Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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Denison ISD

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ESA Energy Systems Associates, Inc. A Terracon COMPANY

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 March, 2011, **SECO** received a request for technical assistance from Jeff Barnett, Director of Facilities for **Denison ISD.** **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 **Denison ISD,** 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. Jeff Barnett* 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.

<u>We estimate that as much as **$53,700** may be saved annually if all recommended projects are implemented</u>. The estimated installed cost of these projects should total approximately **$531,720** yielding an average simple payback of **10** years.

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

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	$501,150	$49,430	10-1/4 Years
HVAC ECRM #2	$120	$200	1/2 Year
Lighting ECRM #1	$30,450	$4,070	7-1/2 Years
TOTAL PROJECTS	**$ 531,720**	**$53,700**	**10 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 DENISON ISD. We hope to be ongoing partners in assisting you to implement the recommendations listed in this report. Please call us if you have further questions or comments regarding your Energy Management Issues.

*ESA Energy Systems Associates, Inc., James W. Brown (512) 258-0547
A Terracon Company

2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities. After receipt of the PEASA, an initial visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state. The purpose of this visit is 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 requested for the engineer's preliminary assessment of the Energy Performance Indicators. After consultation with SECO to determine the program elements to be provided to DENISON ISD, 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 DENISON ISD ENERGY PERFORMANCE INDICATORS:

CAMPUS	DISD ENERGY UTILIZATION INDEX (EUI) BTUs/sf-year	COMPARISON TO DISTRICT AVERAGE	ENERGY COST INDEX (ECI) $/sf-year	COMPARISON TO CITY AVERAGE
Layne ES	90,283	80%	$2.09	82%
Administration	52,558	5%	$1.27	10%
Golden Rule ES	50,772	1%	$1.23	7%
Houston ES	49,410	-2%	$1.11	-4%
Terrell ES	42,628	-15%	$1.10	-4%
Lamar ES	45,498	-9%	$1.07	-7%
Denison HS	46,458	-7%	$1.01	-12%
Service Center	48,656	-3%	$1.00	-13%
Hyde Park ES	46,124	-8%	$0.97	-16%
Mayes ES	39,907	-21%	$0.91	-21%
McDaniel MS	40,040	-20%	$0.90	-22%
Average Value:	50,212		$1.15	

Denison ISD purchases electricity for all facilities from Champion Energy Services. The transmission and distribution utility is Oncor.

Note to Owner: The raw data supplied for the natural gas analysis was labeled as MCF, but the correct unit assignment for the data would be CCF. The consumption indicated in the raw data appears to be 10 times higher than actual consumption.

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

Copies of the rate schedules are included in Appendix I.

OWNER: Denison ISD **BUILDING:** Golden Rule ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	30,835		0	0	3,708	240	1,531
FEBRUARY	2010	27,863		0	0	3,979	86	581
MARCH	2010	27,294		0	0	3,343	23	183
APRIL	2010	30,128		0	0	3,487	10	100
MAY	2010	29,028		0	0	2,793	6	89
JUNE	2010	21,071		0	0	3,130	8	105
JULY	2010	30,374		0	0	4,817	7	101
AUGUST	2010	41,977		0	0	4,366	10	123
SEPTEMBER	2010	28,551		0	0	3,203	11	131
OCTOBER	2010	25,441		0	0	2,996	54	441
NOVEMBER	2010	27,010		0	0	3,119	97	667
DECEMBER	2010	29,133		0	0	3,391	215	1,418
TOTAL		**348,705**	**0**	**0**	**0**	**$42,332**	**767**	**$5,470**

Annual Total Energy Cost = $47,802 Per Year

Total KWH x 0.003413 = 1,190.13 x 106
Total MCF x 1.03 = 790.01 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,980.14 x 106

Floor area: 39,001 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 50,772 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.23 $/s.f. yr

Electric Utility Champion Energy Services — **Account #** 0247 — **Meter#** 0

Gas Utility 0 — **Meter #** G31481

OWNER: Denison ISD **BUILDING:** Houston ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	26,991		0	0	3,264	294	1,992
FEBRUARY	2010	20,219		0	0	3,067	151	986
MARCH	2010	22,456		0	0	2,875	38	287
APRIL	2010	27,711		0	0	3,192	13	121
MAY	2010	25,691		0	0	2,657	4	65
JUNE	2010	10,890		0	0	2,391	0	47
JULY	2010	33,738		0	0	4,949	2	63
AUGUST	2010	46,152		0	0	4,717	11	132
SEPTEMBER	2010	29,391		0	0	3,144	12	134
OCTOBER	2010	24,016		0	0	2,828	38	333
NOVEMBER	2010	22,646		0	0	2,734	148	1,126
DECEMBER	2010	23,094		0	0	2,782	238	2,032
TOTAL		**312,995**	**0**	**0**	**0**	**$38,600**	**949**	**$7,318**

Annual Total Energy Cost = $45,918 Per Year

Total KWH x 0.003413 = 1,068.25 x 106
Total MCF x 1.03 = 977.47 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,045.72 x 106

Floor area: 41,403 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 49,410 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.11 $/s.f. yr

Electric Utility Champion Energy Services — **Account #** 4703 — **Meter#** 0

Gas Utility 0 — **Meter #** G05551

OWNER: Denison ISD **BUILDING:** Hyde Park ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	17,784		0	0	2,019	186	1,269
FEBRUARY	2010	18,624		0	0	2,476	148	945
MARCH	2010	15,636		0	0	1,871	54	351
APRIL	2010	19,560		0	0	2,155	20	137
MAY	2010	24,360		0	0	2,169	10	75
JUNE	2010	8,988		0	0	1,622	1	21
JULY	2010	8,460		0	0	1,566	1	21
AUGUST	2010	33,228		0	0	3,344	12	111
SEPTEMBER	2010	26,316		0	0	2,542	14	122
OCTOBER	2010	18,840		0	0	2,011	18	156
NOVEMBER	2010	17,184		0	0	1,902	93	690
DECEMBER	2010	16,356		0	0	1,822	113	1,353
TOTAL		225,336	0	0	0	$25,499	670	$5,251

Annual Total Energy Cost =	$30,750	Per Year	**Energy Use Index:** Total Site BTU's/yr Total Area (sq.ft.)	46,124 BTU/s.f.yr
Total KWH x 0.003413 =	769.07	x 106		
Total MCF x 1.03 =	690.10	x 106	**Energy Cost Index:**	
Total Other x ____		x 106	Total Energy Cost/yr	$0.97 $/s.f. yr
Total Site BTU's/yr	1,459.17	x 106	Total Area (sq.ft.)	
Floor area:	31,636	s.f.		

Electric Utility	Account #	Meter#	Gas Utility		Meter #
Champion Energy Services	7622	0		0	G10093

OWNER: Denison ISD **BUILDING:** Layne ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	33,472		0	0	3,577	202	1,386
FEBRUARY	2010	29,225		0	0	3,911	153	991
MARCH	2010	21,063		0	0	2,641	53	361
APRIL	2010	22,438		0	0	2,652	18	139
MAY	2010	26,878		0	0	2,471	4	54
JUNE	2010	11,994		0	0	2,125	0	18
JULY	2010	11,022		0	0	2,105	0	30
AUGUST	2010	35,564		0	0	3,750	0	30
SEPTEMBER	2010	26,571		0	0	2,692	15	212
OCTOBER	2010	18,882		0	0	2,283	22	200
NOVEMBER	2010	23,434		0	0	2,671	126	950
DECEMBER	2010	34,868		0	0	3,711	140	1,927
TOTAL		295,411	0	0	0	$34,589	733	$6,298

Annual Total Energy Cost =	$40,887	Per Year	**Energy Use Index:** Total Site BTU's/yr Total Area (sq.ft.)	90,283 BTU/s.f.yr
Total KWH x 0.003413 =	1,008.24	x 106		
Total MCF x 1.03 =	754.99	x 106	**Energy Cost Index:**	
Total Other x ____		x 106	Total Energy Cost/yr	$2.09 $/s.f. yr
Total Site BTU's/yr	1,763.23	x 106	Total Area (sq.ft.)	
Floor area:	19,530	s.f.		

Electric Utility	Account #	Meter#	Gas Utility		Meter #
Champion Energy Services	7522	0		0	G49527

OWNER: **Denison ISD** **BUILDING:** **Mayes ES**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	19,410		0	0	2,433	239	1,623
FEBRUARY	2010	19,125		0	0	2,901	186	1,182
MARCH	2010	17,981		0	0	2,519	72	469
APRIL	2010	21,476		0	0	2,578	14	96
MAY	2010	32,726		0	0	2,859	10	72
JUNE	2010	29,481		0	0	4,145	3	41
JULY	2010	19,214		0	0	3,040	0	19
AUGUST	2010	35,396		0	0	3,718	10	95
SEPTEMBER	2010	29,202		0	0	2,939	11	94
OCTOBER	2010	22,521		0	0	2,468	8	75
NOVEMBER	2010	20,810		0	0	2,382	92	687
DECEMBER	2010	19,514		0	0	2,417	156	2,346
TOTAL		286,856	0	0	0	$34,399	801	$6,799

Annual Total Energy Cost = $41,198 Per Year

Total KWH x 0.003413 = 979.04 x 106
Total MCF x 1.03 = 825.03 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,804.07 x 106

Floor area: 45,207 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 39,907 BTU/s.f.yr

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

Electric Utility	**Account #**	**Meter#**	**Gas Utility**		**Meter #**
Champion Energy Services	0537	0		0	G72685

OWNER: **Denison ISD** **BUILDING:** **Terrell ES**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	36,839		0	0	4,084	169	1,145
FEBRUARY	2010	35,688		0	0	4,740	106	678
MARCH	2010	34,770		0	0	3,928	43	286
APRIL	2010	42,718		0	0	4,261	18	123
MAY	2010	49,208		0	0	3,893	11	80
JUNE	2010	19,899		0	0	3,251	3	40
JULY	2010	31,294		0	0	4,557	3	38
AUGUST	2010	65,922		0	0	6,307	14	127
SEPTEMBER	2010	55,116		0	0	5,075	17	147
OCTOBER	2010	46,436		0	0	4,550	21	173
NOVEMBER	2010	5,410		0	0	4,206	77	576
DECEMBER	2010	32,782		0	0	3,601	147	1,211
TOTAL		456,082	0	0	0	$52,453	629	$4,624

Annual Total Energy Cost = $57,077 Per Year

Total KWH x 0.003413 = 1,556.61 x 106
Total MCF x 1.03 = 647.87 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,204.48 x 106

Floor area: 51,714 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 42,628 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.10 $/s.f. yr

Electric Utility	**Account #**	**Meter#**	**Gas Utility**		**Meter #**
Champion Energy Services	5554	0		0	G85127

OWNER: **Denison ISD** **BUILDING:** **Lamar ES**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	44,055		0	0	4,734	224	1,509
FEBRUARY	2010	36,005		0	0	4,774	160	1,015
MARCH	2010	30,434		0	0	3,682	47	310
APRIL	2010	33,621		0	0	3,731	24	161
MAY	2010	39,005		0	0	3,491	8	60
JUNE	2010	22,293		0	0	3,443	1	25
JULY	2010	34,279		0	0	4,918	2	29
AUGUST	2010	52,799		0	0	5,242	16	143
SEPTEMBER	2010	43,737		0	0	4,223	15	131
OCTOBER	2010	30,686		0	0	2,868	39	308
NOVEMBER	2010	32,587		0	0	3,625	132	987
DECEMBER	2010	42,411		0	0	4,323	164	1,768
TOTAL		**441,912**	**0**	**0**	**0**	**$49,054**	**832**	**$6,446**

Annual Total Energy Cost = $55,500 Per Year

Total KWH x 0.003413 = 1,508.25 x 106
Total MCF x 1.03 = 856.96 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,365.21 x 106

Floor area: 51,985 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 45,498 BTU/s.f.yr

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

Electric Utility	**Account #**	**Meter#**	**Gas Utility**		**Meter #**
Champion Energy Services	1773	0		0	G69692

OWNER: **Denison ISD** **BUILDING:** **McDaniel MS**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	75,364		0	0	8,593	576	3,886
FEBRUARY	2010	75,072		0	0	10,008	376	2,381
MARCH	2010	70,204		0	0	8,145	133	850
APRIL	2010	84,550		0	0	8,781	51	322
MAY	2010	106,670		0	0	8,555	34	212
JUNE	2010	68,878		0	0	9,716	19	162
JULY	2010	74,887		0	0	10,676	17	148
AUGUST	2010	139,466		0	0	13,370	30	256
SEPTEMBER	2010	117,205		0	0	10,520	39	311
OCTOBER	2010	89,420		0	0	8,076	52	412
NOVEMBER	2010	74,214		0	0	8,108	248	1,830
DECEMBER	2010	73,085		0	0	8,000	492	4,319
TOTAL		**1,049,015**	**0**	**0**	**0**	**$112,548**	**2,067**	**$15,089**

Annual Total Energy Cost = $127,637 Per Year

Total KWH x 0.003413 = 3,580.29 x 106
Total MCF x 1.03 = 2,129.01 x 106
Total Other x ____ x 106
Total Site BTU's/yr 5,709.30 x 106

Floor area: 142,590 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 40,040 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $0.90 $/s.f. yr

Electric Utility	**Account #**	**Meter#**	**Gas Utility**		**Meter #**
Champion Energy Services	0630	0		0	G70449

OWNER: Denison ISD **BUILDING:** Denison HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	129,597		0	0	14,724	929	5,708
FEBRUARY	2010	111,217		0	0	15,521	402	2,494
MARCH	2010	151,754		0	0	15,655	178	1,096
APRIL	2010	173,823		0	0	16,982	130	792
MAY	2010	176,398		0	0	14,673	58	483
JUNE	2010	117,712		0	0	16,733	67	568
JULY	2010	165,365		0	0	23,680	94	777
AUGUST	2010	221,364		0	0	20,898	134	1,049
SEPTEMBER	2010	159,488		0	0	15,210	151	1,203
OCTOBER	2010	137,471		0	0	14,045	225	1,667
NOVEMBER	2010	118,869		0	0	12,895	574	3,654
DECEMBER	2010	132,120		0	0	14,143	1,014	6,978
TOTAL		**1,795,178**	**0**	**0**	**0**	**$195,159**	**3,956**	**$26,469**

Annual Total Energy Cost = $221,628 Per Year

Total KWH x 0.003413 = 6,126.94 x 106
Total MCF x 1.03 = 4,074.68 x 106
Total Other x ____ x 106
Total Site BTU's/yr 10,201.62 x 106

Floor area: 219,587 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 46,458 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.01 $/s.f. yr

Electric Utility	**Account #**	**Meter#**	**Gas Utility**		**Meter #**
Champion Energy Services	8648	0		0	G29185

OWNER: Denison ISD **BUILDING:** Administration

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	19,152		0	0	2,002	96	652
FEBRUARY	2010	18,414		0	0	2,303	48	317
MARCH	2010	22,662		0	0	2,232	15	113
APRIL	2010	23,436		0	0	2,235	0	15
MAY	2010	27,990		0	0	2,091	0	14
JUNE	2010	26,658		0	0	3,327	0	15
JULY	2010	31,464		0	0	4,113	0	15
AUGUST	2010	27,594		0	0	2,503	0	15
SEPTEMBER	2010	21,510		0	0	1,894	0	16
OCTOBER	2010	19,134		0	0	1,779	5	53
NOVEMBER	2010	19,998		0	0	1,833	58	437
DECEMBER	2010	21,708		0	0	2,076	87	661
TOTAL		**279,720**	**0**	**0**	**0**	**$28,388**	**309**	**$2,323**

Annual Total Energy Cost = $30,711 Per Year

Total KWH x 0.003413 = 954.68 x 106
Total MCF x 1.03 = 318.27 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,272.95 x 106

Floor area: 24,220 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 52,558 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.27 $/s.f. yr

Electric Utility	**Account #**	**Meter#**	**Gas Utility**		**Meter #**
Champion Energy Services	1736	0		0	G72439

OWNER: **Denison ISD** **BUILDING:** **Service Center**

MONTH / YEAR		**ELECTRIC**					**NAT'L GAS / FUEL**	
			DEMAND					
		CONSUMPTION	**METERED**	**CHARGED**	**COST OF**	**TOTAL ALL ELECTRICAL**	**CONSUMPTION**	**COSTS**
MONTH	**YEAR**	**KWH**	**KW/KVA**	**KW/KVA**	**DEMAND**	**COSTS $**	**MCF**	**$**
JANUARY	2010	37,098		0	0	3,499	199	1,432
FEBRUARY	2010	28,197		0	0	3,344	101	703
MARCH	2010	15,861		0	0	1,838	4	45
APRIL	2010	14,088		0	0	1,475	2	27
MAY	2010	19,491		0	0	1,510	1	24
JUNE	2010	20,668		0	0	2,460	2	34
JULY	2010	22,125		0	0	2,904	2	30
AUGUST	2010	17,133		0	0	1,653	2	32
SEPTEMBER	2010	13,452		0	0	1,301	2	30
OCTOBER	2010	16,365		0	0	1,598	38	326
NOVEMBER	2010	32,184		0	0	2,935	147	1,031
DECEMBER	2009	34,836		0	0	3,118	138	1,278
TOTAL		**271,498**	**0**	**0**	**0**	**$27,635**	**638**	**$4,992**

Annual Total Energy Cost = $32,627 Per Year

Total KWH x 0.003413 = 926.62 x 106
Total MCF x 1.03 = 657.14 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,583.76 x 106

Floor area: 32,550 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 48,656 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $1.00 $/s.f. yr

Electric Utility	**Account #**	**Meter#**
Champion Energy Services	7549	0

Gas Utility		**Meter #**
	0	G8127-5

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: Champion Energy Services Contract price: $0.05886 per kWh

TRANSMISSION AND DISTRIBUTION UTILITY: Oncor

Electric Rate: Secondary Service > 10 kVA

I.	TRANSMISSION AND DISTRIBUTION CHARGES:		
	Customer Charge	=	$3.50 per meter
	Metering Charge	=	$18.41 per IDR meter
	Transmission System Charge		
	IDR Metered	=	$1.99 per 4CP kW
	Distribution System Charge	=	$3.97 per Distribution System Billing kW
II.	SYSTEM BENEFIT FUND	=	$0.000655 per kWh see Rider SBF
III.	TRANSITION CHARGES		
	Transition Charge 1	=	$0.188/kW
	Transition Charge 2	=	$0.269/kW
IV.	NUCLEAR DECOMMISSIONING CHARGE	=	$0.044 per Distribution System Billing kW
V.	TRANSMISSION COST RECOVERY FACTOR	=	$0.175714/4CP kW
VI.	ENERGY EFFICIENCY COST RECOVERY FACTOR	=	$9.66/Retail Customer
VII.	COMPETITIVE METER CREDIT	=	$5.47/Month
VIII.	ADVANCED METERING COST RECOVERY FACTOR	=	$3.98/Month
IX.	RATE CASE EXPENSE SURCHARGE	=	$0.007944/kW
X.	TAXES		
	General Local Taxes		

Average Savings for consumption = $0.05886/kWh + $0.000655/kWh = $0.059515/kWh
Average Savings for demand = $1.99 + $3.97 + $0.188 + $0.269 + $0.044 + $0.175714 + $0.007944 = $ 6.644658/kW**

** This number is a generalization of average cost per kW because the rate schedule from Centerpoint utilizes three (3) different types of demand for the calculation of the utility bill:

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

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 five facilities in the analyzed billing cycle: $91,079

Total quantity purchased during the analyzed billing cycle: 12,351 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $91,079 / 12,351 MCF

Average cost per MCF = $7.37

5.0 CAMPUS DESCRIPTIONS:

Denison ISD consists of 10 educational campuses and one administrative building, which are all located in and around the city of Denison. The energy survey focused on the following four campuses:

Table 2: School Facilities Analyzed For This Report

Facility	Year originally Constructed	Approximate Square Footage	Basic HVAC Cool/Heat	Basic Lighting System Description	Basic Control System Description
Denison High School	1953	219,587	RTU-DX Cooled/ Natural Gas Heat	T8	Programmable T-Stats for RTUs, Digital Timer for Pumps & Cooling Towers, EMS for WSHP's
B. McDaniel Middle School	1963	142,590	RTU-DX Cooled/ Natural Gas Heat	T8	Standalone T-Stats
Mayes Elementary	1967	45,207	RTU-DX Cooled/ Natural Gas Heat	T8	Programmable T-Stats
Administration Building	1924	24,220	S/S-DX Cooled/ Natural Gas Heat	T8	Programmable T-Stats

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

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: RENOVATION OF AGED HVAC EQUIPMENT

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

Denison High School

This facility was originally built in 1953, and has had multiple additions since then. The facility is conditioned with a variety of systems, including packaged DX rooftop units, residential-type split systems, and water source heat pumps with cooling towers. Some classrooms have dedicated units while other rooms share air handlers. The useful life expectancy of rooftop units and split systems is 15-20 years. Existing units manufactured in 1986 should be replaced soon, while units manufactured in the mid-1990s should be planned for replacement within the next few years. Below is a schedule listing units that w*e recommend be budgeted for replacement within the next 5 years to avoid emergency replacement costs that would be incurred if the units are allowed to fail on their own.*

Replacement Recommendation Table:

Year of Manufacture	Quantity	Model	Electrical (V/Ph/A)	Heat (MBH Natural Gas unless otherwise noted)	Nominal Tonnage per Unit
1986	2	Carrier RTU 50FD028620XC	460/3/69	~500 MBH	28
1986	4	Carrier RTU 50FD024620XC	460/3/55	~450 MBH	24
1986	1	Carrier RTU 50FD034620XC	460/3/86	~570 MBH	34
1994	1	Heil RTU PGA060G1HA	208/3/27	150 MBH	5
1995	1	Heil CU NAC036AKA4	208/1/20	(separate FCU)	3
1997	4	Carrier RTU 48TJE004-511GA	208/3/23	74 MBH	4
1997	6	Carrier RTU 48TJE005-511GA	208/3/22	74 MBH	5
1997	1	Carrier CU 38AKS014	208/1/57	(separate FCU)	14

For all 1986 equipment that we recommend replacing immediately, the project budget would approximate:

Estimated Cost: $216,700   Estimated Savings: $19,715   Estimated Payback: 11 Years

For all other equipment that we recommend replacing in the coming years, the current project budget would approximate:

Estimated Cost: $90,575   Estimated Savings: $5,930   Estimated Payback: 15 Years

B. McDaniel Middle School

This facility was originally built in 1963, and has had multiple additions since then. The facility is primarily conditioned with one packaged DX rooftop unit per classroom, along with a few larger DX rooftop units and a few residential-type split systems. There is one existing air handler serving the administrative office area that runs off of a small air-cooled chiller and a small boiler. This unit is already scheduled to be replaced this summer. The useful life expectancy of rooftop units and split systems is 15-20 years. Existing units manufactured in 1986 should be replaced soon, while units manufactured in the 1998 should be planned for replacement within the next few years. Additionally, condenser coil fins for all units on the roof have been vandalized, and especially those on the 1986 units pictured here. This kind of damage greatly affects performance and could be minimized by installing hail guards and keeping the roof secure from vandals. Below is a schedule listing units that w*e recommend be budgeted for replacement within the next 5 years to avoid emergency replacement costs that would be incurred if the units are allowed to fail on their own.*

Replacement Recommendation Table:

Year of Manufacture	Quantity	Model	Electrical (V/Ph/A)	Heat (MBH Natural Gas unless otherwise noted)	Tonnage
1986	5	Carrier RTU 50FD028620SA	460/3/66	~280 MBH	28
1998	2	York RTU D1NA048N06546C	460/3/12	80 MBH	4
1998	3	York RTU D1NA036N06546C	460/3/9	70 MBH	3
1998	1	York RTU D1NA060N06546C	460/3/15	80 MBH	5

For all 1986 equipment that we recommend replacing immediately, the project budget would approximate:

Estimated Cost: $160,500 *Estimated Savings: $14,840* *Estimated Payback: 11 Years*

For all other equipment that we recommend replacing in the coming years, the current project budget would approximate:

Estimated Cost: $33,375 *Estimated Savings: $1,508* *Estimated Payback: 22 Years*

HVAC ECRM 2: Installing Timers for Electric DWHs

Mayes Elementary utilizes electric domestic water heaters. *We recommend installing timers on the water heaters to limit their operation to occupancy hours. We also recommend the district install insulation on the hot water piping as most energy losses within a hot water system occur in the distribution piping.*

Estimated Cost: $120 per unit *Estimated Savings: $200* *Estimated Payback: 3/4 Year*

Lighting ECRM 1: METAL HALIDE FIXTURE RETROFIT TO T5

It was noted during the survey that the gymnasiums at the school campuses use 400 watt metal halide fixtures. Metal halide fixtures have an inherently long re-strike time, which means there is a 5-10 minute delay after the lights are turned on for the lamps to warm up to their full operating light output level. This often promotes coaches and facility operators to leave gym lights energized throughout the day in order to avoid lengthy delays in getting the area illuminated for immediate use. *We recommend replacing the metal halide fixtures with new 54 watt six-lamp T5 high-output fluorescent fixtures.* The facilities at Denison ISD utilize the following quantities of metal halide fixtures in each of their gymnasiums:

Facility	# Existing 400w Metal Halides	# of new 6-lamp T5 HO fixtures	Estimated Installed Cost	Estimated Annual Savings	Simple Payback (Years)
DHS Competition Gym	18	18	$ 6,300	$ 842	7-1/2
DHS Practice Gym	20	20	$ 7,000	$ 935	7-1/2
B. McDaniel MS Comp. Gym	21	21	$ 7,350	$ 982	7-1/2
B. McDaniel MS Prac. Gym	20	20	$ 7,000	$ 935	7-1/2
Mayes ES Gym	8	8	$ 2,800	$ 374	7-1/2
TOTAL			$ 30,450	$ 4,068	7-1/2

Estimated Cost: $30,450 *Estimated Savings: $4,068* *Estimated Payback: 7-1/2*

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Inspect and repair piping insulation at Denison High School, B. McDaniel Middle School, Mayes Elementary and all other Denison ISD campuses
- Install hail guards to protect condenser coil fins in future, secure roof access to prohibit vandalism
- Increase frequency of filter replacement

Lighting

- Turn off all light fixtures not required during daytime
- Turn off lights in unoccupied spaces
- Replace the current exterior light circuit timers with photocell sensors

Controls

- Continue to hone and adjust scheduled conditioning times

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 the hot water piping within facilities surveyed had damaged or missing piping insulation. The majority of the energy losses in a hot water system occur in the hot water piping. *We recommend the district insulate the hot water piping to minimize energy losses in the hot water system.*

HVAC M&O #2

Several of the HVAC split system and rooftop units were noted to have unprotected coil fins. *We recommend installing hail guards to prevent damage by weather, grounds maintenance or student vandalism to coil fins.* Damage to just 10% of the coil fins can lead to a loss of operating efficiency of up to 30%.

HVAC M&O #3

We recommend the district increase the frequency of their filter replacement in order to protect the HVAC equipment.

Lighting M&O#1

There were several areas noted during the survey where natural daylight is supplied in the space by windows, skylights and lightwells, but the light fixtures in those areas were operating during the daytime. We recommend training district staff to not turn those fixtures on during daytime hours. If staff training is unsuccessful to curb this activity, then the district may consider installing photocells to prevent these fixtures from operating whenever sufficient daylight is present in the space.

Lighting M&O#2

There were many areas in the buildings noted to have light fixtures operating in unoccupied spaces. Studies have shown that linear fluorescent fixtures, the type most often found in education spaces, start to save energy if they are turned off in any space that has been unoccupied for more than 23 seconds. The district should consider training staff to turn lights off in unoccupied spaces or install occupancy sensors to perform that task automatically.

Lighting M&O#3

During the survey it was noted that the exterior lighting is controlled by a timeclock to operate from 6 pm to 7 am. There are many times in Texas that this will allow fixtures to operate during daytime hours. *We recommend installing photocells as redundant controllers to prevent the fixtures from operating during daytime hours.*

Controls M&O

The current schedule for the district's air conditioning system is set so that units operate from 6:30 am – 4 pm with an override for afterhours use. The HVAC units in the school kitchens start at 6am during the cooling months. *Though the district is already vigilant about energy management, we recommend the district review this programming to minimize the amount of time the units are required to operate to reach setpoint each morning while still allowing the spaces to be comfortable for students and teachers to arrive at the beginning of the day.*

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:

2. No maintenance expenses for first five years (warranty period)				
3. $500 maintenance expense next 5 years				
4. $1000 maintenance expense next 5 years				
5. Savings decreases 2% per year after year 5				
Cash Flow	**Project Cost**	**Project Savings**	**Maintenance Expense**	**Net Cash Flow**
Time 0	($531,720)		0	($531,720)
Year 1		$ 53,700.00	0	$53,700
Year 2		$ 53,700.00	0	$53,700
Year 3		$ 53,700.00	0	$53,700
Year 4		$ 53,700.00	0	$53,700
Year 5		$ 53,700.00	0	$53,700
Year 6		$ 52,626.00	($500)	$52,126
Year 7		$ 51,552.00	($500)	$51,052
Year 8		$ 50,478.00	($500)	$49,978
Year 9		$ 49,404.00	($500)	$48,904
Year 10		$ 48,330.00	($500)	$47,830
Year 11		$ 47,256.00	($1,000)	$46,256
Year 12		$ 46,182.00	($1,000)	$45,182
Year 13		$ 45,108.00	($1,000)	$44,108
Year 14		$ 44,034.00	($1,000)	$43,034
Year 15		$ 42,960.00	($1,000)	$41,960
			Internal Rate of Return	**4.65%**

More information regarding financial programs available to DENISON ISD 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	$3.50	per Retail Customer
Metering Charge	$18.41	per Retail Customer
Transmission System Charge		
Non-IDR Metered	$1.48	per NCP kW
IDR Metered	$1.99	per 4CP kW
Distribution System Charge	$3.97	per Distribution System billing kW
II. System Benefit Fund:	$0.000655	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

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

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

Principles of the Agreement

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

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

Acceptance of Agreement

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

Signature: [signature]	Date: 03-08-11
Name (Mr./Ms./Dr.) Mr. Jeff Barnett	Title: Director of Facilities
Organization: Denison ISD	Phone: 903-462-7066
Street Address: 3906 S. St. Hwy. 91	Fax: 903-462-7685
Mailing Address: Same	E-Mail: jbarnett@denisonisd.net
Denison, TX 75020	County: Grayson

Contact Information:

Name (Mr./Ms./Dr.): Same	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)

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