Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Prepared by:

ESA ENERGY SYSTEMS ASSOCIATES, Inc

100 East Main Street, Suite 201

Round Rock, Texas 78664

(512) 258-0547

City of Pearland

November 23, 2010

SECO
State Energy Conservation Office

Table of Contents

1.0 EXECUTIVE SUMMARY

This **Energy Efficient Partnership Service** is provided to local government facilities 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**.

Program Administrator:	Stephen Ross
Phone:	512-463-1770
Address:	State Energy Conservation Office LBJ State Office Building 111 E. 17th Street Austin. Texas 78774

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 September, 2010, **SECO** received a request for technical assistance from *Mr. Joe Bnanson*, Assistant City Manager of the City of Pearland. **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 the **City of Pearland,** 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. Ed Grossenheider,* a walk-through energy analysis was conducted throughout the City. 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.

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 City of Pearland, ESA returned to the facilities to perform the following tasks:

1. Design and monitor customized procedures to control run times of energy consuming systems.
2. Analyzing 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. Assist in 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]

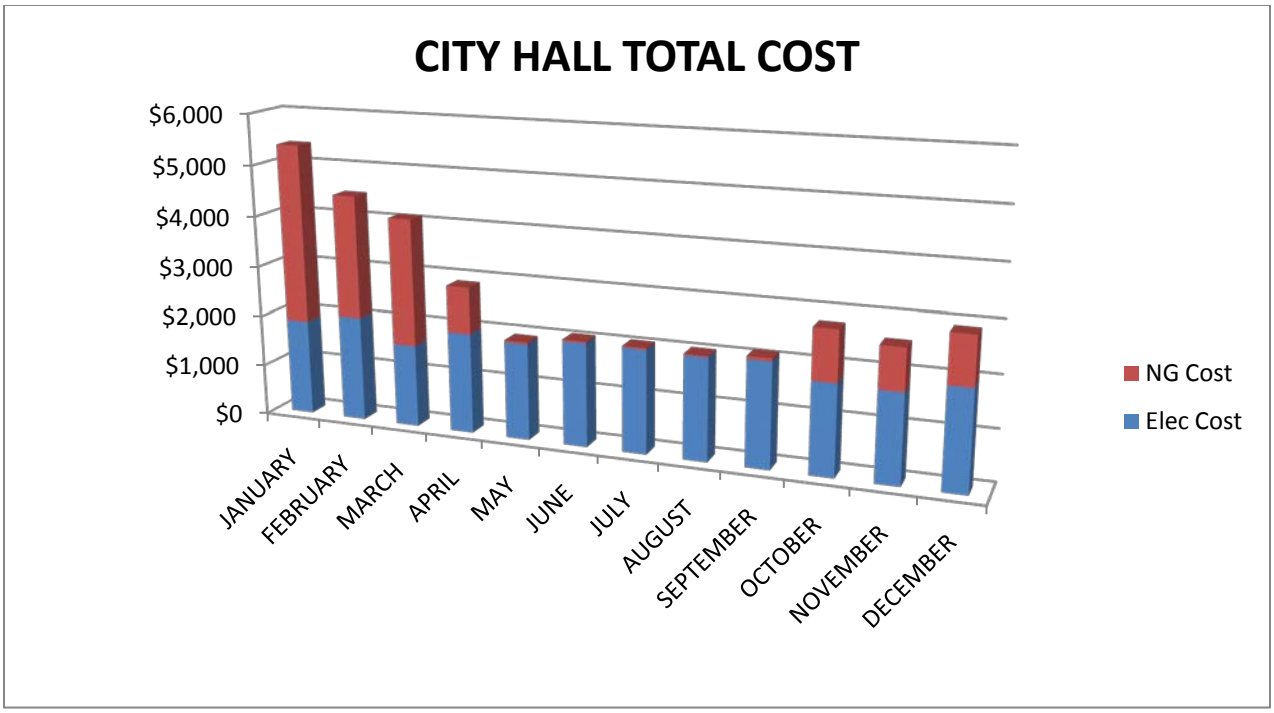
These indicators may be used to compare the facility's current cost and usage to past years, or to other similar facilities in the area. Although the comparisons will not provide specific reasons for unusual operation, they serve as indicators that problems may exist within the energy consuming systems.

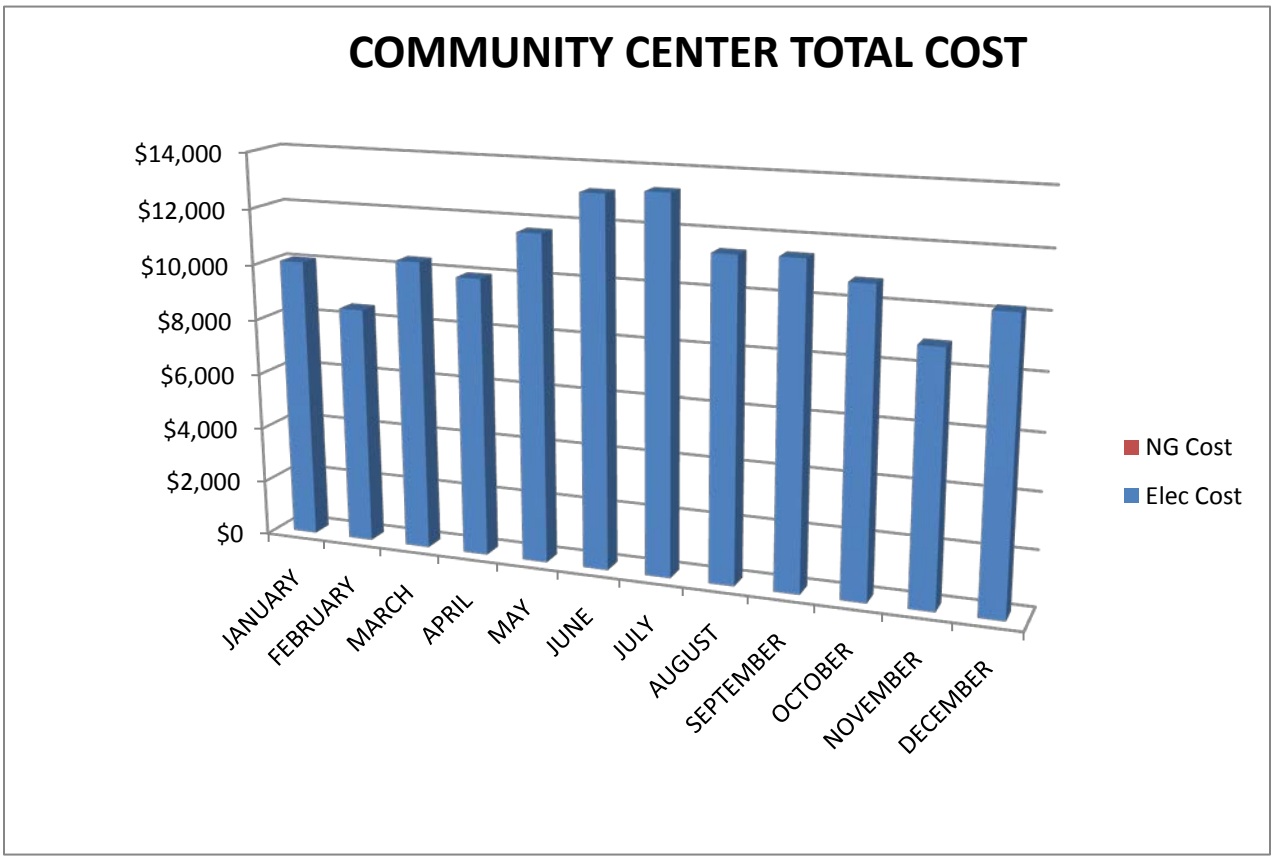
THE CURRENT ENERGY PERFORMANCE INDICATORS FOR:

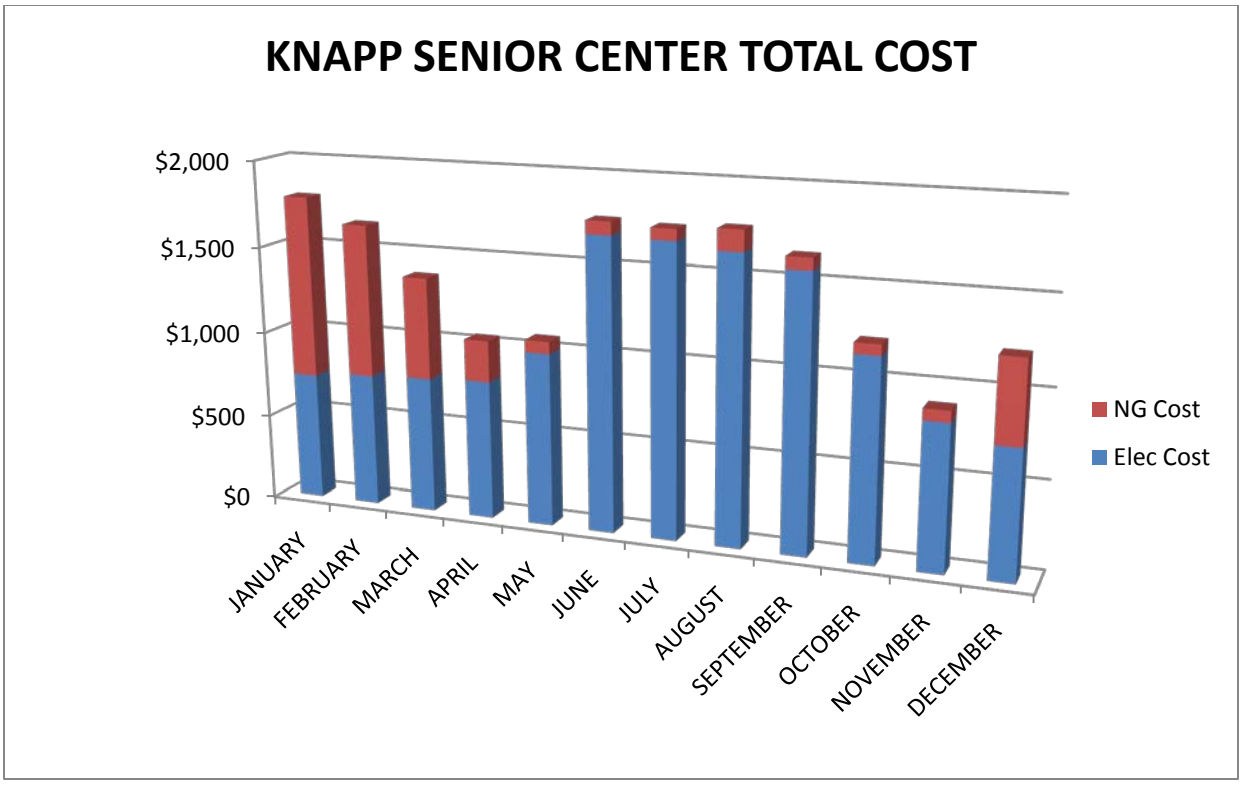
City of Pearland

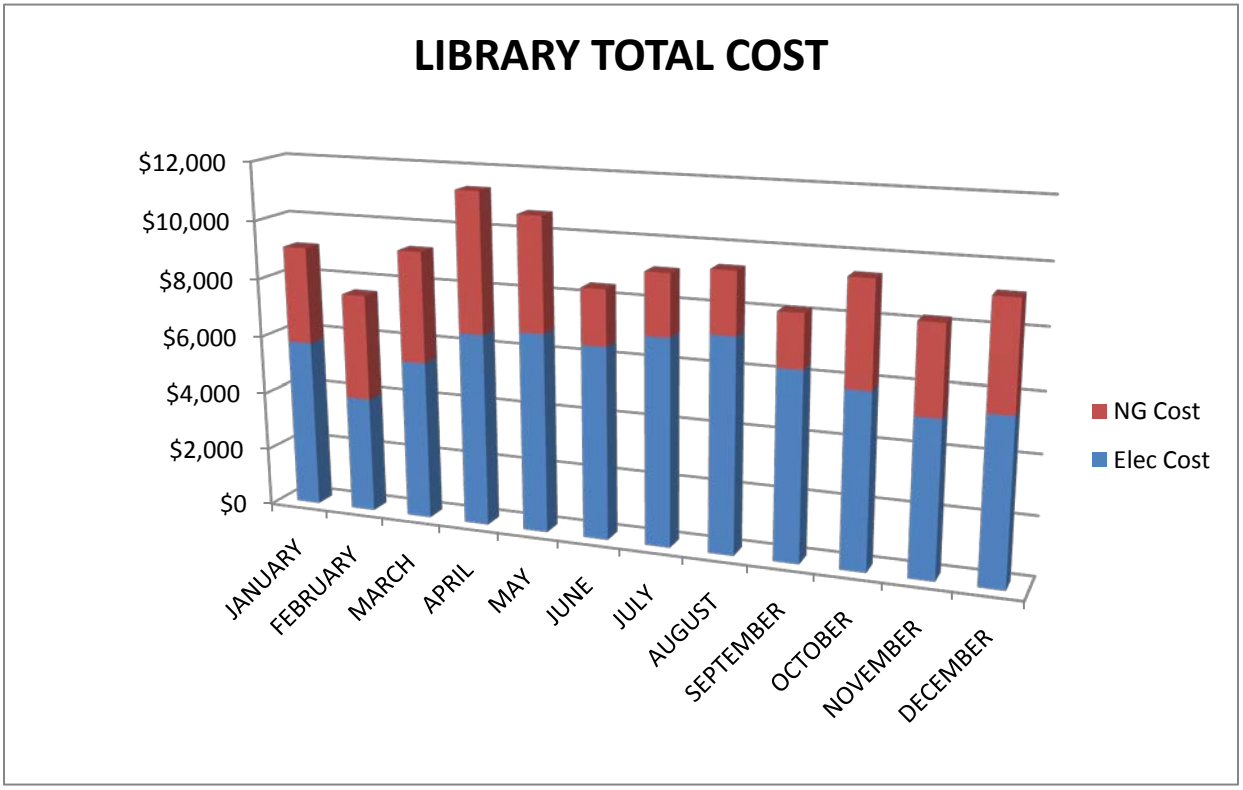
Facility	Energy Utilization Index (EUI) BTUs/sf-yr	Energy Cost Index (ECI) $/sf-yr
City Hall	68,177	$1.17
Community Center	164,187	$4.81
Knapp Senior Center	84,353	$1.71
Library	225,275	$3.92
WEC	77,603	$2.27
Service Center	165,019	$4.84

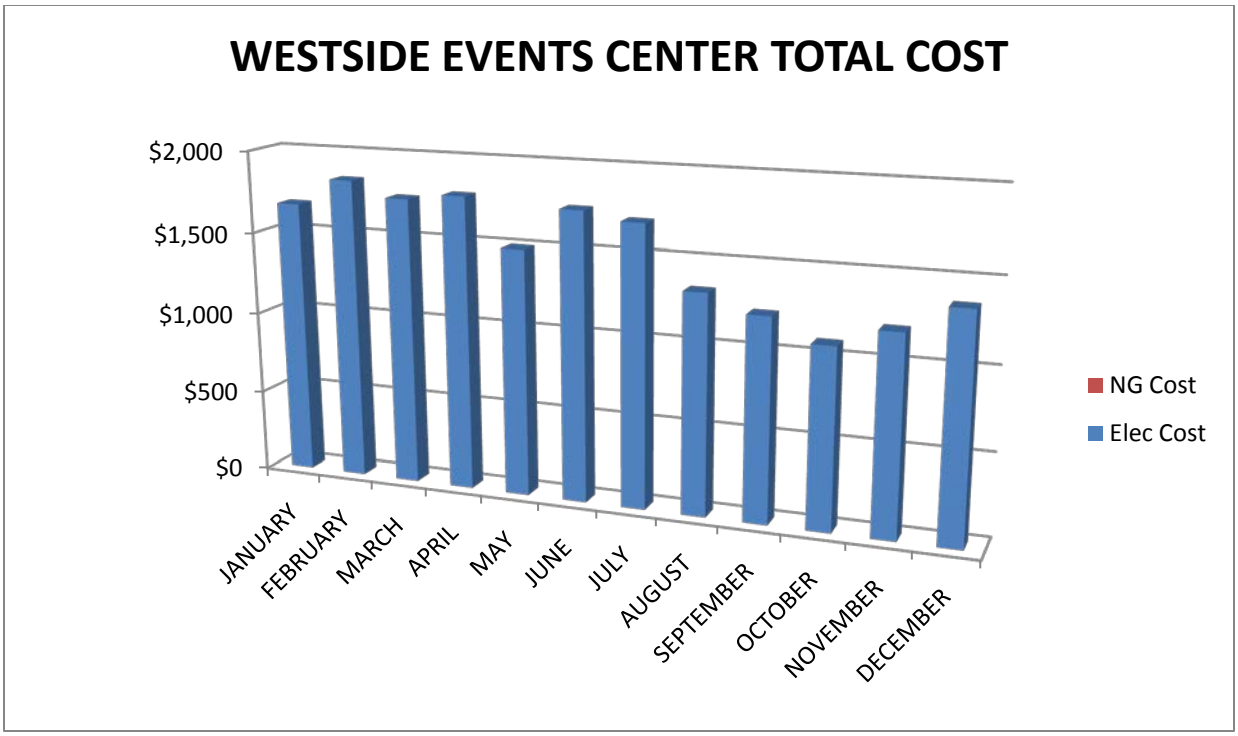
Note: During our meetings with City of Pearland we were given total monthly gas and electric costs of six facilities. We were not given electric or gas usage. As a result we estimated kWh and MCF on the respective facilities. Our report also requires us to perform a rate schedule analysis of the city's utility provider. This rate schedule was not received by our firm; as a result we analyzed a rate schedule of a nearby city.

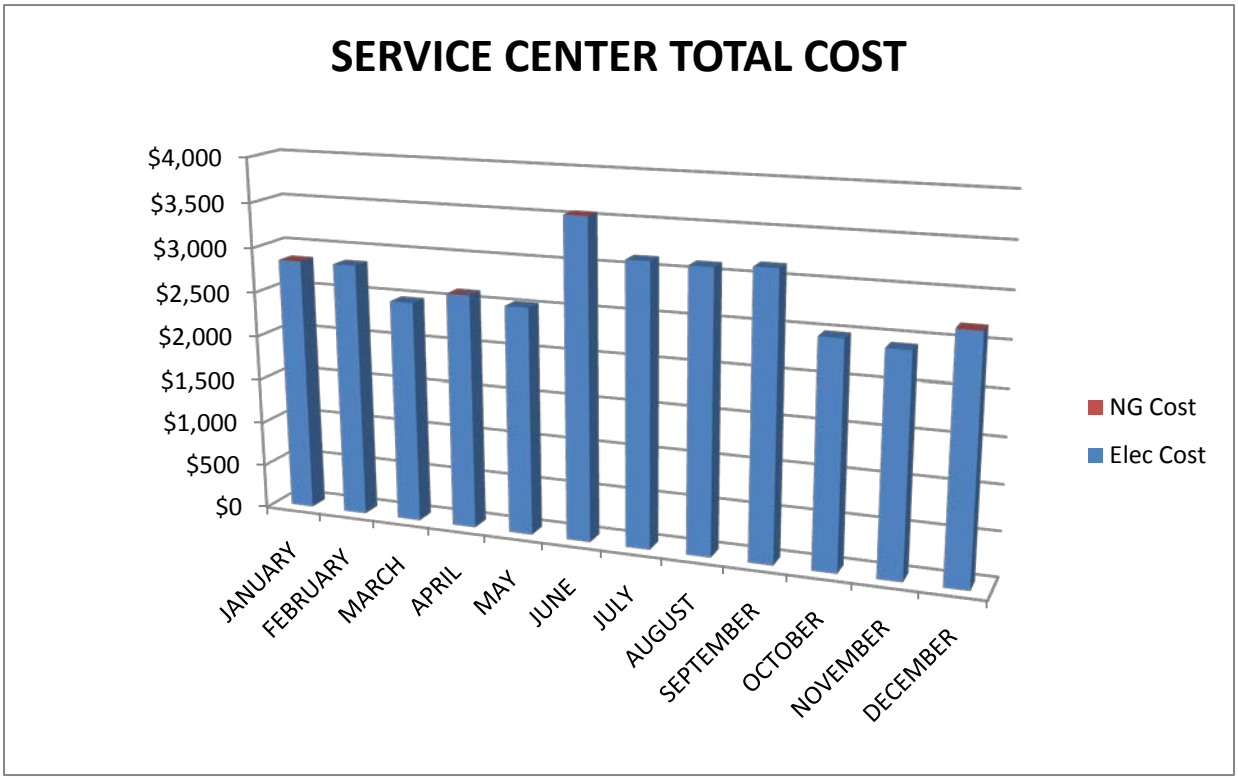

CITY HALL TOTAL COST
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
NG Cost
Elec Cost


COMMUNITY CENTER TOTAL COST
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
NG Cost
Elec Cost


KNAPP SENIOR CENTER TOTAL COST
$2,000
$1,500
$1,000
$500
$0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
NG Cost
Elec Cost


LIBRARY TOTAL COST
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
NG Cost
Elec Cost


WESTSIDE EVENTS CENTER TOTAL COST
$2,000
$1,500
$1,000
$500
$0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
NG Cost
Elec Cost


SERVICE CENTER TOTAL COST
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
NG Cost
Elec Cost

4.0 RATE SCHEDULE ANALYSIS

REP : TXU Energy and Reliant Energy (Varies by Account)

Rate Schedule Demonstrated on TXU Billings:

Customer Charge	= $15.00
Energy Charge	= $0.025 per kWh
Power Cost	= varies

Rate Schedule Demonstrated on Reliant Billings:

Energy Charge (first 3835 kWh)	= $0.0600 per kWh
Energy Charge (all additional kWh)	= $0.0350 per kWh
Fuel Cost (varies per month)	= $0.0771 per kWh

Transmission and Distribution : CenterPoint Energy

Rate Schedule Demonstrated on Billings:

Competition Transition Charge 2	= $1.18
Franchise Fee Adjustment	= $17.91 CR
Delivery Point	= $17.07
Transition Charge	= $0.40517241 per kVa
Nuclear Decommissioning	= $0.01206897 per kVa
Transmission Charge Recovery Factor	= $0.16689655 per kVa
System Benefit Fund	= $5.33
Transition Charge (TC2)	= $19.90
Transition Charge (TC3)	= $7.94
Utility Service Quality	= $0.01241379 CR
Distribution Charge (DUOS)	= $3.13275862 per kVa
Transmission Charge (TUOS)	= $1.10275860 per kVa

Average Savings for consumption determined from billings

= ($0.0600) + ($0.0771) *or* ($0.0350 + $0.0771)

= **$0.1371 per kWh for first 3,385 kWh; $0.1121 for all kWh thereafter**

Average Savings for demand

= ($0.40517241) + ($0.01206897) + ($0.16689655) + ($3.13275862) + ($1.10275860)

= **$4.82 per kVa**

CenterPoint Energy

Rate schedule unavailable: average cost for the commodity determined through utility billings.

Cost for Natural Gas purchased during billing cycle:	$9,177
Gas Service Charge per Meter:	$19.77 per month
	$237.24 per year
Number of Meters:	4

Total Cost of Natural Gas Commodity during billing cycle = $9,177 – (4 meters X $237 per meter) = $8,229

Quantity of Natural gas purchased during billing cycle by NISD: 886 mcf

Average cost per mcf = Total Cost / Quantity Purchased = $8,229 / 886 mcf = $9.29 / mcf

Average Commodity Cost Savings per mcf = $**9.29 / mcf**

5.0 CAMPUS DESCRIPTIONS

The **City of Pearland**, located in the Gulf Coast Region of Texas, owns nine buildings that were surveyed for this report. The buildings include a City Hall, Service Center, Natatorium, Library, Senior Center, Community Center, Police Station, WEC and the University of Houston at Pearland. The buildings are generally operated during normal business hours except for the community center which is occasionally opened for nighttime events and the Natatorium which stays open until 22:00. The population of the city according to the 2010 census is an estimated 120,000.

City of Pearland overall:

The facilities owned and operated by the City of Pearland are in very good shape. The cities current energy management and construction department has been very proactive in keeping their facilities up to date and sustainable. As a result of their diligence most of our energy audit findings were focused on maintenance, operations, and low cost recommendations.

City Pearland HVAC Systems:

The City of Pearland has a combination of central plants, roof top units and split systems throughout the nine facilities inspected. All of the units are newer and in good working shape. A few of the condensing units have some damaged or missing insulation on the refrigerant lines. Many of the facilities are controlled by a Siemens energy management system that range in temperature control and hours of operation.

City of Pearland Lighting:

The existing lighting system throughout the city was found to be new T8 lamps with electronic ballasts and Metal Halides fixtures. We found no opportunities to replace lamps, but found many opportunities where lights were left on or where areas demonstrated higher illumination levels than required by the Illumination Engineering Society of North America (IESNA)

City Hall:

The City Hall was built in 1986 with a recent renovation done in 2007. The facility lighting system utilizes T8 lighting and is controlled with occupancy sensors. Exterior fixtures are controlled with photocells. The City Hall is conditioned with two 2007 and two 2002 air-cooled chillers. The 2002 chillers lack coil guards. *We recommend the city add coil guards on the existing 2002 chillers to prevent future damage that will decrease the efficiency of the units*. Damage to just 10% of the coil fins can lead to as much as a 30% loss of energy efficiency. The City Hall operates from 8a – 4:30p, yet the Siemens control system is programmed to allow systems operate from 6a-6p. Most of the City's facilities had a cooling temperature setpoint that was lower than typical energy recommendations by the Department of Energy (DOE). Current cooling setpoint temperatures for City buildings are 73 to 74°F. Many of the thermostats observed in the buildings were set to 68 or 69°F. *We recommend the city adopt an energy policy that would set the cooling setpoint*

Figure 1: No Coil Guards.

as high as possible while still maintaining occupant comfort. It was noted during the survey, that the City Hall restroom facilities do not have low-flow faucets and fixtures. *We recommend the city consider adding low flow faucets throughout the City Hall to conserve water.*

Community Center:

Similar to the City Hall, it was noted during the survey that the cooling setpoints at the Community Center were 68 degrees. *We recommend increasing temperature set points to 74 degrees; again this could be addressed with a city adopted energy policy.* It was noted that the Kitchen Hood is utilizing incandescent lights and *recommend the city replace these with new compact fluorescent lamps.* Also noted during the kitchen inspection was the ice machine and new refrigerator have unit based condensers which reject heat into the kitchen as the units operate which increases the cooling load that the Kitchen HVAC must overcome. We recommend the City consider utilizing Kitchen equipment with remote condensers in future renovation projects. These condensers are installed exterior to the building and therefore the heat removed from the units is dissipated to the exterior of the building.

University of Houston at Pearland:

It was noted during the survey, that some areas of the UH-Pearland facility were over-lit. It was also noted that lights were left operating in unoccupied rooms and exterior lights were on during daylights hours. The computer classroom had many computer stations that were not used at the time of the survey, but the monitors were operating a screen saver program. *We recommend the City adopt a turn off the lights program and program the computer monitors to go to sleep when they are not being used.* A monitor does not save energy when in screen saver mode and according to the Department of Energy, each computer monitor that is programmed to turn off when it is unused will save the City $25 per year. Turning off lights in unoccupied classrooms can save the facility up to $50 a year. It was noted during the survey that there are six 3-lamp fluorescent fixtures in the Pearland Development Center lobby *that can be turned off during daylight hours as the windows in the lobby allow sufficient daylight to not require artificial light fixtures.*

Library:

The City owned Library was damaged by Hurricane Ike. As a result much of the HVAC was renovated immediately after the storm. Similar the City Development Lobby at UH-Pearland, there are two metal halides fixtures in the Library lobby that were on during daylight hours when the natural daylight in the space did not require they be operating. *We recommend turning off both metal Halides during daylight hours.* It was noted during the survey that some of the condensing units had damaged or missing refrigerant pipe insulation. The lack of insulation allows the refrigerant to absorb heat from the exterior of the building and minimizes the unit's ability to condition the interior space. *We recommend replacing refrigerant insulation on all condensing units as necessary.*

Figure 2: Library.

Natatorium:

The Natatorium is a state of the art facility that was recently built by the City of Pearland. This facility has won multiple LEED awards based on sustainability and design of facility. It was pointed out during inspection that the bills were very high for the facility. During the audit we found that the natatorium has approximately one hundred 400 watt Metal Halide fixtures and forty-two 2-lamp T8 fixtures illuminating the pool area. *We recommend the City turn off approximately 50% of the Metal Halides and turn off all 42 T8 fixtures during daytime hours.* This practice would save the city an estimated $13,755 annually. We also noticed that both racquetball court lighting systems were left on when the courts were unoccupied. *We recommend the City install occupancy sensors for the two courts for a cost of $300 each or $600 total*. The City stated that the 4 foot by 9 foot LED television located in the Natatorium runs 24 hours a day 7 days a week. *We recommend the City turn the sign off at night and anytime the space is unoccupied.*

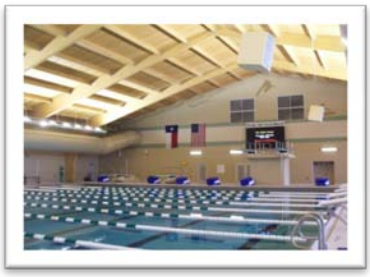


Figure 3: Metal Halides at Natatorium.

It was noted during the survey that the programming for the energy saver timeclock on one of the facility's water heaters had been turned off when the system lost power at some point in the past. *We recommend the city reset the timeclock on the water heater so the economy mode can operate. Tthe error code on the water heater display states that the economy mode is unavailable until the time clock has been re-programmed.*

Senior Center:

During the survey at the Senior Center, we found the cooling temperature was set at 72 degrees. We recommend the City raise the setpoint to 74 degrees. It was also noted during survey in the kitchen that the stand up freezer and refrigerator have internal condensers and the heat rejected into the Kitchen must be overcome by the HVAC system. Similar to the recommendation offered for the City Hall, we recommend the City explore remote condensers for future Kitchen condenser equipment.

Service Center:

The Service Center was constructed in 1995 with renovations to the HVAC and lighting systems in 2003. The control system allows the HVAC system to operate from 6a-6p, yet the facility is only occupied from 8a – 4:30p. *By adopting an energy policy the City could assume tighter control over the conditioning parameters of the City's HVAC systems*

6.0 RECOMMENDATIONS

A. MAINTENANCE AND OPERATIONS PROCEDURES

HVAC	•Add coil guards to City Hall chillers •Adopt City-wide energy policy •Reset cooling setpoints at City Hall, Community Center and Senior Center. •Reset control system operating hours at Service Center •Replace refrigerant pipe insulation at Library condensing units.
Lighting	•Retrofit incandescent lights at Community Center kitchen hood •Add "Turn off lights" program at UH Pearland. •Turn off Lobby Lights during daylight hours at City Development Offices •Turn off 50% of Metal Halides and T8 fixtures in the Natatorium during daytime hours. •Install Occupancy Sensors at Racquetball courts of Recreational Center. •Turn off LED sign at night at Natatorium when unoccupied. •Turn off 2 metal halide fixtures in front of library during day.
Building Envelope	•Add Low Flow Faucets to the City Hall restrooms. •Add computer sleepmode program at UH-Pearland. •Reset timeclock on water heater at Natatorium.

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

HVAC M&O #1

It was noticed at the City Hall that the 2002 Chillers lacked coil guards. If just 10% of coils are damaged, up to 30% of the unit's operating efficiency can be lost. As a result, we recommend adding coil guards to the 2 chillers.

HVAC M&O #2

We recommend the City adopt an energy policy that would raise cooling temperature set points to save energy but still maintain occupant comfort in the facilities

HVAC M&O #3

The control system allows the HVAC system to operate at the facility from 6a-6p, yet the facility is only occupied from 8a – 4:30p.

We recommend refining hours of the energy management system to match the actual hours of operation.

HVAC M&O #4

It was noted that some of the Library condensing units' refrigerant line insulation was damaged or missing. This condition allows the refrigerant to absorb heat from the ambient air and minimizes the ability for the refrigerant to absorb heat from the interior space as desired.

Lighting M&O #1

During the kitchen inspection we found Incandescent fixtures in the kitchen hood and recommend the city replace these with new compact fluorescent lamps.

Lighting M&O #2

We noticed that many lights were left on when rooms were not in use. We recommend the city adopt a turn off your light program. A classroom can save as much as $50 per year if lights are turned off on average of 2 hours or more per day.

Lighting M&O #3

The lighting in University of Houston Pearland lobby was noted to be on during daylight hours. The area has been designed to be illuminated with natural daylight and the artificial fixtures are not necessary during daytime hours.

Lighting M&O #4

We recommend the city turn off approximately 50% of the Metal Halides and turn off all 42 T8 fixtures during daytime hours. This practice would save the city an estimated $13,755 annually.

Lighting M&O #5

We recommend the City add occupancy sensors to the two racquetball courts to turn off the court lighting when they are not being used.

Lighting M&O #6

We recommend the City turn off the 4 foot by 9 foot LED television in the Natatorium that currently operates 24/7. The sign runs unnecessarily at night and the City can save considerable energy by turning the sign off during unoccupied periods.

Lighting M&O #7

The 2 Metal Halide fixtures in Library lobby were noted to be on during daylight hours in an area designed to be illuminated with natural daylight. By turning off the lights during daylight hours will reduce energy consumption while keeping the area at a desired lighting level.

Building Envelope M&O #1

We recommend the City consider adding low flow faucets and fixtures to the City Hall restrooms in order to conserve water.

Building Envelope M&O #2

It was noted that many computer monitors were left operating in screen saver mode during the survey of The University of Houston at Pearland. The City can save up to $25 per year by turning unused computers off. A monitor does not save energy when in screen saver mode; we recommend the City adopt a computer sleep mode program.

Building Envelope M&O #3

We recommend the City reset the timeclock on the water heater so the economy mode can operate during unoccupied periods.

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:

More information regarding financial programs available to City of Pearland can be found in:

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

8.0 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 has 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

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

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

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

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

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

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

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

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

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

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

Performance Contracting:
Through this arrangement, an energy service company (ESCO) using in-house or third party financing to implement comprehensive packages of energy saving retrofit projects. Usually a turnkey service, this method includes an initial assessment of energy savings potential, design of the identified projects, purchase and installation of the equipment, and overall project management. The ESCO guarantees that the cost savings generated will, at a minimum, cover the annual payment due over the term of the contract. The laws governing Performance Contracting for school districts are detailed in the Texas Education Code, Subchapter Z, Section 44.901. Senate Bill SB 3035, passed by the seventy-fifth Texas Legislature, amends some of these conditions. Performance Contracting is a highly competitive field, and interested districts may wish to contact Felix Lopez of State Energy Conservation Office, (SECO), at 512-463-1080 for assistance in preparing requests for proposals or requests for qualifications.

Solution Center

How to Finance Your Energy Program

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

Selecting a Cost/Benefit Analysis Method

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

Simple Payback Analysis

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

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

Simple Payback

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

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

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

Life-Cycle Cost Analysis

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

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

continued

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.

How to Finance Your Energy Program *continued*

Bulk Purchasing. Large organizations generally have purchasing or materials procurement departments that often buy standard materials in bulk or receive purchasing discounts because of the volume of their purchases. Such organizations can help reduce the costs of energy-efficiency renovations if their bulk purchasing capabilities can be used to obtain discounts on the price of materials (e.g., lamps and ballasts). While some locales may have restrictions that limit the use of this option, some type of bulk purchasing can usually be negotiated to satisfy all parties involved.

Project Transaction Costs. Certain fixed costs are associated with analyzing and installing energy measures in each building included in a retrofit program. Each additional building, for example, could represent additional negotiations and transactions with building owners, building analysts, energy auditors, equipment installers, commissioning agents, and other contractors. Similarly, each additional building will add to the effort involved in initial data analysis as well as in tracking energy performance after the retrofit. For these reasons, it is often possible to achieve target energy savings at lower cost by focusing only on those buildings that are the largest energy users. One disadvantage with larger buildings is that the energy systems in the building can be more difficult to understand, but overall, focusing on the largest energy users is often the most efficient use of your financial resources.

Direct Value-Added Benefits. The primary value of retrofits to buildings and facilities lies in the reduction of operating costs through improved energy-efficiency and maintenance savings. Nevertheless, the retrofit may also directly help address a variety of related concerns, and these benefits (and avoided costs) should be considered in assessing the true value of an investment. A few examples of these benefits include the improvement of indoor air quality in office buildings and schools; easier disposal of toxic or hazardous materials found in energy-using equipment; and assistance in meeting increasingly stringent state or Federal mandates for water conservation. Effective energy management controls for buildings can also provide a strong electronic infrastructure for improving security systems and telecommunications.

Economic Development Benefits. In addition to direct savings on operating costs and the added-value benefits mentioned above, investments in energy-efficiency can also support a community's economic development and employment opportunities. Labor will typically constitute about 60 percent of a total energy investment, and about 50 percent of equipment can be expected to be purchased from local equipment suppliers; as a result, about 85 percent of the investment is retained within the local economy. Additionally, funds retained in urban areas will generally be re-spent in the local economy. The Department of Commerce estimates that each dollar retained in an urban area will be re-spent three times. This multiplier effect results in a three-fold increase in the economic benefits of funds invested in energy-efficiency, without even considering the savings from lower overall fuel costs.

For more information contact the Rebuild America Clearinghouse at 252-459-4664 or visit www.rebuild.gov

Rebuild America
U.S. Dept. of Energy

APPENDIX II - ELECTRIC UTILITY RATE SCHEDULES

CenterPoint Energy Houston Electric, LLC
Applicable: Entire Service Area

CNP 8017

6.1.1.1.3 SECONDARY SERVICE GREATER THAN 10 KVA

AVAILABILITY

This schedule is applicable to Delivery Service for non-residential purposes at secondary voltage with demand greater than 10 kVA when such Delivery Service is to one Point of Delivery and measured through one Meter.

TYPE OF SERVICE

Delivery Service will be single or three-phase, 60 hertz, at a standard secondary voltage. Delivery Service will be metered using Company's standard Meter provided for this type of Delivery Service. Any Meter other than the standard Meter will be provided at an additional charge and/or will be provided by a Meter Owner other than the Company pursuant to Applicable Legal Authorities. Where Delivery Service of the type desired is not available at the Point of Delivery, additional charges and special contract arrangements may be required prior to Delivery Service being furnished, pursuant to Section 6.1.2.2, Construction Services, in this Tariff.

MONTHLY RATE

I. Transmission and Distribution Charges:

	Standard Class	Subclass Exception	
Customer Charge	$5.27	$0.00	per Retail Customer per Month
Metering Charge			
Non-IDR Metered	$31.86	$17.07	per Retail Customer per Month
IDR Metered	$116.89	$116.89	per Retail Customer per Month
Transmission System Charge			
Non-IDR Metered	$1.1027	$1.1027	per NCP kVA
IDR Metered	$1.4709	$1.4709	per 4CP kVA
Distribution System Charge	$3.118137	$3.118137	per Billing kVA

The following charges are applicable to both the Standard Class and the Subclass Exception

II.	**System Benefit Fund:**	See Rider SBF
III.	**Transition Charge:**	See Schedules TC, TC2, TC3 and SRC
IV.	**Nuclear Decommissioning Charge:**	See Rider NDC
V.	**Transmission Cost Recovery Factor:**	See Rider TCRF

VI.	**Excess Mitigation Credit:**		Not Applicable
VII.	**State Colleges and Universities Discount:**		See Rider SCUD
VIII.	**Competition Transition Charge:**		See Rider CTC
IX.	**Competitive Metering Credit:**		See Rider CMC
X.	**Other Charges or Credits:**		
	A. Municipal Account Franchise Credit (see application and explanation below)	$(.002207)	per kWh
	B. Rate Case Expenses Surcharge		See Rider RCE
	C. Rider UCOS Retail Credit		See Rider RURC
	D. Advanced Metering System Surcharge		See Rider AMS
	E. Accumulated Deferred Federal Income Tax Credit		See Rider ADFITC

COMPANY SPECIFIC APPLICATIONS

DETERMINATION OF BILLING DEMAND FOR TRANSMISSION SYSTEM CHARGES

Determination of NCP kVA The NCP kVA applicable under the Monthly Rate section shall be the kVA supplied during the 15 minute period of maximum use during the billing month.

Determination of 4 CP kVA The 4 CP kVA applicable under the Monthly Rate section shall be the average of the Retail Customer's integrated 15 minute demands at the time of the monthly ERCOT system 15 minute peak demand for the months of June, July, August and September of the previous calendar year. The Retail Customer's average 4CP demand will be updated effective on January 1 of each calendar year and remain fixed throughout the calendar year. Retail Customers without previous

history on which to determine their 4 CP kVA will be billed at the applicable NCP rate under the "Transmission System Charge" using the Retail Customer's NCP kVA.

DETERMINATION OF BILLING DEMAND FOR DISTRIBUTION SYSTEM CHARGES

Determination of Billing kVA The Billing kVA applicable to the Distribution System Charge shall be the higher of the NCP kVA for the current billing month or 80% of the highest monthly NCP kVA established in the 11 months preceding the current billing month (80% ratchet). The 80% ratchet shall not apply to seasonal agricultural Retail Customers.

OTHER PROVISIONS

Secondary Service Greater Than 10 kVA. This Rate Schedule is applicable only to Retail Customers whose peak demand for the current month is greater than 10 kVA, as measured in the fifteen minute period of highest demand, or whose peak demand exceeded 10 kVA in any of the previous eleven months, and that otherwise qualify under this Rate. This Rate Schedule is applicable to Delivery Service provided for Electric Power and Energy supplied by Retail Customer's REP for Temporary service subject to provisions of Section 6.1.2.2, Construction Services. The Electric Power and Energy delivered may not be re-metered or sub-metered by the Retail Customer for resale except pursuant to lawful sub-metering regulations of Applicable Legal Authorities. Retail Customer's previous metered usage under this or any other Rate Schedule will be used, as needed, in determining the billing determinants under the Monthly Rate section.

Subclass Exception. The Subclass Exception is applicable only to Retail Customers who otherwise qualify for the Secondary Service Greater Than 10 kVA rate schedule and either: (1) whose highest NCP kVa for the most recent 12 months is equal to or less than 50 kVA; or (2) whose highest NCP kVa for the most recent 12 months is greater than 50 kVA but less than or equal to 400 kVA and whose load factor was less than or equal to 10% for each of the most recent 12 months. The most recent 12 months ends with and includes the current month. The monthly load factor is determined as follows:

load factor = billing kWh for the month/ (NCP kVA X number of days in billing period X 24)

Service Voltages. Company's standard service voltages are described in 6.2.2, Standard Voltages and in the Company's Service Standards.

Municipal Account Franchise Credit. A credit equal to the amount of franchise fees included in the Transmission and Distribution Charges will be applied to municipal accounts receiving service within the incorporated limits of such municipality which imposes a municipal franchise fee upon the Company based on the kWh delivered within that municipality and who have signed an appropriate Franchise Agreement.

CenterPoint Energy Houston Electric, LLC
Applicable: Entire Service Area

CNP 8017

Adjustment To The Charges Applied To Retail Customer's Demand Measurement If data to determine the Retail Customer's *Demand Measurement* becomes no longer available, the Company will determine a *Conversion Factor* which will be used as an adjustment to all per unit charges that will then be applied to the *New Demand Measurement*. *Demand Measurement* shall include the Billing kVA, the 4 CP kVA, NCP kVA or any other demand measurement required for billing under this Rate Schedule or any applicable rider(s) or any other applicable schedule(s). *New Demand Measurement* shall be the billing determinants which replace the *Demand Measurement*. The *Conversion Factor* will apply to unit prices per kVA such that when applied to the *New Demand Measurement*, the revenue derived by the Company under demand based charges shall be unaffected by such lack of data.

This adjustment may become necessary because of changes in metering capabilities, such as, Meters that record and /or measure kW with no ability to determine kVA or Meters which meter data in intervals other than 15 minutes. This adjustment also may become necessary due to changes in rules, laws, procedures or other directives which might dictate or recommend that Electric Power and Energy, electric power related transactions, wire charges, nonbypassable charges and/or other transactions measure demand in a way that is inconsistent with the definitions and procedures stated in the Company's Tariff. This adjustment is applicable not only in the instances enumerated above but also for any and all other changes in *Demand Measurement* which would prevent the Company from obtaining the necessary data to determine the kVA quantities defined in this Rate Schedule, applicable Riders and other applicable schedules.

The Conversion Factor shall render the Company revenue neutral to any change in *Demand Measurement* as described above.

NOTICE
This Rate Schedule is subject to the Company's Tariff and Applicable Legal Authorities.

APPENDIX III - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

SECO
State Energy Conservation Office

Local Governments and Municipalities

Preliminary Energy Assessment Service Agreement

Investing in our communities 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 the City of Pearland , 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: _____ Date: 09/07/10

Name (Mr./Ms./Dr.) Mr. Jon Branson

Title: Assistant City Manager

Organization: City of Pearland

Phone: 281-652-1600

Street Address: 3519 Liberty Dr.

Fax: 281-652-1798

Mailing Address: Pearland, Texas 77581

Email: jbranson@ci.pearland.tx.us

County: Brazoria

Contact Information:

Name (Mr./Ms./Dr.): Mr. Ed Grossenheider

Title: Parks and Building Superintendent

Phone: 281-652-1908

Fax: 281-652-1783

E-Mail: egrossenheider@ci.pearland.tx.us

County: Brazoria

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

AND ALSO to your SECO Contractor: Energy Systems Associates, Attn: Yvonne Huneycutt. Phone: 512-258-0547. Fax: 512-388-3312

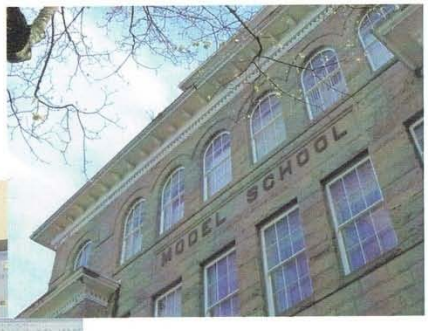
APPENDIX IV - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

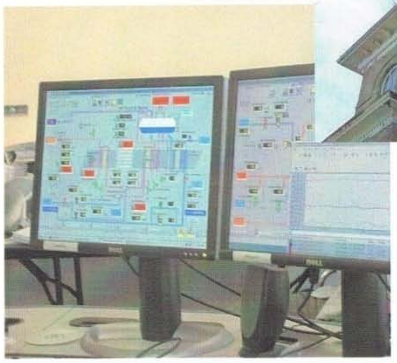
ANNOUNCING!

TEXAS ENERGY MANAGERS ASSOCIATION

TEMA

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