



**Susan Combs**  
Texas Comptroller of Public Accounts

# Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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## Duncanville 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**.



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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 June 2011, **SECO** received a request for technical assistance from Charles Moore, Director of Facilities for **Duncanville 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 **Duncanville 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 *Charles Moore*, 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 **\$22,815** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **\$173,325** yielding an average simple payback of **5** years.

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

<b>SUMMARY:</b>	<b>IMPLEMENTATION COST</b>	<b>ESTIMATED SAVINGS</b>	<b>SIMPLE PAYBACK</b>
HVAC ECRM #1	\$3,075	\$1,535	2 Years
CONTROLS ECRM #2	\$170,250	\$21,280	8 Years
<b>TOTAL PROJECTS</b>	<b>\$ 173,325</b>	<b>\$22,815</b>	<b>5 Years</b>

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., 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 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

$$[ \text{Total KWH /yr} ] \times [ 3413 \text{ BTUs/KWH} ] = \text{_____ BTUs / yr}$$

NATURAL GAS Usage

$$[ \text{Total MCF/yr} ] \times [ 1,030,000 \text{ BTUs/MCF} ] = \text{_____ BTUs / yr}$$

After adding the BTU consumption of each fuel, the total BTUs are then divided by the building area.

$$\text{EUI} = [ \text{Electricity BTUs} + \text{Gas BTUs} ] \text{ divided by } [ \text{Total square feet} ]$$

#### 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:

$$\text{ECI} = [ \text{Electricity Cost} + \text{Gas Cost} ] \text{ divided by } [ \text{Total square feet} ]$$

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:

<u>CAMPUS</u>	ENERGY UTILIZATION INDEX (EUI) BTUs/sf-year	COMPARISON TO DISTRICT AVERAGE	ENERGY COST INDEX (ECI) \$/sf-year	COMPARISON TO DISTRICT AVERAGE
Daniel Intermediate	40,039	-8%	\$1.31	12%
Brandenburg	43,612	0%	\$1.17	0%
Kenemer	47,258	8%	\$1.02	-13%
<b>Average Value:</b>	<b>43,636</b>		<b>\$1.17</b>	

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Duncanville ISD purchases electricity from Constellation Energy. The Transmission and Distribution utility is Centerpoint Energy. 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:		Duncanville ISD			BUILDING:		Daniel Intermediate	
MONTH / YEAR		ELECTRIC DEMAND				NAT'L GAS / FUEL		
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS \$	CONSUMPTION MCF	COSTS \$
JANUARY	2011	33,525	179	179	1,737	4,537	50	353
FEBRUARY	2011	35,332	158	158	1,719	4,673	62	394
MARCH	2011	38,340	185	185	1,756	4,978	15	105
APRIL	2011	41,347	211	211	1,793	5,283	2	26
MAY	2011	50,006	238	238	1,875	6,097	2	25
JUNE	2010	67,920	267	267	2,015	7,833	1	23
JULY	2010	85,833	296	296	2,154	9,568	2	28
AUGUST	2010	79,137	218	218	1,807	8,642	1	23
SEPTEMBER	2010	96,202	314	314	2,269	10,571	2	26
OCTOBER	2010	69,371	300	300	2,152	8,141	2	32
NOVEMBER	2010	53,388	258	258	1,887	6,393	12	139
DECEMBER	2010	45,007	216	216	1,821	5,607	25	175
<b>TOTAL</b>		<b>695,408</b>	<b>2,840</b>	<b>2,840</b>	<b>22,985</b>	<b>\$82,323</b>	<b>176</b>	<b>\$1,349</b>
Annual Total Energy Cost =		\$83,672	Per Year		<b>Energy Use Index:</b>			
Total KWH x 0.003413 =		2,373.43	x 106		Total Site BTU's/yr		40,039	BTU/s.f.yr
Total MCF x 1.03 =		181.28	x 106		Total Area (sq.ft.)			
Total Other x _____			x 106		<b>Energy Cost Index:</b>			
Total Site BTU's/yr		2,554.71	x 106		Total Energy Cost/yr		\$1.31	\$/s.f. yr
Floor area:		63,806	s.f.		Total Area (sq.ft.)			
<b>Electric Utility</b>		<b>ESID #</b>			<b>Gas Utility</b>		<b>Meter #</b>	
Direct Energy		3505			Atmos		447	
		4915						
		7170						

OWNER:		Duncanville ISD			BUILDING:		Brandenburg	
MONTH / YEAR		ELECTRIC DEMAND				NAT'L GAS / FUEL		
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS \$	CONSUMPTION MCF	COSTS \$
JANUARY	2011	39,600	149	149	1,437	4,563	181	1,246
FEBRUARY	2011	40,815	182	182	1,509	4,966	181	1,125
MARCH	2011	43,448	190	190	1,531	5,210	62	402
APRIL	2011	46,080	198	198	1,552	5,454	27	175
MAY	2011	51,345	214	214	1,594	5,941	22	144
JUNE	2010	53,888	302	302	1,982	6,652	18	157
JULY	2010	48,173	257	257	1,817	5,993	1	18
AUGUST	2010	42,458	211	211	1,652	5,333	14	126
SEPTEMBER	2010	66,555	268	268	1,781	7,548	21	179
OCTOBER	2010	46,688	214	214	1,563	5,610	25	209
NOVEMBER	2010	47,385	201	201	1,550	5,563	63	481
DECEMBER	2010	42,480	152	152	1,458	5,055	138	904
<b>TOTAL</b>		<b>568,915</b>	<b>2,538</b>	<b>2,538</b>	<b>19,426</b>	<b>\$67,888</b>	<b>753</b>	<b>\$5,166</b>
Annual Total Energy Cost =		\$73,054	Per Year		<b>Energy Use Index:</b>			
Total KWH x 0.003413 =		1,941.71	x 106		Total Site BTU's/yr		43,612	BTU/s.f.yr
Total MCF x 1.03 =		775.59	x 106		Total Area (sq.ft.)			
Total Other x _____			x 106		<b>Energy Cost Index:</b>			
Total Site BTU's/yr		2,717.30	x 106		Total Energy Cost/yr		\$1.17	\$/s.f. yr
Floor area:		62,306	s.f.		Total Area (sq.ft.)			
<b>Electric Utility</b>		<b>ESID #</b>			<b>Gas Utility</b>		<b>Meter #</b>	
Direct Energy		2819			Atmos		5200	

OWNER:		Duncanville ISD			BUILDING:		Kennemer	
MONTH / YEAR		ELECTRIC				NAT'L GAS / FUEL		
		DEMAND				TOTAL ALL ELECTRICAL		
MONTH	YEAR	CONSUMPTION	METERED	CHARGED	COST OF	CONSUMPTION	COSTS	
		KWH	KW/KVA	KW/KVA	DEMAND	COSTS \$	MCF	\$
JANUARY	2011	88,870	304	304	3,616	10,292	812	5,223
FEBRUARY	2011	84,369	314	314	3,613	9,951	842	4,961
MARCH	2011	95,953	367	367	3,656	10,864	312	1,845
APRIL	2011	107,537	419	419	3,699	11,777	64	390
MAY	2011	118,718	452	452	3,706	12,624	36	226
JUNE	2010	128,395	461	461	3,987	13,632	16	147
JULY	2010	138,071	470	470	4,267	14,639	5	74
AUGUST	2010	123,810	412	412	3,639	12,939	9	101
SEPTEMBER	2010	152,158	573	573	4,068	15,498	45	360
OCTOBER	2010	128,353	514	514	3,757	13,399	70	532
NOVEMBER	2010	106,464	422	422	3,670	11,668	274	1,884
DECEMBER	2010	99,205	370	370	3,665	11,117	510	3,003
<b>TOTAL</b>		<b>1,371,903</b>	<b>5,078</b>	<b>5,078</b>	<b>45,343</b>	<b>\$148,400</b>	<b>2,995</b>	<b>\$18,746</b>
Annual Total Energy Cost =		\$167,146	Per Year		<b>Energy Use Index:</b>			
Total KWH x 0.003413 =		4,682.30	x 106		Total Site BTUs/yr		47,258 BTU/s.f.yr	
Total MCF x 1.03 =		3,084.85	x 106		Total Area (sq.ft.)			
Total Other x _____			x 106		<b>Energy Cost Index:</b>			
Total Site BTUs/yr		7,767.15	x 106		Total Energy Cost/yr		\$1.02 \$/s.f. yr	
Total Area (sq.ft.)					Total Area (sq.ft.)			
Floor area:		164,357	s.f.					
<b>Electric Utility</b>		<b>ESID #</b>		<b>Gas Utility</b>		<b>Meter #</b>		
Direct Energy		6562		Atmos		9809		

## 4.0 RATE SCHEDULE ANALYSIS:

**RETAIL ELECTRIC PROVIDER: TXU** Contract price: \$0.08 per kWh

**TRANSMISSION AND DISTRIBUTION UTILITY: Oncor**

**Electric Rate: Secondary Service > 10 kW**

I. TRANSMISSION AND DISTRIBUTION CHARGES:

Customer Charge	=	\$6.78 per meter
Metering Charge	=	\$22.18 per IDR meter
Transmission System Charge	=	\$0 per 4CP kW
Distribution System Charge	=	Varies per NCP kW by LF

NCP kW	Annual Load Factor	per Distribution Billing kW
≤ 20 kW	ALL	\$4.24
> 20 kW	0-10%	\$4.24
	11-15%	\$5.30
	16-20%	\$5.00
	21-25%	\$4.85
	> 26%	\$4.24

II.	SYSTEM BENEFIT FUND	=	\$0.000654 per kWh
III.	TRANSITION CHARGES		
	Transition Charge 1	=	\$0.188 per NCP kW
	Transition Charge 2	=	\$0.265 per NCP kW
IV.	NUCLEAR DECOMMISSIONING CHARGE	=	\$0.044 per Billing kW
V.	TRANSMISSION COST RECOVERY FACTOR	=	\$2.059691/4CP kW
VI.	ENERGY EFFICIENCY COST RECOVERY FACTOR	=	\$8.14 per month
VII.	COMPETITIVE METERING CREDIT	=	- \$1.82 per month
VIII.	ADVANCED METERING COST RECOVERY FACTOR	=	\$ 3.98 per month
IX.	RATE CASE EXPENSE SURCHARGE	=	\$0.007944 per kWh

Average Savings for consumption = \$0.08273/kWh + \$0.000654/kWh + \$0.007944/kWh  
 = \$0.0913/kWh

Average Minimum Savings for demand, \$4.24 + \$.188 + \$0.265 + \$0.044 + \$2.059691 = \$ 6.80/kVA\*\*

Average Maximum Savings for demand, \$5.30 + \$.188 + \$0.265 + \$0.044 + \$2.059691 = \$ 7.86/kVA\*\*

\*\* This number is a generalization of average cost per kW because the rate schedule from Oncor utilizes three (3) different types of demand for the calculation of the utility bill and a calculation of the previous calendar year's Load Factor as calculated below:

1. NCP kVA: Peak demand during 15 minute interval of current billing cycle
2. 4CP kVA: Average demands of June, July, August and September of previous calendar year; usually only applied to IDR metered accounts
3. Billing kVA: Ratchet demand representing higher of two calculations: 80% of peak demand in last 11 months or current NCP kVA
4. Load Factor: kWh used previous calendar year / (Maximum NCP kW \* Days in Billing Period \* 24)

### **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 histories for the schools surveyed in this report.

Total cost for natural gas at the eight facilities in the analyzed billing cycle: \$25,261

Total quantity purchased during the analyzed billing cycle: 3,924 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = \$25,261 / 3,924 MCF

**Average cost per MCF = \$6.44**

## 5.0 CAMPUS DESCRIPTIONS:

**Duncanville ISD** consists of 18 educational campuses (1 High Schools, 3 Middle Schools, 3 Intermediate Schools, 9 Elementary Schools, and 2 Alternative Learning Schools). The energy survey focused on 2 of the educational campuses:

**Table 2: School Facilities Analyzed For This Report**

Note:

Facility	Year originally Constructed	Approximate Square Footage	Basic HVAC Cool/Heat	Basic Lighting System Description	Basic Control System Description
Byrd MS	1978 & 2005	115,000	Roof Mounted Package Units	T8 & some T12	Band Hall has Alerton, remainder of campus is CSI
Daniel Intermediate	1987	63,806	Central System	Combination T12 and T8	Alerton

The selection of campuses represented a mix of campuses which allows for comparison of energy strategies between different designs as well as the ability to extrapolate recommendations for these facilities to other facilities in the district.

## 6.0 ENERGY RECOMMENDATIONS:

### HVAC ECRM #1: INSTALL DEDICATED HVAC FOR IDF ROOMS

During our survey, district personnel informed us that Daniel Intermediate is operating with a night setback temperature of 78° in order to keep the IDF rooms conditioned. Because operating the HVAC for an unoccupied building at such a low cooling setpoint consumes a large amount of energy, *we recommend installing a 1.5 ton HVAC unit dedicated to each IDF room.* This will allow the district to shut off the main HVAC systems when the building is unoccupied yet ensure the IDF rooms are properly conditioned to care for the equipment contained therein.

This estimate is for a single IDF room. Please extrapolate this estimate to each IDF location as necessary.

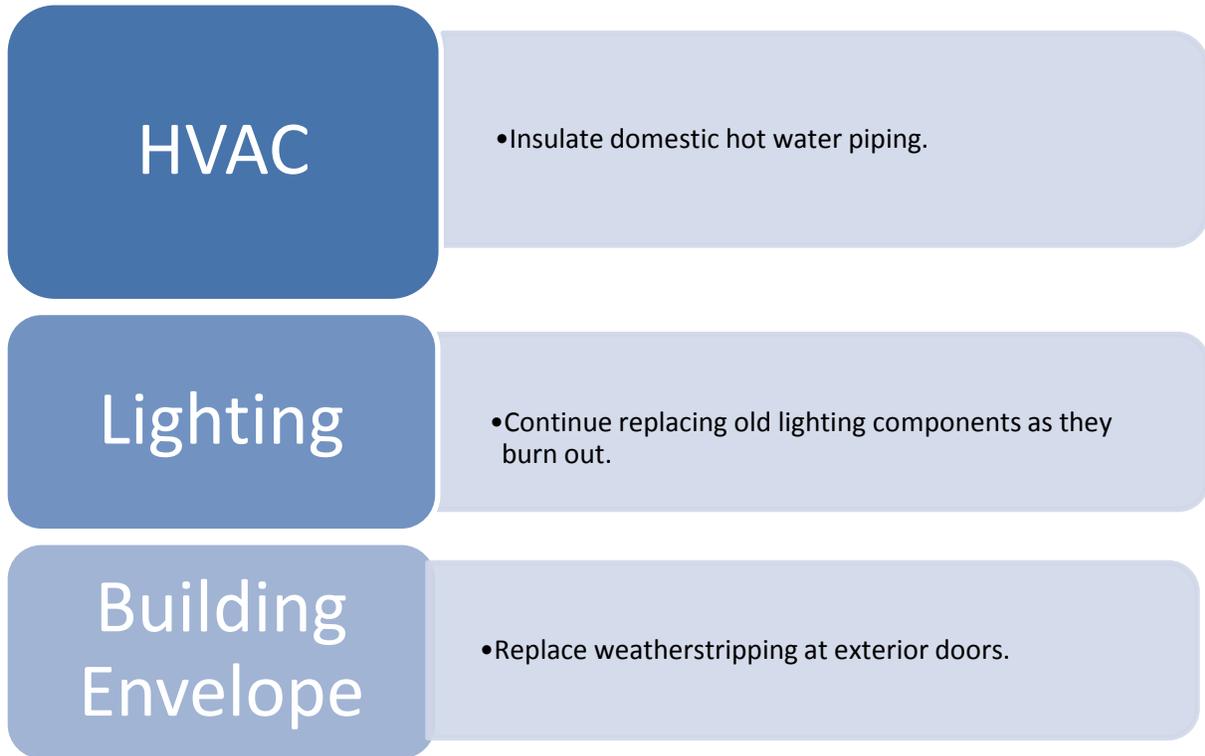
Estimated Cost: \$3,075      Estimated Savings: \$1,535      Estimated Payback: 2 years

### Controls ECRM #1: EXTEND ALERTON CONTROLS TO THE REST OF BYRD

It was noted that Byrd Middle School has new Alerton controls at the Band Hall and CSI controls at the remainder of the campus. In order to have the entire campus on a single energy management system, *we recommend extending Alerton controls to the rest of the building.* This will allow the entire building to be controlled from one interface and will eliminate any failures in communication between the two systems which can result in multiple units competing with one another to achieve separate temperature set-points.

Estimated Cost: \$170,250      Estimated Savings: \$21,280      Estimated Payback: 8 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

At Byrd Middle School we noticed a domestic hot water heater with approximately 10' of hot water piping not insulated. This allows heat to dissipate while the water is circulating through the piping, which in turn forces the heater to work longer and decreases the unit's overall efficiency. *We recommend the district insulate all hot water piping within the mechanical room.*



### Lighting M&O

We were informed by district personnel that any remaining T12 lamps and magnetic ballasts are being retrofitted to T8 lighting with electronic ballasts as the old lighting components burn out. *We recommend the district continue this practice until all T12 lighting components have been retrofitted to T8.*

### Building Envelope M&O

It was noted that both campuses had exterior doors with damaged or missing weatherstripping. This allows unconditioned air to enter the building along with dirt, insects, and other contaminants. *We recommend the district perform a district-wide inspection and replace all damaged or missing exterior door weatherstripping.*

## 8.0 FINANCIAL EVALUATION

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

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

Proposal:	Perform recommended ECRMs			
Assumptions:				
	1. Equipment will last at least 15 years prior to next renovation			
	2. No maintenance expenses for first five years (warranty period)			
	3. \$500 maintenance expense next 5 years			
	4. \$1000 maintenance expense next 5 years			
	5. Savings decreases 5% per year after year 5			
<b>Cash Flow</b>	<b>Project Cost</b>	<b>Project Savings</b>	<b>Maintenance Expense</b>	<b>Net Cash Flow</b>
Time 0	(\$173,325)		0	(\$173,325)
Year 1		\$ 22,815.00	0	\$22,815
Year 2		\$ 22,815.00	0	\$22,815
Year 3		\$ 22,815.00	0	\$22,815
Year 4		\$ 22,815.00	0	\$22,815
Year 5		\$ 22,815.00	0	\$22,815
Year 6		\$ 21,674.25	(\$500)	\$21,174
Year 7		\$ 20,533.50	(\$500)	\$20,034
Year 8		\$ 19,392.75	(\$500)	\$18,893
Year 9		\$ 18,252.00	(\$500)	\$17,752
Year 10		\$ 17,111.25	(\$500)	\$16,611
Year 11		\$ 15,970.50	(\$1,000)	\$14,971
Year 12		\$ 14,829.75	(\$1,000)	\$13,830
Year 13		\$ 13,689.00	(\$1,000)	\$12,689
Year 14		\$ 12,548.25	(\$1,000)	\$11,548
Year 15		\$ 11,407.50	(\$1,000)	\$10,408
			<b>Internal Rate of Return</b>	<b>7.28%</b>

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.

## 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.

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## 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](http://www.rebuild.gov)*



**APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE**

**Tariff for Retail Delivery Service  
Oncor Electric Delivery Company LLC**

6.1.1 Delivery System Charges  
Applicable: Entire Certified Service Area  
Effective Date: July 1, 2011

Sheet: 1.3  
Page 1 of 3  
Revision: Four

### 6.1.1.1.3 Secondary Service Greater Than 10 kW

**AVAILABILITY**

This schedule is applicable to Delivery Service at secondary voltage with demand greater than 10 kW 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, unless Retail Customer is eligible for and chooses a competitive meter provider. Any meter other than the standard meter provided by Company will be provided at an additional charge. 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 of this Tariff.

**MONTHLY RATE**

**I. Transmission and Distribution Charges:**

Customer Charge	\$6.78	per Retail Customer
Metering Charge	\$22.18	per Retail Customer
Transmission System Charge		
Non-IDR Metered	\$0.00	per NCP kW
IDR Metered	\$0.00	per 4CP kW
Distribution System Charge	See Table Below	

NCP kW	Annual Load Factor	per Distribution Billing kW
Less than or equal to 20 kW	All	\$4.24
Greater than 20 kW	0% - 10%	\$5.91
	11% - 15%	\$5.30
	16% - 20%	\$5.00
	21% - 25%	\$4.85
	26% and above	\$4.24

<b>II. System Benefit Fund:</b>	\$0.000654	per kWh, See Rider SBF
<b>III. Transition Charge:</b>	See Riders TC1 and TC2	per Distribution System billing kW
<b>IV. Nuclear Decommissioning Charge:</b>	\$0.044	per Distribution System billing kW, See Rider NDC
<b>V. Transmission Cost Recovery Factor:</b>	See Rider TCRF	
<b>VI. Energy Efficiency Cost Recovery Factor:</b>	See Rider EECRF	
<b>VII. Competitive Meter Credit:</b>	See Rider CMC	

**Tariff for Retail Delivery Service  
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VIII. Advanced Metering Cost Recovery Factor: See Rider AMCRF

**Other Charges or Credits**

IX. Rate Case Expense Surcharge: See Rider RCE per Distribution System billing kW

X. State Colleges and Universities Discount: See Rider SCUD

**COMPANY SPECIFIC APPLICATIONS**

At Company's option, locations where the electrical installation has multiple connections to Company's conductors, due to Company facilities limitations or design criteria, may be considered one Point of Delivery for billing purposes.

**DETERMINATION OF BILLING DEMAND FOR TRANSMISSION SYSTEM CHARGES**

**DETERMINATION OF NCP kW**

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

**DETERMINATION OF 4 CP kW**

The 4 CP kW 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 on January 1 of each calendar year and remain fixed throughout the calendar year. Retail Customers without previous history on which to determine their 4 CP kW will be billed at the applicable NCP rate under the "Transmission System Charge" using the Retail Customer's NCP kW.

**DETERMINATION OF BILLING DEMAND FOR DISTRIBUTION SYSTEM CHARGES**

**DETERMINATION OF ANNUAL LOAD FACTOR**

The Annual Load Factor for each premise shall be calculated using the previous year's usage for that premise ending with the December Bill Cycle. The Annual Load Factor shall apply for the following 12 billing months.

The Annual Load Factor calculation is as follows:

$$\frac{\text{kWh Used in 12 Billing Months Ending December}}{\text{Maximum NCP kW for the 12 Billing Months Ending December} * \text{Days in Billing Periods} * 24}$$

For premises with less than 12 months usage history, the available billing history shall be used for determining the Annual Load Factor. However, if less than 90 days of billing history is available, the premise shall be assumed to have an Annual Load Factor greater than 25%.

**DETERMINATION OF BILLING kW**

For loads whose maximum NCP kW established in the 11 months preceding the current billing month is less than or equal to 20 kW, the Billing kW applicable to the Distribution System Charge shall be the NCP kW for the current billing month.

For loads whose maximum NCP kW established in the 11 months preceding the current billing month is greater than 20 kW and their Annual Load Factor is less than or equal to 25%, the Billing kW applicable to the Distribution System Charge shall be the NCP kW for the current billing month. Billing kW applicable to Riders TC, NDC, RCE charges shall be the higher of the NCP kW for the current billing month or 80% of the highest monthly NCP kW established in the 11 months preceding

**Tariff for Retail Delivery Service  
Oncor Electric Delivery Company LLC**

6.1.1 Delivery System Charges  
Applicable: Entire Certified Service Area  
Effective Date: July 1, 2011

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the current billing month (80% ratchet).

For all other loads, the Billing kW applicable to the Distribution System Charge shall be the higher of the NCP kW for the current billing month or 80% of the highest monthly NCP kW established in the 11 months preceding the current billing month (80% ratchet).

The 80% ratchet and the Annual Load Factor Provisions shall not apply to Retail Seasonal Agricultural Customers.

**NOTICE**

This rate schedule is subject to the Company's Tariff and Applicable Legal Authorities.

**APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE  
AGREEMENT**



## 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 DUNCANVILLE ISD, hereafter 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: <u>Charles Moore</u>	Date: <u>JUNE 16, 2011</u>
Name (Mr/Ms/Mr.): <u>Mr. Charles Moore</u>	Title: <u>FACILITY DIRECTOR</u>
Organization: <u>DUNCANVILLE ISD</u>	Phone: <u>972-708-3267</u>
Street Address: <u>315 CRAWFORD DR.</u>	Fax: <u>972-708-3269</u>
Mailing Address: <u>315 CRAWFORD DR.</u>	E-Mail: <u>cmoore@DuncanvilleISD.org</u>
<u>DUNCANVILLE TX 75116</u>	County: <u>DALLAS</u>

#### Contact Information:

Name (Mr/Ms/Mr.): <u>CHARLES MOORE</u>	Title: <u>FACILITY DIRECTOR</u>
Phone: <u>972-708-3267</u>	Fax: <u>972-708-3269</u>
E-Mail: <u>cmoore@DuncanvilleISD.org</u>	County: <u>DALLAS</u>

Please sign and mail or fax to: Stephen Ross, Schools and Educator Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774 Phone: 512-463-1170 Fax 512-475-2569.

AND fax to the SECO Contractor for the service: Eric Ryan, LSA Energy Systems Associates, Inc. Phone: 512-828-8223, Fax: 512-258-5638.

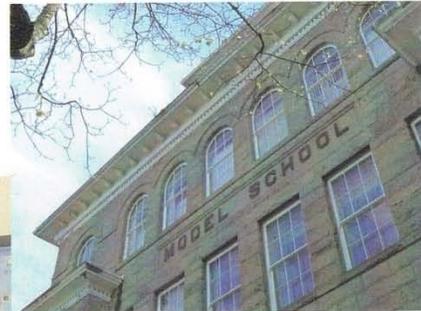
**APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)**

ANNOUNCING!

TEMA

## TEXAS ENERGY MANAGERS ASSOCIATION

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



[WWW.TEXASEMA.ORG](http://WWW.TEXASEMA.ORG)

Check the website for  
Membership  
and Association  
information.

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



**APPENDIX VI - UTILITY CHARTS ON CD**