Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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Wichita Falls Independent School District

April 3, 2012

ESA Energy Systems Associates, Inc.
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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 September 2011, **SECO** received a request for technical assistance from Mr. Kuehler, Chief Financial/Operations Officer at **Wichita Falls 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 **Wichita Falls ISD,** (hereafter known as WFISD) 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 seven campuses. A complete listing of the Base Year Utility Costs and Consumption is provided in Section 3.0 of this report.

Following the utility analysis and a preliminary consultation with *Mr. Shelton*, The Director of Facilities, and *Mr. Alderman*, WFISD Energy Manager, a walk-through energy analysis was conducted throughout the seven campuses. 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 **$49,450** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$523,450** yielding an average simple payback of **10-1/2** years.

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

SUMMARY:	DESCRIPTION OF RECOMMENDATION	LOCATION OF ECRM	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	Replace Aged HVAC Equipment	Where Applicable	$245,750	$20,480	12 Years
HVAC ECRM #1a	Replace Aged Heat Pumps and Install Natural Gas Piping	Haynes			
HVAC ECRM #1b	Replace 3 Ton Unit At Portable Building	Haynes			
HVAC ECRM #1c	Replace 1985 Split Systems and 1994 RTUs	Rider			
HVAC ECRM #2	Replaced Lennox Pulse Air Handler Units	McNeil	$175,200	$12,515	14 Years
Lighting ECRM #1	Replace Gymnasium Metal Halide Lighting	District Wide	$86,450	$14,400	6 Years
Building Envelope ECRM #1	Replace Single Pane Windows	Where Applicable	$4,050	$340	12 Years
Controls ECRM #1	Install VFDs	Kirby	$12,000	$1,715	7 Years
TOTAL PROJECTS			**$523,450**	**$49,450**	**10-1/2 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 WFISD. 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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ESA
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A Terracon COMPANY

Texas Registered Engineering Firm
F-4882

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 WFISD, 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 WFISD 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
Hirschi HS	35,253	2%	$0.78	-17%
Rider HS	34,425	0%	$0.81	-13%
Burgess ES	34,756	1%	$0.83	-11%
McNeil JH	32,472	-6%	$0.84	-10%
Haynes ES	33,909	-1%	$1.02	9%
Kirby JH	42,957	25%	$1.07	15%
Franklin ES	27,037	-21%	$1.19	27%
Average Value:	34,401		$0.93	

Wichita Falls ISD purchases electricity from Reliant Energy. The transmission and distribution utility is Oncor. The energy history spreadsheets are shown on the next few pages.

The rate schedule analysis for the district is shown in Section 4.0.

A copy of the rate schedule is included in Appendix I

OWNER:	Wichita Falls ISD				BUILDING:	Hirschi High School		
MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	COSTS $
JANUARY	2011	90,843				10,854	874	5,481
FEBRUARY	2011	86,241				10,467	569	3,519
MARCH	2011	91,695				11,213	297	1,958
APRIL	2011	104,963				12,227	169	1,231
MAY	2011	120,658				13,710	140	1,078
JUNE	2011	121,476				13,579	105	815
JULY	2010	91,894				11,315	26	273
AUGUST	2010	151,874				16,615	90	811
SEPTEMBER	2010	159,356				17,187	124	1,065
OCTOBER	2010	129,793				14,600	174	1,456
NOVEMBER	2010	100,571				11,810	321	2,542
DECEMBER	2010	88,501				10,616	520	3,615
TOTAL		1,337,865				$154,193	3,409	$23,844

			Energy Use Index:	
Annual Total Energy Cost =	$178,037	Per Year	Total Site BTU's/yr	35,253 BTU/s.f.yr
			Total Area (sq.ft.)	
Total KWH x 0.003413 =	4,566.13	x 106		
Total MCF x 1.03 =	3,511.27	x 106	Energy Cost Index:	
Total Other x ____		x 106	Total Energy Cost/yr	$0.78 $/s.f. yr
Total Site BTU's/yr	8,077.40	x 106	Total Area (sq.ft.)	
Floor area:	229,124	s.f.		
Electric Utility			Gas Utility	
TXU			Atmos	

OWNER:	Wichita Falls ISD				BUILDING:	Rider High School		
MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	COSTS $
JANUARY	2011	133,935				15,230	858	5,449
FEBRUARY	2011	114,597				13,801	664	4,082
MARCH	2011	107,722				13,754	203	1,320
APRIL	2011	133,641				15,244	157	1,080
MAY	2011	155,202				17,816	107	780
JUNE	2011	86,743				12,379	63	473
JULY	2010	88,413				12,177	17	152
AUGUST	2010	198,827				21,767	117	999
SEPTEMBER	2010	201,773				21,017	180	1,511
OCTOBER	2010	158,387				17,421	136	1,103
NOVEMBER	2010	124,631				14,109	274	2,154
DECEMBER	2010	119,850				14,187	568	3,991
TOTAL		1,623,721				$188,902	3,344	$23,094

			Energy Use Index:	
Annual Total Energy Cost =	$211,996	Per Year	Total Site BTU's/yr	34,452 BTU/s.f.yr
			Total Area (sq.ft.)	
Total KWH x 0.003413 =	5,541.76	x 106		
Total MCF x 1.03 =	3,444.32	x 106	Energy Cost Index:	
Total Other x ____		x 106	Total Energy Cost/yr	$0.81 $/s.f. yr
Total Site BTU's/yr	8,986.08	x 106	Total Area (sq.ft.)	
Floor area:	260,826	s.f.		
Electric Utility			Gas Utility	
TXU			Atmos	

OWNER: **Wichita Falls ISD** **BUILDING:** **Burgess Elementary**

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	23,268				3,105	244	1,493
FEBRUARY	2011	26,874				3,411	162	980
MARCH	2011	28,558				3,670	75	481
APRIL	2011	33,503				3,993	37	264
MAY	2011	37,498				4,425	28	211
JUNE	2011	25,713				3,376	11	92
JULY	2010	23,526				3,009	9	87
AUGUST	2010	43,110				4,745	21	186
SEPTEMBER	2010	50,820				5,368	29	246
OCTOBER	2010	39,879				4,439	34	280
NOVEMBER	2010	29,823				3,483	65	511
DECEMBER	2010	22,284				2,911	112	764
TOTAL		**384,856**				**$45,935**	**827**	**$5,595**

Annual Total Energy Cost = $51,530 Per Year

Total KWH x 0.003413 = 1,313.51 x 106
Total MCF x 1.03 = 851.81 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,165.32 x 106

Floor area: 62,301 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 34,756 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $0.83 $/s.f. yr

Electric Utility
TXU

Gas Utility
Atmos

OWNER: **Wichita Falls ISD** **BUILDING:** **McNiel Junior High**

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	62,077				7,057	292	1,852
FEBRUARY	2011	54,358				6,519	260	1,609
MARCH	2011	57,522				7,000	72	479
APRIL	2011	67,797				7,518	57	406
MAY	2011	77,951				8,641	39	297
JUNE	2011	46,690				6,074	20	160
JULY	2010	36,184				5,134	5	55
AUGUST	2010	86,250				9,813	12	117
SEPTEMBER	2010	101,255				10,530	25	223
OCTOBER	2010	82,188				8,951	37	312
NOVEMBER	2010	62,985				7,116	92	730
DECEMBER	2010	53,935				6,589	181	1,297
TOTAL		**789,192**				**$90,942**	**1,092**	**$7,537**

Annual Total Energy Cost = $98,479 Per Year

Total KWH x 0.003413 = 2,693.51 x 106
Total MCF x 1.03 = 1,124.76 x 106
Total Other x ____ x 106
Total Site BTU's/yr 3,818.27 x 106

Floor area: 117,585 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 32,472 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $0.84 $/s.f. yr

Electric Utility
TXU

Gas Utility
Atmos

OWNER: Wichita Falls ISD **BUILDING:** Haynes Elementary

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	30,400				3,859	91	579
FEBRUARY	2011	27,881				3,573	61	384
MARCH	2011	24,534				3,345	33	228
APRIL	2011	25,746				3,297	26	193
MAY	2011	26,480				3,424	22	176
JUNE	2011	15,140				2,491	5	47
JULY	2010	15,583				2,672	6	66
AUGUST	2010	35,065				4,319	14	128
SEPTEMBER	2010	38,155				4,472	21	186
OCTOBER	2010	31,147				3,966	26	228
NOVEMBER	2010	24,442				3,203	34	274
DECEMBER	2010	24,276				3,214	47	334
TOTAL		318,849				$41,835	386	$2,823

Annual Total Energy Cost = $44,658 Per Year

Total KWH x 0.003413 = 1,088.23 x 106
Total MCF x 1.03 = 397.58 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,485.81 x 106

Floor area: 43,818 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 33,909 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.02 $/s.f. yr

Electric Utility
TXU

Gas Utility
Atmos

OWNER: Wichita Falls ISD **BUILDING:** Kirby Junior High

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	110,909				11,681	329	2,056
FEBRUARY	2011	98,310				10,606	232	1,425
MARCH	2011	70,974				8,481	146	949
APRIL	2011	77,258				8,789	94	670
MAY	2011	81,646				9,201	68	509
JUNE	2011	63,002				7,612	33	255
JULY	2010	48,244				6,260	22	216
AUGUST	2010	77,452				8,862	37	323
SEPTEMBER	2010	102,567				10,959	54	448
OCTOBER	2010	87,938				9,634	67	552
NOVEMBER	2010	82,371				9,137	138	1,081
DECEMBER	2010	89,415				9,777	201	1,394
TOTAL		990,086				$110,999	1,421	$9,878

Annual Total Energy Cost = $120,877 Per Year

Total KWH x 0.003413 = 3,379.16 x 106
Total MCF x 1.03 = 1,463.63 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,842.79 x 106

Floor area: 112,736 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 42,957 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.07 $/s.f. yr

Electric Utility
TXU

Gas Utility
Atmos

OWNER: Wichita Falls ISD **BUILDING:** Franklin Elementary School

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	52,665				7,373	61	426
FEBRUARY	2011	39,754				6,071	63	422
MARCH	2011	23,531				4,540	24	180
APRIL	2011	25,277				4,604	22	175
MAY	2011	28,978				5,000	17	156
JUNE	2011	14,373				3,740	2	42
JULY	2010	8,096				3,130	3	48
AUGUST	2010	33,803				8,475	8	101
SEPTEMBER	2010	38,089				5,642	18	175
OCTOBER	2010	25,452				4,743	20	190
NOVEMBER	2010	22,444				4,132	23	210
DECEMBER	2010	29,435				5,127	40	335
TOTAL		**341,897**				**$62,577**	**301**	**$2,460**

Annual Total Energy Cost = $65,037 Per Year

Total KWH x 0.003413 = 1,166.89 x 106
Total MCF x 1.03 = 310.03 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,476.92 x 106

Floor area: 54,627 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 27,037 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.19 $/s.f. yr

Electric Utility
TXU

Gas Utility
Atmos

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: Direct Energy Contract price: $0.077 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 = $0.077/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)

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: $213,825

Total quantity purchased during the analyzed billing cycle: 30,896 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $213,825 / 30,896 MCF

Average cost per MCF = $6.92

5.0 CAMPUS DESCRIPTIONS:

Wichita Falls ISD ISD consists of 27 educational campuses. This energy survey included a walkthrough at seven WFISD campuses.

Table 2: School Facilities Analyzed For This Report

Facility	Approximate Year of Original Construction	Approximate Square Footage	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
Hirschi HS	1962	229,124	RTUs/ Natural Gas	SZAHU	T8	Solidyne Controls
Rider HS	1961	260,826	RTU's and Heat Pumps	SZAHU	T8	Solidyne Controls
Burgess ES	1962	62,301	RTUs/ Natural Gas	SZAHU	T8	Solidyne Controls
McNeil JH	1995	117,585	RTU's	SZAHU	T8	Solidyne Controls
Haynes ES	1964	43,818	S/S	SZAHU	T8	Solidyne Controls
Kirby JH	1974	112,736	Central System/ Cooling Tower	MZAHU	T8	Solidyne Controls
Franklin ES	1926	54,627	Heat Pumps	SZAHU	T8	Solidyne Controls

Note: SZAHU = Single-Zone Air Handling Unit RTU = Rooftop Unit

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: RENOVATION OF AGED HVAC EQUIPMENT

It was noted during the survey that multiple 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*.

Haynes Elementary School

Haynes Elementary School has fifteen 3-ton, one 4-ton, and three 7.5-ton units that were originally installed in 1985. These units have surpassed the end of their useful life expectancy of 15-20 years. *We recommend these units be replaced with new gas-fired packaged rooftop units that can be installed to use the existing ductwork already in place throughout the building.*

The existing units utilize electric heat despite the fact that natural gas is available in the area. WFISD pays $6.92, on average, for each MCF of natural gas consumed at the schools. Each MCF of natural gas contains approximately 1,030,000 British Thermal Units (BTUs) of energy, but due to efficiency losses in the combustion processes required to convert heat from natural gas, only 85% of those BTUs are available to be used (modern equipment is considerably more efficient than 85% in this conversion, but for the purposes of this calculation, we will use 85%, conservatively). Therefore only 85% of 1,030,000, or 875,500 BTUs, are available per MCF of natural gas. This indicates that WFISD pays $0.0000079 per BTU for natural gas. Electricity costs the district $0.077/kWh, on average. Each kWh of electricity represents 3,413 BTUh; therefore the district pays $0.00002256 per BTU of electricity. Comparing the cost of natural gas to electricity, we utilize the following formula:

Cost of electricity per BTU / Cost of natural gas per BTU =

$0.00002256 / $0.0000079041 = 2.9

Therefore, for an equivalent amount of energy, electricity costs the district 2.9 times more than energy obtained from natural gas consumption.

The HVAC units determined to need replacement at Haynes and Rider are listed in the following table:

Campus	Year of Manufacture	Quantity	Nominal Tonnage/Type
Haynes ES	1985	15	3-ton split system
Haynes ES	1985	1	4-ton split system
Haynes ES	1985	3	7.5-ton
Haynes ES (portable bldg)	-	1	3-ton through the wall unit
Rider HS	1985	3	5-ton split system
Rider HS	1985	2	3-ton split system
Rider HS	1994	3	4-ton RTU
Rider HS	1994	1	7.5-Ton RTU

This cost estimate represents 115 total tons of nominal cooling capacity that need to be replaced and includes the cost of installing natural gas piping to each of the new RTUs at Haynes Elementary.

Estimated Cost: $245,750 Estimated Savings: $20,480 Estimated Payback: 12 Years

HVAC ECRM 2: REPLACE FURNACE UNITS AT MCNEIL JUNIOR HIGH

McNeil Junior High is partially conditioned by Lennox Pulse split systems. The furnace units are mounted on the roof inside small penthouses with the correlating condensing unit mounted on the roof next to the enclosure. There are typically four furnaces with four condensing units per enclosure. While these condensing units are still functioning, the Lennox Pulse furnaces are now obsolete and consequently, locating replacement parts has become increasingly difficult. *We recommend the district replace these furnace units with newer units that will offer an increase in efficiency while reducing the maintenance time and cost associated with having to locate replacement parts that are no longer in production.*

This cost estimate is to replace the 44 Lennox Pulse furnace units located in the 11 penthouse enclosures which represent 219 tons of combined cooling capacity.

Estimated Cost: $175,200 Estimated Savings: $12,515 Estimated Payback: 14 Years

Lighting ECRM 1: RETROFIT GYMNASIUM METAL HALIDE LIGHTING

While surveying the campuses, we noted gymnasiums that are utilizing metal halide lighting 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. *We recommend replacing the metal halides with 4-lamp T8 high-bay fluorescent fixtures at the elementary schools and 6-lamp T5 high bay fluorescent fixture at the Middle and High Schools.* This will improve overall light levels in the space and allow the fixtures to be turned off during unoccupied periods of the day.

This cost estimate is to replace the metal halide lighting displayed in the table below

Campus	Gym	Quantity of existing MHs
McNeil	Main	30 ea 400w MH
McNeil	Aux	30 each 400w MH
Hirsch	Main	35 ea 400w at floor; 12 ea 250w at bleachers
Hirsch	Aux	20 ea 400w MH
Kirby	Main	30 each 400w MH
Rider	Aux	12 ea 400w MH
Rider	Mini	20 ea 400w MH
Rider	Comp	40 ea 400w, 18 ea 250w MH

Estimated Cost: $86,450 *Estimated Savings: $14,400* *Estimated Payback: 6 Years*

Building Envelope ECRM 1: REPLACE SINGLE PANE WINDOWS

At many of the campuses we noticed older, single pane windows that are in need of replacement. These windows are less effective at minimizing heat gain in the cooling season and heat loss during the heating season than modern insulated dual pane units. *At Burgess Elementary, we recommend the district replace every other window with an insulated window enclosure and the remaining windows with new double-pane units to allow natural light into the space.*

The scope of work included in the cost estimate is to replace 5 single pane windows and enclose 4 window spaces in a typical classroom at Burgess Elementary. Although this recommendation is for Burgess, we recommend WFISD extrapolate this recommendation to any campuses where applicable. This estimate includes all labor and materials.

Estimated Cost: $4,050 Estimated Savings: $340 Estimated Payback: 12 Years

Controls ECRM 2: INSTALL VFDs AT KIRBY JUNIOR HIGH

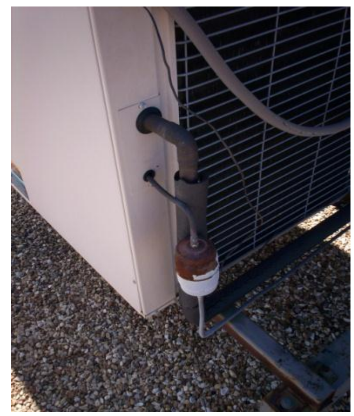
It was noted that the cooling tower and chilled water pump at Kirby JH would attain considerable energy savings if Variable Frequency Drives were installed on these two pieces of equipment. *We recommend WFISD install VFDs to allow the cooling tower and chilled water pump to operate on a level that uses less energy when full power is not needed to satisfy the conditioning requirements being called for by the building.*

Estimated Cost: $12,000 Estimated Savings: $1,715 Estimated Payback: 7 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC	• Replace damaged refrigerant piping insulation • Comb condenser coil fins • Vent the heat being rejected by freezer/cooler out of Burgess ES
Lighting	• Ensure exterior lights are off during the day • Keep unnecessary lights off during the day • De-lamp gymnasium flourescent lighting • Turn off scoreboards when not in use
Building Envelope	• Replace weatherstripping at exterior doors • Relocate EMS sensors or classroom equipment • Cover unused exhaust fans
Controls	• Reduce staggered start intervals • Implement "Sleep is Good" program • Install rotary timers for custodial closet lighting • Adjust heating and cooling temperature setpoints
Behavioral Modification	• Implement energy management policy banning personal appliances in classrooms • Use kilns only during off-peak demand periods
General	• Require all appliances purchased by schools to be Energy Star rated

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 weatherstripping are well documented and universally accepted.



HVAC M&O #1

Upon inspection of the district's HVAC equipment, it was discovered that many of the units refrigerant piping insulation is damaged or missing. This condition minimizes the ability of the refrigerant to absorb heat from the conditioned space as it absorbs heat from the roof. *We recommend the district replace the refrigerant piping insulation on all exterior units that have aged or deteriorating insulation.*

HVAC M&O #2

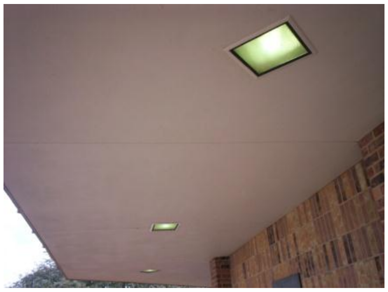
It was noted that some condenser unit coil fins were bent in from a prior hail storm. *We recommend WFISD comb the condenser fins at all units where damage is visible* [combs available for less than $10]. The installation of quality coil guards prevents future fin combing, which is ultimately a combination 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.

HVAC M&O #3

At Burgess Elementary we noticed the kitchen freezer/cooler unit was not ducted out of the building; therefore, all heat being rejected by this unit is being released directly into the conditioned kitchen space. *We recommend installing an exhaust fan at Burgess to pull this rejected heat out of the conditioned space, as well as the district amending their purchasing specifications for kitchen freezer and cooler units to have remote condensers mounted to the exterior of the building.*

<u>Lighting M&O #1</u>

Throughout the district we noticed multiple exterior lights remaining on during the day. Depending on how the lights are controlled, this condition can be attributed to an error in the time-clock system settings or a photocell that is dirty or damaged. *We recommend WFISD make the necessary provisions to ensure all exterior lights are turning off during the day.*



<u>Lighting M&O #2</u>

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

<u>Lighting M&O #3</u>

At the Burgess Elementary Gymnasium, we noticed T5 fluorescent lighting fixtures utilizing 4-lamps per fixture and which were producing 80 footcandles on the gym floor. *We recommend WFISD de-lamp each 4-lamp fixture down to 2-lamps per fixture at this gymnasium*. The 2-lamps per fixture will produce adequate lighting for this space and provide instant energy savings.

<u>Lighting M&O #4</u>

At multiple campuses we noted gymnasium scoreboards that had been left on since the last time they were used. To indicate the scoreboard is on, they are programmed to cycle through the lighting by flashing each row of lamps, one at a time. *We recommend WFISD ensure all scoreboards are turned off after each use*. This will save energy and preserve the life of the scoreboard lamps.

Building Envelope M&O #1

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

Building Envelope M&O #2

During our survey we noted several wall mounted thermostat units that were located directly above or near an electrical appliance. The heat being rejected from the equipment will be detected by this thermostat causing the HVAC system to run more hours than necessary when in cooling mode in an attempt to satisfy the false reading. *We recommend moving the appliances away from the thermostat so it can accurately sample the room temperature.*

Building Envelope M&O #3

It was noted that the Hirsch gymnasium is a conditioned space that has exhaust fans that are uncovered and not being used. These exhaust fans are allowing conditioned air to escape the gymnasium thus forcing the HVAC system to work harder and longer to condition this space. *We recommend the district cover or enclose these exhaust fans in a manner that will eliminate them from allowing conditioned air to escape.*

Controls M&O #1

District personnel informed us that the current HVAC staggered start settings are programmed to allow a 30 minute delay before each zone comes online in the morning. *We recommend the district adjust the start time to 15 minute intervals allowing the first unit to come on as late as possible.* This will reduce the run time for the first interval starters but will not set or increase the district's peak demand.

At multi-story facilities, *we recommend the early morning HVAC startup begin with the lower floors when heating and the upper floors during cooling season*. This will allow extra cooling to descend from the top floors during the cooling season and existing heat from the lower floors to ascend during the heating season to in effect, pre-condition the space before the startup sequence initiates systems on that level.

Controls M&O #2

During our survey, district personnel stated a desire to have a personal computer power saving program installed on all WFISD computers. *We recommend the district install SECO's "Sleep Is Good," a free computer program that will ensure district computers are going to sleep when not being used.*

Controls M&O #3

While surveying the district, we were informed that it is not uncommon to find custodial closets with the lights being left on after custodian personnel have left the area. Because these closets store custodial equipment and are not occupied throughout the day, lights that are left on will often remain on for many hours or even days at a time. *We recommend the district install rotary lighting timers in all custodial closets that will turn the closet lights off after a predetermined amount of time.*

Controls M&O #4

It was noted during the survey that the temperature set points for the district are currently 74°-78° F for cooling and 68°-72° for heating. While the cooling set point is already programmed within a recommended temperature range, *we recommend the district experiment by adjusting the heating set point to 66°-70°F to see if most of the students and faculty remain comfortable but save energy by reducing the run time for the heating systems.* Adjusting the heating range to 66°-70°F will still allow teachers 4° of control at each classroom but will save the district energy by stopping the heating at 70° instead of 72°.

Behavioral Modification M&O #1

Upon surveying the district we noticed many classrooms at each campus had mini refrigerators, microwaves, and other personal electronic appliances. Although WFISD currently allows teachers to have these appliances in classrooms, *we recommend the district amend the energy management policy so that personal appliances such as mini refrigerators and microwaves are not allowed in classrooms when full-size refrigerators and microwaves are readily available in the teacher lounge areas.*

Behavioral Modification M&O #2

During our survey it was noted that several campus art departments had kilns. When a kiln is used, it requires a large amount of instantaneous electrical demand in order to operate. Because WFISD is charged for their peak demand, *we recommend the district observe the practice of load shedding by only allowing kilns to be used after student occupied hours*. This will ensure the demand used by the kilns is not contributing to the school's peak demand which is usually set in the heat of the afternoon while the building is fully occupied.

General M&O #1

WFISD staff noted that there are not specification requirements for new appliances within the district to be energy star rated. *We recommend WFISD require all new appliances and equipment purchased be Energy Star rated.* This will help the district promote energy efficiency as a priority and will save money while doing so.

In addition, if WFISD has not already initiated the process of obtaining Energy Star ratings for their buildings, we strongly urge consideration be given toward this effort. If more information is desired, either SECO or ESA can be contacted for additional information.

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. $2,000 maintenance expense next 5 years				
4. $4,000 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	($523,450)		0	($523,450)
Year 1		$ 49,450.00	0	$49,450
Year 2		$ 49,450.00	0	$49,450
Year 3		$ 49,450.00	0	$49,450
Year 4		$ 49,450.00	0	$49,450
Year 5		$ 49,450.00	0	$49,450
Year 6		$ 47,450.00	($2,000)	$45,450
Year 7		$ 45,450.00	($2,000)	$43,450
Year 8		$ 43,450.00	($2,000)	$41,450
Year 9		$ 41,450.00	($2,000)	$39,450
Year 10		$ 39,450.00	($2,000)	$37,450
Year 11		$ 35,450.00	($4,000)	$31,450
Year 12		$ 31,450.00	($4,000)	$27,450
Year 13		$ 27,450.00	($4,000)	$23,450
Year 14		$ 23,450.00	($4,000)	$19,450
Year 15		$ 19,450.00	($4,000)	$15,450
			Internal Rate of Return	**1.34%**

More information regarding financial programs available to WFISD 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

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

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:

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

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.

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 ________________________________, 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: Ronald Kuehler	Date: 9/20/2011
Name (Mr./Ms./Dr.) Ronald Kuehler	Title: Chief Financial/Operations Officer
Organization: Wichita Falls ISD	Phone: 940-235-1003
Street Address: 1104 Broad	Fax: 940-235-1317
Mailing Address: P.O. Box 97533	E-Mail: rkuehler@wfisd.net
Wichita Falls, TX 76307-7533	County: Wichita

Contact Information:

Name (Mr./Ms./Dr.):	Title:
Phone:	Fax:
E-Mail:	County:

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)

TEMA

ANNOUNCING!

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