Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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Liberty Independent School District

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SECO
State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY:

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

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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 April, 2011, **SECO** received a request for technical assistance from Tony Munson, Energy manager for **Liberty 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 **Liberty ISD,** (hereafter known as LISD) 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 *Kenny Jones* 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 **$109,135** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$812,305**, yielding an average simple payback of **7-1/2** years.

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

HVAC ECRM #1	RENOVATION OF AGED HVAC EQUIPMENT	$213,800	$21,625	10 Years
HVAC ECRM #2	RENOVATION OF PROBLEMATIC HVAC EQUIPMENT	$82,000	$8,200	10 Years
CONTROLS ECRM #1	UPGRADE DISTRICT EMS TO DDC	$350,000	$50,000	7 Years
LIGHTING ECRM #1	RETROIT T12 TO T8	$119,625	$19,950	6 Years
LIGHTING ECRM #2	REPLACE METAL HALIDES WITH T5 FLUORESCENT	$46,400	$9,280	5 Years
LIGHTING ECRM #3	REPLACE INCANDESCENT EXIT FIXTURES	$480	$80	6 Years
TOTAL PROJECTS		**$812,305**	**$109,135**	**7-1/2 Years**

Although additional savings from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Internal Rate of Return (IRR), for this retrofit program has been calculated and shown in Section 8.0 of this report.

Our final "summary" comment is that **SECO** views the completion and presentation of this report as a beginning, rather than an end, of our relationship with LISD. 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 LISD, 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 LISD 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
Liberty High School	54,705	44%	$1.80	44%
San Jacinto ES	41,337	9%	$1.42	13%
Educational COOP	29,438	-22%	$0.91	-27%
Liberty ES	26,171	-31%	$0.88	-30%
Average Value:	37,913		$1.25	

Liberty ISD purchases electricity from Liberty Municipal Cooperative. The energy history spreadsheets are shown on the next few pages.

Note: The utility analysis was conducted with eight months of electricity data from the most recent fiscal year. Gas utility data was not available for this period. Inclusion of the gas data will not have a significant impact on the calculated ECIs (on average < $0.10 per facility); the EUIs often are much more affected as the energy content of natural gas is significant.

The conclusions that can be drawn from the utility data analysis, despite incomplete data, remain clear. Liberty High School is the largest energy consumer in the district. We estimate that the actual ECI for this campus for a year's worth of data would be approximately $2.65, which is very high for a public education facility in Texas.

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: **Liberty ISD** **BUILDING:** **Liberty 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	2011	257,878		0	0	29,156	DATA UNAVAILABLE AT TIME OF SURVEY	
FEBRUARY	2011	224,384		0	0	25,695		
MARCH	2011	0		0	0	0		
APRIL	2011	0		0	0	0		
MAY	2011	0		0	0	0		
JUNE	2011	0		0	0	0		
JULY	2010	271,664		0	0	30,009		
AUGUST	2010	458,515		0	0	47,969		
SEPTEMBER	2010	299,482		0	0	33,448		
OCTOBER	2010	350,001		0	0	38,586		
NOVEMBER	2010	197,673		0	0	24,638		
DECEMBER	2010	191,216		0	0	23,027		
TOTAL		2,250,813	0	0	0	$252,528	0	$0

Annual Total Energy Cost = $252,528 Per Year

Total KWH x 0.003413 = 7,682.02 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 7,682.02 x 106

Floor area: 140,427 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 54,705 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.80 $/s.f. yr

OWNER: **Liberty ISD** **BUILDING:** **San Jacinto ES**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	85,448		0	0	10,103	DATA UNAVAILABLE AT TIME OF SURVEY	
FEBRUARY	2011	70,736		0	0	8,629		
MARCH	2011	0		0	0	0		
APRIL	2011	0		0	0	0		
MAY	2011	0		0	0	0		
JUNE	2011	0		0	0	0		
JULY	2010	87,106		0	0	10,129		
AUGUST	2010	149,016		0	0	15,959		
SEPTEMBER	2010	106,160		0	0	12,358		
OCTOBER	2010	122,848		0	0	14,035		
NOVEMBER	2010	58,180		0	0	7,970		
DECEMBER	2010	68,472		0	0	8,745		
TOTAL		747,966	0	0	0	$87,928	0	$0

Annual Total Energy Cost = $87,928 Per Year

Total KWH x 0.003413 = 2,552.81 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,552.81 x 106

Floor area: 61,756 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 41,337 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.42 $/s.f. yr

OWNER: **Liberty ISD** **BUILDING:** **715 Austin**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	18,800		0	0	2,033	Ed. Coop	
FEBRUARY	2011	15,120		0	0	1,670		
MARCH	2011	0		0	0	0		
APRIL	2011	0		0	0	0		
MAY	2011	0		0	0	0		
JUNE	2011	0		0	0	0		
JULY	2010	24,720		0	0	2,546		
AUGUST	2010	35,200		0	0	3,477		
SEPTEMBER	2010	22,800		0	0	2,384		
OCTOBER	2010	24,960		0	0	2,634		
NOVEMBER	2010	11,600		0	0	1,364		
DECEMBER	2010	17,200		0	0	1,871		
TOTAL		**170,400**	**0**	**0**	**0**	**$17,979**	**0**	**$0**

Annual Total Energy Cost = $17,979 Per Year

Total KWH x 0.003413 = 581.58 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 581.58 x 106

Floor area: 19,756 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 29,438 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $0.91 $/s.f. yr

OWNER: **Liberty ISD** **BUILDING:** **Liberty ES**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	67,620		0	0	7,919	DATA UNAVAILABLE AT TIME OF SURVEY	
FEBRUARY	2011	55,300		0	0	6,496		
MARCH	2011	0		0	0	0		
APRIL	2011	0		0	0	0		
MAY	2011	0		0	0	0		
JUNE	2011	0		0	0	0		
JULY	2010	34,930		0	0	4,462		
AUGUST	2010	111,090		0	0	11,980		
SEPTEMBER	2010	87,500		0	0	9,729		
OCTOBER	2010	102,410		0	0	11,286		
NOVEMBER	2010	48,650		0	0	6,118		
DECEMBER	2010	53,410		0	0	6,505		
TOTAL		**560,910**	**0**	**0**	**0**	**$64,495**	**0**	**$0**

Annual Total Energy Cost = $64,495 Per Year

Total KWH x 0.003413 = 1,914.39 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,914.39 x 106

Floor area: 73,149 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 26,171 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $0.88 $/s.f. yr

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

ELECTRIC PROVIDER: City of Liberty (Municipality)

Electric Rate: Commercial or Large Commercial

I. COMMERCIAL

Customer Charge	=	$21.80 per meter
Energy Charge	=	$0.038320 per kWh
Fuel Adjustment Charge	=	$Varies per month
Demand Charge	=	$ 6.24 per billing kW

Demand is measured kW multiplied by the meter's demand multiplier

II. LARGE COMMERCIAL

Customer Charge	=	$30.87 per meter
Energy Charge	=	$0.023989 per kWh
Fuel Adjustment Charge	=	$Varies per month
Demand Charge	=	$ 4.62 per billing kW

Demand is measured kW multiplied by the meter's demand multiplier

Average Savings for consumption (from billings) = $422,930 / 3,730,089 kWh = <u>$0.113383 per kWh</u>
Average Savings for demand = <u>$ 4.62 OR $6.24,</u> depending upon the rate schedule

5.0 CAMPUS DESCRIPTIONS:

Liberty ISD consists of 5 educational campuses (1 High School, 1 Middle School, 2 Elementary Schools and a County Educational Cooperative) which are all located in Liberty County; in the City of Liberty. The energy survey focused on four of the educational campuses:

Table 2: School Facilities Analyzed For This Report

Facility	Year originally Constructed	Approximate Square Footage (per Tax Records)	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
Liberty Middle School	2004	103,919	Air-cooled chillers / HW Boiler / Split Systems	MZAHU	100% T8	DDC – Automated Logic
San Jacinto ES	2004	61,756	Air Cooled Chiller/ HW Boiler	VAV/AHU with hot water reheat	100% T8	DDC Automated Logic
Liberty ES	1986	73,149	Air Cooled Chillers/HW Boiler	4 pipe fan coil units	85% T8 15% T12	Pneumatic/Timeclock
High School	1980, 1996, 1998	140,427	Rooftop Packaged Units	Rooftop Packaged Units	100% T12	KMC Controls (PID Loop)

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

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: RENOVATION OF AGED HVAC EQUIPMENT

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

Administrative Office

This 40,000 square foot facility has been earmarked to be renovated from the former school facility that it was to the Administration facility that it is today. Unfortunately, the bond proposed to complete this renovation failed to pass. The majority of the Administration wing is conditioned by one central furnace served with two 1998 Carrier 38AE016 condensing units. The furnace is likely original to the 1960s era construction of the building. Given the varied use of the spaces in the wing of this building, a Variable Flow Refrigerant (VFR) collection of split systems would be a more efficient installation for this facility than the existing system. This new system allows central condensing units to pump refrigerant into or out of different air handler units to simultaneously zone, heat or cool spaces as required.

Estimated Cost: $90,000 *Estimated Savings: $8,200* *Estimated Payback: 11 Years*

Auditorium

The Auditorium has two large condensing units to condition the space; one of the units was replaced in 2007, the 1981 40-ton Carrier split system is still in use. At 30 years old, it has surpassed its anticipated life expectancy of 15-20 years. We recommend the district replace the condensing unit with a new unit. The payback is slightly longer than normal HVAC replacement projects due to the anticipated low operational hours.

Estimated Cost: $50,000 *Estimated Savings: $4,200* *Estimated Payback: 12 Years*

At Liberty Elementary School, there are four Through-The-Wall (TTW) unitary HVAC units at the 6 Classroom Building and three more TTWs at the Gymnasium. Of these 9 units, 5 of them are more than 20 years old; the other 4 have been replaced in the last few years. TTW units are inherently inefficient units as the outside air intake is often located immediately above the coil where indoor heat is rejected to the atmosphere. The OA intake short cycles the rejected heat from the unit and re-introduces it back into the space the unit is trying to condition. We recommend replacing the TTWs with split systems to improve the efficiency of these systems.

Estimated Cost: $73,800 *Estimated Savings: $9,225* *Estimated Payback: 8 Years*

HVAC ECRM-1 Summary:

Estimated Cost: $213,800 *Estimated Savings: $21,625* *Estimated Payback: 10 Years*

HVAC ECRM 2: RENOVATION OF PROBLEMATIC HVAC EQUIPMENT

It was noted during the survey that the Carrier 48EJD044 at Liberty High School, just a 2001 unit, has had high maintenance labor and expenses since its installation. The staff reports that "sometimes the unit starts, sometimes it does not". The unit is also leaking air at the condensate connection. *We recommend the district replace the unit despite its relative young age to avoid the maintenance labor and expense.*

Estimated Cost: $82,000 *Estimated Savings: $8,200* *Estimated Payback: 10 Years*

CONTROLS ECRM 1: UPGRADE THE EXISTING KMC CONTROL SYSTEM TO FULL CONTROL DDC

The existing control system at the High School is a Proportional-Integral-Derivative (PID) control system. These systems must be tuned and adjusted to ensure consistent control. Liberty Elementary utilizes timeclocks and pneumatic control systems. *We recommend the district replace these older systems with a full control, district-wide Direct Digital Control (DDC) system similar to the system already in place at San Jacinto Elementary and the Middle School.*

Estimated Cost: $350,000 *Estimated Savings: $50,000* *Estimated Payback: 7 Years*

LIGHTING ECRM 1: RETROFIT T12 LIGHT FIXTURES WITH T8 COMPONENTS

It was noted during the survey that the High School, Administration Building and 15% of the Liberty Elementary School were all noted to utilize T12 components in their linear fluorescent lighting fixtures. T12 components produce approximately 18% less light and consume about 20% more energy than the T8 lamps and electronic ballasts that may be retrofit into the existing linear fluorescent fixtures. Additionally, the T12 components are no longer produced by lighting manufacturers. While still available, the ability to acquire replacement parts for T12 fixtures will become more difficult over time. *Therefore we recommend the district retrofit the fixtures at these facilities with T8 lamps and electronic ballasts.*

Estimated Cost: $119,625 *Estimated Savings: $19,950* *Estimated Payback: 6 Years*

LIGHTING ECRM 2: REPLACE METAL HALIDE FIXTURES WITH T5 LINEAR FLUORESCENT

There are multiple facilities utilizing metal halide light fixtures. One characteristic of metal halide fixtures is their inherently long re-strike. This means that if the fixtures are ever turned off, it can take up to 15 minutes for them to come back on. This long re-strike encourages staff to leave the lights on throughout the day, even if the space is not occupied. Studies have shown that linear fluorescent fixtures offer energy savings 23 seconds after they have been turned off when considering the startup current required to turn the fixtures back on. To maximize the energy efficiency of installing systems that do not have a long re-strike issue, we recommend the district consider installing occupancy sensors to ensure all lighting is turned off when the space is unoccupied. *We recommend replacing the 400w metal halides with 6-lamp T5 high bay fluorescent fixtures with occupancy sensors serving each space.*

- Liberty Middle School – 30 each 400w MH at Auxiliary Gym
- Liberty Middle School - 25 more at Competition Gym (along with 25 2-lamp T8)
- Liberty High School – 12 each 400w MH at Cafeteria
- Liberty High School – 24 each 400w MH
- Old Gym (SJES Campus) – 25 each 400w MH

Estimated Cost: $46,400 Estimated Savings: $9,280 Estimated Payback: 5 years

Lighting ECRM 3: REPLACE INCANDESCENT EXIT FIXTURES WITH LED FIXTURES

Liberty Elementary School was noted to have four incandescent exit fixtures in the building. Most incandescent exit fixtures have two each 15-watt lamps and consume 30 watts per fixture, 8,760 hours per year. Therefore, each fixture consumes 263 kWh per year. LED exit fixtures consume less than 1 watt per fixture and reduce electrical consumption to 9 kWh per year. *We recommend the district replace all incandescent exit fixtures with LED exit fixtures.*

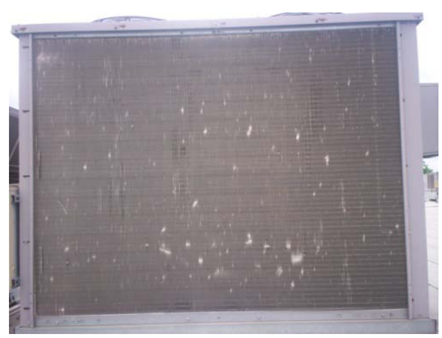
Estimated Cost: $480 Estimated Savings: $80 Estimated Payback: 6 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC	•Install coil guards to protect fins in future •Clean dirty coils on DX equipment •Replace damaged or missing refrigerant insulation •Install vending machine controls
Lighting	•Turn off all exterior light fixtures during daytime
Controls	•Reduce HVAC operation to match occupancy hours •Raise cooling temperature setpoint
Envelope	•Replace damaged or missing weatherstripping

Maintenance and Operation procedures are strategies that can offer significant energy savings potential, yet require little or no capital investment by the district to implement. Exact paybacks are at times difficult to calculate, but are typically always less than one year. The difficulties with payback calculation are often related to the fact that the investigation required to make the payback calculation, for example measuring the air gap between exterior doors and missing or damaged weatherstripping so that exact air losses may be determined, is time and cost prohibitive when the benefits of renovating door and weather weatherstripping are well documented and universally accepted.

HVAC M&O #1



It was noted during the survey that many of the DX outdoor units do not have hail guards over the coil fins. It is a common perception in the Houston area that there is not a significant hail threat and therefore many districts choose not to require hail guards for this equipment. The reality is that hail guards are also coil guards that prevent damage from landscaping equipment (for ground-mounted equipment), wind-blown debris and student vandalism. Damage to just 10% of the coil fins can lead to a loss of operating efficiency up to 30%. *We recommend the district comb damaged coil fins and install coil guards on all DX equipment that does not have the guards and revise their purchasing specifications to require coil guards on all future DX equipment purchases.*

HVAC M&O #2

In addition to being at risk for damage, many of the DX coils inspected around the district were found to be extremely dirty. Dirty fins limit the air that can be blown through the coil and inhibit the unit from dissipating heat to the atmosphere, reducing the unit's operating efficiency. *We recommend the district wash the coils on the DX equipment.*

HVAC M&O #3

It was noted that some of the DX equipment had damaged or missing refrigerant line insulation. This insulation minimizes the heat absorbed by the refrigerant when exposed to the atmosphere so that it may more effectively absorb heat from the conditioned space. *We recommend the district replace the damaged or missing refrigerant line insulation.*

HVAC M&O #4

There were several vending machines noted around the district that did not have vending machine controls. Using a motion sensor mounted on top of the machine, the vending machines will allow advertising lighting to operate whenever it senses occupants in the area, but turn it off whenever activity is not detected. The controls also cycle the compressor on and off to maintain food or beverages at a programmable temperature instead of running the compressor all of the time. There were four vending machines at the Middle School and one at Liberty Elementary specifically noted during our survey. *We recommend the district install vending machine controls on all existing vending machines.*

LIGHTING M&O #1

There was one exterior fixture at the Liberty Elementary School Gymnasium (pictured to the right) that was discovered operating during the daytime hours. *We recommend the district repair the timeclock or photocell that is supposed to control this fixture and eliminate daytime operation.*

CONTROLS M&O #1

Currently, the district is universally programmed to allow HVAC systems to operate from 7:00am through 7:00pm, 12 hours per day. Many of the facilities are only occupied from 7:30am to 3:45pm. There is 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 M&O #2
Currently, the district's cooling temperature setpoint is 71°F. Recommended energy policy guidelines for school facilities is a setpoint between 72 and 76°F. *We recommend the district experiment with higher cooling setpoints so as to maintain occupant comfort for the majority of the students and staff, but keep the setpoint as high as possible.* Studies have shown that schools can save as much as 3% of the total utility budget for every 1°F that the cooling setpoint is effectively raised in the building.

Envelope M&O #1
There were sets of exterior doors within the district noted to have damaged or missing weatherstripping. Missing weatherstripping allows conditioned air to escape and non-conditioned air and contaminants to enter the building. *We recommend the district replace any damaged or missing weatherstripping.*

8.0 FINANCIAL EVALUATION

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

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

Proposal:	Perform recommended ECRMs			
Assumptions:				
1. Equipment will last at least 15 years prior to next renovation				
2. No maintenance expenses for first five years (warranty period)				
3. $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	($812,305)		0	($812,305)
Year 1		$ 109,135.00	0	$109,135
Year 2		$ 109,135.00	0	$109,135
Year 3		$ 109,135.00	0	$109,135
Year 4		$ 109,135.00	0	$109,135
Year 5		$ 109,135.00	0	$109,135
Year 6		$ 103,678.25	($5,000)	$98,678
Year 7		$ 98,221.50	($5,000)	$93,222
Year 8		$ 92,764.75	($5,000)	$87,765
Year 9		$ 87,308.00	($5,000)	$82,308
Year 10		$ 81,851.25	($5,000)	$76,851
Year 11		$ 76,394.50	($10,000)	$66,395
Year 12		$ 70,937.75	($10,000)	$60,938
Year 13		$ 65,481.00	($10,000)	$55,481
Year 14		$ 60,024.25	($10,000)	$50,024
Year 15		$ 54,567.50	($10,000)	$44,568
			Internal Rate of Return	**7.25%**

More information regarding financial programs available to LISD 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 costs 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.

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.

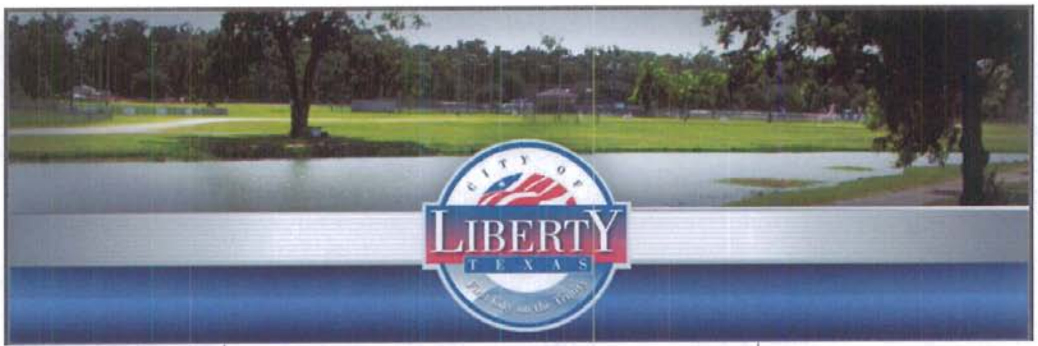
Economic Development Benefits. In addition to direct savings on operating costs and the added-value benefits mentioned above, investments in energy-efficiency can also support a community's economic development and employment opportunities. Labor will typically constitute about 60 percent of a total 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

HOMEPAGE | ABOUT LIBERTY | CITY SERVICES | GOVERNMENT | ONLINE TOOLS | THINGS TO DO | CONTACT US



HOMEPAGE > CITY SERVICES > Finance > Billing Rates > Electrical Service Rates

Search [ ] Go

Electrical Service Rates
Garbage Service Rates
Water Service Rates
Sewer Service Rates

Electrical Service Rates

As established by City of Liberty Ordinance No. 914

Residential Service Rates

Minimum Charge		$6.00
Total Kilowatts minus 50	x	$0.037128
Total Kilowatts	x	Fuel Adjustment
Total Electricity Charge	=	Total of three figures above

Add tax for a taxable business and rental property.

Commercial Service Rates

Minimum Charge		$21.80
Total Kilowatts	x	$ 0.038320
Total Kilowatts	x	Fuel Adjustment
See Note below	+	Total Demand Charge
Tax, if taxable business	+	8.25%
Total Electricity Charge	=	Total of five figures above

Note: Demand Decimal Figure and Multiplier can be obtained from the Utility Billing Department. The demand charge is based on the multiplier on the account. The Total Demand Factor is calculated as follows:

Demand Decimal Figure x Multiplier - 15 x $6.24

Large Commercial

Minimum Charge		$30.87
Total Kilowatts	x	$ 0.023989
Total Kilowatts	x	Fuel Adjustment
See Note below	+	Total Demand Charge
Tax, if taxable business	+	8.25%
Total Electricity Charge	=	Total of five figures above

Note: Demand Decimal Figure and Multiplier can be obtained from the Utility Billing Department. The demand charge is based on the multiplier on the account. The Total Demand Charge is calculated as follows:

Demand Decimal Figure x Multiplier x $4.62

Click To Receive Important Safety Alerts Immediately

Jul 01, 2011
2011 July 3rd Celebration

Jun 20, 2011
SHRED IT DAY on July 30, 2011

NIXLE

Retail Coach Analysis

PUBLIC NOTICE REGARDING WATER SUPPLY

Black and Gold Street Sign Program

RSS

Server Error in '/' Application.

Forecast Radar Cameras Photos

WeatherBug

http://cityo

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 Liberty Independent School District, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

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

Principles of the Agreement

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

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

Acceptance of Agreement

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

Signature: [signature]

Date: 5/3/2011

Name (Mr./Ms./Dr.) Mr. Robert Ward

Title: Director of Maintenance/Operations

Organization: Liberty Independent School District

Phone: 936-336-7213

Street Address: 1600 Grand Ave, Liberty, TX 77575

Fax: 936-336-6810

Mailing Address: 1600 Grand Ave, Liberty, TX 77575

E-Mail: rgward@libertyisd.net

County: Liberty

Contact Information:

Name (Mr./Ms./Dr.): Mr. Tony Munson

Title: LISD Energy Manager

Phone: 936-336-6483

Fax: 936-336-7914

E-Mail: tamunson@libertyisd.net

County: Liberty

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

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

APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

ANNOUNCING!

TEMA

TEXAS ENERGY MANAGERS ASSOCIATION

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

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

WWW.TEXASEMA.ORG

Check the website for Membership and Association information.

Texas Energy Managers Association

SECO
State Energy Conservation Office

APPENDIX VI - UTILITY CHARTS ON CD