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Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

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Refugio Independent School District

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ESA-Energy Systems Associates, Inc.
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SECO
State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY:

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

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

In January 2010, **SECO** received a request for technical assistance from Jack Gaskins, Superintendent for Refugio 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 **Refugio ISD,** (hereafter known as RISD) 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. Gaskins,* 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 6.0 of this report.

We estimate that as much as **$44,000** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$399,600**, yielding an average simple payback of **9 years**.

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	$157,000	$10,500	15
HVAC ECRM #2	$164,000	$18,200	9
Lighting ECRM #3a	$66,000	$13,200	5
Lighting ECRM #3b	$165,000	$13,200	12-1/2
Lighting ECRM #4	$12,600	$2,100	6
TOTAL PROJECTS	$399,600	$44,000	9

The total utility cost for RISD in 2009 was $302,768. The projected savings of $44,000 would represent a decrease in utility expenditures for the district of 14.5%. 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 Return of Investment (ROI), for this retrofit program has been calculated and shown in Section 7.0 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 **RISD**. 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

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 RISD, ESA returned to the facilities to perform the following tasks:

1. Design and monitor customized procedures to control run times of energy consuming systems.
2. 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.
3. Develop a prioritized schedule for replacement projects.
4. 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 ENERGY PERFORMANCE INDICATORS FOR :

Refugio ISD

CAMPUS	ENERGY UTILIZATION INDEX (EUI) (Btu/sf-year)	ENERGY COST INDEX (ECI) ($/sf-year)
2009 Refugio Elementary School:	**50,845**	**$1.49**
2009 Refugio High School Old Building:	**51,914**	**$1.57**
2009 Refugio High School New Building:	**48,052**	**$2.06**

The electricity and gas consumption charts for all of Refugio facilities area as follows:

OWNER: **REFUGIO ISD** **BUILDING:** **New Elementary School**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	64,400	187		1,809	7,661	128	$1,098
FEBRUARY	2010	48,080	161		1,739	6,111	191	$1,421
MARCH	2010	46,240	188		1,795	6,000	54	$551
APRIL	2009	45,360	166		1,545	5,937	21	$219
MAY	2009	57,202	197		1,823	7,145	17	$120
JUNE	2009	55,970	186		1,725	6,812	9	$108
JULY	2009	75,840	190		1,752	8,641	6	$82
AUGUST	2009	57,440	189		1,750	6,969	15	$134
SEPTEMBER	2009	89,920	227		2,117	10,284	13	$121
OCTOBER	2009	84,720	256		2,370	9,068	16	$289
NOVEMBER	2009	73,280	222		2,083	8,728	116	$867
DECEMBER	2009	59,920	215		1,978	7,411	101	$767
TOTAL		**758,372**	**758,372**		**22,486**	**$90,767**	**687**	**$5,777**

Annual Total Energy Cost =	$96,544	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	50,845	BTU/s.f.yr
Total KWH x 0.003413 =	2,588.32	x 106			
Total MCF x 1.03 =	707.61	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$1.49	$/s.f. yr
Total Other x ____		x 106			
Total Site BTU's/yr	3,295.93	x 106			
Floor area:	64,823	s.f.			

OWNER: **REFUGIO ISD** **BUILDING:** **Old High School**

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2010	95,918	344		4,244	12,964	359	$3,045
FEBRUARY	2010	83,103	354		3,829	11,386	75	$684
MARCH	2010	64,553	323		3,271	9,145	57	$518
APRIL	2009	112,617	240		2,640	9,305	38	$352
MAY	2009	80,340	322		3,542	11,350	33	$313
JUNE	2009	72,036	268		2,948	10,125	29	$270
JULY	2009	94,005	229		2,508	13,733	17	$135
AUGUST	2009	183,891	422		4,639	23,815	36	$273
SEPTEMBER	2009	136,888	485		5,331	17,767	33	$257
OCTOBER	2009	127,634	491		5,069	16,665	35	$269
NOVEMBER	2009	70,851	368		3,656	10,081	316	$2,295
DECEMBER	2009	76,640	324		3,636	10,606	338	$1,335
TOTAL		**1,198,476**	**4,170**	**4,170**	**45,313**	**$156,942**	**1,366**	**$9,746**

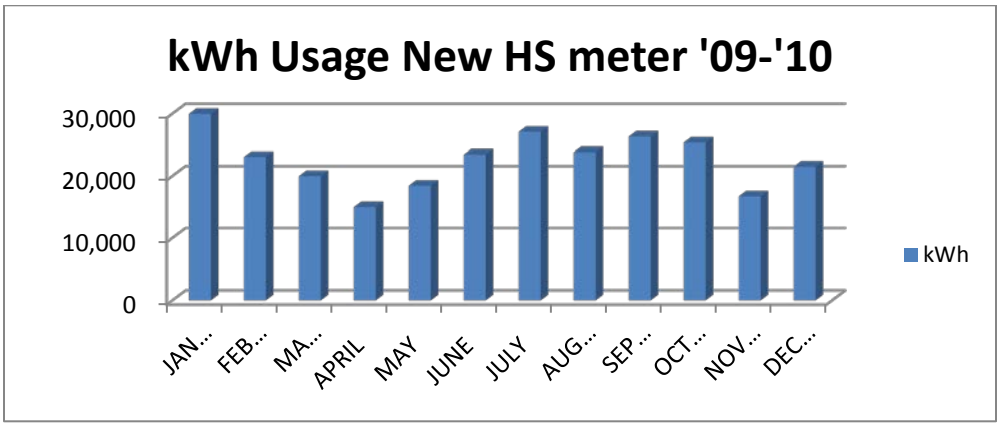
Annual Total Energy Cost =	$166,688	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	51,914	BTU/s.f.yr
Total KWH x 0.003413 =	4,090.40	x 106			
Total MCF x 1.03 =	1,406.98	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$1.57	$/s.f. yr
Total Other x ____		x 106			
Total Site BTU's/yr	5,497.38	x 106			
Floor area:	105,894	s.f.			

OWNER: **REFUGIO ISD** **BUILDING:** **New High School**

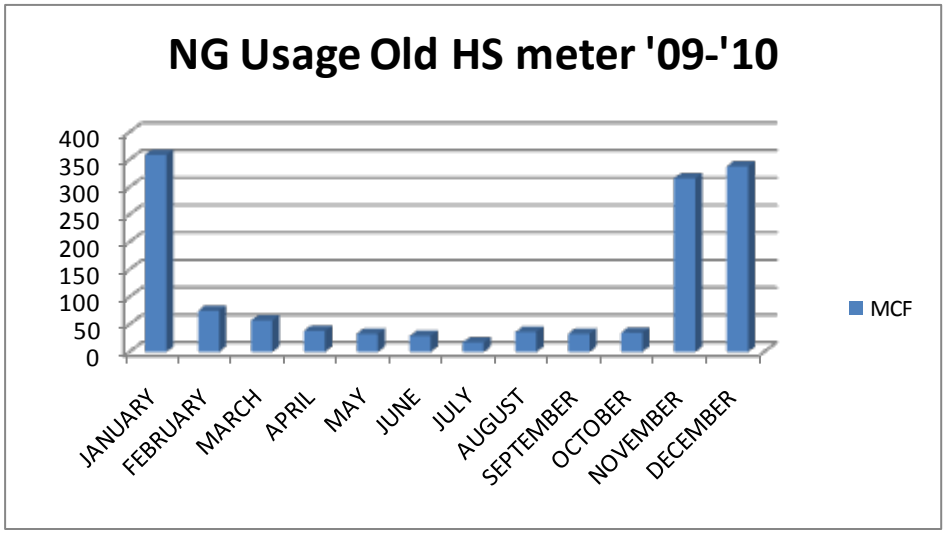
MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	COSTS $
JANUARY	2010	29,952	119		1,061	3,784	All Electric Facility	
FEBRUARY	2010	23,040	127		1,098	3,194		
MARCH	2010	19,968	124		1,079	2,898		
APRIL	2009	14,976	43		387	2,286		
MAY	2009	18,432	66		594	2,639		
JUNE	2009	23,424	76		684	3,147		
JULY	2009	27,072	214		1,927	6,518		
AUGUST	2009	23,808	106		953	3,118		
SEPTEMBER	2009	26,304	106		950	3,341		
OCTOBER	2009	25,344	106		955	3,259		
NOVEMBER	2009	16,704	104		940	2,454		
DECEMBER	2009	21,504	106		941	2,898		
TOTAL		270,528	1,297		11,569	$39,536	0	$0

Annual Total Energy Cost =	$39,536	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	48,052 BTU/s.f.yr
Total KWH x 0.003413 =	923.31	x 106		
Total MCF x 1.03 =	0.00	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$2.06 $/s.f. yr
Total Other x ____		x 106		
Total Site BTU's/yr	923.31	x 106		
Floor area:	19,215	s.f.		

Charting the annual electricity consumption, see example below for the new High School Building meter, reveals that the campuses do not experience a significant decrease in consumption for June and July as would be expected for periods of vacationing students. While it is acknowledged that summer months do represent custodial and administrative occupancy periods, the lack of a decrease in consumption for these months may indicate an opportunity for improved coordination and zoning of June and July Administrative and Custodial activities in order to reduce consumption during these time periods. Lack of a decrease in consumption during summer months implies that more units than necessary are being operated for floor maintenance activities or possibly that thermostat programs are not being adjusted to the summer occupancy schedules.



The district's natural gas consumption, on the other hand, shows an ideal inverted bell curve that demonstrates excellent control of natural gas use for space heating in a public school facility in Texas. The baseline readings in summer months likely represent the consumption for natural gas water heaters that are not disconnected during the summer.



As Refugio is located in a deregulated energy market area of the State, the district is free to negotiate electricity contracts within State mandated procurement processes. The district's current Retail Electric Provider (REP) is Direct Energy and their Transmission and Distribution (T&D) Provider is AEP Central. The rate schedule applicable to most of the district's meters is Secondary Service Greater than 10 kW. A copy of the schedule and applicable riders is included in Appendix II.

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER (REP): Direct Energy [$0.08807 per kWh]

AGGREGATION FEE: $0.0015 per kWh

TRANSMISSION AND DISTRIBUTION (T&D): AEP

Electric Rate: Secondary Service > 10 kW

I.	TRANSMISSION AND DISTRIBUTION CHARGES:		
	Customer Charge	=	$26.52 per meter
	Metering Charge	=	$15.81 per meter
	Transmission System Charge (Non-IDR Meter)	=	$1.793 per NCP kW
	Distribution System Charge	=	$3.314 per Billing kW
II.	SYSTEM BENEFIT FUND	=	$0.000662 per kWh
III.	TRANSITION CHARGES		
	Transition Charge 1	=	$1.035407/kW
	Transition Charge 2	=	$2.464918/kW
IV.	NUCLEAR DECOMMISSIONING CHARGE	=	$0.037224 per Billing kVA
V.	TRANSMISSION COST RECOVERY FACTOR	=	$0.335686/4CP kVA
VI.	COMPETITIVE METERING CREDIT	=	$2.17 per month
VII.	RATE CASE SURCHARGE RIDER #1	=	$0.000047 per kWh
VIII.	RATE CASE SURCHARGE RIDER #2	=	$0.000065 per kWh
IX.	TRUE-UP CASE SURCHARGE RIDER	=	$0.041116 per kW
X.	ENERGY EFFICIENCY RIDER	=	$0.000288 per kWh
XI.	ADVANCED METERING SYSTEM RIDER	=	$2.05 per month

Average Savings for consumption (from billings) = $0.08807 + $0.0015 + $0.000662 + $0.000047 + $0.000065 + $0.000288 = $0.090632 / kWh

Average Savings for demand = $1.793 + $3.314 + $1.035407 + $2.464918 + + 0.037224 + $0.335686 + $0.041116 = $9.02 / kW**

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

1. NCP kW: Peak demand during 15 minute interval of current billing cycle
2. 4CP kW: Average demands of June, July, August and September of previous calendar year; usually only applied to IDR metered accounts
3. DS (Distribution System) Billing kW: Ratchet demand representing higher of two calculations: 80% of peak demand in last 11 months or current NCP DS kW (Distribution System) Billing kW: Ratchet demand representing higher of two calculations: 80% of peak demand in last 11 months or current NCP kW

NATURAL GAS PROVIDER:

Centerpoint

Rate Schedule Unavailable: Average cost per MCF determined from utility billings.

Total Cost of Natural Gas purchased for Refugio ISD: $15,523

Total Quantity of Natural Gas purchased for Refugio ISD: 2,053 MCF

Average Unit Cost = Total Cost for Gas purchased by RISD / Total MCF purchased by RISD

=$15,523 / 2,053 mcf = $7.56 per mcf

5.0 CAMPUS DESCRIPTIONS:

Refugio ISD consists of two campuses located in Refugio, Texas. Refugio Elementary School is located on Crockett Street and consists of a Pre-K – 4th grade building and a newly constructed 5-6th grade building. Refugio High School is located on W Vance St and consists of a 9-12th grade building and a newly constructed 7-8th grade building. The newly constructed facilities have both experienced differential settling in the foundation and are scheduled to be repaired during the Summer and Fall of 2010. The facilities are occupied from mid- August through late May on a weekday schedule of 8:00 A.M. to 3:30 P.M. with equipment running from 7:30 A.M. to 4:00 P.M. The Administrative area is open all year, and portions of the facility are occupied by the maintenance/custodial staff throughout the summer.

The new 7-8th grade building has strong restroom odors circulating throughout the Administration and surrounding corridors. Possible causes for this odor include, but are not limited to:

1. An un-terminated plumbing vent in the ceiling plenum space
2. Incorrectly wired exhaust fan / fan turns backward
3. Differential foundation settling has cracked waste piping under the slab
4. Building is at negative pressure and drawing smell into the building
5. Restroom vent terminates too close to outdoor air intake of Administration HVAC unit

It was noted during the survey, that a number of exterior doors, even in newer building areas, have damaged or missing weather stripping. *We recommend the district replace all damaged and missing weather stripping as necessary*.

Figure 1: Outdoor light seen underneath door due to absent weather stripping

HVAC System Description:

Most of the district facilities have either flat built-up gravel or low-sloping metal roofs. Consequently, campuses predominantly utilize ground mounted split systems and only a few rooftop units to condition the classroom spaces.

The classrooms at the Pre-K – 4th building at the Elementary campus utilize nineteen each 1991 2-1/2 ton split system units. The Pre-K activity room has 6 window units distributed around the large room. Currently, the classroom split systems only incorporate outside air to comply with the old ASHRAE 5 CFM/student standard. The new ASHRAE standard, ASHRAE 62.1, requires 15 CFM/student of outside air. These larger quantities of outside air incorporated into the classroom space will require each split system's cooling capacity to be increased to approximately 3-1/2 tons. The increased power consumption required by higher capacity units will cancel out some of the energy savings that would have been available if the units could

have been renovated with the same capacity units, therefore the payback for this project will not appear as favorable as might be expected. Despite the increased payback period, *we recommend replacing the existing 2.5 ton split systems with new 3.5 ton units and replacing the window units at the activity room with a single 10 ton split system unit.*

The new 5 – 6th grade building at the ES and the 7-8th grade building at the HS both utilize rooftop units with electric resistance heat, despite the availability of natural gas at the campus. The use of the electric heat is reflected in higher ECI for this building as compared to the ECI for the gas heating split systems in the older areas of the campus. Electricity is approximately 2.8 times more expensive to space heat facilities than is natural gas :

Average cost of electricity for RISD: $0.090632 per kWh
Average efficiency of electric resistance heat: 100%
Quantity of BTUs per kWh: 3,413
Average cost of electrical BTU at RISD: $0.090632 / (3,413 BTU*100%) = $0.0000265549 per BTU

Average cost per MCF natural gas: $7.56
Average efficiency of gas-fired heaters in existing AHUs: 80%
Quantity of BTUs derived from burning 1 mcf of natural gas: 1,000,000
Average cost of usable NG BTU at RISD: $ 7.56 / (1,000,000 * 80%) = $0.00000945 per BTU

Comparison, electricity BTU cost to NG BTU cost: $0.0000265549 / $0.00000945 = 2.81 times

It was noted during the survey that a number of new air conditioning units lack appropriate insulation on their refrigeration lines as seen in figure 3 which reduces the efficiency of the unit. *We recommend these refrigeration lines be insulated to prevent the units from absorbing heat from the ambient air and reducing the refrigerant's ability to absorb heat from the conditioned space as intended.*

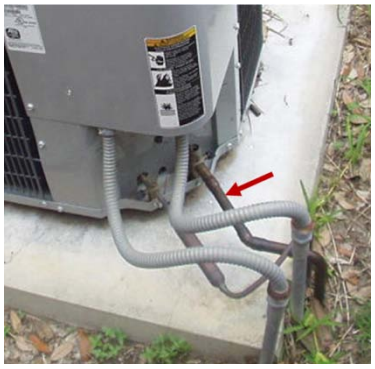


Figure 2: Un-insulated refrigerant line

Control System Description:

The district utilizes programmable thermostats in the newer spaces, but still has some conventional thermostats in older areas of the campuses. While reviewing the schedule in the programmable units, it was noticed that many thermostats are set at 69°F for their cooling setpoint. We recommend the district consider raising the cooling setpoints for the classroom spaces to 73°F or higher during the cooling season.

The staff reported that many of the teachers in classrooms with conventional thermostats do not turn their units off at the end of the day, they simply bump up the cooling setpoint or lower the heating setpoint. The most efficient setting for any piece of energy consuming equipment is off; therefore, for all but the most extremely cold days of the year, when a night setback temperature is required to protect interior plumbing pipes from freezing overnight, we recommend the units be turned off overnight. A common misconception is that the energy

required for the unit to startup in the morning when the units have not run all night is more than the savings generated by turning the units off overnight. In fact, there is substantial energy savings available by turning off all energy consuming equipment whenever it is not required. Humidity buildup in the building can be prevented by ensuring all exhaust fans in the building are turned off afterhours as well; exhaust fans operating when the rest of the HVAC system is off will place the building in a negative pressure condition which will draw in moist humid air throughout the evening hours.

It was also noted during the survey that a thermostat in the elementary school library has been covered up by a periodicals rack, see figure 4, which may adversely affect the thermostat's ability to properly sample air temperature. *We recommend relocating the periodical rack or the room sensor to allow the unit to properly sample circulating air.*

Figure 3: Sensor blocked by periodicals rack

Lighting System Description:

The district utilizes T8 lighting in the newer additions to the campuses. T12 lighting is still in use in the older areas of the campuses. The district has been replacing the T12 lamps in the fixtures with T8 lamps, but magnetic ballasts have not been replaced at the same time. The inappropriately matched magnetic ballasts have been causing flickering in the T8 replacement lamps. *We recommend retrofitting all T12 fixtures with new T8 lamps and electronic ballasts, and installing new electronic ballasts in fixtures where the lamps were retrofit, but the ballasts were not.* The new T8 system components produce approximately 18% more light while consuming about 20% less energy to perform the work. The electronic ballasts do not produce a humming sound like the magnetic ballasts do and will also eliminate all lamp flicker. This project will also allow the district to comply with Senate Bill 300, which requires school districts operate the most efficient lamps and ballasts possible in their existing light fixtures.

The Elementary School cafeteria has 36 each 3-lamp T8fixtures and 18 perimeter compact fluorescent (CFL) recessed can lights which were all on turned while the cafeteria was unoccupied. The can lights are located above the cafeteria windows and offer little illumination to the space during the daytime hours. The T8 lights are currently switched in 18 fixture groups. *We recommend the current switching scheme be replaced with a system that uses occupancy sensors to control the outboard lamps in the section of fixtures on the corridor side of the cafeteria and all lamps in the fixtures on the window side of the cafeteria. In this strategy, the majority of the lamps can be turned off when the space is unoccupied, with just 18 inboard lamps left operating to prevent the space from appearing tool dark from the corridor.*

The Elementary School corridor lobby has 14 up-light fixtures, as shown in figure 5, which remain on during daytime. The contribution of these fixtures as daylight is entering the lightwells is minimal and turning these fixtures off during daytime hours will offer significant energy savings and reduce maintenance expenses for the up-light fixtures. *We recommend relocating the up-light fixtures to a separate circuit under photocell control to limit their operation to nighttime activities only.*

Figure 4: Lightwell up-lighting on during day

The Elementary and High School gymnasiums are both illuminated with eight-foot, bare-lamped T12 fixtures. These types of fixtures are vulnerable to damage if hit by a ball or other sports equipment. *We recommend replacing the T12 fixtures with new 6-lamp T5 high-bay fixtures*. T5 lamps are more efficient than T12 lamps and the high bay fixtures provide appropriate protection from damage. The HS gymnasium has 10 each incandescent fixtures above the bleachers. *We recommend replacing the incandescent lamps with 4-lamp T5 or T8 fluorescent high-bay fixtures.*

Exit signs in the High School building utilize incandescent lamps. *We recommend the incandescent fixtures be retrofit with new LED lamps if they are in sufficient condition to remain in service. Exit fixtures that are not illuminated, or in too poor of condition to be re-used, should be replaced with new LED or LEC units.*

It was also noted that many exterior lights are operating during daytime hours as shown in figure 6. *We recommend controlling exterior lights with timeclocks and/or photocells to limit their use to nighttime only.*

Figure 5: Exterior lights on during daytime

The various vending machines around the district do not currently have controls. *We recommend installing a vending miser for each machine to limit illumination of the advertisement lighting and cycle the compressor so that it does not run all of the time, based upon the sensor's detection of occupancy in the area. The compressor will operate only long enough to keep the food or beverages at the programmed temperature and not operate most of the time as they currently do.*

6.0 RECOMMENDATIONS

A. MAINTENANCE AND OPERATIONS PROCEDURES

HVAC	•insulate AC refrigerant lines as needed
Lighting	•Install vending miser on vending machines •Replace incandescant lights in exit signs with LED or LEC units •Install photocells on exterior and up- lighting •Install occupancy sensors in elementary school cafeteria
Controls	•Expose library sensor to circulating air by relocating periodicals rack
Building Envelope	•Check weatherstrip at all exterior doors, replace as needed

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 less than one year. The difficulties with payback calculations 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 weather-stripping so that exact air losses may be determined), is prohibitive when the benefits of renovating door and weather-stripping are well documented and universally accepted.

HVAC M&O

At RISD, many of the air conditioning units' refrigerant lines are not properly insulated. This causes excessive heat transfer between the refrigerant and the outside air which reduces the efficiency of the air conditioning unit. These lines should be insulated to reduce heat transfer.

Lighting System M&O #1

Vending misers turn off vending machine lighting when no occupants are detected.

Lighting System M&O #2

Many of the exit signs in the district use incandescent lamps. Replacing these incandescent lamps with LED or LEC units will increase the efficiency and reliability of these fixtures.

Lighting System M&O #3

Many exterior lights and up-lighting fixtures near windows are turned on during daytime. This wastes electricity as natural light is already doing a sufficient job lighting these areas. Timeclocks or photocells should be installed on these lights to limit their use to nighttime only.

Lighting System M&O #4

The elementary school cafeteria has 48 fixtures on three separate circuits that were all turned on despite the cafeteria being unoccupied. The can lights near the windows should be left off during the day when natural light makes them obsolete. Occupancy sensors could be installed on outboard lamps in each fluorescent fixture to turn them off when the space is unoccupied.

Controls M&O

A thermostat in the elementary school library is currently covered by a periodicals rack. Relocating the periodicals rack, or the thermostat, will improve the unit's ability to properly sample the space temperature and eliminate excessive operation of the HVAC system.

Envelope M&O

It was noted there were several exterior doors around the district that suffered from damaged or missing weather-stripping.

B. CAPITAL EXPENSE PROJECTS

HVAC	•Replace Elementary and High School window units and split systems with high-efficiency split systems
Lighting	•Replace T12 lighting and ballasts •Replace gymnasium lighting

HVAC ECRM

ECRM #1: Replace K-4th building systems

The HVAC system at Refugio ES consists of 19 each 2-1/2 ton split system units and 6 window units that total 57-1/2 tons of cooling capacity. To fully comply with the outside air requirements of ASHRAE 62.1, the project will require 19 each 3-1/2 ton split system units and one (1) 10 ton unit to replace the window units. The additional tonnage required to meet minimum outside air requirements will result in a longer than normal payback period.

Estimated Installed Cost	=	$ 157,000
Estimated Energy Cost Savings	=	$ 10,500
Simple Payback Period	=	15 years

ECRM #2: Replace dated high school building systems

There are ten split systems that are 15 years old or older at Refugio High School that should be replaced with new high-efficiency units. The total cooling capacity of these units is 80 tons.

Estimated Installed Cost	=	$ 164,000
Estimated Energy Cost Savings	=	$ 18,200
Simple Payback Period	=	9 years

LIGHTING ECRMs

ECRM #3: Replace T12 lighting and ballasts with T8 lighting

The district has been replacing T12 lamps with T8 lamps, but they have not been replacing the magnetic ballasts with electronic ballasts. The T12 fixtures not yet retrofit should be renovated with T8 lamps and electronic ballasts. The fixtures with magnetic ballasts and T8 lamps should be retrofit with electronic ballasts. Some of the existing fixtures do not have lenses and are possible not in sufficient condition to

be retrofit with lamps and ballasts, but should rather be replaced with new fixtures. We have therefore produced two cost estimates for this ECRM. One is just for a lamp and ballast retrofit; the other is for new fixtures.

ECRM 3a: Lamp and Ballast retrofit only:

Estimated Installed Cost	=	$ 66,000
Estimated Energy Cost Savings	=	$ 13,200
Simple Payback Period	=	5 years

ECRM 3b: New fixtures:

Estimated Installed Cost	=	$ 165,000
Estimated Energy Cost Savings	=	$ 13,200
Simple Payback Period	=	12-1/2 years

ECRM #4: Replace gymnasium lighting

The elementary school and high school practice gymnasiums in Refugio ISD are currently lit with T12 fixtures which are vulnerable to shattering. These fixtures should be replaced with 6-lamp T5 high bay lighting fixtures which are more efficient and provide better protection for the installed lamps.

Estimated Installed Cost	=	$ 12,600
Estimated Energy Cost Savings	=	$ 2,100
Simple Payback Period	=	6 years

SUMMARY TABLE:
The projects we recommend RISD consider at the present time include ECRM #1, #2, #3a, and #4.

Estimated Installed Cost	=	$ 399,600
Estimated Energy Cost Savings	=	$ 44,000
Simple Payback Period	=	9 years

Should the district desire to implement these projects in stages and not all at once, we recommend the following implementation schedule:

1. Lighting ECRM #3 — Replacing T12 ballasts and lamps will eliminate light flickering and increase classroom lighting which was measured to be slightly lower than recommended. Option ECRM #3a has a short payback period with significant savings.

2. HVAC ECRM #1&2 — The 15 year old split systems have reached the end of their functional life expectancy. Replacing these units will offer energy savings and reduce the possibility that units will have to be replaced on an emergency basis in the near future.

3. Lighting ECRM #4 — The new high-bay fluorescent fixtures will offer improved quality of light in the gymnasium and protection for the lamps.

7.0 FINANCIAL EVALUATION

Financing of these projects may be provided using a variety of methods 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. $500 maintenance expense next 5 years				
4. $1000 maintenance expense last 5 years				
5. Savings decreases 4% per year after year 5				
Cash Flow	**Project Cost**	**Project Savings**	**Maintenance Expense**	**Net Cash Flow**
Time 0	($399,600)		0	($399,600)
Year 1		$ 44,000	0	$44,000
Year 2		$ 44,000	0	$44,000
Year 3		$ 44,000	0	$44,000
Year 4		$ 44,000	0	$44,000
Year 5		$ 44,000	0	$44,000
Year 6		$ 42,240	($500)	$41,740
Year 7		$ 40,480	($500)	$39,980
Year 8		$ 38,720	($500)	$38,220
Year 9		$ 36,960	($500)	$36,460
Year 10		$ 35,200	($500)	$34,700
Year 11		$ 33,440	($1,000)	$32,440
Year 12		$ 31,680	($1,000)	$30,680
Year 13		$ 29,920	($1,000)	$28,920
Year 14		$ 28,160	($1,000)	$27,160
Year 15		$ 26,400	($1,000)	$25,400
			Internal Rate of Return	**4.94%**

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

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:

They 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 Felix Lopez of State Energy Conservation Office, (SECO), at 512-463-1080 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

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 SCHEDULES

PUBLIC UTILITY COMMISSION OF TEXAS
APPROVED
DEC 23 '09 DOCKET 36928
CONTROL #

AEP TEXAS CENTRAL COMPANY
TARIFF FOR ELECTRIC DELIVERY SERVICE
Applicable: Entire System
Chapter: 6 Section: 6.1.1
Section Title: Delivery System Charges
Revision: Sixth Effective Date: December 30, 2009

6.1.1.1.3 SECONDARY VOLTAGE SERVICE GREATER THAN 10 KW

AVAILABILITY

This schedule is applicable to Delivery Service for non-residential purposes 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-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. Any meter other than the standard meter 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 arrangements may be required prior to Delivery Service being furnished, pursuant to Section 5.7 and 6.1.2 of this Tariff.

MONTHLY RATE

I. Transmission and Distribution Charges:

Customer Charge		
Non-IDR Metered	$3.26	per Retail Customer per Month
IDR Metered	$26.52	per Retail Customer per Month
Metering Charge	$15.81	per Retail Customer per Month
Transmission System Charge		
Non-IDR Metered	$1.286	per NCP kW Billing Demand
IDR Metered	$1.793	per 4CP kW Billing Demand
Distribution System Charge	$3.314	per NCP kW Billing Demand
II. System Benefit Fund:	$0.000662	per kWh See SBF 6.1.1.4
III. Transition Charge:	See Riders TC 6.1.1.2.1.1 and TC-2 6.1.1.2.2.1	
IV. Nuclear Decommissioning Charge:	See Rider NDC 6.1.1.5.1	
V. Transmission Cost Recovery Factor:	See Rider TCRF 6.1.1.6.2.1	

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VI. Excess Mitigation Credit: Not Applicable

VII. State Colleges and Universities Discount: See Rider SCUD 6.1.1.6.1

VIII. Competitive Metering Credit: See Rider CMC 6.1.1.6.6

IX. Other Charges or Credits:

A. Rate Case Surcharge Rider See Rider RCS-2 6.1.1.6.8

B. True-up Case Surcharge Rider See Rider TCE 6.1.1.6.7

C. Energy Efficiency Rider See Rider EECRF 6.1.1.6.4.1

D. Advanced Metering System Rider See Rider AMSCRF 6.1.1.6.9

COMPANY-SPECIFIC APPLICATIONS

Refer to Section 6.2.2 of the Tariff for additional voltage information.

Three-phase service may be provided if Retail Customer has permanently installed, and in regular use, motor(s) which qualify according to Section 6.2.3.4, or, at the Company's sole discretion, the load is sufficient to warrant three-phase service.

Service will normally be metered at the service voltage. For more information, refer to the Meter Installation and Meter Testing Policy, Section 6.2.3.3 of the Tariff.

Refer to Section 5.5.2 of the Tariff for additional information regarding highly fluctuating loads.

Refer to Section 5.5.4 of the Tariff for additional information regarding operational changes significantly affecting Demand.

Refer to Section 5.5.5 of the Tariff for additional information regarding Power Factor.

Transmission service will be furnished by the Transmission Service Providers (TSPs), and not the Company. The Company performs only the billing function for TSPs.

Determination of Billing Demand for Transmission System Charges

Determination of NCP kW

The NCP kW applicable under the Monthly Rate section for transmission system charges for non-IDR metered customers and IDR metered customers without sufficient 4CP kW

PUBLIC UTILITY COMMISSION OF TEXAS
APPROVED
DEC 2 3 '09 DOCKET 36928
CONTROL #

demand data shall be the kW supplied during the 15-minute period of maximum use during the billing month.

Determination of 4 CP kW For IDR Metered Customers

If the Billing Meter is an IDR Meter that was installed at the Retail Customer's request, or by Commission rule, the transmission system charges will be calculated using the 4CP billing kW demand as determined in this section. The 4 CP kW demand applicable under the Monthly Rate section shall be the average of the sum 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 4 CP kW 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 demand will be billed at the applicable NCP kW demand rate under the "Transmission System Charge" using the Retail Customer's NCP kW demand.

All Retail Customers with IDR metering, except IDR meters installed by Company for load survey purposes, will be billed Transmission charges on their 4 CP kW demand pursuant to this schedule.

Determination of Billing Demand for Distribution System Charges

Determination of NCP kW Billing Demand

The NCP kW Billing Demand shall be the kW supplied during the 15-minute period of maximum use. The NCP kW Billing Demand applicable to the Distribution System Charge shall be the higher of the NCP kW demand for the current billing month or 80% of the highest monthly NCP kW demand established in the 11 months preceding the current billing month (80% ratchet). The 80% ratchet shall not apply to Retail Seasonal Agricultural Customers.

Determination Of Billing Demand When Meter Readings Cannot be Obtained

When meter readings cannot be obtained due to denial of access, weather, meter failure, tampering, or other event, the Retail Customer's demand will be estimated pursuant to Section 6.2.3.2.

NOTICE

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

APPENDIX III - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

OFFICE OF THE COMPTROLLER TEXAS

SECO 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 Refugio ISD, 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: Jack Gaskins
Date: 4/9/10
Name (Mr./Ms./Dr.) Mr. Jack Gaskins
Title: Supt.
Organization: Refugio ISD
Phone: (361) 526-2325
Street Address: 212 W. Vance St.
Fax: (361) 526-2326
Mailing Address: Refugio, TX 78377
E-Mail: jack.gaskins@refugioisd.net
County: Refugio

Contact Information:

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

Please sign and mail or fax to: **Juline Ferris**, Schools and Education Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-936-9283. **Fax 512-475-2569.**

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

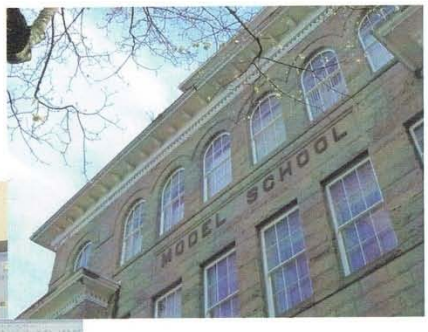
APPENDIX IV - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

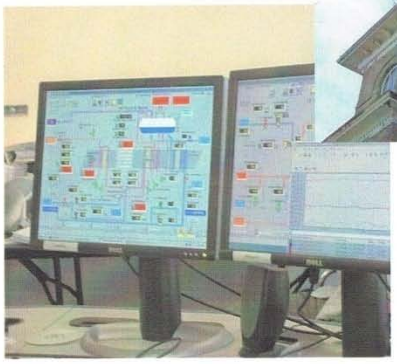
ANNOUNCING!

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.

SECO
State Energy Conservation Office

APPENDIX V - UTILITY CHARTS ON CD