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Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

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Columbia-Brazoria Independent School District

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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

Program Administrator:	Stephen Ross
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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 2012, **SECO** received a request for technical assistance from Steven Galloway, Superintendent at **Columbia-Brazoria 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 **Columbia-Brazoria ISD,** (hereafter known as CBISD) 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. Galloway*, 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 **$29,300** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$244,000**, yielding an average simple payback of **8-1/3 years**.

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

SUMMARY:	DESCRIPTION OF RECOMMENDATION	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	Revise heating design	Dependent upon desired strategy	n/a	n/a
HVAC ECRM #2	Replace air cooled chiller	$150,000	$12,500	12 years
HVAC ECRM #3	Open throttled chilled water valves and balance system with VFDs	$10,000	$1,500	6-2/3 years
Controls ECRM #1	Replace pneumatic controls	$80,000	$13,300	6 years
Lighting ECRM #1	Daylighting / De-lamping opportunities	$4,000	$2,000	2 years
TOTAL PROJECTS		**$ 244,000**	**$29,300**	**8-1/3 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 CBISD. 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 CBISD, 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 CBISD ELECTRICITY ENERGY PERFORMANCE INDICATORS:

Campus	2011 EUI	2011 ECI
Wild Peach Elementary	**60,395** BTUs/sf-year	**$1.98** /sf

Columbia-Brazoria ISD purchases electricity from Reliant Energy. The transmission and distribution utility is Centerpoint Energy. The energy history spreadsheet is shown on this page.

The rate schedule analysis for the district is shown in Section 4.0. A copy of the rate schedule is included in Appendix II.

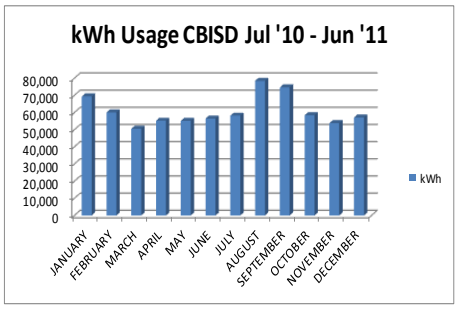
OWNER: **Columbia-Brazoria ISD** **BUILDING:** **Wild Peach ES**

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		69,320		282	2,530	7,504	Existing HVAC system utilizes electric heating	Existing HVAC system utilizes electric heating
FEBRUARY		60,040		297	2,665	6,961		
MARCH		50,520		240	2,153	5,993		
APRIL		55,200		249	2,234	6,229		
MAY		55,120		282	2,530	6,625		
JUNE		56,480		248	2,225	6,379		
JULY		58,160		212	1,902	6,365		
AUGUST		78,440		279	2,503	8,132		
SEPTEMBER		74,640		263	2,360	7,728		
OCTOBER		58,400		275	2,467	6,673		
NOVEMBER		53,800		260	2,333	6,185		
DECEMBER		57,120		265	2,378	6,470		
TOTAL		**727,240**	**3,152**	**3,152**	**28,279**	**$81,244**	**0**	**$0**

Annual Total Energy Cost =	$81,244	Per Year
Total KWH x 0.003413 =	2,482.07	x 106
Total MCF x 1.03 =	0.00	x 106
Total Other x ____		x 106
Total Site BTU's/yr	2,482.07	x 106
Floor area:	41,097	s.f.

Energy Use Index:
Total Site BTU's/yr — 60,395 BTU/s.f.yr
Total Area (sq.ft.) — * Electricity Only

Energy Cost Index:
Total Energy Cost/yr — $1.98 $/s.f. yr
Total Area (sq.ft.) — * Electricity Only



The consumption profile to the right illustrates a pattern typical of schools utilizing electric heat. The peak consumption occurs in August-September, but is followed by a secondary peak in January. This chart also demonstrates that the electricity consumption does not decrease in the summer months when compared to April and May, suggesting that the existing control system may allow opportunity for decreased occupancy hours in the summer. However, when comparing July consumption with August, there may also be some adjustments being made that are producing some energy savings. This operation schedule should be analyzed with the school district.

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: Reliant Energy

TRANSMISSION AND DISTRIBUTION UTILITY: Centerpoint Energy

Electric Rate: Secondary Service > 10 kVA

I.	TRANSMISSION AND DISTRIBUTION CHARGES:		
	Customer Charge	=	$65.83 per meter
	Metering Charge	=	$63.07 per IDR meter
	Transmission System Charge	=	$2.2387 per 4CP kVA
	Distribution System Charge	=	$3.059429 per Billing kVA
II.	SYSTEM BENEFIT FUND	=	$0.000656 per kWh
III.	TRANSITION CHARGES		
	Transition Charge 1	=	$0.714603/kVA
	Transition Charge 2	=	$1.097271/kVA
	Transition Charge 3	=	$0.437260/kVA
	SRC	=	$0.147714/kVA
	Transition Charge 5	=	$0.945847/kVA
IV.	NUCLEAR DECOMMISSIONING CHARGE	=	$0.008909 per Billing kVA
V.	TRANSMISSION COST RECOVERY FACTOR	=	$0.095208 /4CP kVA
VI.	COMPETITION TRANSITION CHARGE	=	$ Not Currently Applicable
VII.	COMPETETIVE METERING CREDIT	=	$1.32 per month
VIII.	OTHER CHARGES		
	a. MUNIPAL ACCOUNT FRANCHISE CREDIT	=	$-0.690362 per Billing kVA
	b. RATE CASE EXPENSES SURCHARGE	=	$0.008670 per Billing kVA
	c. ADVANCED METERING SURCHARGE	=	$3.16 per month
	d. ENERGY EFFICIENCY COST RECOVERY FACTOR	=	$12.87 per month
	e. ADFITC	=	$-0.025955 per Billing kVA
	f. Deferred Tax Accounting Tracker	=	$ Not Currently Applicable

Average Savings for consumption = $0.071922/kWh + $0.000656/kWh = **$0.072578/kWh**
Average Savings for demand = $2.2387 + $3.059429 + $0.714603 +$0.43726 + $0.147714 + $0.945847 + $0.008909 + $0.095208 + $-0. 690362 + $0.00867 + $-0.025955 **= $ 6.94/kVA****

NATURAL GAS PROVIDER:

The existing HVAC system utilizes electric heating for all winter space heating at Wild Peach ES; however, the unit costs for the district-wide consumption of the commodity can be evaluated by examining the Annual Utility Cost Comparison for Columbia-Brazoria ISD as posted on the school district's official website.

2008-2009: $32,833 utilized to purchase 25,185 CCF of natural gas = $32,833 / 25,185 CCF =

$1.31 per CCF or $13.04 per MCF

2009-2010: $35,082 utilized to purchase 29,938 CCF of natural gas = $35,082 / 29,938 CCF =

$1.17 per CCF or $11.72 per MCF

2010-2011: $20,886 utilized to purchase 20,494 CCF of natural gas = $20,866 / 20,494 CCF =

$1.02 per CCF or $10.19 per MCF

5.0 CAMPUS DESCRIPTIONS:

Facility	Approximate Year of Construction and Additions	Approximate Square Footage	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
Wild Peach Elementary	1977	41,097	Air Cooled Chillers, electric radiant heat panels	CVAHU	100% T8	Pneumatics

Note: CVAHU = Constant Volume Air Handling Unit

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: REVISE HEATING DESIGN

Image 1. Panel heater in ceiling of classrooms.

Each classroom has ceiling mounted radiant heating panels (see picture to the right); hallways and major rooms have radiant wall heaters that are all controlled with individual thermostats.

The heating panels in the ceiling do not have fan distribution systems. As they are located in the classroom ceilings and given the fact that heated air rises, the ceiling and the plenum space above the ceiling receive most of the benefit from the heat generated by the panel. A significant portion of the energy consumed to generate the heat is wasted because it does not contribute to occupant comfort.

Image 2. Hallway radiant heater

Image 3. Independent heater thermostat.

There are several options for replacing the existing radiant heat panels:

- While there are inherent maintenance difficulties with a changeover to 2-pipe hot and chilled water systems, converting the existing 2-pipe chilled water system to a changeover hot and chilled water system requires the lowest amount of first cost capital for a project that could introduce hot water heating into the campus. Although a better heating system than the current heat panels, seasonal changeover does present some comfort issues with a 2-pipe system.
- Convert the existing two-pipe hydronic system to a four pipe hot and chilled water system. First cost expense is high as an additional set of hydronic pipes must be installed for the hot water parallel to the existing chilled water pipes in existing spaces.
- Replace the existing radiant heat panels with new electric duct heaters. Electric heat is approximately 2-1/2 times more expensive per BTU than natural gas, but utilizing electric heat in the ductwork will at least distribute the heat to the occupants via the existing air distribution system as opposed to the non-fan-powered radiant heat panels currently installed.

All of these heating alternatives will require renovation of the existing HVAC controls to insure that simultaneous heating and cooling processes do not occur.

Estimated Cost: Varies per target strategy; more investigation is required.

HVAC ECRM 2: RENOVATION OF AGED HVAC EQUIPMENT

It was noted during the survey that some HVAC equipment has reached the end of its useful life expectancy. We recommend this equipment be included in subsequent maintenance budgets to be replaced as planned equipment upgrades in order to avoid the higher cost of emergency replacement when they inevitably fail.

Image 2. Wild Peach air cooled chiller.

The Wild Peach Elementary facility is currently conditioned with a Trane air cooled chiller originally installed in 1999. In the costal environment of Columbia-Brazoria ISD, the salt-laden air has damaged the aluminum coil fins faster than would be expected with a typical 15 year life expectancy for this type of equipment. Consequently, the unit's ability to reject heat to the atmosphere is compromised and the operating efficiency of the chiller is reduced. The air cooled condenser has been coated with a protective coating to minimize the effects of the salt air, but it looks like the coating was applied after the initial deterioration had already been detected. While the coating has likely served to minimize the progress of the deterioration, the earlier damage had already occurred. *We recommend the district replace the existing chiller.*

Image 3. Close up of condenser coil.

Estimated Cost: $150,000 Estimated Savings: $12,500
Estimated Payback: 12 Years

HVAC ECRM 3: OPEN CHOKED WATER VALVES AND BALANCE PUMPS WITH VFDS

It was noted during the survey that the valves on the chilled water piping were significantly throttled to reduce the water flow within the system. This creates unneeded resistance in the system that must be overcome continuously by the pump and suggests that the pump or the piping itself may be oversized for the load requirements in the building.

Image 4. Throttled valve on chiller.

The 10hp pump is part of a constant volume primary layout system. In this type of system, there are often energy savings available by replacing the existing pump starter with a Variable Frequency Drive (VFD) and opening up all of the manual balancing valves to 100% open. The increased flow through the open valves is recognized by the system as an increase in pressure within the system. The drive responds by reducing the output of the pump, and consequently, the energy required to operate the pump, as the drive matches the chilled water flow to the load conditions at the time. *We recommend the district install a VFD on the chilled water pump.*

Estimated Cost: $10,000 Estimated Savings: $1,500 Estimated Payback: 6-2/3 Years

CONTROLS ECRM 1: REPLACE PNEUMATIC CONTROL SYSTEM WITH NEW DDC SYSTEM.

Wild Peach Elementary School was noted to have a pneumatic control system that was installed when the building was originally built in 1977. The current state of the system is very poor; the air compressor runs continuously in an attempt to keep the system pressurized, but the abundant leaks in the system keep the compressor from reaching design system pressure. There is a very large leak immediately downstream of the compressor, wasting most of its work.

Additionally, the heating controls operate independently of the controls for the cooling and ventilation processes. Subsequently, it is possible to have simultaneous heating and cooling which is extremely inefficient. At the time of the survey, it was noted that the air handling units were often operating at full load when space loads were substantially satisfied. We recommend replacing the existing pneumatic system with a DDC system that can keep the system balanced and calibrated.

Estimated Cost: $80,000 Estimated Savings: $13,300 Estimated Payback: 6 Years

LIGHTING ECRM 1: DAYLIGHTING/DE-LAMPING OPPORTUNITIES:

Daylighting is the practice of incorporating natural daylight into spaces to reduce the need for light fixtures during the daytime hours. Unfortunately, many times the artificial fixtures in these areas are switched on throughout the day because of poor staff training or because the lighting design did not incorporate appropriate lighting controls to promote the operation of the daylighting strategies. As a result, there are often energy saving opportunities available to school districts with minor lighting control modifications or staff training. The Cafeteria at Wild Peach has one wall filled with windows. There are

Image 5. Wild Peach Cafeteria.

20 Fluorescent fixtures in the area that are switched on during the unoccupied times, when the natural daylight contribution is all that is required for proper illumination, w*e recommend training staff not to turn these fixtures on during the day, or if necessary, make proper switching scheme modifications to allow the fixtures to be left off during the day. On overcast days We recommend the district just operate 2-lamps in each of the cafeteria fixtures during unoccupied periods.*

The corridors utilize 4-lamp fixtures at 6 feet on center spacing in an 8 foot ceiling. Light levels in the corridors were measured to be 29-56 footcandles. The Illumination Engineering Society of North America (IESNA) develops recommendations for appropriate light levels in various spaces in school buildings. Their recommendation for school corridors is 10-15 footcandles. We recommend the district consider de-lamping to 2-lamps in each fixture in the corridors. Light levels will fall to 15-30 footcandles, which still exceeds IESNA recommendations, and the school will benefit from the energy savings of using 1/2 of the existing lamps to illuminate the corridors.

Likewise, classrooms use 4-lamp fixtures to light their classroom producing 90-150 footcandles of light. As per the recommendation for the corridors, these fixtures can be de-lamped to 2-lamp fixtures by removing a center lamp and still provide more than the recommended 50 footcandles in the classrooms (new measurements should indicate light levels in these spaces between 45-75 footcandles).

Estimated Cost: $4,000 Estimated Savings: $2,000 Estimated Payback: 2 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- revised cooling and heating setpoints in gym to 72 cooling and 69 heating. Revised occupied/ unoccupied schedule.

Lighting

- Keep unnecessary lights off during the day
- Open curtains on windows where acceptable.

Building Envelope

- Replace weatherstripping

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 our survey we noticed the setpoints of the two units in the new gym where not set at the same temperatures. This creates a situation where the two units will work against each other. District personnel revised the cooling temperature setpoint to 72F and the heating setpoint to 69F. We also revised the Saturday schedule to an unoccupied state.

Lighting M&O #1

It was noted that there were lights on at several corridor locations, unoccupied spaces, and decorative architectural fixtures that are not needed in order to adequately light the given space during the daytime. Training district personnel to be conscientious about which lights they are turning on, turning lights off when they leave, and recognizing lights that are not needed, is a cost effective solution that will yield immediate energy savings. *We recommend CBISD conduct training for all appropriate district personnel about lighting use and look for any opportunities to save energy by keeping unnecessary lights turned off.*

Lighting M&O #2

At the new wing, we noticed there were curtains on most of the windows in the building. Opening the windows and utilizing natural daylight to fill the space may allow the fixtures in the space to be turned off.

Image 6. Curtains on the windows.

Building Envelope M&O #1

It was noted that the weatherstripping at many of the exterior doors throughout the district was damaged or missing. This allows the conditioned air to escape the building and contaminants to enter. *We recommend the district inspect all exterior door weatherstripping and repair or replace the weatherstripping as needed.*

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. $1,000 maintenance expense next 5 years				
4. $2,000 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	($244,000)		0	($244,000)
Year 1		$ 29,300.00	0	$29,300
Year 2		$ 29,300.00	0	$29,300
Year 3		$ 29,300.00	0	$29,300
Year 4		$ 29,300.00	0	$29,300
Year 5		$ 29,300.00	0	$29,300
Year 6		$ 27,835.00	($1,000)	$26,835
Year 7		$ 26,370.00	($1,000)	$25,370
Year 8		$ 24,905.00	($1,000)	$23,905
Year 9		$ 23,440.00	($1,000)	$22,440
Year 10		$ 21,975.00	($1,000)	$20,975
Year 11		$ 20,510.00	($2,000)	$18,510
Year 12		$ 19,045.00	($2,000)	$17,045
Year 13		$ 17,580.00	($2,000)	$15,580
Year 14		$ 16,115.00	($2,000)	$14,115
Year 15		$ 14,650.00	($2,000)	$12,650
			Internal Rate of Return	**5.43%**

More information regarding financial programs available to MISD 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

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

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

6.1.1.1.3 SECONDARY SERVICE GREATER THAN 10 KVA

AVAILABILITY
This schedule is applicable to Delivery Service for non-residential purposes at secondary voltage with demand greater than 10 kVA when such Delivery Service is to one Point of Delivery and measured through one Meter.

TYPE OF SERVICE
Delivery Service will be single or three-phase, 60 hertz, at a standard secondary voltage. Delivery Service will be metered using Company's standard Meter provided for this type of Delivery Service. Any Meter other than the standard Meter will be provided at an additional charge and/or will be provided by a Meter Owner other than the Company pursuant to Applicable Legal Authorities. Where Delivery Service of the type desired is not available at the Point of Delivery, additional charges and special contract arrangements may be required prior to Delivery Service being furnished, pursuant to Section 6.1.2.2, Construction Services, in this Tariff.

MONTHLY RATE

I. Transmission and Distribution Charges:

Customer Charge		
Non-IDR Metered	$ 2.26	per Retail Customer per Month
IDR Metered	$65.83	per Retail Customer per Month
Metering Charge		
Non-IDR Metered	$18.82	per Retail Customer per Month
IDR Metered	$63.07	per Retail Customer per Month
Transmission System Charge		
Non-IDR Metered	$1.4318	per NCP kVA
IDR Metered	$2.2387	per 4CP kVA
Distribution System Charge	$3.059429	per Billing kVA

II. System Benefit Fund: See Rider SBF

III. Transition Charge: See Schedules TC, TC2, TC3, SRC, and TC5

IV. Nuclear Decommissioning Charge: See Rider NDC

V. Transmission Cost Recovery Factor: See Rider TCRF

VI.	**Competition Transition Charge:**		See Rider CTC
VII.	**Competitive Metering Credit:**		See Rider CMC
VIII.	**Other Charges or Credits:**		
	A. Municipal Account Franchise Credit (see application and explanation below)	$(.690362)	per Billing kVA
	B. Rate Case Expenses Surcharge		See Rider RCE
	C. Advanced Metering System Surcharge		See Rider AMS
	D. Energy Efficiency Cost Recovery Factor		See Rider EECRF
	E. Accumulated Deferred Federal Income Tax Credit		See Rider ADFITC
	F. Deferred Tax Accounting Tracker		See Rider DTA

COMPANY SPECIFIC APPLICATIONS

DETERMINATION OF BILLING DEMAND FOR TRANSMISSION SYSTEM CHARGES

Determination of NCP kVA The NCP kVA applicable under the Monthly Rate section shall be the kVA supplied during the 15 minute period of maximum use during the billing month.

Determination of 4 CP kVA The 4 CP kVA applicable under the Monthly Rate section shall be the average of the Retail Customer's integrated 15 minute demands at the time of the monthly ERCOT system 15 minute peak demand for the months of June, July, August and September of the previous calendar year. The Retail Customer's average 4CP demand will be updated effective with the February billing month of each year and remain fixed for a year. Retail Customers without previous history on which to determine their 4 CP kVA will be billed at the applicable NCP rate under the "Transmission System Charge" using the Retail Customer's NCP kVA.

DETERMINATION OF BILLING DEMAND FOR DISTRIBUTION SYSTEM CHARGES

Determination of Billing kVA For loads whose maximum NCP kVA established in the 11 months preceding the current billing month is less than or equal to 20 kVA, the Billing kVA applicable to the Distribution System Charge shall be the NCP kVA for the current billing month. For all other loads, the Billing kVA applicable to the Distribution System Charge shall be the higher of the NCP kVA for the current billing month or 80% of the highest monthly NCP kVA established in the 11 months preceding the current billing month (80% ratchet). The 80% ratchet shall not apply to seasonal agricultural Retail Customers.

OTHER PROVISIONS

Secondary Service Greater Than 10 kVA. This Rate Schedule is applicable only to Retail Customers whose peak demand for the current month is greater than 10 kVA, as measured in the fifteen minute period of highest demand, or whose peak demand exceeded 10 kVA in any of the previous eleven months, and that otherwise qualify under this Rate. This Rate Schedule is applicable to Delivery Service provided for Electric Power and Energy supplied by Retail Customer's REP for Temporary service subject to provisions of Section 6.1.2.2, Construction Services. The Electric Power and Energy delivered may not be re-metered or sub-metered by the Retail Customer for resale except pursuant to lawful sub-metering regulations of Applicable Legal Authorities. Retail Customer's previous metered usage under this or any other Rate Schedule will be used, as needed, in determining the billing determinants under the Monthly Rate section.

Service Voltages. Company's standard service voltages are described in 6.22, Standard Voltages and in the Company's Service Standards.

Municipal Account Franchise Credit. A credit equal to the amount of franchise fees included in the Transmission and Distribution Charges will be applied to municipal accounts receiving service within the incorporated limits of such municipality which imposes a municipal franchise fee upon the Company based on the Billing kVA within that municipality and who have signed an appropriate Franchise Agreement.

Adjustment To The Charges Applied To Retail Customer's Demand Measurement If data to determine the Retail Customer's *Demand Measurement* becomes no longer available, the Company will determine a *Conversion Factor* which will be used as an adjustment to all per unit charges that will then be applied to the *New Demand Measurement*. *Demand Measurement* shall include the Billing kVA, the 4 CP kVA, NCP kVA or any other demand measurement required for billing under this Rate Schedule or any applicable rider(s) or any other applicable schedule(s). *New Demand Measurement* shall be the billing determinants which replace the *Demand Measurement*. The *Conversion Factor* will apply to unit prices per kVA such that when applied to the *New Demand*

Measurement, the revenue derived by the Company under demand based charges shall be unaffected by such lack of data.

This adjustment may become necessary because of changes in metering capabilities, such as, Meters that record and /or measure kW with no ability to determine kVA or Meters which meter data in intervals other than 15 minutes. This adjustment also may become necessary due to changes in rules, laws, procedures or other directives which might dictate or recommend that Electric Power and Energy, electric power related transactions, wire charges, nonbypassable charges and/or other transactions measure demand in a way that is inconsistent with the definitions and procedures stated in the Company's Tariff. This adjustment is applicable not only in the instances enumerated above but also for any and all other changes in *Demand Measurement* which would prevent the Company from obtaining the necessary data to determine the kVA quantities defined in this Rate Schedule, applicable Riders and other applicable schedules.

The Conversion Factor shall render the Company revenue neutral to any change in *Demand Measurement* as described above.

NOTICE
This Rate Schedule is subject to the Company's Tariff and Applicable Legal Authorities.

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 Columbia-Brazoria Independent School District, 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: _____ Date: 2/22/12

Name (Mr.) Steven Galloway Title: Superintendent

Organization: Columbia-Brazoria ISD Phone: 345-5147X1102

Street Address: 520 S. 16th Street Fax: 979-345-4890

Mailing Address: PO Box 158 E-Mail: steven.galloway@cbisd.com

West Columbia, Texas 77486 County: Brazoria

Contact Information:

Name (Mr.): Scott Williams Title: CBISD Director of Maintenance

Phone: 979-799-1803 Fax: 979-798-5120

E-Mail: scott.williams@cbisd.com County: Brazoria

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

AND fax to the SECO Contractor for this service, Colby May, ESA Energy Systems Associates, Inc. Phone: 512-258-0547, x124. Fax: 512-388-3312.

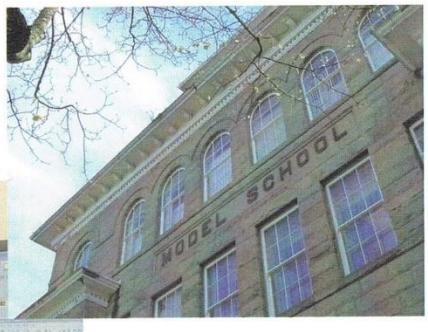
APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

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