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Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

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Damon Independent School District

August 3, 2012

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SECO State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY:

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

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 February 2012, **SECO** received a request for technical assistance from Mr. Donald Rhodes, Superintendent at **Damon 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 **Damon ISD,** (hereafter known as DISD) 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. Rhodes*, 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 **$13,245** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$56,380**, yielding an average simple payback of **4 ¼** years.

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

SUMMARY:	DESCRIPTION OF RECOMMENDATION	LOCATION OF ECRM	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
Controls ECRM #1	Install IP-addressable Thermostats	Campus wide	$5,000	$2,500	2 ½ years
Controls ECRM #2	Install Vending Machine Controls	Gym	$180	$90	2 years
Lighting ECRM #1	Replace Metal Halide with T8 lighting	Gym	$18,000	$2,400	7 ½ years
Lighting ECRM #2	Replace T12 lighting with T8 lighting	Old wing, Old JH	$30,000	$7,500	4 years
Lighting ECRM #3	Replace incandescent Exit lights with LED	Old wing, Old JH	$1,200	$370	3 ¼ years
Lighting ECRM #4	Add timers to exterior lights	Campus Wide	$2,000	$385	5 years
TOTAL PROJECTS			**$ 56,380**	**$13,245**	**4 ¼ 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 DISD. 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., A Terracon Company James W. Brown (512) 258-0547

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 DISD, 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 DISD ENERGY PERFORMANCE INDICATORS:

Damon ISD

CAMPUS	ENERGY UTILIZATION INDEX (EUI) BTUs/sf-year	ENERGY COST INDEX (ECI) $/sf-year
Pre-K through 12	29,038	$0.87

Damon ISD purchases electricity from Reliant Energy. The transmission and distribution utility is Centerpoint. 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 I

OWNER: **Damon ISD** **BUILDING:** **Damon PreK - 12**

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 $
APRIL	2011	45,455		0	0	5,000	11	87
MAY	2011	45,455		0	0	5,000	12	90
JUNE	2011	30,445		0	0	3,349	10	76
JULY	2011	30,445		0	0	3,349	11	100
AUGUST	2011	30,445		0	0	3,349	8	78
SEPTEMBER	2011	20,464		0	0	2,251	12	103
OCTOBER	2011	20,464		0	0	2,251	12	103
NOVEMBER	2011	20,464		0	0	2,251	12	106
DECEMBER	2011	50,291		0	0	5,532	16	132
JANUARY	2012	50,291		0	0	5,532	11	82
FEBRUARY	2012	50,291		0	0	5,532	26	167
MARCH	2012	29,773		0	0	3,275	12	86
TOTAL		**424,282**	**0**	**0**	**0**	**$46,671**	**153**	**$1,210**

Annual Total Energy Cost = $47,881 Per Year

Total KWH x 0.003413 = 1,448.07 x 106
Total MCF x 1.03 = 157.59 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,605.66 x 106

Floor area: 55,296 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 29,038 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $0.87 $/s.f. yr

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 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 rate schedule for Natural gas is unavailable, but we have calculated the average cost per MCF of purchased natural gas in the district by analyzing the utility history for the school surveyed in this report.

Total cost for natural gas at the eight facilities in the analyzed billing cycle: $1,210

Total quantity purchased during the analyzed billing cycle: 153 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $1,210 / 153 MCF

Average cost per MCF = $7.91

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
Damon ISD School	Old wing 1955, Old Junior High 1976, PreK 2001, New wing 2011	55,296	Split Systems and Window Units	SZAHU or Window Unit	50% T8 50% T12	Programmable Thermostats

Note: SZAHU = Single-Zone Air Handling Unit

6.0 ENERGY RECOMMENDATIONS:

Controls ECRM 1: INSTALL IP-ADDRESSABLE THERMOSTATS

It was noted during the survey that the HVAC systems at the Elementary, Intermediate, and High School are currently controlled by either conventional or programmable thermostats. *We recommend installing IP-addressable programmable thermostats at each existing thermostat location*. These devices will allow the district personnel with appropriate password credentials to monitor and program these units at any district network computer and will limit operation of the HVAC equipment to scheduled occupancy hours.

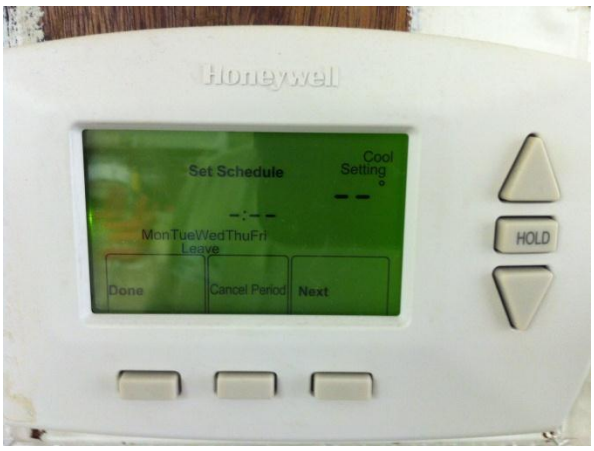


Image 1. Band hall thermostat

If this recommendation is not taken, a system should be devised to make sure the thermostats are programmed properly. Two thermostats examined during the survey were unlocked and not programmed properly. As seen in the picture above, the thermostat does not have an unoccupied schedule time so the unit will operate all of the time. The thermostat for AHU-5 in the science class had the following schedule in place.

Day	Status	Time	Cooling Set Point	Heating Set Point
M-F	Occupied	7:00	75	65
	Unoccupied	4:00	85	55
Sat-Sun	Occupied	6:15	72	69
	Unoccupied	6:15	78	55

While the Monday through Friday operation seems appropriate, we recommend the district examine the reasons that the systems are allowed to operate for such an extended period, if at all, on the weekends. Additionally, the weekend cooling and heating temperature setpoints are respectively cooler and warmer than the weekday normally occupied schedule setpoints. This situation is indicative of a district operating without a standardized energy policy. *Establishing a Board mandated energy policy will give the Facilities Department the support necessary to implement changes in the HVAC system. The IP Addressable Thermostats will allow the facilities Department to remotely monitor and program the systems to adhere to the new policy.*

Estimated Cost: $5000 Estimated Savings: $2500 Estimated Payback: 2 1/2 Years

Controls ECRM 2: INSTALL VENDING MACHINE CONTROLS

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 DISD install vending machine controls on all vending machines.* For the 1 vending machines we identified during the survey, our calculated cost and energy savings for this project is displayed below.

Image 2. Vending Machine in front of gym

Estimated Cost: $180 Estimated Savings: $90 Estimated Payback: 2 Years

Lighting ECRM 1: METAL HALIDE FIXTURE RETROFIT TO T8

The gymnasium currently utilizes 16 Metal-Halide (MH) light fixtures. One characteristic to MH fixtures is an inherently long re-strike period; it can take 10-15 minutes for the fixture to "warm up" to rated light output after power has been turned off to the fixtures. Consequently, these fixtures are left on many more hours than necessary because the users do not turn them off so that they do not have to wait for the light system to warm up. *We recommend the district replace the MH lighting located in the gymnasium with high-bay T5 or T8 fixtures that provide instant re-strike lighting and can be turned off when the space is not occupied.*

Occupancy sensors should be considered for the gymnasiums to avoid leaving the lights on when no one is present.

Image 3. Gym existing MH lighting.

Estimated Cost: $18,000 Estimated Savings: $2,400 Estimated Payback: 7.5 Years

Lighting ECRM 2: RETROFIT T12 FIXTURES WITH T8 LAMPS AND ELECTRONIC BALLASTS

The old wing and the old junior high section have T12 lighting. T12 components produce approximately 18% less light and consume about 20% more energy than the T8 lamps and electronic ballasts that may be retrofit into the existing linear fluorescent fixtures. W*e recommend the district retrofit the fixtures at these facilities with T8 lamps and electronic ballasts.*

Some spaces have a high number of failed lamps. In these areas, a comprehensive lighting retrofit will not reduce overall energy consumption but will improve the learning environment significantly by re-establishing proper light levels. In contrast, many areas such as corridors and some teaching spaces were noted to have very high light levels that exceeded IES recommendations. These areas may be de-lamped as part of the retrofit project so that the fixtures only produce the recommended amount of light in any given space. Occupancy sensors should be considered for frequently vacant areas such as the old office area, as staff states that the lights are frequently left operating in these areas when no persons are present.

Estimated Cost: $30,000 Estimated Savings: $7,500 Estimated Payback: 4 years

Lighting ECRM 3: REPLACE INCANDESCENT EXIT FIXTURES WITH LED FIXTURES

The old wing, gym and old junior high were noted to operate at least 12 incandescent exit fixtures. These exit fixtures utilize a 40-watt lamps and operate 8,760 hours per year. Therefore, each fixture consumes 350 kWh per year. LED exit fixtures consume less than 5 watts per fixture and reduce electrical consumption to 44 kWh per year.

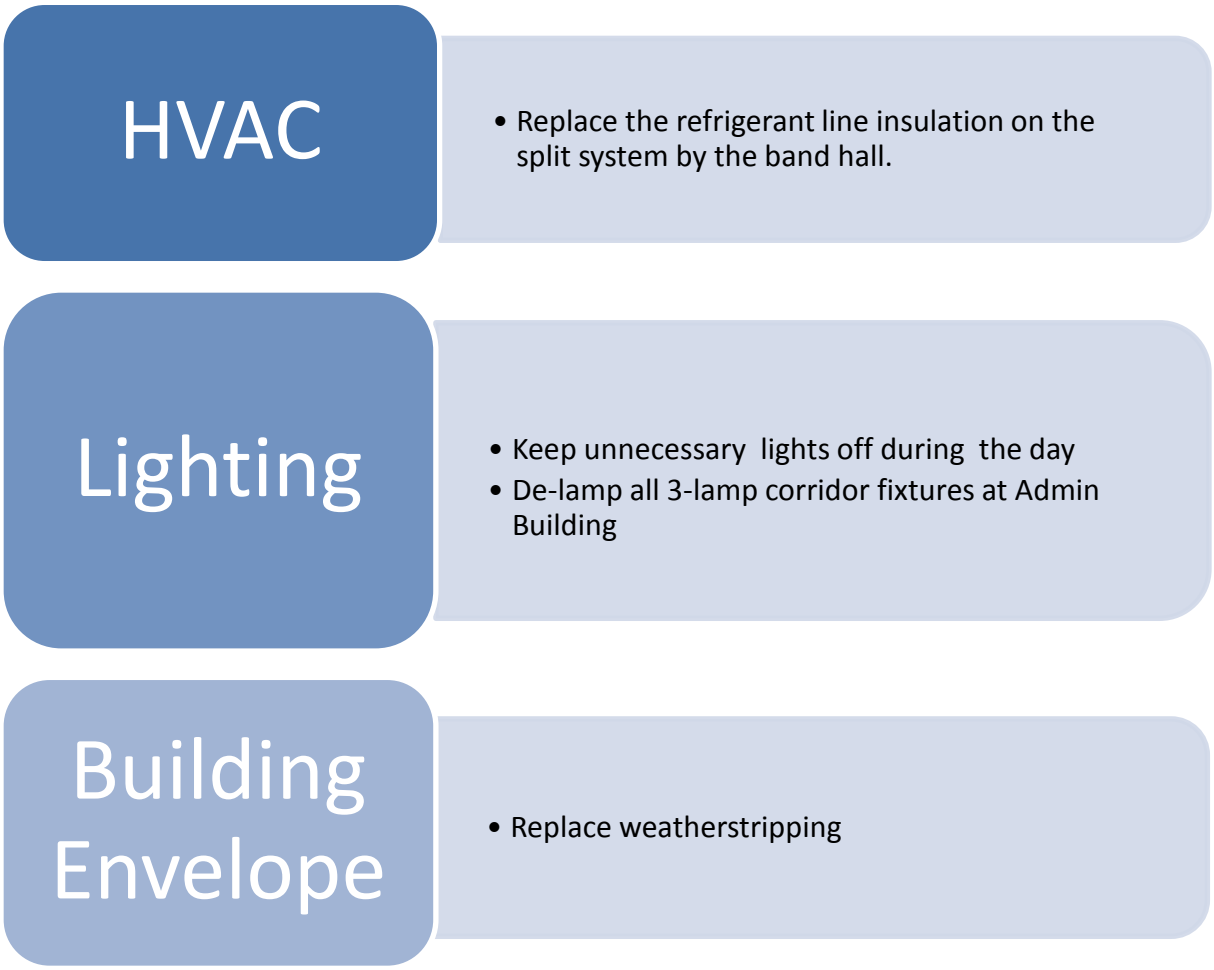
Estimated Cost: $1200 Estimated Savings: $370 Estimated Payback: 3-1/4 Years

Lighting ECRM 4: REPLACE PHOTOCELLS WITH ELECTRIC TIMERS

The exterior wall-packs, as well as the breezeway canopy lights were noted to be operating during the daytime, despite the assumption that they are under the control of a photocell. W*e recommend the district repair or replace the existing photocell so that the exterior lights do not operate during the daytime.*

Estimated Cost: $2000 Estimated Savings: $385 Estimated Payback: 5 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS



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 insulation on the refrigerant piping was damaged or missing. This condition minimizes the ability for the refrigerant to absorb heat from the conditioned space, and reduces the operational efficiency of the system. *We recommend the insulation be fixed.*

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 DISD be persistent in training all district personnel to be conscientious about lighting use and look for any opportunities to save energy by keeping unnecessary lights turned off.*

Lighting M&O #2

In the new wing addition, we noted corridor light fixtures utilizing 3-lamp fixtures. *We recommend DISD de-lamp each down to 2-lamps per fixture at this corridor*. The Illumination Engineering Society of North America (IESNA) recommends school corridors have between 10 and 15 footcandles of light. Reducing the number of lamps in the existing fixtures will still satisfy those conditions and consume 33% less energy per fixture.

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 damaged or missing areas 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. $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	($56,380)		0	($56,380)
Year 1		$ 13,245.00	0	$13,245
Year 2		$ 13,245.00	0	$13,245
Year 3		$ 13,245.00	0	$13,245
Year 4		$ 13,245.00	0	$13,245
Year 5		$ 13,245.00	0	$13,245
Year 6		$ 12,582.75	($500)	$12,083
Year 7		$ 11,920.50	($500)	$11,421
Year 8		$ 11,258.25	($500)	$10,758
Year 9		$ 10,596.00	($500)	$10,096
Year 10		$ 9,933.75	($500)	$9,434
Year 11		$ 9,271.50	($1,000)	$8,272
Year 12		$ 8,609.25	($1,000)	$7,609
Year 13		$ 7,947.00	($1,000)	$6,947
Year 14		$ 7,284.75	($1,000)	$6,285
Year 15		$ 6,622.50	($1,000)	$5,623
			Internal Rate of Return	**19.96%**

More information regarding financial programs available to DISD 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

How to Finance Your Energy Program *continued*

Financing Mechanisms

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

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

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

Internal Funds

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

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

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

Debt Financing

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

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

How to Finance Your Energy Program *continued*

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

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

Lease and Lease-Purchase Agreements

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

Energy Performance Contracts

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

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

Types of Leasing Agreements

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

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

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

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

How to Finance Your Energy Program *continued*

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

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

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

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

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

Rebuild America
U.S. Dept. of Energy

APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE

CenterPoint Energy Houston Electric, LLC
Applicable: Entire Service Area

CNP 8017

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.

CenterPoint Energy Houston Electric, LLC
Applicable: Entire Service Area

CNP 8017

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*

CenterPoint Energy Houston Electric, LLC
Applicable: Entire Service Area

CNP 8017

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 III - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

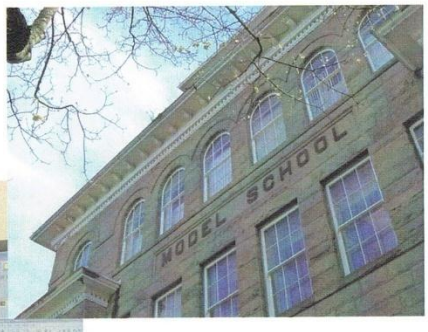
APPENDIX IV - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

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.

SECO
State Energy Conservation Office

APPENDIX V - UTILITY CHARTS ON CD