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Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

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September 19, 2011

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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
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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 May, 2011, **SECO** received a request for technical assistance from Richard Wilkinson, Deputy Superintendant for **Frisco 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 **Frisco ISD,** (hereafter known as FISD) 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 *George Radtke*, 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 **$69,066** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$399,270**, yielding an average simple payback of **5-3/4** years.

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

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	$18,870	$5,391	3-1/2 Years
Lighting ECRM #1	$100	$300	4 Months
Lighting ECRM #2	$300	$75	4 Years
Controls ECRM #1	$380,000	$63,300	6 Years
TOTAL PROJECTS	**$399,270**	**$69,066**	**5-3/4 Years**

**Lighting ECRMs should be extrapolated to meet the specific needs of the district as these estimates are based on a small scale project.*

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 FISD. 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.

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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 FISD, 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 FISD ENERGY PERFORMANCE INDICATORS:

CAMPUS	ENERGY UTILIZATION INDEX (EUI) BTUs/sf-year	COMPARISON TO DISTRICT AVERAGE	ENERGY COST INDEX (ECI) $/sf-year	COMPARISON TO DISTRICT AVERAGE
Centennial HS	65,221	1%	$1.50	2%
Frisco HS	64,000	-1%	$1.45	-2%
Average Value:	64,611		$1.48	

Frisco ISD purchases electricity from CoServ Electricity and Direct Energy. Oncor Energy is the transmission and distribution company. The energy history spreadsheets are shown on the next page.

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: Frisco ISD **BUILDING:** Centennial HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	403,940		0	0	36,372	1,778	10,308
FEBRUARY	2010	356,340		0	0	33,216	603	3,555
MARCH	2010	355,980		0	0	33,229	334	2,117
APRIL	2009	336,040		0	0	33,902	507	3,144
MAY	2009	375,400		0	0	40,957	196	1,182
JUNE	2009	340,277		0	0	33,559	90	539
JULY	2009	331,560		0	0	38,226	2	27
AUGUST	2009	383,575		0	0	35,817	29	228
SEPTEMBER	2009	428,185		0	0	40,829	65	489
OCTOBER	2009	457,400		0	0	39,677	134	972
NOVEMBER	2009	389,900		0	0	34,427	345	2,854
DECEMBER	2009	359,760		0	0	33,311	516	3,885
TOTAL		4,518,357	0	0	0	$433,522	4,599	$29,300

			Energy Use Index:		
Annual Total Energy Cost =	$462,822	Per Year	Total Site BTU's/yr	65,221	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	15,421.15	x 106			
Total MCF x 1.03 =	4,736.97	x 106	**Energy Cost Index:**		
Total Other x ____		x 106	Total Energy Cost/yr	$1.50	$/s.f. yr
Total Site BTU's/yr	20,158.12	x 106	Total Area (sq.ft.)		
Floor area:	309,076	s.f.			

Electric Utility	Account #	Meter#	Gas Utility	Meter #
CoServ Electricity	0000275905	0	Atmos Gas	)0187465-0170

OWNER: Frisco ISD **BUILDING:** Frisco HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	290,400		0	0	25,122	1,566	9,339
FEBRUARY	2010	277,920		0	0	24,733	661	5,772
MARCH	2010	280,320		0	0	25,237	483	7,284
APRIL	2009	271,680		0	0	27,183	534	3,308
MAY	2009	305,763		0	0	31,482	329	1,975
JUNE	2009	254,880		0	0	30,165	115	684
JULY	2009	186,240		0	0	20,155	16	138
AUGUST	2009	228,960		0	0	23,743	15	126
SEPTEMBER	2009	366,240		0	0	35,473	56	417
OCTOBER	2009	348,960		0	0	33,936	61	450
NOVEMBER	2009	305,760		0	0	28,419	288	2,380
DECEMBER	2009	260,160		0	0	26,867	420	3,182
TOTAL		3,377,283	0	0	0	$332,515	4,544	$35,055

			Energy Use Index:		
Annual Total Energy Cost =	$367,570	Per Year	Total Site BTU's/yr	64,000	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	11,526.67	x 106			
Total MCF x 1.03 =	4,680.32	x 106	**Energy Cost Index:**		
Total Other x ____		x 106	Total Energy Cost/yr	$1.45	$/s.f. yr
Total Site BTU's/yr	16,206.99	x 106	Total Area (sq.ft.)		
Floor area:	253,233	s.f.			

Electric Utility	Account #	Meter#	Gas Utility	Meter #
CoServ Electricity	5294050826	0	Atmos Gas	)0173463-1428

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: Direct Energy Contract price: $0.0882235 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 = $0.0775/kWh + $0.000654/kWh + $0.007944/kWh
= $0.086098/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)

ELECTRICITY PROVIDER:

ELECTRIC PROVIDER: CoServ Electricity Contract price: $0.0963748 per kWh

Electric Rate: Public Building > 35 kW

X.	TRANSMISSION AND DISTRIBUTION CHARGES:		
	Customer Charge	=	$35.00 per meter
XI.	ENERGY CHARGE		
	a. First 150 kWh per Billing kW	=	$0.138325 per kWh
	b. Over 150 kWh per Billing kW	=	$0.104345 per kWh

Average Savings for consumption first 150 kWh per billing kW =$0.138325/kWh = $0.138325/kWh

Average Savings for consumption over 150 kWh per billing kW =$0.104345/kWh = $0.104345/kWh

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: $80,210

Total quantity purchased during the analyzed billing cycle: 11,576 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $80,210 / 11,576 MCF

Average cost per MCF = $6.93

5.0 CAMPUS DESCRIPTIONS:

Frisco ISD consists of 52 educational campuses (6 High Schools, 12 Middle Schools, 30 Elementary Schools and 4 specialty campuses) which are located in Collin and Denton Counties; in and throughout the cities of McKinney, Plano and Little Elm. The energy survey focused on 2 of the educational campuses:

Table 2: School Facilities Analyzed For This Report

Facility	Approximate Square Footage	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
Centennial HS	309,076	Water Cooled Central System/ Geothermal Heat Pumps	Face and Bypass AHUs	T8/T5 in gyms	DDC Controls
Frisco HS	253,233	Air Cooled Chiller Central System/Geothermal Heat Pumps	Face and Bypass AHUs	T8/T5 in gyms	Pneumatic and DDC Controls

Note: SZAHU = Single-Zone Air Handling Unit; MZAHU = Multi-Zone Air Handling Unit

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

6.0 ENERGY RECOMMENDATIONS:

The district has several on-going energy efficiency measures that we recommend the district continue to implement.

A. The district has plans to re-lamp their fluorescent light fixtures from 32 watt lamps to 25 watt lamps.
B. The district has some gymnasiums that have not yet been renovated from metal halide fixtures to T5 high-bay fluorescent fixtures.

Both of these projects will continue next year when the utility company energy efficiency rebate programs renew for the 2012 program.

One of the energy saving recommendations we have for Frisco High School should be reserved for future consideration. The relatively new Field House, although served by the Central Utility Plant (CUP), is located several hundred feet away from the CUP and operates on a significantly different occupancy schedule than the main building. In fact, the occupancy schedule for the Field House often dictates the operating schedule for the CUP. In the future, when an additional wing is added to the Main Building, we recommend the Field House be removed from the CUP and the capacity reserved for the Field House be used to condition the new wing. At the same time, a small system could be installed at the Field House and would operate according to the occupancy schedule of the Field House. Significant energy savings would result from:

1. A reduction in losses in the chilled and hot water systems as the length of supply piping could be greatly reduced.
2. The operating hours for the CUP could match the occupancy hours for its main service, the main building, and eliminate unnecessary runtime for the system.
3. Operating efficiency would be improved as the systems would be sized for the needs of the facility, rather than operating all of the CUP at times just for the Field House.

HVAC ECRM 1: INSTALL COOLING TOWER VFDs

It was noted during the survey that the cooling tower fans at Centennial High School do not have Variable Frequency Drives (VFDs). This condition means that the fans operate at full speed any time the cooling tower is operating. *We recommend installing VFDs for the cooling tower fans so that the tower fans will operate at the minimum speed required to satisfy the condenser water setpoint temperature*.

Estimated Cost: $18,870 *Estimated Savings: $5,391* *Estimated Payback: 3.5 Years*

Lighting ECRM 1: DAYLIGHTING OPPORTUNITIES

Daylighting is the practice of incorporating natural sunlight into spaces to reduce the reliance on artificial light fixtures. These same areas require artificial light fixtures at night when the natural light contribution has ceased. Unfortunately, many times the artificial fixtures in these areas are switched on throughout the day because of poor staff training or because the lighting design did not incorporate appropriate lighting controls to promote the operation of the daylighting strategies. As a result, there are often energy saving opportunities available to school districts with minor lighting control modifications or staff training. We recommend training staff not to turn these fixtures on during the day, or if necessary, make proper switching scheme modifications to allow the fixtures to be left off during the day. If the faculty training does not prove to be beneficial, *we recommend incorporating photocells in these circuits that will automatically turn off the lights when there is adequate daylighting in the space.*

Estimated Cost per photo sensor: $100 Estimated Savings: $300 Estimated Payback: 4 months

**This savings estimate is based on the assumption that the lighting near the daylighting is on an isolated circuit, and is able to be controlled without additional construction costs associated with re-circuiting.*

Lighting ECRM 3: OCCUPANCY SENSOR INSTALLATION

There were several areas of the facilities that were noted to have light fixtures operating during unoccupied periods. The first line of defense for the district to eliminate unnecessary fixture operation is to conduct staff training to turn lights off as the last occupant leaves the room. Studies have shown that linear fluorescent fixtures, the type of fixture most often found in classrooms, offers energy savings 23 seconds after they have been turned off when considering the startup current required to turn the fixtures back on when the occupants return. If the training is unsuccessful in changing the behavior of the occupants, then automatic means of turning off the lights, most commonly occupancy sensors, can be installed to perform the task. *Below is a cost and saving estimate for one standard classroom ceiling sensor (assuming the classroom has nine each 3 lamp T8 fluorescent fixtures in the space).*

Estimated Cost: $300 Estimated Savings: $75 Estimated Payback: 4 years

Controls ECRM 1: REPLACE PNEUMATIC CONTROLS WITH DDC EMS

Frisco High School was noted to operate with a combination of energy management timeclock and pneumatic controls. We recommend retrofitting the existing energy management system to full DDC (Direct Digital Control) systems. To achieve the full benefit of these new DDC systems, we recommend the district involve three steps:

Controls ECRM 1a: Replace pneumatic controls with DDC systems

Pneumatic controls require operation of an air compressor and maintenance of the pneumatic piping system. These are inherently cost intensive systems to maintain. School districts often have difficulty retaining maintenance staff with significant experience operating pneumatic

systems. Converting the systems to DDC will improve the level of control the district has with the HVAC system and allow the air compressor and pneumatic system to be abandoned.

Controls ECRM 1b: Minimize system run schedules.

Currently, the district is universally programmed to allow HVAC systems to operate from 5:00am through 10pm on most days and with an 85 degree setback temperature for the rest of the night. Except for the Kitchen staff that works between 5am and 2pm, many of the facilities are only occupied from 7:30am to 4:00pm. There are significant energy savings available by limiting the HVAC system operation to times coinciding with occupancy schedules. For Elementary and Middle Schools, we recommend limiting operation of the systems to 7:30am to 4:00pm; for High Schools, we recommend limiting operation to 7:30am to 6:00pm. There are custodial and extracurricular activities that occur outside these hours, but in most cases, the residual heating or cooling should be adequate to provide at least minimal comfort for these occupants during these extended hours.

Controls ECRM 1c: Install damper controllers on Outside Air Dampers and control Exhaust Fans

One of the most likely reasons the existing schedule is maintained at these schools is that the systems are reported to take an extended period of time to reach setpoint in time for the first occupant to arrive at the building. A significant cause for this slow startup is the often lack of controls on the outside air dampers and exhaust fans. Lack of control on the outside air dampers reduces the system's ability to dehumidify spaces as they remain open during startup and operation during unoccupied periods. Uncontrolled exhaust fans may operate throughout the evening and bring in moist air throughout the night that the HVAC system has to overcome the next morning. Keeping the dampers closed during startup and after-hour operation will result in more efficient and less energy intensive system operation that will reach setpoint more rapidly. Cost summary information incorporates all three phases for Controls ECRM 1.

Estimated Cost: $380,000 Estimated Savings: $63,300 Estimated Payback: 6 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Install hail guards to protect fins in future
- Comb condenser fin coils

Lighting

- Turn off all light fixtures not required during daytime
- Turn off lights in unoccupied spaces

Controls

- Reset photocell at mechanical room exterior lights
- Experiment with higher chilled water set point temperature

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

It was noted during the survey that the air cooled chillers at Frisco High do not have coil guards. Damage to just 10% of the coil fins on DX cooled equipment can result in a loss of operating efficiency of up to 30%. Damage can occur as a result of weather, grounds keeping equipment or vandalism by students. The installation of coil guards prevents future fin combing, which is ultimately a combination of deferred labor savings for eliminating the need for maintenance personnel to perform the task and energy savings resulting from the units maintaining optimum operating efficiency. *We recommend installing hail guards on the units to prevent future coil fin damage.*

Lighting M&O

Some areas of the buildings noted in Section 6.0 of the report had light fixtures that were not required to be operating during the day or were fixtures left operating in unoccupied spaces. One of these areas is the hallway at the front of Centennial High where 15 each CFL can light

fixtures operate in front of the full-glass window wall during the daytime. The least expensive remedy to these issues is to train staff to not turn on fixtures not needed during daytime hours and to turn off fixtures in unoccupied spaces. Failure of the behavioral modification training will require the district to invest capital into automatic controls for the fixtures.

Controls M&O#1

During the survey the engineer observed the exterior lights at the mechanical rooms operating during the daytime. As mentioned in the section above this is energy consumption that is wasted due to the natural daylighting. *We recommend the district reset the photocell settings to turn off the lights during the daytime.*

Controls M&O#2

At Centennial High School the chilled water set point temperature is set to 40°F because the district began that practice when it operated with the ice-based thermal storage system. With the conventional chilled water system the district operates today, and the ice thermal storage system removed from service, it should be possible to cool the space with a chilled water set point temperature as high as 46°F. *We recommend the district experiment with higher set point temperatures to condition the space while still providing comfort to the occupants.* Each degree the district increases the chilled water setpoint saves approximately 3% of energy costs.

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:

Assumptions:				
1. Equipment will last at least 15 years prior to next renovation				
2. No maintenance expenses for first five years (warranty period)				
3. $5,000 maintenance expense next 5 years				
4. $10,000 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	($399,270)		0	($399,270)
Year 1		$ 69,066.00	0	$69,066
Year 2		$ 69,066.00	0	$69,066
Year 3		$ 69,066.00	0	$69,066
Year 4		$ 69,066.00	0	$69,066
Year 5		$ 69,066.00	0	$69,066
Year 6		$ 65,612.70	($5,000)	$60,613
Year 7		$ 62,159.40	($5,000)	$57,159
Year 8		$ 58,706.10	($5,000)	$53,706
Year 9		$ 55,252.80	($5,000)	$50,253
Year 10		$ 51,799.50	($5,000)	$46,800
Year 11		$ 48,346.20	($10,000)	$38,346
Year 12		$ 44,892.90	($10,000)	$34,893
Year 13		$ 41,439.60	($10,000)	$31,440
Year 14		$ 37,986.30	($10,000)	$27,986
Year 15		$ 34,533.00	($10,000)	$24,533
			Internal Rate of Return	**11.92%**

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

9.0 GENERAL COMMENTS

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

APPENDICES

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

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

LoanSTAR Program:

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

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

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

Loans on Commercial Market:

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

Leasing Corporations:

Leasing corporations have become increasingly interested in the energy efficiency market. The financing vehicle frequently used is the municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase agreement. Ownership of the financed equipment passes to the district at the beginning of the lease, and the lessor retains a security interest in the purchase until the loan is paid off. A typical lease covers the total cost of the equipment and may include installation costs. At the end of the contract period a nominal amount, usually a dollar, is paid by the lessee for title to the equipment.

Bond Issue:

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

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

State Purchasing:

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

Design/Bid/Build (Competitive Bidding):

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

Design/Build:

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

Purchasing Standardization Method:

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

Performance Contracting:

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

Solution Center

How to Finance Your Energy Program

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

Selecting a Cost/Benefit Analysis Method

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

Simple Payback Analysis

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

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

Simple Payback

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

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

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

Life-Cycle Cost Analysis

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

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

continued

Financing Mechanisms

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

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

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

Internal Funds

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

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

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

Debt Financing

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

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

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

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

Lease and Lease-Purchase Agreements

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

Energy Performance Contracts

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

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

Types of Leasing Agreements

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

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

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

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

How to Finance Your Energy Program *continued*

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

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

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

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

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

Rebuild America
U.S. Dept. of Energy

APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE

6.1.1.1.3 Secondary Service Greater Than 10 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

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

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

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.

Public Building Rates

Applicable to public buildings (including schools, churches and community halls, but not municipal facilities) with a demand requirement less than 35 kW.

Customer Charge	$20.00 per meter
Energy Charge	
May-October	$0.125304 per kWh
November-April	$0.125304 per kWh - First 700 kWh
	$0.115304 per kWh - Additional kWh

Applicable to public buildings (including schools, churches and community halls, but not municipal facilities) with a demand requirement of 35 kW or greater. (Billing demand is never less than 50 percent of the highest adjusted kW demand established in the preceding May-to-October billing period, or 35 kW, whichever is greater.)

Customer Charge	$35.00 per meter
Energy Charge	
First 150 kWh per Billing Demand kW	$0.138325 per kWh
Over 150 kWh per Billing Demand kW	$0.104345 per kWh

APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

OFFICE OF THE COMPTROLLER ★ TEXAS ★

SECO
State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment
Service Agreement

Investing in our public schools, colleges and non-profit hospitals through improved energy efficiency in public buildings is a win-win opportunity for our communities and the state. Energy-efficient buildings reduce energy costs, increase available capital, spur economic growth, and improve working and living environments. The Preliminary Energy Assessment Service provides a viable strategy to achieve these goals.

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with Frisco ISD, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

Principles of the Agreement

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- ✓ Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- ✓ SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- ✓ Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

Acceptance of Agreement

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: Richard Wilkinson
Date: May 20 2011
Name (Mr./Ms./Dr.) Richard Wilkinson
Title: Deputy Superintendent
Organization: Frisco ISD
Phone: 469-633-6032
Street Address: 6942 Maple Street
Fax: 469-633-6050
Mailing Address: Frisco, TX 75034
E-Mail: WilkinsR@friscoisd.org
County: Collin

Contact Information:

Name (Mr./Ms./Dr.): George Radtke
Title: Energy Mgr.
Phone: 469-633-6582
Fax: 469-633-6525
E-Mail: Radtkeg@friscoisd.org
County: Collin

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

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

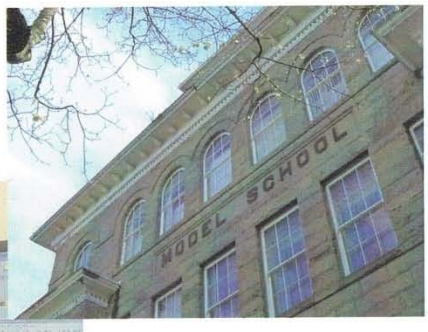
APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

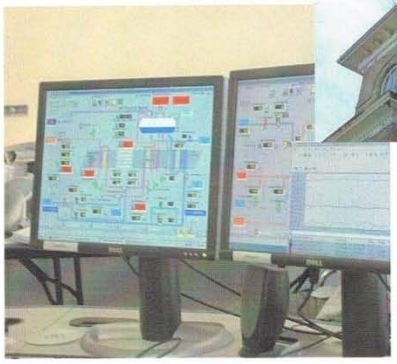
ANNOUNCING!

TEMA

TEXAS ENERGY MANAGERS ASSOCIATION

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





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

WWW.TEXASEMA.ORG

Check the website for Membership and Association information.

SECO
State Energy Conservation Office

APPENDIX VI - UTILITY CHARTS ON CD