dr.): HL Brockett Title: Asst. Supt.
Phone: 940-453-5921 Fax: 940-365-2627
E-Mail: hlbrockett@aubreyisd.net County: Denton

Please sign and mail or fax to: Stephen Ross, Local Governments and Municipalities Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-463-1770. Fax 512-475-2569.

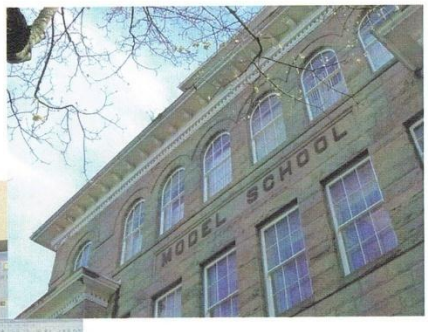
APPENDIX IV - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

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 V - UTILITY CHARTS ON CD