Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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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**.

State Energy Conservation Office

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The service assists these public, non-profit institutions to take basic steps towards energy efficient facility operation. Active involvement in the partnership from the entire administration and staff within the agencies and institutions is critical in developing a customized blueprint for energy efficiency for their facilities.

In May 2011, **SECO** received a request for technical assistance from Luis M. Velez, Project Manager for **Fort Worth 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 **Fort Worth ISD,** (hereafter known as FWISD) was completed by ESA **Energy Systems Associates, Inc**., (hereafter known as *Engineer*) to determine the annual energy cost index (ECI) and energy use index (EUI) for each campus or facility. A complete listing of the Base Year Utility Costs and Consumption is provided in Section 3.0 of this report.

Following the utility analysis and a preliminary consultation with *Mr. Stojan Trickovic*, 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.

The District engaged in a Capital Improvement Program (CIP) based on a bond issue approved by the voters in November 2007. As part of the CIP, the district performed numerous energy systems upgrades (replacement of air handling units, roof top units, chillers, gas lines, conversion from analog to digital controls, etc.) on all existing schools.
This report only looked at the high school campuses. Other existing and newly built facilities were not in the scope of this Energy Survey.

We estimate that as much as **$346,125** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$2,338,275**, yielding an average simple payback of **6-3/4** years.

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

SUMMARY:	DESCRIPTION	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	RENOVATION OF AGED HVAC EQUIPMENT	$1,348,850	$151,050	9 Years
HVAC ECRM #2	REFRIGERANT MONITOR	$5,000	N/A	N/A
HVAC ECRM #3	TEST AND BALANCE	BEYOND SCOPE OF REPORT	N/A	N/A
Controls ECRM #1	DDC CONTROLS	$952,000	$190,475	5 Years
Lighting ECRM #1	RETROFIT T12 FIXTURES	$5,700	$950	5 Years
Lighting ECRM #2	REPLACE METAL HALIDES	$15,600	$2,250	6 Years
Lighting ECRM #3	REPLACE INCANDESCENTS	$11,125	$1,400	8 Years
TOTAL PROJECTS		**$2,338,275**	**$346,125**	**6-3/4 Years**

**A listing of all campuses surveyed for this report can be found on page 17*

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 FWISD. We hope to be ongoing partners in assisting you to implement the recommendations listed in this report. Please call us if you have further questions or comments regarding your Energy Management Issues.

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A Terracon Company

2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities. After receipt of the PEASA, an initial visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state to review the program elements that SECO provides to school districts and determine which elements could best benefit the district. A summary of the *Partner's* most recent twelve months of utility bills was provided to the engineer for the preliminary assessment of the Energy Performance Indicators. After reviewing the utility bill data analysis and consultation with SECO to determine the program elements to be provided to FWISD, 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 FWISD 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
Eastern Hills HS	82,934	39%	$2.01	42%
Carter Riverside HS	74,220	24%	$1.68	19%
Western Hills HS	66,674	11%	$1.67	18%
Paschal HS	61,822	3%	$1.54	9%
Arlington Heights HS	58,858	-2%	$1.45	2%
Northside HS	60,925	2%	$1.41	0%
Diamond Hill HS	57,737	-4%	$1.39	-2%
Southwest HS	55,911	-7%	$1.36	-4%
Dunbar HS	52,250	-13%	$1.26	-11%
Wyatt HS	52,823	-12%	$1.26	-11%
Poly HS	58,986	-1%	$1.17	-17%
South Hills HS	49,096	-18%	$1.12	-21%
Trimble HS	45,756	-24%	$1.08	-24%
Average Value:	59,846		$1.42	

Fort Worth ISD purchases electricity from TXU 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.

Oncor has changed their Secondary Service Greater than 10kW rate schedule as of July 1, 2011. There is a significant change in the way demand is charged in the new rate. A copy of the new interim rate schedule is included in Appendix I

OWNER: Fort Worth ISD **BUILDING:** Eastern Hills HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	333,943		1,308	8,894	31,725	66	392
JUNE	2010	389,789		1,230	9,668	37,030	63	365
JULY	2010	280,307		1,219	9,581	26,629	55	419
AUGUST	2010	376,939		1,334	10,485	35,809	50	393
SEPTEMBER	2010	397,592		1,343	10,556	37,771	67	524
OCTOBER	2010	286,724		1,249	8,493	27,239	114	874
NOVEMBER	2010	249,469		1,233	8,384	23,700	188	1,427
DECEMBER	2010	204,380		1,219	8,289	19,416	299	2,194
JANUARY	2011	227,579		1,184	8,051	21,620	628	3,848
FEBRUARY	2011	212,568		1,181	8,031	20,194	606	3,640
MARCH	2011	209,529		1,173	7,976	19,905	91	537
APRIL	2011	301,616		1,149	7,813	28,654	73	452
TOTAL		**3,470,435**		**14,822**	**106,223**	**$329,691**	**2,299**	**$15,065**

Annual Total Energy Cost = $344,756 Per Year

Total KWH x 0.003413 = 11,844.59 x 106
Total MCF x 1.03 = 2,368.07 x 106
Total Other x ____ x 106
Total Site BTU's/yr 14,212.67 x 106

Floor area: 171,373 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 82,934 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $2.01 $/s.f. yr

Electric Utility **Account #** **Meter#** E006-167-9873 - 999 **Gas Utility** **Meter #** G006-1139605

OWNER: Fort Worth ISD **BUILDING:** Carter Riverside HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	219,011		864	5,875	20,806	37	220
JUNE	2010	155,077		823	6,469	14,732	22	127
JULY	2010	184,609		827	6,500	17,538	1	4
AUGUST	2010	269,447		954	7,498	25,597	1	7
SEPTEMBER	2010	200,960		946	7,436	19,091	17	102
OCTOBER	2010	178,147		846	6,650	16,924	44	337
NOVEMBER	2010	147,390		836	6,571	14,002	216	1,643
DECEMBER	2010	133,508		835	6,563	12,683	686	4,460
JANUARY	2011	150,200		869	6,830	14,269	311	1,920
FEBRUARY	2011	146,325		913	7,176	13,901	679	4,076
MARCH	2011	127,089		891	7,003	12,073	75	439
APRIL	2011	176,728		872	6,854	16,789	62	387
TOTAL		**2,088,491**		**10,476**	**81,426**	**$198,407**	**2,151**	**$13,722**

Annual Total Energy Cost = $212,129 Per Year

Total KWH x 0.003413 = 7,128.02 x 106
Total MCF x 1.03 = 2,215.84 x 106
Total Other x ____ x 106
Total Site BTU's/yr 9,343.86 x 106

Floor area: 125,894 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 74,220 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.68 $/s.f. yr

Electric Utility **Account #** **Meter#** E001-560-2243 **Gas Utility** **Meter #** G001-1328125

OWNER: Fort Worth ISD **BUILDING:** Western Hills HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	ESTIMATED COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	COSTS $
MAY	2010	404,969		1,299	8,833	38,472	31	175
JUNE	2010	378,617		1,155	9,078	35,969	13	94
JULY	2010	386,137		1,187	9,330	36,683	13	97
AUGUST	2010	463,770		1,313	10,320	44,058	30	237
SEPTEMBER	2010	275,592		1,194	9,385	26,181	45	338
OCTOBER	2010	220,536		1,095	7,446	20,951	54	409
NOVEMBER	2010	195,860		1,099	7,473	18,607	112	816
DECEMBER	2010	223,433		1,104	7,507	21,226	331	2,085
JANUARY	2011	209,571		1,125	7,650	19,909	681	3,924
FEBRUARY	2011	175,754		1,111	7,555	16,697	199	1,168
MARCH	2011	205,477		1,167	7,936	19,520	66	416
APRIL	2011	266,535		1,244	8,459	25,321	54	365
TOTAL		**3,406,251**		**14,093**	**100,972**	**$323,594**	**1,629**	**$10,124**

Annual Total Energy Cost = $333,718 Per Year

Total KWH x 0.003413 = 11,625.53 x 106
Total MCF x 1.03 = 1,678.18 x 106
Total Other x ____ x 106
Total Site BTU's/yr 13,303.71 x 106

Floor area: 199,535 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 66,674 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.67 $/s.f. yr

Electric Utility	**Account #**	**Meter#**	**Gas Utility**	**Meter #**
		E-015-298-4076-99-8		G015-1254368-1013043-4

OWNER: Fort Worth ISD **BUILDING:** Paschal HS

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 $
MAY	2010	377,776		1,669		35,889	71	422
JUNE	2010	394,316		1,558		37,460	83	649
JULY	2010	495,300		1,718		47,054	38	308
AUGUST	2010	594,551		1,705		56,482	46	369
SEPTEMBER	2010	420,682		1,559		39,965	82	629
OCTOBER	2010	299,370		1,428		28,440	95	739
NOVEMBER	2010	225,935		1,437		21,464	145	1,070
DECEMBER	2010	208,714		1,440		19,828	868	5,601
JANUARY	2011	259,523		1,458		24,655	585	4,130
FEBRUARY	2011	290,183		1,459		27,567	68	394
MARCH	2011	380,136		1,602		36,113	97	616
APRIL	2011	416,240		1,583		39,543	90	613
TOTAL		**4,362,726**		**18,616**		**$414,459**	**2,266**	**$15,540**

Annual Total Energy Cost = $429,999 Per Year

Total KWH x 0.003413 = 14,889.98 x 106
Total MCF x 1.03 = 2,334.08 x 106
Total Other x ____ x 106
Total Site BTU's/yr 17,224.07 x 106

Floor area: 278,608 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 61,822 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.54 $/s.f. yr

Electric Utility	**Account #**	**Meter#**	**Gas Utility**	**Meter #**
TXU Electricity		E010-560-1933-99-6		G010-1068458-5

OWNER: Fort Worth ISD **BUILDING: rlington Heights H**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRIC AL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	384,571		2,198		36,534	55	320
JUNE	2010	342,318		2,218		32,520	46	359
JULY	2010	364,465		2,829		34,624	39	310
AUGUST	2010	424,482		2,858		40,326	44	354
SEPTEMBER	2010	301,538		1,306		28,646	57	439
OCTOBER	2010	247,621		1,249		23,524	67	515
NOVEMBER	2010	147,214		1,155		13,986	157	1,170
DECEMBER	2010	172,990		1,149		16,434	289	1,865
JANUARY	2011	201,060		1,171		19,101	813	4,722
FEBRUARY	2011	197,175		1,152		18,732	245	1,456
MARCH	2011	302,946		1,260		28,780	65	415
APRIL	2011	265,864		1,244		25,257	65	444
TOTAL		**3,352,244**		**19,789**		**$318,463**	**1,941**	**$12,369**

Annual Total Energy Cost = $330,832 Per Year

Total KWH x 0.003413 = 11,441.21 x 106
Total MCF x 1.03 = 1,998.92 x 106
Total Other x ____ x 106
Total Site BTU's/yr 13,440.13 x 106

Floor area: 228,347 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) — 58,858 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) — $1.45 $/s.f. yr

Electric Utility **Account #** **Meter#** E-002-298-3983-99-6 **Gas Utility** **Meter #** G002-113

OWNER: Fort Worth ISD **BUILDING: Northside HS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	268,713		1,111	7,555	25,528	24	137
JUNE	2010	222,891		1,000	7,860	21,175	12	87
JULY	2010	270,884		1,060	8,332	25,734	8	62
AUGUST	2010	343,119		1,217	9,566	32,596	38	306
SEPTEMBER	2010	288,857		1,191	9,361	27,441	54	411
OCTOBER	2010	253,431		1,084	8,520	24,076	67	416
NOVEMBER	2010	180,617		1,046	8,222	17,159	385	2,855
DECEMBER	2010	168,250		1,043	8,198	15,984	614	3,394
JANUARY	2011	184,239		1,076	8,457	17,503	1,122	6,546
FEBRUARY	2011	186,911		1,064	8,363	17,757	149	919
MARCH	2011	233,240		1,060	8,332	22,158	77	497
APRIL	2011	251,327		1,109	8,717	23,876	81	553
TOTAL		**2,852,479**		**13,061**	**101,482**	**$270,986**	**2,630**	**$16,183**

Annual Total Energy Cost = $287,169 Per Year

Total KWH x 0.003413 = 9,735.51 x 106
Total MCF x 1.03 = 2,708.80 x 106
Total Other x ____ x 106
Total Site BTU's/yr 12,444.31 x 106

Floor area: 204,256 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) — 60,925 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) — $1.41 $/s.f. yr

Electric Utility **Account #** **Meter#** E-008-298-3921-99-6 **Gas Utility** **Meter #** G008-1183416-0960375-9

OWNER: **Fort Worth ISD** **BUILDING:** **Diamond Hill HS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	213,206		3,254	22,127	20,255	24	129
JUNE	2010	143,094		3,228	25,372	13,594	8	48
JULY	2010	145,493		3,360	26,410	13,822	7	48
AUGUST	2010	282,987		3,745	29,436	26,884	25	202
SEPTEMBER	2010	208,643		1,049	8,245	19,821	53	404
OCTOBER	2010	168,349		924	6,283	15,993	80	621
NOVEMBER	2010	152,452		928	6,310	14,483	157	1,162
DECEMBER	2010	156,646		923	6,276	14,881	342	2,127
JANUARY	2011	154,604		935	6,358	14,687	533	3,116
FEBRUARY	2011	132,817		944	6,419	12,618	91	564
MARCH	2011	149,957		941	6,399	14,246	56	368
APRIL	2011	177,509		936	6,365	16,863	44	302
TOTAL		**2,085,757**		**21,167**	**156,001**	**$198,147**	**1,419**	**$9,091**

Annual Total Energy Cost = $207,238 Per Year

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 57,737 BTU/s.f.yr

Total KWH x 0.003413 = 7,118.69 x 106
Total MCF x 1.03 = 1,461.47 x 106
Total Other x ____ x 106
Total Site BTU's/yr 8,580.16 x 106

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.39 $/s.f. yr

Floor area: 148,608 s.f.

Electric Utility	**Account #**	**Meter#**	**Gas Utility**	**Meter #**
		E-004-560-2305-99-6		G004-1302398-1052090-9

OWNER: **Fort Worth ISD** **BUILDING:** **Southwest HS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	322,506		994	6,759	30,638	30	196
JUNE	2010	299,924		921	7,239	28,493	24	186
JULY	2010	310,399		972	7,640	29,488	20	163
AUGUST	2010	388,905		1,138	8,945	36,946	29	230
SEPTEMBER	2010	284,629		1,065	8,371	27,040	34	261
OCTOBER	2010	218,123		1,043	7,092	20,722	60	458
NOVEMBER	2010	199,975		927	6,304	18,998	182	1,363
DECEMBER	2010	175,693		923	6,276	16,691	516	3,197
JANUARY	2011	185,456		925	6,290	17,618	847	4,966
FEBRUARY	2011	187,417		933	6,344	17,805	83	518
MARCH	2011	218,754		928	6,310	20,782	57	370
APRIL	2011	273,322		1,073	7,296	25,966	41	279
TOTAL		**3,065,103**		**11,842**	**84,867**	**$291,185**	**1,923**	**$12,187**

Annual Total Energy Cost = $303,372 Per Year

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 55,911 BTU/s.f.yr

Total KWH x 0.003413 = 10,461.20 x 106
Total MCF x 1.03 = 1,980.90 x 106
Total Other x ____ x 106
Total Site BTU's/yr 12,442.09 x 106

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.36 $/s.f. yr

Floor area: 222,535 s.f.

Electric Utility	**Account #**	**Meter#**	**Gas Utility**	**Meter #**
		E014-560-1840-99-3		G014-1104869-2

OWNER: **Fort Worth ISD** **BUILDING:** **Dunbar HS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	280,948		914	6,215	26,690	70	412
JUNE	2010	181,586		994	7,813	17,251	13	69
JULY	2010	252,271		978	7,687	23,966	12	89
AUGUST	2010	276,799		1,024	8,049	26,296	1	6
SEPTEMBER	2010	298,855		1,045	8,214	28,391	16	117
OCTOBER	2010	233,864		965	7,585	22,217	17	121
NOVEMBER	2010	203,858		917	7,208	19,367	43	316
DECEMBER	2010	167,019		917	7,208	15,867	245	1,812
JANUARY	2011	182,012		917	7,208	17,291	652	3,991
FEBRUARY	2011	179,731		957	7,522	17,074	589	3,535
MARCH	2011	175,248		960	7,546	16,649	78	460
APRIL	2011	227,883		1,016	7,986	21,649	33	197
TOTAL		2,660,074		11,604	90,239	$252,707	1,767	$11,125

Annual Total Energy Cost =	$263,832	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	52,250 BTU/s.f.yr
Total KWH x 0.003413 =	9,078.83	x 106		
Total MCF x 1.03 =	1,819.80	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$1.26 $/s.f. yr
Total Other x ____		x 106		
Total Site BTU's/yr	10,898.64	x 106		
Floor area:	208,587	s.f.		

Electric Utility **Account #** **Meter#** E005-560-2584 **Gas Utility** **Meter #** G005-1263108

OWNER: **Fort Worth ISD** **BUILDING:** **Wyatt HS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	325,520		953	6,480	30,924	43	253
JUNE	2010	298,922		934	7,341	28,398	50	393
JULY	2010	319,027		951	7,475	30,308	42	338
AUGUST	2010	349,510		1,058	8,316	33,203	50	405
SEPTEMBER	2010	365,096		983	7,726	34,684	51	396
OCTOBER	2010	243,995		960	6,528	23,180	62	472
NOVEMBER	2010	221,137		1,020	6,936	21,008	544	4,076
DECEMBER	2010	183,242		874	5,943	17,408	741	4,561
JANUARY	2011	210,488		849	5,773	19,996	559	3,349
FEBRUARY	2011	219,356		950	6,460	20,839	139	842
MARCH	2011	207,229		849	5,773	19,687	91	579
APRIL	2011	272,863		967	6,576	25,922	46	314
TOTAL		3,216,385		11,348	81,328	$305,557	2,418	$15,978

Annual Total Energy Cost =	$321,535	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	52,823 BTU/s.f.yr
Total KWH x 0.003413 =	10,977.52	x 106		
Total MCF x 1.03 =	2,490.13	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$1.26 $/s.f. yr
Total Other x ____		x 106		
Total Site BTU's/yr	13,467.65	x 106		
Floor area:	254,958	s.f.		

Electric Utility **Account #** **Meter#** E016-298-4107-99-1 **Gas Utility** **Meter #** G016-1031751-4

OWNER: Fort Worth ISD **BUILDING:** Polytechnic HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	234,618		1,048	7,126	22,289	25	136
JUNE	2010	120,231		996	7,829	11,422	12	60
JULY	2010	91,710		984	7,734	8,712	20	146
AUGUST	2010	285,215		1,003	7,884	27,095	47	366
SEPTEMBER	2010	277,514		1,018	8,001	26,364	71	538
OCTOBER	2010	166,650		1,000	7,860	15,832	72	539
NOVEMBER	2010	129,272		918	7,215	12,281	853	6,321
DECEMBER	2010	138,144		910	7,153	13,124	1,091	7,022
JANUARY	2011	140,158		916	7,200	13,315	1,037	6,309
FEBRUARY	2011	127,891		911	7,160	12,150	391	2,372
MARCH	2011	111,082		740	5,816	10,553	121	729
APRIL	2011	156,688		1,354	10,642	13,744	59	375
TOTAL		1,979,173		11,798	91,621	$186,880	3,800	$24,913

Annual Total Energy Cost = $211,793 Per Year

Total KWH x 0.003413 = 6,754.92 x 106
Total MCF x 1.03 = 3,913.69 x 106
Total Other x ____ x 106
Total Site BTU's/yr 10,668.61 x 106

Floor area: 180,867 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 58,986 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.17 $/s.f. yr

Electric Utility **Account #** **Meter#** E009-560-2088

Gas Utility **Meter #** G009-1484627

OWNER: Fort Worth ISD **BUILDING:** South Hills HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	252,535		1,094	7,439	23,991	29	171
JUNE	2010	186,997		1,050	8,253	17,765	19	145
JULY	2010	182,772		1,062	8,347	17,363	26	206
AUGUST	2010	271,578		1,186	9,322	25,800	23	182
SEPTEMBER	2010	222,576		1,097	8,622	21,145	25	194
OCTOBER	2010	184,056		1,025	6,970	17,485	46	353
NOVEMBER	2010	168,545		1,049	7,133	16,012	308	2,290
DECEMBER	2010	133,623		1,035	7,038	12,694	604	3,751
JANUARY	2011	171,168		1,040	7,072	16,261	810	4,751
FEBRUARY	2011	153,937		1,031	7,011	14,624	185	1,139
MARCH	2011	164,470		1,038	7,058	15,625	152	987
APRIL	2011	206,979		1,073	7,296	19,663	131	899
TOTAL		2,299,236		12,780	91,563	$218,427	2,356	$15,068

Annual Total Energy Cost = $233,495 Per Year

Total KWH x 0.003413 = 7,847.29 x 106
Total MCF x 1.03 = 2,427.09 x 106
Total Other x ____ x 106
Total Site BTU's/yr 10,274.38 x 106

Floor area: 209,271 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 49,096 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.12 $/s.f. yr

Electric Utility **Account #** **Meter#** E003-256-0460-98-8

Gas Utility **Meter #** G003-1106098-2

OWNER: Fort Worth ISD **BUILDING:** Trimble HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	ESTIMATED COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
MAY	2010	500,518		1,433	9,744	47,549	23	180
JUNE	2010	260,782		1,233	9,691	24,774	21	167
JULY	2010	516,203		1,582	12,435	49,039	19	156
AUGUST	2010	618,058		1,496	11,759	58,716	39	296
SEPTEMBER	2010	366,418		1,291	10,147	34,810	43	332
OCTOBER	2010	237,820		1,290	8,772	22,593	102	755
NOVEMBER	2010	206,491		1,290	8,772	19,617	485	3,137
DECEMBER	2010	212,732		1,290	8,772	20,210	1,122	6,746
JANUARY	2011	215,511		1,293	8,792	20,474	1,024	5,803
FEBRUARY	2011	190,539		1,299	8,833	18,101	145	929
MARCH	2011	286,732		1,302	8,854	27,240	48	327
APRIL	2011	316,595		1,390	9,452	30,077	54	380
TOTAL		**3,928,399**		**16,189**	**116,023**	**$373,198**	**3,123**	**$19,208**

Annual Total Energy Cost = $392,406 Per Year

Total KWH x 0.003413 = 13,407.63 x 106
Total MCF x 1.03 = 3,216.28 x 106
Total Other x ____ x 106
Total Site BTU's/yr 16,623.90 x 106

Floor area: 363,320 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 45,756 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $1.08 $/s.f. yr

Electric Utility	Account #	Meter#	Gas Utility	Meter #
		E011-560-2553-99-1		G011-0972017-5

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: TXU Energy Contract price: $0.06461 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 = $0.06461/kWh + $0.000654/kWh + $0.007944/kWh = <u>$0.073208/kWh</u>

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

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

** 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 facilities in the analyzed billing cycle: $190,573

Total quantity purchased during the analyzed billing cycle: 29,722 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $190,573 / 29,722 MCF

Average cost per MCF = $6.41

5.0 CAMPUS DESCRIPTIONS:

Fort Worth ISD consists of over 130 educational campuses located in and around the city of Fort Worth. Fort Worth ISD has been involved in SECO's Energy Partnership Program for many years with the assistance of Estes McClure Associates. Many of the recommendations generated by those surveys have been incorporated into the schools as the district has expanded and grown.

All of the high school campuses surveyed utilized a combination of chilled water systems and packaged rooftop units, with a few split systems serving miscellaneous areas. Some of the schools surveyed are performing rather efficiently, with others not performing so well. While no schools were terrible energy performers, all campuses had room for large improvements.

The energy survey focused on the following thirteen high school campuses:

Table 2: School Facilities Analyzed For This Report

Facility	Approximate Square Footage	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
Eastern Hills HS	171,373	Chilled water, Rooftop Units, Heat Pump Split Systems	Air Handlers, Rooftop Units	T8	Pneumatic controls / Programmable Thermostat
Carter Riverside HS	125,894	Air-cooled chillers / RTUs / Steam boiler	RTUs	T8 / Metal Halide	Siemens DDC
Western Hills HS	199,535	Air cooled chillers / NG boilers	AHUs / Fan Coil Units	T8	DDC Alerton
Paschal HS	278,608	Water- cooled chillers / NG boiler	AHUs	T8 with occupancy sensors	DDC – Delta
Northside HS	204,256	RTUs	RTUs	T8	DDC Alerton / Johnson Controls
Arlington HS	228,347	Air-cooled chillers / Split System with NG heat	AHUs	T8 with occupancy sensors	DDC Alerton
Diamond Hill HS	148,608	Air-cooled chillers / NG boiler	AHUs	T8	DDC Alerton
Southwest HS	222,535	Water-cooled chillers / NG boiler	Rooftop 4-pipe AHUs / MZAHU VAV / RTUs	T8 / T12 at elevator	Trane controls
Dunbar HS	208,587	Water-cooled chiller with FCUs / NG Boiler / RTUs	AHUs / RTUs	T8 / Metal Halide	Pneumatic controls / Programmable Thermostat
Wyatt HS	254,958	Air & water-cooled chillers, Rooftop Units	AHUs / RTUs	T8 / Metal Halide	Pneumatic controls
Polytechnic HS	180,867	Air-cooled chiller, RTUs / Steam boiler	AHUs / RTUs	T8 / T12	DDC
South Hills HS	209,271	Air-cooled chiller with FCUs / NG Boiler / RTUs	AHUs / RTUs	T8 / T12	DDC - ALC
Trimble HS	363,320	Water cooled chiller / RTUs	AHUs	T8	DDC

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: RENOVATION OF AGED HVAC EQUIPMENT

Rooftop Units (RTUs)

The district utilizes a large number of packaged rooftop units (RTUs) at all of its high school campuses. Many of these units have been replaced using bond money over the past decade. However, there are a number of units that were not yet ready for replacement during the last two waves of change-outs that are now nearing the end of their useful lives. These units should be changed out soon in a planned and scheduled fashion to both avoid catastrophic failure and the high maintenance costs that come along with emergency repair and replacement. Packaged rooftop equipment has an average useful life expectancy of 20 years.

We have identified a list of RTUs that should be replaced in the near future. When replacing units using a planned obsolescence approach, the best strategy is to replace the oldest and most maintenance intensive units first, then complete the replacement of the units as the finances and planning permits. The following chart represents 476 nominal tons of RTUs and depicts the units we recommend be considered for replacement within the next 5 years.

RTUs			
High School	*Units*	*Quantity*	*Nominal Tonnage*
Northside	Carrier 4-ton units	3	12
Riverside	(10) 5-ton units; (1) ~10-ton unit	11	60
Paschal	(3) 5-ton units; ~8-ton unit	4	23
South Hills	(2) 5-ton units; (4) 10-ton units	6	50
Southwest	(20) 5-ton RTUs	20	100
	TOTAL	44	245

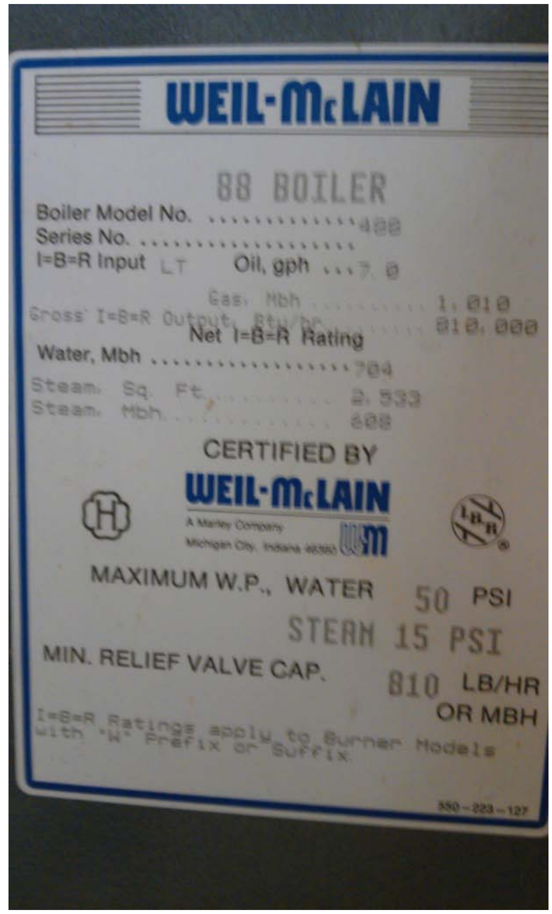
Estimated Cost: $502,250 Estimated Savings: $45,650 Estimated Payback: 11 Years

Split Systems (S/Ss)

It was noted during the survey that some of the split systems were also in need of replacement. There are five 2-1/2 ton condensing units at South Hills HS and one 2-ton condensing unit at Southwest HS that have reached the end of their anticipated 15 year useful life expectancy. We recommend the district replace these systems with new units demonstrating a SEER rating of 16.0 or better and utilizing R410A refrigerant.

Estimated Cost: $30,450 Estimated Savings: $3,500 Estimated Payback: 10 Years

Steam Boilers



At Carter Riverside and Polytechnic High Schools, the space heating system utilizes steam boilers and heat exchangers to convert the steam energy to hot water. Steam distribution systems require intensive maintenance and steam leaks in system traps and condensate return pumps are expensive to detect and repair. Steam systems are less responsive to changes in demand on neutrally temperate days in which the school must heat in the morning and cool in the afternoon. We recommend the district consider installing on-demand natural gas water heaters to respond instantly to the hot water needs of the campus and eliminate the wasted energy inherent to steam systems operated in Texas schools. The price estimate below includes the series-installation of the new on-demand water heaters at both schools; we recommend the district consider reserving a contingency allowance for possible additional costs that may be associated with de-commissioning the existing steam system such as the possible abatement of asbestos-suspicious insulation.

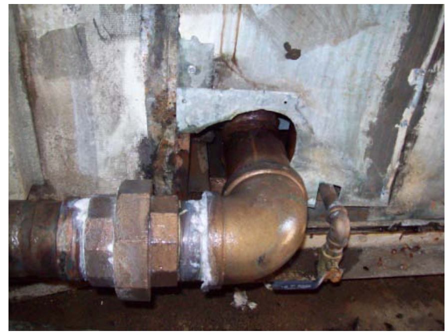
Estimated Cost: $68,000 Estimated Savings: $18,000 Estimated Payback: 3-3/4 Years

Chillers

At Arlington Heights HS there are three 150-ton reciprocating chillers and one Northside HS 1999 200-ton rotary chiller that have reached the end of their anticipated useful life expectancy. We recommend the district replace these chillers with oil-free centrifugal units. These new units have significantly improved IPLV energy efficiencies and lower overall lifetime operating costs than the older chillers they will be replacing.

Estimated Cost: $725,000 Estimated Savings: $80,000 Estimated Payback: 9 Years

Air Handlers



At Western Hills HS there is a multi-zone AHU that is demonstrating air and water leaks at the unit, does not have a VFD, and has a history of delivering too much air at reduced loads and occupancies. We recommend the district replace this unit with a unit that incorporates the ability to operate with variable volume.

Estimated Cost: $23,150 Estimated Savings: $3,900 Estimated Payback: 6 Years

HVAC ECRM 2: Refrigerant Monitor for Eastern Hills HS

It was noted during the survey that there was no refrigerant monitor in operation at Eastern Hills HS. We recommend the direct install a monitor and exhaust fan to purge the mechanical space in case of a refrigerant leak in the chiller system. This recommendation does not have an energy savings payback; it is purely a life-safety issue.

Estimated Cost: $5,000 Estimated Savings: N/A Estimated Payback: N/A

HVAC ECRM 3: Test and Balance of existing Central Systems

A number of indicators that the existing central systems would benefit from a system-wide test and balance were noted during the surveys. Manual flow-control valves throttled back at chilled and hot water pumps; air leaks from ductwork and connections at air handlers and reports that air handlers did not supply comfortable conditions during occupied or unoccupied periods are all indicators that the systems would operate more efficiently with this procedure. Test and Balance is needed in some schools on the air side of the system, some the water-side and some need both sides adjusted.

Estimated Cost: Beyond the scope of this report, we recommend the district consult with a Test and Balance firm to identify a budget cost for the process.

CONTROLS ECRM 1: Complete renovation of energy management systems to full control DDC

It was noted at Eastern Hills, Dunbar and Wyatt High Schools that a combination of pneumatic and electronic timeclock control systems are operating at the schools. We recommend the systems be upgraded to full-control Direct-Digital-Control (DDC) systems to improve the district's ability to monitor and control the systems at these schools. The price below includes the new DDC control system components, as well as an allowance for additional equipment such as electronic damper and valve actuators, necessary to complete the renovation to DDC.

Another suggestion regarding the district's Energy Management Control System (EMCS) arises upon analysis of the base year utility data in Section 3 of this report. When control systems are properly programmed, there should be a noticeable reduction in both electric consumption and demand during summer months. Although, we did discover a few summer months with lower consumption, the peak demand requirement showed almost no variation. Because we don't know the reasoning behind current system programming, we can offer no projected savings at this point. However, experience tells us that significant savings are available through reprogramming.

Estimated Cost: $952,000   Estimated Savings: $190,475   Estimated Payback: 5 Years

Lighting ECRM 1: Retrofit T12 fluorescent fixtures with T8 lamps and electronic ballasts

There were several facilities that were noted to have T12 light fixtures still in operation around the district. The following chart delineates some of the areas where this condition was noted during the survey:

School	***Fixtures***	***Area***
Western Hills	(33) 1-lamp fixtures	Room 219
Western Hills	(32) 2-lamp fixtures	200 wing
Arlington Heights	(31) 2-lamp T12s	
Arlington Heights	2-lamp T12 fixtures	Pump and Mechanical Rooms
Trimble Tech	1-lamp fixtures	Trophy Cases
Northside	T12 fixtures	Mechanical Rooms / RRs
South Hills	T12 fixtures	Mechanical Rooms
South Hills	4-lamp T12s	Classroom B103
Polytechnic	T12 fixtures	Mechanical Rooms
Paschal	(6) F96T12	Boiler Room
Carter Riverside	T12 fixtures	Mechanical Rooms

T12 fixtures produce about 20% less light output, yet consume about 18% more energy, than T8 component fluorescent fixtures. We recommend the district complete the district-wide lighting renovation from T12 to T8 fixtures by renovating these fixtures with T8 lamps and electronic ballasts.

Estimated Cost: $5,700 Estimated Savings: $950 Estimated Payback: 6 Years

Lighting ECRM 2: Replace Metal Halide fixtures with New Dimmable Fixtures

While the district has performed a district-wide renovation from gymnasium metal halide fixtures to T5 or T8 high-bay fluorescent fixtures, there were several 250-watt metal halide fixtures discovered still in operation at the following locations:

School	***Fixtures***	***Area***
OD Wyatt HS	(12) 250-watt MHs	Cafeteria
Eastern Hills HS	(26) 250-watt MHs	Auditorium
Trimble Tech	(40) 250-watt MHs	Auditorium

We recommend the district replace these fixtures with new dimmable compact fluorescent fixtures in order to eliminate the tendency to leave these fixtures on throughout the day so as to avoid the re-strike issue inherent to metal halide fixtures as they are turned back on. Metal halide fixtures can take 10-15 minutes before they reach full light output after they have been turned off. Teachers and staff avoid this waiting time by leaving the fixtures on throughout the day instead of turning them off when the space is unoccupied.

Estimated Cost: $15,600 Estimated Savings: $2,250 Estimated Payback: 6 Years

Lighting ECRM 3: Replace Incandescent lamps new fixtures

There were several incandescent lamps still noted to be used within the district:

School	***Fixtures***	***Area***
Trimble Tech	(10) incandescent lamps	Auditorium
OD Wyatt	(7) incandescent lamps	boiler room
OD Wyatt	(8) incandescent lamps	chiler room
Dunbar	(18) incandescent lamps	chiller/boiler/mechanical room
Eastern Hills	(12) incandescent lamps	chiller room
Western Hills	(13) incandescent lamps	boiler room
Diamond Hill	(21) incandescent lamps	Auditorium

In most cases, compact fluorescent lamps alone would not offer an appropriate alternative for the operation of the fixtures in these spaces. In the case of the Auditorium, these lamps are likely installed in dimmable fixtures; therefore new dimmable compact fluorescent fixtures are most appropriate. In the case of the mechanical rooms, new 2-lamp F17T8 industrial fixtures would supply an adequate amount of light and still occupy a relatively small footprint in the confined ceiling spaces of these rooms.

Estimated Cost: $11,125 Estimated Savings: $1,400 Estimated Payback: 8 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Comb fins on damaged condensing units
- Install hail guards to protect fins in future
- Seal AHU cabinets
- Clean AHU coils throughout district
- Utilize pleated filters on all HVAC equipment
- Replace older fan motors
- Install VFD's on fan and pump motors
- Turn off HVAC when space unoccupied (Auditoriums, Cafeterias, Gymnasiums, etc.)
- Check for obstruction in Rooftop AHUs

Lighting

- Turn off all light fixtures not required during daytime
- Turn off lights in unoccupied spaces
- Turn off exterior lights during daytime
- Retrofit T12 fixtures with T8 lamps and electronic ballasts
- Retrofit Metal Halide fixtures with T5 lamps

Controls

- Reduce run-time schedules of major energy consuming equipment (lighting, HVAC)
- Put computers/monitors to sleep when not used
- Experiment with higher cooling setpoints

Envelope

- Ensure exterior doors close securely
- 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 there was damage to some of the condenser coils, largely because the units do not have coil guards installed. Damage to just 10% of the coil fins can lead to a loss of operational efficiency up to 30%. The district can repair this damage by combing the condenser fins [combs available for less than $10]. The installation of coil guards prevents future fin combing, which is ultimately a combination of deferred labor savings for eliminating the need for maintenance personnel to perform the task and energy savings resulting from the units maintaining optimum operating efficiency. *We recommend installing hail guards on the units to prevent future coil fin damage.*

HVAC M&O #2

Most indoor air handler units throughout the district are quite old, but these units can still provide many useful years of providing comfort more efficiently. Many of these units have air leaks that should be sealed to prevent conditioned air loss to the mechanical rooms. All of these units would benefit from having the chilled water coils professionally cleaned, as well as cleaning of condensate pans and any other areas where dust or grime has collected. *We recommend cleaning and resealing all indoor air handler cabinets throughout the district to improve comfort in conditioned spaces while improving energy performance.*

HVAC M&O #3

Throughout the district, HVAC units in auditoriums, gymnasiums and cafeterias were operating during occupied building hours when the spaces were not in use, as well as during unoccupied hours. Some of these spaces are used intermittently throughout the day or at scheduled times on a daily basis such as cafeterias and gymnasiums. Air conditioning equipment serving such areas should be set back to maintain a higher space temperature when rooms are not in use, and can be scheduled to cool down prior to known occupied times such as lunch time for a cafeteria or scheduled classes in a gym. Some such spaces would benefit from the installation of occupancy sensors to allow a higher unoccupied setpoint that can be overridden when someone enters the space. Auditoriums are used less regularly and can be kept at a higher set-back temperature during days when nothing is scheduled, and units can be requested to be overridden in advance of a scheduled event. *We recommend a higher set-back temperature for units serving large rooms with intermittent occupied periods and turning the units off at all other unoccupied times.*

HVAC M&O #4
It was noted during the survey that there was damaged or missing insulation on hot water piping. The majority of energy losses in a hot water system occur within the distribution piping, not from the storage tanks. *We recommend replacing the damaged or missing insulation on the hot water piping.* This condition was specifically noted at the Arlington Heights boilers.

HVAC M&O #4
There were several vending machines around the district to be operating without controls. Vending machine controls will turn off the advertising lighting and cycle the compressors so as not to allow the temperature of the chilled product to exceed a programmed temperature, but not run continuously as well. *We recommend the district install vending machine controls on uncontrolled machines around the district.* The payback for this measure is often less than 2 years.

Lighting M&O #1
Some areas of the buildings noted in Section 6.0 of the report had light fixtures that were not required to be operating during the day or where fixtures were found to be left operating in unoccupied spaces. The least expensive remedy to these issues is to train staff to not turn on fixtures not needed during daytime hours and to turn off fixtures in unoccupied spaces. Failure of the behavioral modification training will require the district to invest capital into automatic controls for the fixtures. Examples of these fixtures are sunlit corridors and spaces at Northside, South Hills, Paschal and Eastern Hills High Schools.

Lighting M&O #2
It was noted during the survey, that there were some exterior light fixtures operating during the daytime at Dunbar and Trimble Tech High Schools. *We recommend installing or repairing timeclock or photocells to control these fixtures to ensure the exterior lights do not operate during the daytime.*

Lighting M&O #3
It was noted during the survey, that there were several corridor areas where the district operates 3 or 4-lamp fixtures. The Illumination Engineering Society of North America (IESNA) recommends that school corridors have 10-15 footcandles of light on the floor. This level is easily accomplished with 2-lamp fixtures at 10' center spacing for standard width school corridors. Many of the light level measurements taken during the survey were considerable higher than the recommended level and represents energy waste. *We recommend the existing fixtures be de-lamped to 2-lamp fixtures.*

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 3% per year after year 5				
Cash Flow	**Project Cost**	**Project Savings**	**Maintenance Expense**	**Net Cash Flow**
Time 0	($2,338,275)		0	($2,338,275)
Year 1		$ 346,125.00	0	$346,125
Year 2		$ 346,125.00	0	$346,125
Year 3		$ 346,125.00	0	$346,125
Year 4		$ 346,125.00	0	$346,125
Year 5		$ 346,125.00	0	$346,125
Year 6		$ 335,741.25	($5,000)	$330,741
Year 7		$ 325,357.50	($5,000)	$320,358
Year 8		$ 314,973.75	($5,000)	$309,974
Year 9		$ 304,590.00	($5,000)	$299,590
Year 10		$ 294,206.25	($5,000)	$289,206
Year 11		$ 283,822.50	($10,000)	$273,823
Year 12		$ 273,438.75	($10,000)	$263,439
Year 13		$ 263,055.00	($10,000)	$253,055
Year 14		$ 252,671.25	($10,000)	$242,671
Year 15		$ 242,287.50	($10,000)	$232,288
			Internal Rate of Return	**10.65%**

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

9.0 GENERAL COMMENTS

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

APPENDICES

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

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

LoanSTAR Program:

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

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

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

Loans on Commercial Market:

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

Leasing Corporations:

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

Bond Issue:

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

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

State Purchasing:

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

Design/Bid/Build (Competitive Bidding):

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

Design/Build:

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

Purchasing Standardization Method:

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

Performance Contracting:

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

Solution Center

How to Finance Your Energy Program

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

Selecting a Cost/Benefit Analysis Method

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

Simple Payback Analysis

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

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

Simple Payback

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

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

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

Life-Cycle Cost Analysis

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

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

continued

How to Finance Your Energy Program *continued*

Financing Mechanisms

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

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

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

Internal Funds

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

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

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

Debt Financing

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

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

How to Finance Your Energy Program *continued*

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

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

Lease and Lease-Purchase Agreements

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

Energy Performance Contracts

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

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

Types of Leasing Agreements

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

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

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

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

How to Finance Your Energy Program *continued*

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

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

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

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

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

Rebuild America
U.S. Dept. of Energy

APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE

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	

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VIII. Advanced Metering Cost Recovery Factor: See Rider AMCRF

Other Charges or Credits

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

X. State Colleges and Universities Discount: See Rider SCUD

COMPANY SPECIFIC APPLICATIONS

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

DETERMINATION OF BILLING DEMAND FOR TRANSMISSION SYSTEM CHARGES

DETERMINATION OF NCP kW

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

DETERMINATION OF 4 CP kW

The 4 CP kW applicable under the Monthly Rate section shall be the average of the Retail Customer's integrated 15 minute demands at the time of the monthly ERCOT system 15 minute peak demand for the months of June, July, August and September of the previous calendar year. The Retail Customer's average 4CP demand will be updated effective on January 1 of each calendar year and remain fixed throughout the calendar year. Retail Customers without previous history on which to determine their 4 CP kW will be billed at the applicable NCP rate under the "Transmission System Charge" using the Retail Customer's NCP kW.

DETERMINATION OF BILLING DEMAND FOR DISTRIBUTION SYSTEM CHARGES

DETERMINATION OF ANNUAL LOAD FACTOR

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

The Annual Load Factor calculation is as follows:

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

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

DETERMINATION OF BILLING kW

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

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

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the current billing month (80% ratchet).

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

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

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

APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

Submit by Email | Print Form

OFFICE OF THE COMPTROLLER TEXAS

SECO State Energy Conservation Office

Local Governments and Municipalities

Preliminary Energy Assessment Service Agreement

Investing in our communities 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 Fort Worth 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: Walter Dansby (signed) | Date: 6/30/11

Name (Mr./Ms./Dr.) Mr. Walter Dansby | Title: Interim Superintendent

Organization: Fort Worth ISD | Phone: 817-814-2050

Street Address: See below | Fax: 817-814-2055

Mailing Address: 100 N. University Dr. Suite 300 | E-Mail: walter.dansby@fwisd.org

Fort Worth, TX 76107 | County: Tarrant

Contact Information:

Name (Mr./Ms./Dr.): Mr. Danilo Lopez, AIA | Title: Deputy Director CIP

Phone: 817-317-7779, 214-682-9714 | Fax: 817-317-7781

E-Mail: danilo.lopez@fwisd.org | County: Tarrant

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

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