Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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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**.

SECO
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 Craig Finley, Director of Facilities for **Waco 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 **Waco ISD,** (hereafter known as WISD) 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. Finley*, 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 **$51,400** may be saved annually if all recommended projects are implemented</u>. The estimated installed cost of these projects should total approximately **$627,630**, yielding an average simple payback of **12-1/4** years.

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

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	$445,500	$16,000	27 Years
HVAC ECRM #2	$17,400	$2,900	6 Years
Lighting ECRM #1	$88,800	$17,750	5 Years
Lighting ECRM #2	$15,750	$2,625	6 Years
Controls ECRM #1	$60,000	$12,000	5 Years
Controls ECRM #2	$180	$125	1-1/2 Years
TOTAL PROJECTS	**$ 627,630**	**$51,400**	**12-1/4 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 WISD. 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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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 WISD, 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.

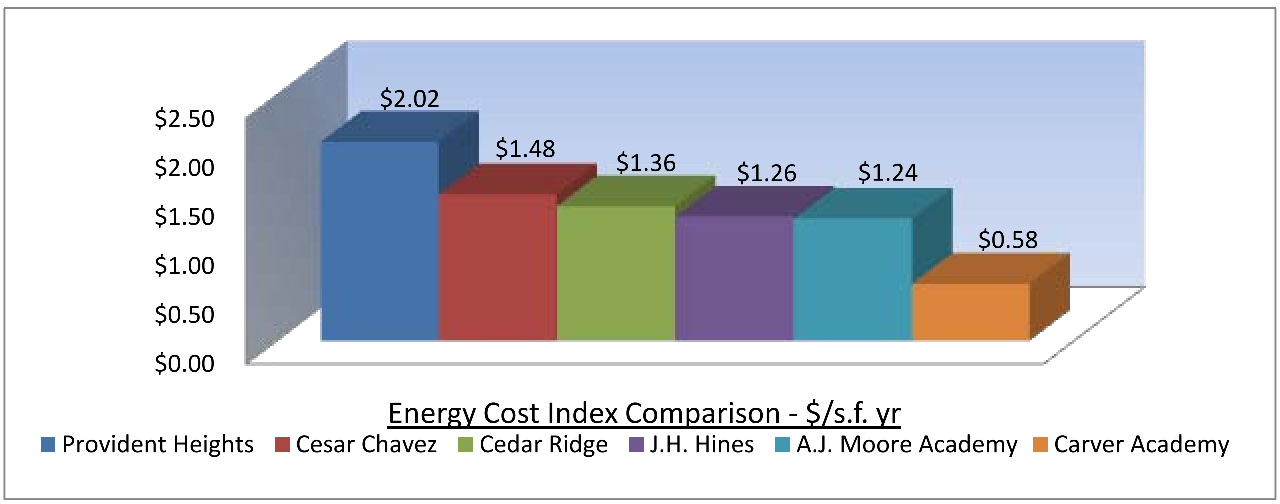
To calculate the ECI, the annual costs of electricity and gas are totaled and divided by the total square footage of the facility:

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 WISD 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
Provident Heights ES	59,440	26%	$2.02	53%
Cesar Chavez MS	56,643	20%	$1.48	12%
Cedar Ridge	49,664	5%	$1.36	3%
J.H. Hines ES	49,558	5%	$1.26	-5%
Moore Academy	46,743	-1%	$1.24	-6%
Carver Academy	20,533	-56%	$0.58	-56%
Average Value:	47,097		$1.32	



Waco ISD purchases electricity from Constellation Energy. The transmission and distribution utility is Centerpoint Energy. 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 is in the process of changing 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: Waco ISD BUILDING: Provident Heights

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	55,755		196	0	6,504		
FEBRUARY	2011	53,833		186	0	6,231		
MARCH	2010	51,910		175	0	5,958		
APRIL	2010	58,456		235	0	6,749		
MAY	2010	70,238		247	0	8,110		
JUNE	2010	69,918		226	0	7,844	All Electric Facility	
JULY	2010	65,809		197	0	7,378		
AUGUST	2010	60,651		228	0	6,947		
SEPTEMBER	2010	59,534		199	0	6,820		
OCTOBER	2010	54,357		199	0	6,282		
NOVEMBER	2010	48,198		261	0	6,179		
DECEMBER	2010	47,967		150	0	5,740		
TOTAL		**696,626**	**0**	**2,499**	**0**	**$80,742**		

Annual Total Energy Cost = $80,742 Per Year

Total KWH x 0.003413 = 2,377.58 x 106
Total MCF x 1.03 = 0.00 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,377.58 x 106

Floor area: 40,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 59,440 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $2.02 $/s.f. yr

OWNER: Waco ISD BUILDING: Cesar Chavez

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	67,200		226	0	8,185	309	1,848
FEBRUARY	2011	70,140		230	0	8,479	251	1,429
MARCH	2010	73,080		234	0	8,772	78	513
APRIL	2010	89,040		318	0	10,189	48	309
MAY	2010	119,610		335	0	13,688	21	140
JUNE	2010	123,630		318	0	13,603	14	128
JULY	2010	89,040		278	0	10,275	10	99
AUGUST	2010	83,655		264	0	9,751	14	123
SEPTEMBER	2010	80,962		257	0	9,489	38	313
OCTOBER	2010	78,270		250	0	9,227	66	527
NOVEMBER	2010	74,100		223	0	8,791	190	1,305
DECEMBER	2010	69,930		196	0	8,354	315	2,083
TOTAL		**1,018,657**	**0**	**3,129**	**0**	**$118,803**	**1,354**	**$8,817**

Annual Total Energy Cost = $127,620 Per Year

Total KWH x 0.003413 = 3,476.68 x 106
Total MCF x 1.03 = 1,394.62 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,871.30 x 106

Floor area: 86,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 56,643 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.48 $/s.f. yr

OWNER: Waco ISD **BUILDING:** Cedar Ridge

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	40,683		172	0	5,286	152	940
FEBRUARY	2011	41,779		170	0	5,376	16	105
MARCH	2010	42,875		168	0	5,465	10	80
APRIL	2010	57,020		211	0	6,891	5	51
MAY	2010	49,295		203	0	5,958	2	79
JUNE	2010	48,476		189	0	5,945	1	23
JULY	2010	38,057		254	0	2,845	4	44
AUGUST	2010	65,178		254	0	4,872	16	136
SEPTEMBER	2010	53,512		214	0	6,465	28	228
OCTOBER	2010	48,304		199	0	6,053	66	464
NOVEMBER	2010	42,145		157	0	5,282	104	699
DECEMBER	2010	43,784		153	0	5,555	179	1,170
TOTAL		**571,108**	**2,344**	**2,344**	**0**	**$65,993**	**583**	**$4,019**

Annual Total Energy Cost = $70,012 Per Year

Total KWH x 0.003413 = 1,949.19 x 106
Total MCF x 1.03 = 600.49 x 106
Total Other x ____ x 106
Total Site BTU's/yr 2,549.68 x 106

Floor area: 51,339 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 49,664 BTU/s.f.yr

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

OWNER: Waco ISD **BUILDING:** J.H. Hines

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	45,400	0	200	0	6,533	55	351
FEBRUARY	2011	72,600	0	312	0	8,267	42	287
MARCH	2010	71,000	0	282	0	7,822	34	245
APRIL	2010	74,100	0	306	0	7,415	53	335
MAY	2010	77,200	0	329	0	7,009	23	153
JUNE	2010	64,200	0	330	0	7,194	9	82
JULY	2010	84,400	0	302	0	5,788	10	94
AUGUST	2010	84,400	0	356	0	8,230	21	182
SEPTEMBER	2010	98,800	0	410	0	10,671	33	267
OCTOBER	2010	83,800	0	410	0	9,473	84	654
NOVEMBER	2010	82,600	0	410	0	9,377	167	1,082
DECEMBER	2010	72,600	0	312	0	8,267	209	1,241
TOTAL		**865,700**	**0**	**3,759**	**0**	**89,513**	**740**	**$4,973**

Annual Total Energy Cost = $94,486 Per Year

Total KWH x 0.003413 = 2,954.63 x 106
Total MCF x 1.03 = 762.20 x 106
Total Other x ____ x 106
Total Site BTU's/yr 3,716.83 x 106

Floor area: 75,000 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 49,558 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $1.26 $/s.f. yr

The red values in Hines' utility bill analysis are a result of missing utility data for the analysis period. Red text values have been extrapolated to provide a complete data collection.

OWNER: Waco ISD **BUILDING:** A.J. Moore Academy

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	91,795		336		11,504	253	1,467
FEBRUARY	2011	87,200		383		10,913	71	485
MARCH	2010	101,052		415		12,621	81	578
APRIL	2010	120,528		470		14,683	67	436
MAY	2010	140,664		532		17,135	39	260
JUNE	2010	116,012		476		14,289	18	168
JULY	2010	152,394		578		12,184	16	155
AUGUST	2010	175,416		608		14,025	18	172
SEPTEMBER	2010	137,771		585		11,015	48	395
OCTOBER	2010	109,428		465		13,582	34	295
NOVEMBER	2010	97,149		427		12,366	307	2,052
DECEMBER	2010	89,865		637		11,708	376	2,246
TOTAL		1,419,274		5,912		$156,025	1,328	$8,709

Annual Total Energy Cost = $164,734 Per Year

Total KWH x 0.003413 = 4,843.98 x 106
Total MCF x 1.03 = 1,367.84 x 106
Total Other x ____ x 106
Total Site BTU's/yr 6,211.82 x 106

Floor area: 132,893 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 46,743 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.24 $/s.f. yr

OWNER: Waco ISD **BUILDING:** Carver Academy

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2011	23,872	171	171	0	3,454	117	726
FEBRUARY	2011	23,334	152	152	0	3,400	104	682
MARCH	2010	20,583	177	177	0	3,041	25	252
APRIL	2010	24,447	160	160	0	3,611	16	110
MAY	2010	29,127	120	120	0	3,753	8	61
JUNE	2010	31,242	117	117	0	4,025	0	15
JULY	2010	22,461	114	114	0	3,205	2	28
AUGUST	2010	41,553	161	161	0	5,098	14	130
SEPTEMBER	2010	33,049	124	124	0	4,198	29	238
OCTOBER	2010	33,110	129	129	0	4,211	62	838
NOVEMBER	2010	28,519	157	157	0	3,958	130	1,000
DECEMBER	2010	27,037	158	158	0	3,911	124	863
TOTAL		338,334	1,740	1,740	0	$45,865	631	$4,943

Annual Total Energy Cost = $50,808 Per Year

Total KWH x 0.003413 = 1,154.74 x 106
Total MCF x 1.03 = 649.42 x 106
Total Other x ____ x 106
Total Site BTU's/yr 1,804.15 x 106

Floor area: 87,865 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 20,533 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $0.58 $/s.f. yr

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: Direct Energy Contract price: $0.0775 per kWh

TRANSMISSION AND DISTRIBUTION UTILITY: Oncor

Electric Rate: Secondary Service > 10 kW

I. TRANSMISSION AND DISTRIBUTION CHARGES:

Customer Charge	=	$6.78 per meter
Metering Charge	=	$22.18 per IDR meter
Transmission System Charge	=	$0 per 4CP kW
Distribution System Charge	=	Varies per NCP kW by LF

NCP kW	Annual Load Factor	per Distribution Billing kW
≤ 20 kW	ALL	$4.24
> 20 kW	0-10%	$4.24
	11-15%	$5.30
	16-20%	$5.00
	21-25%	$4.85
	> 26%	$4.24

II. SYSTEM BENEFIT FUND = $0.000654 per kWh

III. TRANSITION CHARGES

Transition Charge 1	=	$0.188 per NCP kW
Transition Charge 2	=	$0.265 per NCP kW

IV.	NUCLEAR DECOMMISSIONING CHARGE	=	$0.044 per Billing kW
V.	TRANSMISSION COST RECOVERY FACTOR	=	$2.059691/4CP kW
VI.	ENERGY EFFICIENCY COST RECOVERY FACTOR	=	$8.14 per month
VII.	COMPETITIVE METERING CREDIT	=	- $1.82 per month
VIII.	ADVANCED METERING COST RECOVERY FACTOR	=	$ 3.98 per month
IX.	RATE CASE EXPENSE SURCHARGE	=	$0.007944 per kWh

Average Savings for consumption = $0.0775/kWh + $0.000654/kWh + $0.007944/kWh = $0.086098/kWh

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

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

** This number is a generalization of average cost per kW because the rate schedule from Oncor utilizes three (3) different types of demand for the calculation of the utility bill and a calculation of the previous calendar year's Load Factor as calculated below:

1. NCP kVA: Peak demand during 15 minute interval of current billing cycle
2. 4CP kVA: Average demands of June, July, August and September of previous calendar year; usually only applied to IDR metered accounts
3. Billing kVA: Ratchet demand representing higher of two calculations: 80% of peak demand in last 11 months or current NCP kVA
4. Load Factor: kWh used previous calendar year / (Maximum NCP kW * Days in Billing Period * 24)

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: $31,461

Total quantity purchased during the analyzed billing cycle: 4636 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = $31,461 / 4,636 MCF

Average cost per MCF = $6.79

5.0 CAMPUS DESCRIPTIONS:

Waco ISD consists of 32 educational campuses (4 High Schools, 7 Middle Schools, 16 Elementary Schools and 5 Magnet or Alternative Schools) which are located in McLennan County; in and throughout the cities of Beverly Hills and Waco. Waco 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.

The energy survey focused on eight of the educational campuses:

Table 2: School Facilities Analyzed For This Report

Facility	**Year originally Constructed**	**Approximate Square Footage**	**Basic HVAC Cool/Heat**	**Basic HVAC Air Distribution**	**Basic Lighting System Description**	**Basic Control System Description**
Provident Heights ES	1998	40,000	Heat Pump Split Systems	Air Handlers	T8	Programmable Thermostat
Cesar Chavez MS	2002	86,000	RTUs	RTUs	T8 / Metal Halide	Siemens DDC
Cedar Ridge ES	1954 / 1988	51,339	Air cooled chillers / NG boilers	AHUs / Fan Coil Units	T8	DDC Alerton
J.H. Hines ES	2010	75,000	Air cooled chillers / NG boiler	AHUs	T8 with occupancy sensors	DDC – Delta
Moore Academy	1970	132,893	RTUs	RTUs	T8	DDC Alerton / Johnson Controls
Carver Academy	1995 / 2003	87,865	Split System with NG heat	AHUs	T8 with occupancy sensors	DDC Alerton
Viking Hills ES	1968	34,753	Air-cooled chillers / NG boiler	AHUs	T8	DDC Alerton
Waco HS	1960 / 1970 / 1981	211,813	Water-cooled chillers / NG boiler	Rooftop 4-pipe AHUs / MZAHU VAV / RTUs	T8 / T12 at elevator	Trane controls

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: RENOVATION OF AGED HVAC EQUIPMENT

It was noted during the survey that the campus with the highest operating cost of the campuses surveyed, has an older heat pump HVAC system. The campus does not have natural gas available, therefore we recommend the district consider a Variable Flow Refrigerant (VFR) split system installation when the 1999 system will need to considered for replacement in the next 3-5 years. The heat pumps currently in use (pictured to the right) have an anticipated life expectancy of 15 years.

A VFR system utilizes large condensing units that serve multiple classrooms through a refrigerant piping system that allows refrigerant to simultaneous flow forward or backward through the system as a function of the load required. This means that the system can heat one classroom while cooling another and providing neutral air to a third according to their relationship to the cooling setpoint. Since the system only works to the requirements of the loading, it is more efficient than the existing system. The cost estimated below is higher than typically expected given the first cost for the installation of the refrigerant piping system and the fact that the existing system still has viable life at the current time. The cost analysis at the time the system will need to be installed will be more favorable.

Estimated Cost: $445,500 Estimated Savings: $16,000 Estimated Payback: 27 Years

HVAC ECRM 2: ADD VFDs TO HOT WATER PUMPS AT WACO HS

There are three 3hp hot water pumps in the main mechanical room at Waco HS that do not have Variable Frequency Drives (VFDs), but have manual flow control valves throttled back about 50%. This condition requires the pump to operate at full speed all of the time while working against a partially closed valve. Significant energy savings are available by installing VFDs on these pumps as the pumps will be allowed to match the demand load at any given time and only operate to meet that load.

Estimated Cost: $17,400 Estimated Savings: $2,900 Estimated Payback: 6 Years

Lighting ECRM 1: OCCUPANCY SENSOR INSTALLATION

There were several areas of the facilities that were noted to have light fixtures operating during unoccupied periods. The first line of defense for the district to eliminate unnecessary fixture operation is to conduct staff training to turn lights off as the last occupant leaves the room. Studies have shown that linear fluorescent fixtures, the type of fixture most often found in classrooms, offer energy savings 23 seconds after they have been turned off when considering the startup current required to turn the fixtures back on when the occupants return. If the training is unsuccessful in changing the behavior of the occupants, then automatic means of turning off the lights, most commonly occupancy sensors, can be employed to perform the task as has been done at some schools in Waco ISD already. Two locations noted to have the most significant savings potential from occupancy sensor installation is Cedar Ridge and Moore Academy.

Estimated Cost: $88,800 Estimated Savings: $17,750 Estimated Payback: 5 Years

Lighting ECRM 2: METAL HALIDE FIXTURE RETROFIT TO T5

The Chavez Middle School cafeteria has 8 each 250-watt metal halide fixtures and the Library has an additional seven. One characteristic of metal halide fixtures is their inherently long re-strike. This means that if the fixtures are ever turned off, it can take up to 15 minutes for them to come back on. This long re-strike encourages staff to leave the lights on throughout the day, even if the space is not occupied. *We recommend replacing the 250 watt metal halides with 4-lamp T5 high-bay fixtures to improve overall light levels in the space and to allow the fixtures to be turned off during unoccupied periods of the day.* The ceiling grid at both locations will allow the new fixtures to be recessed in the ceiling.

Similarly, the gymnasium at Moore Academy utilizes 30 400-watt metal halide fixtures. *We recommend replacing these fixtures with 6-lamp T5 high bay fluorescent fixtures.*

Estimated Cost: $15,750 Estimated Savings: $2,625 Estimated Payback: 6 Years

Controls ECRM 1: REPLACE PROGRAMMABLE THERMOSTATS WITH DDC EMS

Most of the campuses in Waco ISD operate with DDC (Direct Digital Control) energy management systems. Provident Heights ES operates with programmable thermostats. While the programs in these units can usually limit the operation of the HVAC system to scheduled occupied hours, they do not provide the opportunity to remotely monitor and control the system. Additionally, it was noted during the survey that many of the thermostats were operating in the "HOLD" status which overrides all occupancy programming. In this status, it is likely that the units at this school are operating many more hours than an occupancy-limiting program would allow.   We recommend retrofitting the existing thermostats to full DDC (Direct Digital Control) systems.

Estimated Cost: $60,000 Estimated Savings: $12,000 Estimated Payback: 5 Years

Controls ECRM 2: INSTALL VENDING MACHINE CONTROLS

There were several vending machines noted around the district to not have controls. The controls receive input from an occupancy sensor mounted on top of the unit that will control advertising lighting and cycle the compressor. The maximum temperature to which the vending product is allowed to elevate is programmable based on the district's desires. The cost data below is indicated for one machine only and can be extrapolated to other machines across the district.

Estimated Cost: $180 per unit Est. Savings: $125 per unit Est. Payback: 1-1/2 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Comb fins on damaged condensing units
- Install hail guards to protect fins in future
- Tighten motor belts
- Seal AHU cabinet
- Clean R/A grills
- Turn off HVAC when space unoccupied
- Do not allow doors to be propped open
- Ensure filter door closes
- Relocate vending machine from closet
- Paint Rooftop AHUs
- 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
- Retorfit T12 fixtures with T8 lamps and electronic ballasts

Controls

- Restore programmable thermostats to auto operation
- Put computers/monitors to sleep when not used
- Experiment with higher cooling setpoints

Envelope

- Ensure exterior doors close securely
- Replace damaged or missing weatherstripping
- Clean out bird's nests from OA or EA grills

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.

<u>HVAC M&O #1 and 2</u>

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.*

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

AHU-4, one of the rooftop air handlers at Waco HS, was found to have loose belts on the blower motor. *We recommend tightening these belts to eliminate slippage and unnecessary wear on the belt.*

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

Similarly, it was noted that AHU-7 at Waco HS has air leaks from the supply plenum cabinet that should be sealed to prevent conditioned air loss to the atmosphere. It was noted at this unit that the static pressure in the supply plenum is extremely high when compared to the other AHUs at Waco HS. We suspect the area served by this unit is experiencing decreased airflow and comfort and a fire damper or other blockage has closed off a significant portion of the distribution ductwork. *We recommend the district investigate the system for AHU-7.*

<u>HVAC M&O #5</u>

It was noted during the survey that the return air grills in the corridor and some of the classrooms at Hines ES were dirty. Dirt accumulating on the grills minimizes the air flow back to the unit and can lead to shortage of return air at the air handler.

<u>HVAC M&O #6</u>

The HVAC units at the Moore Academy Gymnasium were operating when there was nobody present at the school. It is possible the system was dehumidifying the space to protect the integrity of the wood flooring, but the setpoint remained 72 and 73 for both units in the space. *We recommend a higher setback temperature for conditioning cycles required during unoccupied periods and turning the units off at all other unoccupied times.*

<u>HVAC M&O #7</u>

There were doors propped open at Carver Academy and Cedar Ridge ES with the HVAC operating and no obvious activity requiring the doors to be propped open. *We recommend the district not prop open doors when the HVAC system is operating.*

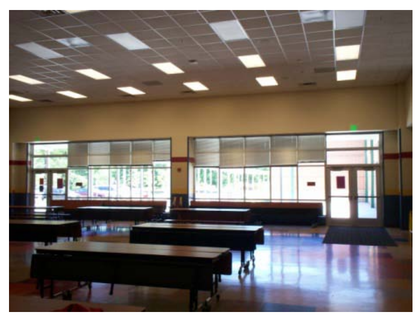
<u>HVAC M&O #8</u>

The filter access door on the air handler at classroom 415 at Carver Academy does not close correctly. Consequently, the filter does not fully enclose the air stream between the return plenum and the fan, therefore the unit is not protected by the filter to prevent dirt infiltration. *We recommend the filter door be repaired to protect the unit.*

<u>HVAC M&O #9</u>

There is a vending machine located within a closet at the Teacher's Lounge at Viking Hills ES. The heat produced by the machine is not dissipated by the restriction of the closet enclosure and consequently, the unit is forced to operate in much higher ambient temperatures which forces the condenser to work harder than normal. Additionally, there are no controls on the vending machine to turn off the lights and cycle the compressor when the area is not occupied. *We recommend relocating the unit to an area with increased air circulation and installing vending machine controls as described in Controls ECRM #2.*

<u>Lighting M&O #1 and 2</u>

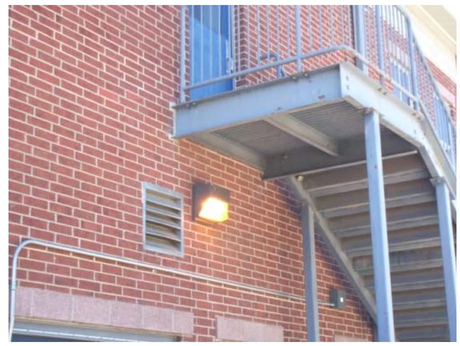


Some areas of the buildings noted in Section 6.0 of the report had light fixtures that were not required to be operating during the day or were fixtures left operating in unoccupied spaces. The least expensive remedy to these issues is to train staff to not turn on fixtures not needed during daytime 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 stair landing light fixtures at Provident Heights ES, cafeteria lights at Chavez MS and Provident Heights outside of student scheduled lunch periods, and the Moore Academy cafeteria and gym when nobody was present at the school. In the case of the Moore Academy cafeteria (pictured above), it appears that someone was trying to zone the lights so that only some lights remained on during the day, but the zone selected was the bank of lights immediately adjacent to the windows. If there is a reason to have light fixtures on during the day with nobody present in the school, *we recommend it at least be the bank on the opposite side of the cafeteria, away from the windows.*

The trophy cases at Hines will someday prominently display the accomplishments of these students, but at the present time, the new school does not have any trophies to display. The lights in the cabinet can be turned off during the summer and until the trophies are displayed.

Lighting M&O #3

It was noted during the survey, that there were some exterior light fixtures operating during the daytime. The picture to the right is an exterior light at Provident Heights ES. We recommend the timeclock or photocell that controls these fixtures be inspected to ensure proper control of the exterior lights.



Lighting M&O #4

It was demonstrated in the Carver Academy classrooms operating with all of the lamps in the fixtures produced 86 footcandles on the desktop. The Illumination Engineering Society of North America (IESNA) has determined that the optimum light level on student desktops is 50 footcandles. Using just the outboard lamps in the fixtures (controlled with just one of the two light switches on the wall) produced 58 footcandles at the desktops. Therefore, *we recommend the district train the teachers to just use the outboard lamps during the day and leave the inboard switch off.* If behavioral training is not successful, the district might consider installing a photocell controller to automatically control the inboard lamps and relegate them to use during cloudy or evening periods.

Controls M&O #1

As discussed in HVAC ECRM #1, it was noted during the survey that the programmable thermostats at Provident Heights ES were set to "HOLD" status. The programming does not override the unit in this mode and until such time that the district can extend the DDC control system to this facility, *we recommend the district place the thermostats back in "AUTO" operation.* This facility had the highest ECI of all of the campuses surveyed for this report. In addition to the reliance on electric heat, it is suspected that the high ECI is due to having HVAC systems operating outside of the programmed schedules on the thermostats.

Controls M&O #2

There were several areas in the schools where computers and computer monitors were operating with no students in the building. *We recommend the district consider implementing a "Sleep is Good" program for the computers.* This program turns off the computer and/or the monitor after a programmable period of inactivity.

Controls M&O #3

The current ASHRAE recommendations for cooling temperature setpoint are 68°F for heating and 76-78°F for cooling. It was noted during the survey, that many of the setpoints at campuses are between 70 and 73°F. The district can save up to 3% of their utility bill for every degree that heating/cooling setpoints are lowered or raised, respectively. *We recommend the district experiment with raising the cooling setpoint to find the optimum balance between occupant comfort and utility bill savings.*

Envelope M&O #1 and 2

There were several sets of exterior doors that were noted to not close securely. This condition leads to similar problems as damaged or missing weatherstripping (pictured to the right) as conditioned air can escape the building and contaminants can enter the facility. *We recommend ensuring all doors close securely and damaged or missing weatherstripping be replaced.* The door issues were specifically noted at Provident Heights and Moore Academy; weatherstripping issues were noted throughout the surveyed campuses.

Envelope M&O #3

Viking Hills ES has a ground level basement under the Office side of the building with several outside air intakes or exhaust air grills (the space itself was locked and inaccessible at the time of the survey) that were fully blocked with bird nests. The nests prevent the grills from transferring air between the building and the exterior and represent an indoor air quality concern with the bird waste deposited in the area. *We recommend the nests be removed when the birds relocate for the winter and that the bird screens be improved to prevent their return next spring.*

8.0 FINANCIAL EVALUATION

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

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

Proposal:	Perform recommended ECRMs			
Assumptions:				
1. Equipment will last at least 15 years prior to next renovation				
2. No maintenance expenses for first five years (warranty period)				
3. $2,500 maintenance expense next 5 years				
4. $5,000 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	($627,630)		0	($627,630)
Year 1		$ 51,400.00	0	$51,400
Year 2		$ 51,400.00	0	$51,400
Year 3		$ 51,400.00	0	$51,400
Year 4		$ 51,400.00	0	$51,400
Year 5		$ 51,400.00	0	$51,400
Year 6		$ 49,858.00	($2,500)	$47,358
Year 7		$ 48,316.00	($2,500)	$45,816
Year 8		$ 46,774.00	($2,500)	$44,274
Year 9		$ 45,232.00	($2,500)	$42,732
Year 10		$ 43,690.00	($2,500)	$41,190
Year 11		$ 42,148.00	($5,000)	$37,148
Year 12		$ 40,606.00	($5,000)	$35,606
Year 13		$ 39,064.00	($5,000)	$34,064
Year 14		$ 37,522.00	($5,000)	$32,522
Year 15		$ 35,980.00	($5,000)	$30,980
			Internal Rate of Return	**0.46%**

More information regarding financial programs available to WISD 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 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:

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

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

DETERMINATION OF BILLING kW

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

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

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

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

NOTICE

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

APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment
Service Agreement

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

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with ______________________, 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: Craig Finley
Date: 5-27-11

Name (Mr./Ms./Dr.): MR. CRAIG FINLEY
Title: DIRECTOR OF FACILITES

Organization: WACO ISD
Phone: 254-379-2907

Street Address: 2025 S. 19th St
Fax: 254-750-3413

Mailing Address: WACO, TX 76706
E-Mail: CFinley@WACOISD.org

County: McLENNAN

Contact Information:

Name (Mr./Ms./Dr.): MR. HARRY HARRINGTON
Title: COORDINATOR OF MAINTENANCE

Phone: 254-752-3497
Fax: 254-750-3413

E-Mail: HHARRINGTON@WACOISD.org
County: McLENNAN

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