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Facility Preliminary Energy Assessments and Recommendations

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SECO
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1.0 EXECUTIVE SUMMARY:

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

State Energy Conservation Office

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

In February 2010, **SECO** received a request for technical assistance from James Sanders, Business Manager for Madisonville 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 **Madisonville CISD,** (hereafter known as MCISD) 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. Sanders*, 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 **$24,000** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$269,750**, yielding an average simple payback of **11-1/4** years.

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	$252,150	$21,000	12 Years
Lighting ECRM #1	$ 17,600	$ 3,000	6 Years
TOTAL PROJECTS (Lighting and HVAC)	$ 269,750	$ 24,000	11-1/4 Years

The total utility cost for MCISD in 2009 was $386,568. The projected savings of $24,000 would represent a decrease in utility expenditures for the district of 6.2%. 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 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 MCISD. 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 MCISD, 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 ENERGY PERFORMANCE INDICATORS FOR :

MADISONVILLE CISD

CAMPUS	ENERGY UTILIZATION INDEX (EUI) (Btu/sf-year)	ENERGY COST INDEX (ECI) ($/sf-year)
2009 Madisonville Head Start Campus	**37,203**	**$1.02**
2009 Madisonville Elementary	**41,167**	**$0.99**
2009 Madisonville Intermediate	**46,357**	**$2.03**
2009 Madisonville Junior High School	**53,187**	**$1.26**
2009 Madisonville High School	**76,242**	**$1.43**

OWNER: Madisonville CISD **BUILDING: Head Start**

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	2009	19336	134	134	534	2,984	6	$79
FEBRUARY	2009	14,800	134	134	332	1,729	1	$26
MARCH	2009	12,240	99	99	427	1,399	2	$24
APRIL	2009	10,880	110	110	359	1,350	3	$28
MAY	2009	16440	95	95	409	1,665	2	$23
JUNE	2009	20040	73	73	504	1,207	2	$25
JULY	2009	20520	79	79	500	1,290	2	$29
AUGUST	2009	16200	80	80	404	1,306	2	$26
SEPTEMBER	2009	18980	103	103	310	1,490	2	$28
OCTOBER	2009	21760	125	125	216	1,673	1	$16
NOVEMBER	2009	22520	126	126	462	2,784	1	$15
DECEMBER	2009	21760	125	125	460	1,663	1	$15
TOTAL		215,476	1,283	1,283	4,917	$20,540	25	$334

			Energy Use Index:		
Annual Total Energy Cos	$20,874	Per Year	Total Site BTU's/yr	37,203	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	735.42	x 106			
Total MCF x 1.03 =	25.75	x 106	Energy Cost Index:		
Total Other x ____		x 106	Total Energy Cost/yr	$1.02	$/s.f. yr
Total Site BTU's/yr	761.17	x 106	Total Area (sq.ft.)		
Floor area:	20,460	s.f.			
Electric Utility	Account #	Meter#	Gas Utility	Account #	
Energy for Schools	Multiple			Multiple	

OWNER:	Madisonville CISD			BUILDING:	Elementary			
MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2009	60480	317	317	1366	7292	All Electric Facility	
FEBRUARY	2009	63360	317	317	1366	5855		
MARCH	2009	51840	223	223	961	4641		
APRIL	2009	67680	295	295	1271	6064		
MAY	2009	88560	295	295	1271	7413		
JUNE	2009	76320	209	209	901	5043		
JULY	2009	66240	194	194	836	3427		
AUGUST	2009	102240	302	302	2388	5517		
SEPTEMBER	2009	85680	274	274	1181	5664		
OCTOBER	2009	68400	259	259	1598	6094		
NOVEMBER	2009	68405	252	252	1086	6254		
DECEMBER	2009	77040	288	288	1123	8617		
TOTAL		876,245	3,225	3,225	15,348	$71,881	0	$0

			Energy Use Index:		
Annual Total Energy Cos	$71,881	Per Year	Total Site BTU's/yr	41,167	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	2,990.62	x 106			
Total MCF x 1.03 =	0.00	x 106	Energy Cost Index:		
Total Other x ____		x 106	Total Energy Cost/yr	$0.99	$/s.f. yr
Total Site BTU's/yr	2,990.62	x 106	Total Area (sq.ft.)		
Floor area:	72,646	s.f.			

OWNER:	Madisonville CISD			BUILDING:	Intermediate			
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	2009	78600	468	468	2017	9707	All Electric Facility	
FEBRUARY	2009	86800	372	372	1603	7740		
MARCH	2009	66400	386	386	1664	6367		
APRIL	2009	91800	366	366	1577	8065		
MAY	2009	95200	366	366	2233	8177		
JUNE	2009	90600	338	338	1457	6367		
JULY	2009	70400	264	264	1138	3890		
AUGUST	2009	105000	400	400	2452	6052		
SEPTEMBER	2009	91000	382	382	2125	6405		
OCTOBER	2009	78600	372	372	1836	7317		
NOVEMBER	2009	76200	334	334	1992	71952		
DECEMBER	2009	85600	398	398	1827	9875		
TOTAL		1,016,200	4,446	4,446	21,921	$151,914		

			Energy Use Index:		
Annual Total Energy Cos	$151,914	Per Year	Total Site BTU's/yr	46,357	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	3,468.29	x 106			
Total MCF x 1.03 =	0.00	x 106	Energy Cost Index:		
Total Other x ____		x 106	Total Energy Cost/yr	$2.03	$/s.f. yr
Total Site BTU's/yr	3,468.29	x 106	Total Area (sq.ft.)		
Floor area:	74,817	s.f.			

OWNER: Madisonville CISD				BUILDING: Junior High				
MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	COSTS
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	$
JANUARY	2009	68200	366	366	1,577	8,292	All Electric Facility	
FEBRUARY	2009	62,860	354	354	1,526	6,941		
MARCH	2009	57,520	342	342	1,474	5,590		
APRIL	2009	71360	320	320	1379	6,468		
MAY	2009	84960	334	334	1993	7,370		
JUNE	2009	78200	274	274	1826	5,462		
JULY	2009	75,920	265	265	1,077	4,079		
AUGUST	2009	102120	352	352	1517	5,764		
SEPTEMBER	2009	86800	345	345	1498	6,065		
OCTOBER	2009	73760	345	345	1723	6,888		
NOVEMBER	2009	72400	325	325	1400	1,858		
DECEMBER	2009	79760	371	1447	1447	9238		
TOTAL		913,860	3,993	5,069	18,437	$74,015	0	$0

			Energy Use Index:		
Annual Total Energy Cos	$74,015	Per Year	Total Site BTU's/yr	53,187	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	3,119.00	x 106			
Total MCF x 1.03 =	0.00	x 106	Energy Cost Index:		
Total Other x ____		x 106	Total Energy Cost/yr	$1.26	$/s.f. yr
Total Site BTU's/yr	3,119.00	x 106	Total Area (sq.ft.)		
Floor area:	58,642	s.f.			

OWNER: Madisonville CISD				BUILDING: 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	2009	156335	589	589	1250	12235	231	$1,576
FEBRUARY	2009	124,659	581	581	1,749	12243	113	$645
MARCH	2009	106,239	676	676	1,431	10486	48	$327
APRIL	2009	47,654	390	390	1,527	4526	37	$202
MAY	2009	155503	643	643	1160	13815	23	$128
JUNE	2009	177687	581	581	1659	11982	6	$50
JULY	2009	199871	518	518	2158	10150	22	$227
AUGUST	2009	252322	768	768	920	13445	27	$213
SEPTEMBER	2009	188045	637	637	1570	12738	46	$344
OCTOBER	2009	146206	619	619	1024	13391	44	$392
NOVEMBER	2009	155851.00	213	213	704	5293	191	$1,439
DECEMBER	2009	155238	641	641	1500	13197	391	$2,781
TOTAL		1,865,610	6,856	6,856	16,652	$133,501	1,179	$8,324

			Energy Use Index:		
Annual Total Energy Cos	$141,825	Per Year	Total Site BTU's/yr	76,242	BTU/s.f.yr
			Total Area (sq.ft.)		
Total KWH x 0.003413 =	6,367.33	x 106			
Total MCF x 1.03 =	1,214.37	x 106	Energy Cost Index:		
Total Other x ____		x 106	Total Energy Cost/yr	$1.43	$/s.f. yr
Total Site BTU's/yr	7,581.70	x 106	Total Area (sq.ft.)		
Floor area:	99,442	s.f.			

Charting the annual electricity consumption reveals that the district does 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. The district conditions their spaces with packaged heat pump units; control is provided with conventional thermostats. The lack of a decrease in consumption during summer months implies that more units than necessary are being operated for floor maintenance activities.

The second observation apparent from the consumption chart is that the electric heat used during the winter is having more of an impact on the utility budget than is the cooling consumption during the warmer months. This is contrary to curves generated by most South and Central Texas schools. One possible cause for this profile is that the electric heat may be undersized for the demand and therefore operates many more hours than should be necessary to satisfy comfort in the colder months.

Madisonville CISD is served by Guadalupe Valley Electric Coop. The rate schedule analysis for the district is shown below. A copy of the rate schedule is included in Appendix II.

4.0 RATE SCHEDULE ANALYSIS:

RETAIL ELECTRIC SUPPLIER: Entergy

Electric Rate: General Service

I.	Customer Charge	=	$37.1500 per meter
II.	Demand Charge	=	$4.31000 per Billing kW
III.	Energy Charge	=	$0.0234 per kWh

TTC RIDER		=	$0.0011000 per kWh
FUEL ADJUSTMENT	[Varies per month]	=	$0.0547115 per kWh
	[Average for 12 months of analyzed billing cycle.]		

Average Savings for consumption (from billings) = $0.0234 + $0.001100 + $0.0547115 = <u>$0.0792115 / kWh</u>

Average Savings for demand = $4.31 = <u>$4.31 / kW</u>**

** This number is a generalization of average cost per kW because the rate schedule from ENTERGY utilizes two (2) different types of demand for the calculation of the utility bill:

1. Highest Contract Power: the greater of (i) the highest Billing Load established during the billing months of June through September or (ii) the contracted kW specified in the currently effective contract.
2. Contract Power: the greater of (i) 60% of the Highest Contract Power, or (ii) the customer's maximum measured 30-minute demand during any 30-minute interval during the billing months of June – September during the 12 months ending with the current month.

NATURAL GAS PROVIDER: Atmos Energy

Rate schedule: C023

Customer Charge:	$13.50 per month
Consumption Charge:	$ 0.98090 per MCF
Gas Cost Recovery Rider:	Varies per month
Various Riders	

Average cost for the commodity determined through utility billings:

Cost for Natural Gas purchased during billing cycle by NISD: $8,658

Quantity of Natural gas purchased during billing cycle by NISD: 1,204 mcf

Average cost per mcf = Quantity Purchased / Cost of Purchase = $8,658 / 1,204 mcf = **<u>$7.19/mcf</u>**

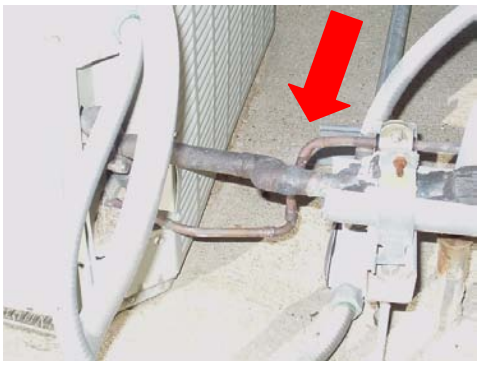
5.0 CAMPUS DESCRIPTIONS:

Madisonville CISD consists of a recently renovated (2009-2010) Administration complex and five main educational campuses which are located in Madisonville, Texas. There is a Head Start campus, along with an Elementary, Intermediate, Junior High and High School campus. The district serves approximately 2,250 students.

All of the buildings are brick-clad structures, many of which used to have flat built-up roofs. The district has renovated the buildings to have low-sloping metal roofs. There is natural gas available at most campuses, but its use is often limited to culinary equipment and domestic water heaters in the Kitchen area.

HVAC System Description:

The majority of the campuses are conditioned with packaged or split system heat pump units. At the High School, these 11 year old, predominantly Trane TTA split system units remain in reasonably good condition. There are several of the units which need their refrigerant insulation repaired or replaced. This condition allows the refrigerant to absorb heat from the ambient air and minimizes its ability to absorb heat in the conditioned space as intended.



Additionally, one of the units, a 10-ton model, lacked proper coil protection and has suffered minor to moderate coil fin damage. This type damage, even affecting just 10% of the coil fin surface, can result in a loss of overall operating efficiency up to 30%.

The oldest HVAC units in the district are located at the Elementary School. *Here, there are 42 each 1994 heat pump split systems totaling 123 tons of cooling capacity that we recommend be considered for replacement*. At 16 years old, the units have surpassed their 15 year anticipated life expectancy and have begun to suffer increased maintenance expenses to replace them on an emergency basis or to simply keep them running.

The large air handlers at the Auditorium were found conditioning the space to occupied setpoint temperatures (~73°F) with the space unoccupied at the time of the survey. We recommend the district consider an occupancy sensor in this space to signal the system when occupants enter the space and use a setback temperature of 80°F for anytime the rest of the building is occupied and occupancy of this space is possible, but not require the system to maintain occupied cooling setpoint at all times of the day.

It was noted during the survey that many of the domestic water heaters had damaged or missing insulation on the hot water lines. The majority of the energy losses in a hot water

system occur through the hot water piping. We recommend the district repair or replace the insulation at all water heaters as necessary. The water heaters pictured to the right had approximately 24' of 2-1/2" pipe and 12' of 1" pipe uninsulated. Assuming the ambient temperature in the space is about 80°F average, and the loop temperature runs at 120°F, this conservative condition would be costing the district $130 per year in energy losses. Higher loop temperatures and lower temperatures in the space would lead to much higher energy losses.

Control System Description:

The district utilizes a computer-based energy management system (EMS) for most of the district's facilities. A combination of conventional and programmable thermostats does still exist for areas not currently under the EMS control. *We recommend the district consider replacing the existing conventional and programmable thermostats with IP-addressable programmable thermostats to allow the staff to monitor and control the HVAC units through the local school intranet instead of having to travel to each individual location to inspect or update the thermostat's operation*. These devices can offer considerable amounts of labor and energy savings by allowing the unit's to be accessed from one central location, without requiring the expense of expanding the EMS to areas not currently covered. Examples of areas not covered by the current EMS are the Administration Building and the new 10 classroom addition at the High School.

Currently, at least one thermostat, the Band Hall unit (see picture to the right), was blocked by music files which can lead to inappropriate temperature sampling in the space. *We recommend the music, or the thermostat itself, be relocated to a less obstructed location.*

Lighting System Description:

All of the district's campuses are illuminated with T8 linear fluorescent fixtures. There are energy savings opportunities in several of the buildings through de-lamping or by simply turning off lights that currently operate when the spaces are unoccupied or in daylit areas.

High School

The newest ten classroom addition to the High School was recently completed in 2010. In these areas, 4-lamp T8 fixtures were used almost exclusively, regardless of space type. The corridors contain 26 each 4-lamp fixtures which are producing 70-82 footcandles on the corridor floor. The Illumination Engineering Society of North America (IESNA), the investigatory body that determines appropriate light levels for tasks performed within a facility, has recommended that corridors can be maintained with as little as 10-15 footcandles. *Our recommendation is for the district to de-lamp two of the four lamps in each corridor fixture*

which will lower the corridor light levels to 35-40 footcandles. At these levels, the corridors should not appear to be too dark, but the excess energy required to operate the additional two lamps will be available as energy savings. These 26 fixtures de-lamped to 2-lamps each, will save MCISD approximately $330 per year, assuming the fixtures operate about 2100 hours per year.

Similarly, the classrooms in this addition demonstrate light levels considerably higher than the 50 footcandles recommended by IESNA. The eight 4-lamp fixtures in each classroom produced 112-116 footcandles at the desktop surface. The fixtures are bank switched (five fixtures controlled by one switch, and 3 fixtures controlled by a second switch) with light level readings of 90 footcandles and 44 footcandles when just one of the switches is turned on, respectively. De-lamping these fixtures to two lamps should result in light levels of about 56 footcandles at the desktop surface, almost perfectly in line with the 50fc recommendation from IESNA.

The Junior High corridor is another location where 4-lamp fixtures are being utilized for areas only requiring 2-lamp fixtures. Light level readings in this area were 44-80 footcandles. Fifteen fixtures could be de-lamped in this area and still produce 22-40 footcandles in the corridor.

It was noted during the survey that a few exterior light fixtures were operating during the day. One example is the exterior lights at the Auto Tech Shop. We recommend replacing or repairing the photocell or timeclock that is intended to control these fixtures and prevent them from operating during daytime hours.

At the Band Hall, there are 19 each twin compact fluorescent (CFL) fixtures around the perimeter of the room which were discovered operating with the space unoccupied. These fixtures contribute little light to the task area of the room and can likely be left off during daytime hours altogether. Turning these fixtures off during daytime hours could save the district $267 per year.

The High School competition gymnasium utilizes 20 each 400-watt metal halide fixtures and 40 each 3-lamp T8 fluorescent fixtures. The concept is for the T8 fixtures to be used during general physical education classes and the metal halides to be brought on for competition activities. The fluorescent fixtures were discovered operating when the gym was unoccupied. Since the fluorescent fixtures do not have the re-strike issue inherent to metal halides, they can be easily turned off when the space is unoccupied. *We recommend the district begin to turn off the fluorescent fixtures when the space is empty.*

The Junior High gymnasium utilizes 20 each 400-watt and the Intermediate Gym utilizes 24 each 250-watt metal halide fixtures. One characteristic of metal halide fixtures is their inherently long re-strike. This means that if the fixtures are ever turned off, it can take up to 15 minutes for them to come back on. This long re-strike encourages coaches and staff to leave the lights on throughout the day, even if the space is not occupied. *We recommend that the metal halide fixtures be replaced with new T5 high-bay linear fluorescent fixtures that can be turned off when*

the space is unoccupied. Additionally, the new fixtures can be designed with multiple ballasts that will allow the fixtures to operate with ½ the number of lamps for general physical education class periods and then fully activated for competitive sports activities.

At the Elementary School cafeteria, there are nine 4-lamp fixtures lining the window wall which could be kept off during daylight hours. As can be seen in the picture to the right, with the shades open, there would be no need for the artificial light fixtures to operate during the day. *We recommend the district use a photocell to sample the light level in front of the windows and determine if the light output from the fixtures is necessary.*

General District Observations:

It was noted during the survey that many of the computers in the High School Library do not appear to have an automatic power reduction program operating to eliminate unnecessary monitor and/or CPU operation when the space is not occupied. The programs offer different levels of control that can be adjusted based on the desires of the district's IT Department. At the most basic levels, monitor operation will "time-out" after a programmed period of inactivity, eliminating unnecessary energy consumption to operate screen savers. More advanced levels will also hibernate the entire computer and reduce energy consumption levels to bare minimums for units in unoccupied spaces. Studies have shown that these programs can save as much as $17 per computer per year in a public school facility.

There were several exterior doors with missing or damaged weatherstripping (see picture to the right). This condition allows for conditioned air to escape the building, contaminants to enter the building and prevents the building from maintaining a slightly positive overall pressure to promote good indoor air quality. This condition was discovered at all school locations.

There were several vending machines that do not appear to have any control over the lighting or the operation of the compressor, as can be seen in the picture to the right. *We recommend the district install vending misers for these units.* The devices utilize an occupancy sensor to turn off the advertising lighting and cycle the compressor (the contents are only allowed to warm up to a programmed temperature) when the space is unoccupied.

6.0 RECOMMENDATIONS

A. MAINTENANCE AND OPERATIONS PROCEDURES

HVAC

- Comb fins on damaged condensing units
- Install hail guards to protect fins in future
- Replace/Repair refrigerant line insualtion
- Operate Auditorium Units with unoccupied setback temperature
- Repair/Replace damaged or missing hot water pipe insulation
- Ensure Band Hall thermostat in open location

Lighting

- De-lamp 4-lamp fixtures to 2-lamp in areas with excess light levels
- Repair or replace photocell at HS Auto Tech
- Turn off artificial fixtures where daylighting exists
- Replace incandescent exit lamps with LED lamps

Building Envelope

- Check weatherstrip at all exterior doors, replace as needed
- Initiate Power Management Program for HS Library computers
- Install vending misers on uncontrolled vending machines

Maintenance and Operation procedures are strategies that can offer significant energy savings potential, yet require little or no capital investment by the district to implement. Exact paybacks are at times difficult to calculate, but are typically always less than one year. The difficulties with payback calculation are often related to the fact that the investigation required to make the payback calculation, for example measuring the air gap between exterior doors and missing or damaged weatherstripping so that exact air losses may be determined, is time and cost prohibitive when the benefits of renovating door and weather weatherstripping are well documented and universally accepted.

HVAC M&O

At MCISD, the HVAC M&O opportunities revolve around combing the condenser fins [combs available for less than $10]. The installation of coil guards and concrete maintenance pads 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.

Lighting M&O

The existing exit lamps are incandescent. Replacing these lamps with new LED lamps will significantly reduce energy consumption and reduce the frequency of required lamp maintenance.

Envelope M&O

As discussed previously, calculating paybacks for missing or damaged weatherstripping is tedious and serves little purpose. It was noted there were several exterior doors around the district that suffered from missing or absent weatherstripping and we recommend that these situations be addressed as the opportunity arises.

B. CAPITAL EXPENSE PROJECTS

HVAC	•Replace 42 each 1994 Heat Pump Units •Replace exisitng programmable or conventional thermostats with new IP Addressable Programmable thermostat
Lighting	•Renovate Gym metal halide fixtures with T5 high bay fluorescents

HVAC and Controls ECRMs

ECRM #1: Plan to replace 42 each 1994 split system heat pumps.

These units have surpassed their estimated 15 year life expectancy and have begun to generate high maintenance costs to keep them operating. The total cooling capacity represented by these 42 units is 123 tons.

Estimated Installed Cost	=	$252,150
Estimated Energy Cost Savings	=	$ 21,000
Simple Payback Period	=	12 years

Note: This payback is longer than many HVAC replacement projects because these units have been designed with the older 5CFM per student of outside air requirement instead of the current 15 CFM per student requirement of ASHRAE 62.1. The increased outside air requirement may require an increase in the total cooling capacity of some of the units and will reduce the overall payback period.

ECRM #2: Replace existing conventional or programmable thermostats with new IP Addressable Programmable thermostats.

The new units will allow the staff to monitor and control the HVAC systems over the intranet without requiring the expense to extend the EMS to areas where there is no coverage.

Estimated Installed Cost	=	$450 per unit
Estimated Energy Cost Savings	=	$115
Simple Payback Period	=	4 years

<u>LIGHTING ECRMs</u>

ECRM #1: Renovate existing metal halide gymnasium lighting with new T5 high-bay fluorescent fixtures.

There are 20 400-watt metal halide fixtures at the Junior High and 24 400-watt metal halide fixtures at the Intermediate School that we recommend be replaced with new four or six-lamp T5 high-bay fluorescent fixtures. The new fixtures do not have the long re-strike issue inherent to metal halides and can therefore be turned off when the area is unoccupied.

Estimated Installed Cost	=	$ 17,600
Estimated Energy Cost Savings	=	$ 3,000
Simple Payback Period	=	6 years

SUMMARY TABLE:

If all of the recommended projects were completed at one time, the overall project finances would be as follows:

Estimated Installed Cost	=	$ 269,750
Estimated Energy Cost Savings	=	$ 24,000
Simple Payback Period	=	11-1/4 years

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. Savings decreases 2% per year after year 5				
Cash Flow	**Project Cost**	**Project Savings**	**Maintenance Expense**	**Net Cash Flow**
Time 0	($269,750.00)		0	($269,750)
Year 1		$ 24,000.00	0	$24,000
Year 2		$ 24,000.00	0	$24,000
Year 3		$ 24,000.00	0	$24,000
Year 4		$ 24,000.00	0	$24,000
Year 5		$ 24,000.00	0	$24,000
Year 6		$ 23,520.00	($500)	$23,020
Year 7		$ 23,040.00	($500)	$22,540
Year 8		$ 22,560.00	($500)	$22,060
Year 9		$ 22,080.00	($500)	$21,580
Year 10		$ 21,600.00	($500)	$21,100
Year 11		$ 21,120.00	($500)	$20,620
Year 12		$ 20,640.00	($500)	$20,140
Year 13		$ 20,160.00	($500)	$19,660
Year 14		$ 19,680.00	($500)	$19,180
Year 15		$ 19,200.00	($500)	$18,700
			Internal Rate of Return	**2.70%**

More information regarding financial programs available to MCISD 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:

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 Theresa Sifuentes of State Energy Conservation Office, (SECO), at 512-463-1896 for assistance in preparing requests for proposals or requests for qualifications.

Solution Center

How to Finance Your Energy Program

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

Selecting a Cost/Benefit Analysis Method

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

Simple Payback Analysis

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

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

Simple Payback

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

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

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

Life-Cycle Cost Analysis

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

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

continued

Financing Mechanisms

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

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

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

Internal Funds

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

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

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

Debt Financing

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

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

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

ENTERGY TEXAS, INC. Electric Service SCHEDULE GS	Sheet No.: 9 Effective Date: 1-28-09 Revision: 14 Supersedes: GS Effective 3-1-99 Schedule Consists of: Two Sheets

GENERAL SERVICE

I. APPLICABILITY

This rate is applicable under the regular terms and conditions of the Company to Customers who contract for not less than 5 kW or not more than 2,500 kW of electric service to be used for general lighting and power.

II. NET MONTHLY BILL

A. Customer Charge $37.15 per month

B. Billing Load Charge
All kW per month $ 4.31 per kW

C. Energy Charge

All kWh used $ 0.02003 per kWh*

*Plus the Fixed Fuel Factor per Schedule FF and all applicable riders.

D. Delivery Voltage Adjustment

The Delivery Voltage below represents the voltage of the line from which service is delivered and metered or the voltage used in determining the facilities charge under Schedule AFC, whichever is less. When service is metered at a voltage other than the Delivery Voltage, metered quantities will be adjusted by 1.5% for each transformation step to the Delivery Voltage.

Delivery Voltage	Adjustment
Secondary	No adjustment
Primary (2.4KV-34.5KV)	($0.53) per kW of Billing Load
69KV/138KV	($1.05) per kW of Billing Load

E. Minimum Charge

The monthly minimum charge will be the sum of the Customer Charge, the Billing Load Charge and the Delivery Voltage Adjustment. Where the installation of excessive new facilities is required or where there are special conditions affecting the service, Company may require, in the Contract, a higher minimum charge and/or Facilities Agreement pursuant to Schedule AFC, to compensate for the additional costs.

(Continued on reverse side)

III. METERING, PHASE AND VOLTAGE OF SERVICE

Service under this rate schedule will be rendered at the Company's standard phase and voltage available at the point of service. Customer will pay a facilities charge as set forth in Schedule AFC for any applicable nonstandard or duplicative facilities.

Where the Customer elects to take service at the available line voltage (greater than Secondary), metering will be installed at that voltage and Customer will receive the applicable Voltage Adjustment pursuant to § II (D) above. In such cases, Customer may elect to have Company install the necessary transformation facilities to provide service at a lower voltage and Customer will then pay facilities charges pursuant to Schedule AFC. At Company's option, metering may then be at Secondary and Customer's metered quantities will be adjusted pursuant to § II (D) above.

Where service is of extremely fluctuating or intermittent type, Company may specify shorter intervals of load measurement than 30-minute intervals.

IV. POWER FACTOR ADJUSTMENT

Where Customer's power factor of total service supplied by Company is such that 80% of measured monthly maximum kVA used during any 30-minute interval exceeds the corresponding measured kW, Company will use 80% of such measured maximum kVA as the number of kW for all purposes that measured maximum kW load is specified herein. However, where Customer's power factor is regularly 80% or higher, Company may at its option omit kVA metering equipment or remove same if previously installed.

V. DETERMINATION OF BILLING LOAD

The kW of Billing Load will be the greatest of the following:

(A) The Customer's maximum measured 30-minute demand during any 30-minute interval of the current billing month, subject to § III, and IV above; or

(B) 50% of the first 500 kW of Contract Power plus 75% of all additional kW of Contract Power as defined in § VI, or

(C) 5 kW.

VI. DETERMINATION OF CONTRACT POWER

Unless Company gives Customer written notice to the contrary, Highest Contract Power and Contract Power will be as defined below:

Highest Contract Power - the greater of (i) the highest Billing Load established during the billing months of June through September since service to Customer began under the currently effective contract or (ii) the contracted kW specified in the currently effective contract.

Contract Power - the greater of (i) 60% of the Highest Contract Power, or (ii) the highest load established under V (A) above during the billing months of June - September during the 12 months ending with the current month. For the initial 12 months of Customer's service, the Contract Power shall be estimated in advance from best data available and subject to adjustment for difference in actual and estimated.

 (Continued on next page)

ENTERGY TEXAS, INC.
Electric Service

SCHEDULE GS (Cont.)

Sheet No.: 10
Effective Date: 1-28-09
Revision: 14
Supersedes: GS Effective 3-1-99
Schedule Consists of: Two Sheets

GENERAL SERVICE

VII. **USE OF SERVICE**

Electric service furnished under this rate shall not be used by Customer as an auxiliary or supplementary service to engines or other prime movers, or to any other source of power except in conjunction with rider for Standby and Maintenance Service. Customer shall not sub-meter and resell any energy purchased under this rate, except as may be specifically authorized by the appropriate regulatory authority.

VIII. **AMOUNT DUE AND PAYMENT**

The past due amount for service furnished for which payment is not made within sixteen (16) days of the billing date shall be the monthly bill, including all adjustments under the rate schedule and applicable riders, plus 5% of the first $50.00 and 2% of any additional amount of such net monthly bill above $50.00. If the amount due when rendered is paid prior to such date, the monthly bill, including all adjustments under the rate schedule and applicable riders, shall apply. If providing service to the state of Texas, Company shall not assess a fee, penalty, interest or other charge to the state for delinquent payment of a bill.

ENTERGY TEXAS, INC. Electric Service SCHEDULE SMC	Sheet No.: 13 Effective Date: 1-28-09 Revision: 9 Supersedes: SMC Effective 12-18-98 Schedule Consists of: One Sheet

SPECIAL MINIMUM CHARGE RIDER TO SCHEDULES SGS, GS AND LGS

I. APPLICABILITY

This rider is applicable under the regular terms and conditions of the Company to Customers served under Schedule SGS, GS or LGS for service to seasonal operations recurring annually such as the following:

- seasonally operated municipal facilities including sewage treatment plants, municipally-owned seasonal athletic fields;
- Municipal Utility Districts serving an incorporated city;
- churches; and,
- elementary and secondary schools (public and parochial) and state colleges and universities including the athletic fields of such educational institutions.

For purposes of this rider, seasonal operations are those operations associated with agricultural products (rice, soybeans, cotton, etc.), ball parks operated by non-profit organizations, and public playgrounds.

II. MODIFICATION TO REGULAR RATE SCHEDULE

Section V, Determination of Billing Load, under Schedules GS and LGS is modified to the extent that Billing Load will be the actual maximum kW load of the current month but not less than 5 kW under Schedule GS and 300 kW under Schedule LGS.

III. SEASONALLY OPERATED FACILITY RECONNECTIONS

Seasonally operated facilities such as those described above may, upon request, reconnect after the facility's regular seasonal operations have been completed. Such reconnections will be allowed in accordance with § A and B below. Where a portion of the service, such as lighting is on a year-round basis and not seasonally disconnected, Customer will arrange wiring so that such portion can be separately served, metered, and billed under the applicable rate schedule.

A. Following a seasonal disconnect, the first reconnection of service requested in the same calendar year that the seasonal disconnect was requested will be free of charge;

B. For each additional reconnection of service requested thereafter, in the same calendar year, the customer will be charged a Connection Charge in accordance with § II.B of Rate Schedule MES.

ENTERGY TEXAS, INC.
Electric Service

SCHEDULE FF

Sheet No.: 51
Effective Date: 3-2-10
Revision: 29
Supersedes: FF Effective 8-28-09
Schedule Consists of: One Sheet

FIXED FUEL FACTOR AND LOSS MULTIPLIERS

The Texas retail fixed fuel factor is $0.0528816 per kWh.

The loss multipliers by voltage level are:

Delivery Voltage	Loss Multiplier
Secondary	1.034603
Primary	1.004911
69KV/138KV	0.962921
230KV	0.945741

The corresponding fixed fuel factors by voltage level are:

Delivery Voltage	Fixed Fuel Factor
Secondary	$0.0547115 per kWh
Primary	$0.0531413 per kWh
69KV/138KV	$0.0509208 per kWh
230KV	$0.0500123 per kWh

APPENDIX IV - 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 Madisonville CISD, 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.

no PEA on Record

Signature: _____ Date: February 25, 2010

Name (Mr./Ms./Dr.) Keith Smith Title: Superintendent

Organization: Madisonville CISD Phone: _____

Street Address: _____ Fax: _____

Mailing Address: _____ E-Mail: ksmith@madisonvillecisd.org

County: Madison / ESA

Contact Information:

Name (Mr./Ms./Dr.): James Sanders Title: Business Mgr.

Phone: 936-348-2797 Fax: _____

E-Mail: jsanders@madisonvillecisd.org County: Madison

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.

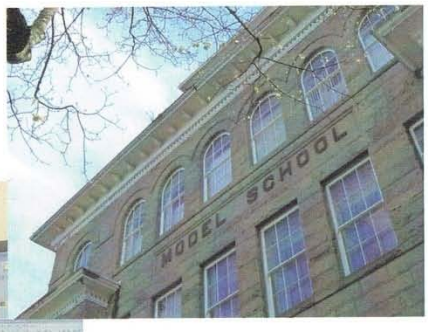
APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

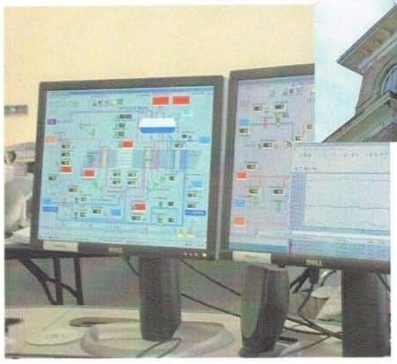
ANNOUNCING!

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.

SECO
State Energy Conservation Office

APPENDIX VI - UTILITY CHARTS ON CD