



Facility Preliminary Energy Assessments and Recommendations

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Sabine Pass Independent School District

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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 February 2010, **SECO** received a request for technical assistance from Malcolm Nash, Superintendent for **Sabine Pass 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 **Sabine Pass ISD**, (hereafter known as SPISD) 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. Tom Butler*, a walk-through energy analysis was conducted throughout the campus. Specific findings of this survey and the resulting recommendations for both operation and maintenance procedures and cost-effective energy retrofit installations are identified in Section 7.0 of this report.

We estimate that as much as \$24,800 may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **\$358,000**, yielding an average simple payback of **14-1/2** years.

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

SUMMARY:	IMPLEMENTATION COST	ESTIMATED SAVINGS	SIMPLE PAYBACK
HVAC ECRM #1	\$350,000	\$23,300	15 Years
HVAC ECRM #2	\$8,000	\$1,500	5-1/3 Years
TOTAL PROJECTS	\$358,000	\$24,800	14-1/2 Years

Although additional savings from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Internal Rate of Return (IRR), for this retrofit program has been calculated and shown in Section 8.0 of this report.

Our final “summary” comment is that **SECO** views the completion and presentation of this report as a beginning, rather than an end, of our relationship with SPISD. We hope to be ongoing partners in assisting you to implement the recommendations listed in this report. Please call us if you have further questions or comments regarding your Energy Management Issues.

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2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities. After receipt of the PEASA, an initial visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state to review the program elements that SECO provides to school districts and determine which elements could best benefit the district. A summary of the *Partner's* most recent twelve months of utility bills was provided to the engineer for the preliminary assessment of the Energy Performance Indicators. After reviewing the utility bill data analysis and consultation with SECO to determine the program elements to be provided to SPISD, 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

$$[\text{Total KWH /yr}] \times [3413 \text{ BTUs/KWH}] = \text{_____ BTUs / yr}$$

NATURAL GAS Usage

$$[\text{Total MCF/yr}] \times [1,030,000 \text{ BTUs/MCF}] = \text{_____ BTUs / yr}$$

After adding the BTU consumption of each fuel, the total BTUs are then divided by the building area.

$$\text{EUI} = [\text{Electricity BTUs} + \text{Gas BTUs}] \text{ divided by } [\text{Total square feet}]$$

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:

$$\text{ECI} = [\text{Electricity Cost} + \text{Gas Cost}] \text{ divided by } [\text{Total square feet}]$$

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.

OWNER: Sabine Pass ISD

BUILDING: Gym and Auditorium

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	2011	55,000		290	3,230	4,786	200	1,592
FEBRUARY	2011	48,000		190	2,217	3,575	217	1,699
MARCH	2011	42,000		215	1,994	3,182	240	1,800
APRIL	2010	Building Was Opened November 2010						
MAY	2010							
JUNE	2010							
JULY	2010							
AUGUST	2010							
SEPTEMBER	2010							
OCTOBER	2010							
NOVEMBER	2010	100,000		325	3,526	7,232	2	69
DECEMBER	2010	94,000		295	5,983	8,629	199	1,432
TOTAL		339,000	0	1,315	16,950	\$27,404	858	\$6,592

Annual Total Energy Cost = \$33,996 Per Year

Total KWH x 0.003413 = 1,157.01 x 106

Total MCF x 1.03 = 883.74 x 106

Total Other x _____ x 106

Total Site BTU's/yr 2,040.75 x 106

Floor area: 57,655 s.f.

Electric Utility
Entergy

Energy Use Index:

Total Site BTU's/yr

Total Area (sq.ft.)

35,396 BTU/s.f.yr

Energy Cost Index:

Total Energy Cost/yr

Total Area (sq.ft.)

\$0.59 \$/s.f. yr

Gas Utility

Texas Gas Service

4.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER:

RETAIL ELECTRIC PROVIDER: None Contract price: \$0.02738 per kWh

TRANSMISSION AND DISTRIBUTION UTILITY: Entergy Texas, Inc.

Electric Rate: General Service > 5 kW

I. TRANSMISSION AND DISTRIBUTION CHARGES:

Customer Charge	=	\$41.09 per month
Billing Load Charge	=	\$4.77 per kW
Energy Charge	=	\$0.02214 per kWh
Fixed Fuel Factor (Secondary Service)	=	\$0.0416953 per kWh
Loss Multiplier (Secondary Service)	=	1.034603

Average Savings for consumption = $\$0.02738/\text{kWh} + \$0.02214/\text{kWh} + \$0.0416953 = \underline{\underline{\$0.0912153/\text{kWh}}}$

Average Savings for demand = $\underline{\underline{\$ 4.77/\text{kW}}}$

NATURAL GAS PROVIDER:

The rate schedule for Natural gas is unavailable, but we have calculated the average cost per MCF of purchased natural gas in the district by analyzing the utility histories for the schools surveyed in this report.

Total cost for natural gas at the eight facilities in the analyzed billing cycle: \$14,627

Total quantity purchased during the analyzed billing cycle: 1,891 MCF

Average cost per MCF = Cost of natural gas / quantity purchased = \$14,627 / 1,891 MCF

Average cost per MCF = \$7.74

5.0 CAMPUS DESCRIPTIONS:

Sabine Pass ISD consists of one K-12 educational campus located in the City of Sabine Pass, which is located in Jefferson County, Texas. The district serves 255 students.

Located immediately adjacent to the Gulf of Mexico, much of Sabine Pass has suffered recent damage from Hurricanes Rita and Ike. The main building suffered extensive roof damage after Hurricane Rita; the school Gym and Auditorium suffered extensive flood damage after Ike. As a result, the facilities have been re-built and none of the equipment is more than 9 years old.



Table 2: School Facilities Analyzed For This Report

Facility	Year originally Constructed	Approximate Square Footage	Basic HVAC Cool/Heat	Basic HVAC Air Distribution	Basic Lighting System Description	Basic Control System Description
K-12	2002	80,000	Hydronic Central System/ Air Cooled Chillers/gas fired boilers	VAV AHU	100% T8	DDC Automated Logic
Gymnasium/ Auditorium	2010	57,655	Hydronic Central System/ Air Cooled Chillers/gas fired boilers	VAV AHU	100% T8	DDC Automated Logic

6.0 ENERGY RECOMMENDATIONS:

HVAC ECRM 1: RENOVATION OF AGED HVAC EQUIPMENT

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

Gymnasium and Auditorium Building

This 80,000 square foot facility is currently conditioned with (2) York 20-ton air cooled chillers. These chillers supply (8) air handling units that distribute the conditioned air to the occupied space. The (2) chillers were manufactured in 2000 and are approaching their life expectancy of fifteen years. *We recommend creating a budget plan to replace these units within the next three to five years to avoid an emergency replacement cost scenario.*

Estimated Cost: \$350,000 Estimated Savings: \$23,300 Estimated Payback: 15 Years

HVAC ECRM 2: REPLACEMENT OF ELECTRIC BOOSTER HEATER

It was noted during the survey that the kitchen dishwasher at this facility utilizes a 460/3/65A booster heater to heat the water to the appropriate temperature to sterilize the dishes. Gas-fired booster heaters are less expensive to operate than electric booster heaters for two reasons:

1. The electric booster heater raises the peak demand at the facility while it's operating by 45 kW. At the current average cost per kW of demand, this represents \$215 per month, \$2,579 per year.
2. Natural gas supplies more BTUs per dollar than electricity. Natural gas is \$4.77/MCF at Sabine Pass. With 1,030,000 BTUs/MCF and assuming the burner is 80% efficient, this means natural gas costs \$0.00000579 per BTU. Electricity supplies 3,413 BTUs per kWh. With a cost of \$0.0912153/kWh, this equals \$0.0000267258. Therefore, electricity is 4-1/2 times more expensive per BTU than natural gas.

We recommend replacing the 45kW electric booster heater with a 150,000 BTU gas-fired booster heater.

Estimated Cost: \$8,000 Estimated Savings: \$1,500 Estimated Payback: 5-1/3 Years

7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

HVAC

- Keep pump valves in appropriate open position
- Replace refrigerant line insulation

Lighting

- Turn off all light fixtures not required during daytime
- Turn off lights in unoccupied spaces
- Turn off trophy case lighting when trophies are not present
- Replace trophy case lighting
- Install exterior lighting motion sensors
- "Turn Off Lights" program

Controls

- Ensure outside air dampers and exhaust fans are controlled
- Reprogram schedule

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

HVAC M&O #1

Upon inspection of the high school section of this campus, it was noted that the primary chilled water pump variable frequency drive was running at 56 hertz and was essentially dead-heading against the shut flow control valve. The VFD cannot realize the energy savings potential to match required loads when the manual flow valves are closed. *We recommend investigating the reason for the valve closure. If no reason determined, we recommend the manual valve be opened to allow the VFD to match the load conditions and conserve energy.*



HVAC M&O #2

During the survey, it was observed that the refrigerant piping insulation at one of the air cooled chillers was damaged. *We recommend the district replace the insulation in order to prevent the refrigerant from absorbing heat from the atmosphere.*



Lighting M&O #1

Some areas of the buildings noted in Section 6.0 of the report had light fixtures that were not required to be operating during the day or were fixtures left operating in unoccupied spaces. The least expensive remedy to these issues is to train staff to not turn on fixtures not needed during daytime hours and to turn off fixtures in unoccupied spaces. Failure of the behavioral modification training will require the district to invest capital into automatic controls for the fixtures. *In order to help train staff to turn off the lights the district can implement a “Turn off the Lights” program which actively engages the students and faculty.*

It was noted during the survey that there are numerous trophy cases that are still utilizing T12 fluorescent fixtures with magnetic ballasts. T12 components produce approximately 18% less light and consume about 20% more energy than the T8 lamps and electronic ballasts that may be retrofit into the existing linear fluorescent fixtures. Senate Bill 300 requires Texas school districts to install the most efficient lamps and ballasts possible in their existing fixtures. *Therefore we recommend the district retrofit the fixtures at these facilities with T8 lamps and electronic ballasts.* Below is the cost estimates per lamp fixture replacement.



Estimated Cost: \$25

Estimated Savings: \$7

Estimated Payback: 4 Years

Also noted was the fact that the trophy cases' lights are turned on during the day without having trophies in them. *We recommend turning the case lighting off when they are not being utilized to display trophies.*

Lighting M&O #2

The engineer observed that the school has a significant number of exterior lights that remain on approximately twelve hours every night. At certain locations around the exterior of the building the lights could be turned off when not needed. *We recommend the district consider installing motion sensors on these fixtures to minimize the amount of energy used by the night lights.* The fixtures will turn on if motion is detected in the area, but the energy savings available by keeping these fixtures off most of the night is potentially significant. The district should note that the types of exterior fixtures have a significant impact on the ability to implement this measure. Compact fluorescent and halogen fixtures work well with motion sensors; metal halides do not as they have an inherently long strike/re-strike characteristic. The motion sensor will energize the metal halide fixture, but the light output will not be immediately available. Implementing this measure would also necessitate replacing metal halide fixtures with compact fluorescent units. The estimated cost and savings below covers the installation of a motion sensor on one exterior fixture and does not include any replacement of potential metal halide fixtures at the school.

Estimated Cost: \$75

Estimated Savings: \$200

Estimated Payback: 5 Months

Lighting M&O #3

The exterior of the building utilizes 50 watt Damar metal halide fixtures. The tour personnel stated that these lamps are very expensive to replace. *We recommend replacing these fixtures with a fixture that has a less expensive replacement lamp and is also compatible with motion sensor operation, such as a compact fluorescent.*



Controls M&O #1

The district stated that the control system schedule is set to turn on at 5:30 am and turn off at 5:00 pm. The district stated that the early start time was required in order for the spaces to feel comfortable by the time occupants arrive. Typically, systems that require long operation hours just to reach early morning setpoint have some outside air dampers or exhaust fans that are not under control by the energy management system. Outside air dampers that remain open during startup (not required by ASHRAE when students are not in the space) inhibit the system from reaching setpoint quickly in the morning. Exhaust fans that are not controlled will often be left operating overnight. Without the remainder of the HVAC system operating at night, the building is placed in an overall negative pressure condition and humid night air is brought unnecessarily into the building. *We recommend the district ensure that all outside air dampers and exhaust fans are connected to the control system to ensure that excess outside air*

is not infiltrating the building causing the system to take longer to reach setpoint. When the outside air dampers and exhaust fans are controlled we recommend the district experiment with start times to minimize system operating hours yet still have satisfactory conditions when teachers and students arrive.

8.0 FINANCIAL EVALUATION

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

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

Proposal:	Perform recommended ECRMs			
Assumptions:				
	1. Equipment will last at least 15 years prior to next renovation			
	2. No maintenance expenses for first five years (warranty period)			
	3. \$500 maintenance expense next 5 years			
	4. \$1,000 maintenance expense next 5 years			
	5. Savings decreases 5% per year after year 5			
Cash Flow	Project Cost	Project Savings	Maintenance Expense	Net Cash Flow
Time 0	(\$358,000)		0	(\$358,000)
Year 1		\$ 24,800.00	0	\$24,800
Year 2		\$ 24,800.00	0	\$24,800
Year 3		\$ 24,800.00	0	\$24,800
Year 4		\$ 24,800.00	0	\$24,800
Year 5		\$ 24,800.00	0	\$24,800
Year 6		\$ 23,560.00	(\$500)	\$23,060
Year 7		\$ 22,320.00	(\$500)	\$21,820
Year 8		\$ 21,080.00	(\$500)	\$20,580
Year 9		\$ 19,840.00	(\$500)	\$19,340
Year 10		\$ 18,600.00	(\$500)	\$18,100
Year 11		\$ 17,360.00	(\$1,000)	\$16,360
Year 12		\$ 16,120.00	(\$1,000)	\$15,120
Year 13		\$ 14,880.00	(\$1,000)	\$13,880
Year 14		\$ 13,640.00	(\$1,000)	\$12,640
Year 15		\$ 12,400.00	(\$1,000)	\$11,400
			Internal Rate of Return	-2.59%

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

9.0 GENERAL COMMENTS

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

APPENDICES

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

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

LoanSTAR Program:

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

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

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

Loans on Commercial Market:

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

Leasing Corporations:

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

Bond Issue:

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

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

State Purchasing:

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

Design/Bid/Build (Competitive Bidding):

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

Design/Build:

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

Purchasing Standardization Method:

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

Performance Contracting:

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

How to Finance Your Energy Program



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

Selecting a Cost/Benefit Analysis Method

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

Simple Payback Analysis

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

This kind of analysis assumes that the service life of the energy-efficiency measure will equal or exceed the simple payback time. Simple payback analysis provides a relatively easy way to examine the overall costs and savings potentials for a variety of project alternatives. However, it does

not consider a number of factors that are difficult to predict, yet can have a significant impact on cost savings. These factors may be considered by performing a life-cycle cost (LCC) analysis.

Simple Payback

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

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

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

Life-Cycle Cost Analysis

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

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

continued

How to Finance Your Energy Program *continued*

Financing Mechanisms

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

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

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

Internal Funds

The most direct way for the owner of a building or facility to pay for energy-efficiency improvements is to allocate funds from the internal capital or operating budget. Financing internally has two clear advantages over the other options discussed below – it retains internally all savings from increased energy-efficiency, and it is usually the simplest option administratively. The resulting savings may be used to decrease overall operating

expenses in future years or retained within a revolving fund used to support additional efficiency investments. Many public and private organizations regularly finance some or all of their energy-efficiency improvements from internal funds.

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

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

Debt Financing

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

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

How to Finance Your Energy Program *continued*

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

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

Lease and Lease-Purchase Agreements

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

Energy Performance Contracts

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

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

Types of Leasing Agreements

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

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

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

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

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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



APPENDIX II - ELECTRIC UTILITY RATE SCHEDULE

SECTION III RATE SCHEDULES

ENTERGY TEXAS, INC.
Electric Service

Sheet No.: 9
Effective Date: 5-2-11
Revision: 16
Supersedes: GS Effective 8-15-10
Schedule Consists of: Two Sheets

SCHEDULE GS

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 \$41.09 per month
- B. Billing Load Charge
All kW per month \$ 4.77 per kW
- C. Energy Charge
All kWh used \$ 0.02214 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.

<u>Delivery Voltage</u>	<u>Adjustment</u>
Secondary	No adjustment
Primary (2.4KV-34.5KV)	(\$0.58) per kW of Billing Load
69KV/138KV	(\$1.15) 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

- (A) For existing accounts with contracts for service for loads existing prior to August 15, 2010 - the greater of (i) 60% of the Highest Contract Power established prior to August 15, 2010, 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.

SECTION III RATE SCHEDULES

ENTERGY TEXAS, INC.
Electric Service

Sheet No.: 10
Effective Date: 5-2-11
Revision: 16
Supersedes: GS Effective 8-15-10
Schedule Consists of: Two Sheets

SCHEDULE GS (Cont.)

GENERAL SERVICE

(B) For new accounts with contracts for service for loads not existing prior to August 15, 2010 - the highest load established under V (A) above during the billing months of June - September during the 12 months ending with the current month.

(C) For either (A) or (B) above 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.

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%. The 5% penalty on delinquent bills shall not be applied to any balance to which the penalty has already been applied. 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 or to municipalities or other political subdivisions of this state, Company shall not assess a fee, penalty, interest or other charge to these entities for delinquent payment of a bill.

SCHEDULE GS

APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT
SERVICE AGREEMENT



Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment Service Agreement

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

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with Sabine Pass 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: <u>Malcolm Nash</u>	Date: <u>03 21 11</u>
Name (Mr./Ms./Dr.): <u>Mr. Malcolm Nash</u>	Title: <u>Superintendent</u>
Organization: <u>Sabine Pass ISD</u>	Phone: <u>409-971-2321</u>
Street Address: <u>5641 S. Gateway Dr.</u>	Fax: <u>409-971-2120</u>
Mailing Address: <u>P.O. Box 1148</u>	E-Mail: <u>mnash@sabinepass.net</u>
<u>Sabine Pass, TX 77655</u>	County: <u>Jefferson</u>

Contact Information:

Name (Mr./Ms./Dr.): <u>Mr. Tom Butler</u>	Title: <u>Maintenance Supervisor</u>
Phone: <u>409-971-2321</u>	Fax: <u>409-971-2120</u>
E-Mail: <u>tbutler@sabinepass.net</u>	County: <u>Jefferson</u>

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

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

APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

ANNOUNCING!

TEMA

TEXAS ENERGY MANAGERS ASSOCIATION

A PROFESSIONAL ASSOCIATION
FOR THOSE RESPONSIBLE FOR
ENERGY MANAGEMENT IN TEXAS
PUBLIC FACILITIES



WWW.TEXASEMA.ORG

Check the website for
Membership
and Association
information.

- Networking
- Sharing Knowledge and Resources
- Training Workshops
- Regional Meetings
- Annual Conference
- Certification
- Legislative Updates
- Money-Saving Opportunities



APPENDIX VI - UTILITY CHARTS ON CD