SCHOOLS/LOCAL GOVERNMENT ENERGY MANAGEMENT PROGRAM

For

HILL COUNTRY MEMORIAL HOSPITAL

Fredericksburg, Texas

Energy Efficient Partnership Service
of
COMPTROLLER of the STATE of TEXAS
STATE ENERGY CONSERVATION OFFICE
111 E. 17th Street
Austin, Texas 78774

Professional Engineering Services By:

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April 17, 2009

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APPENDICES:

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**.

Program Administrator: Glenda Baldwin
Phone: 512-463-1731
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.

The **SECO** office received a request for technical assistance from *Mark Peterson*, Executive Director for **Hill Country Memorial Hospital**. **SECO** responded by sending **ESA Energy Systems Associates, Inc.**, a registered professional engineering firm, to prepare this preliminary report for the hospital campus. This report is intended to provide support for the hospital district as it determines the most appropriate path for facility renovation, especially as it pertains to the heating and cooling systems. 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 updated analysis of the utility usage and costs for **Hill Country Memorial Hospital,** (hereafter known as *Hospital or HCMH*), 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. A complete listing of the Base Year Utility Costs and Consumptions are provided in Appendix V of this report.

Following the utility analysis and a preliminary consultation with John Brewer, Chief Engineer for HCMH, a walk-through energy analysis was conducted for the Hospital. The Clinic facilities were not surveyed at this time.

Specific findings of this survey and the resulting recommendations for both low cost M&O [maintenance and operation] procedures, as well as cost-effective capital expense energy retrofit installations are identified in Section 6.0.

Financing for these recommended projects may be obtained from any of the programs discussed in Appendix 1 "Funding and Procurement Options," but our initial suggestion is that the district consider the SECO administered *LoanSTAR Loan Program*. This program allows school and hospital districts to borrow up to *$5 million dollars* at a *3% rate of interest*, with allowance of up to *ten years* for loan repayment.

SUMMARY TABLE:

Recommended Project	Estimated Annual Energy Cost Avoidance	Estimated Installation Cost	Predicted Simple Payback Period (Years)
Heating System Renovation	$ 72,000	$840,000	11-1/2

(See Section 6.0 for a detailed description of each recommended project.)

Although *additional savings* from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Return-On-Investment, (ROI), for this retrofit program should be even faster than noted within these calculations.

There are additional resources available to **Hill Country Memorial Hospital** that may address some energy consumption concerns:

1. SECO is sponsoring a State-wide Energy Manager Program that may involve collaboration of energy management duties and personnel between the local government offices and school districts for rural Texas communities.
2. SECO may sponsor energy management and maintenance personnel training seminars for rural Texas communities.
3. ESA can offer presentations to the Hospital Board as well as technical assistance with energy management questions.

These issues are not included in the savings or the implementation cost estimates within this report. Should *Hospital* desire a more complete district analysis, a discussion with Glenda Baldwin, **SECO**'s program administrator for ***Schools/Local Government Energy Management Program*** is recommended.

Our final "summary" comment is that **SECO** views the completion and presentation of this report as a continuance of our relationship with **Hill Country Memorial Hospital**. 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 the Energy Management issues within the district.

Prepared By: ESA Energy Systems Associates, Inc. / James W. Brown, P.E. / (512) 258-0547

2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office, (**SECO**), for the purposes of energy costs and consumption reduction within owned and operated facilities.

After receipt of the PEASA, an on-site visit was conducted by the professional engineering firm contracted by **SECO** to provide service within that area of the state. A summary of ***Hill Country Memorial Hospital's*** most recent twelve months of utility bills was provided to the **Engineer** for the preliminary assessment of the Energy Performance Indicators. The **Engineer,** accompanied by the *Hospital* staff, then toured the facilities to evaluate changes in maintenance, operations, and/or equipment which would produce potential savings in energy consumption and cost.

3.0 CAMPUS DESCRIPTIONS:

Hill Country Memorial Hospital is located on one campus in Fredericksburg, Texas. The facility occupies two separate buildings: one housing the Hospital, one a separate Clinic facility. The three story clinic building is serviced via separate electric meters from the Main Building. The Hospital oversees and maintains the Clinic, but does share in the profit produced by the Clinic.

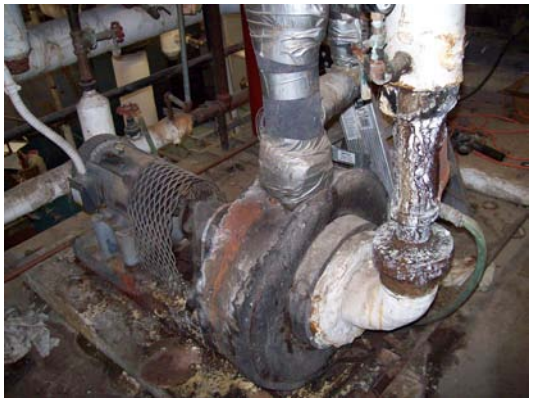
The 88-bed hospital serves eight counties in the Hill Country of Central Texas, approximately 75 miles west of Austin. Originally built in 1971, there have been some minor additions and renovations over the last 38 years.

A new 5-story bed tower has been designed, but the Hospital is waiting for improvements in the overall economy before breaking ground on the new project.

General Notes HVAC:

The Hospital has two separate central plants.

Chiller Plant #1 is the smaller of the two serves the Lobby, Kitchen, Radiology, ICU and Women's areas. The chilled and hot water distribution system for Plant #1 has been installed as a two-pipe system. A Johnson Controls DDC energy management system (EMS) automatically changes over between heating and cooling cycles by "blending" chilled and hot water throughout the changeover process. Most of the EMS has been converted to full DDC controls, but a few pneumatic actuators still exist in some locations.

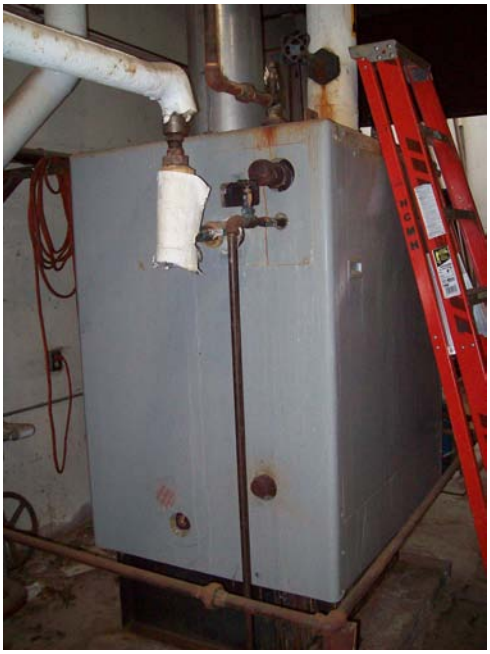


Hot Water Pump – Central Plant #1

Air is distributed for the Plant #1 systems by 1970 Carrier Series 39 air handlers.

In general, the steam and hot water system equipment in Central Plant #1 is in poor condition and should be replaced. *We recommend renovating the piping distribution system to 4-pipe to improve the Hospital's ability to switch heating and cooling cycles during the moderate spring and fall weather conditions.*

Chiller plant #2 is a 4-pipe water distribution system. All of the centrifugal hydronic chillers for both plants are located in this area. The chillers are York YTG1, 250-ton, R123 refrigerant centrifugal chillers that were installed between 2001 and 2005. The leaving chilled water temperature is 40°F and the return is 48.2°F. The ambient temperature at the time of the survey is 58°F with 80% relative humidity. The chillers are rotated for lead/lag operation by the DDC control system along with the chiller's assigned cooling towers (2 each Evapco and one BAC). The chillers were not installed with the variable speed option originally; this functionality has been added to the existing units within the last several years. A redundant air cooled chiller is located on site if one of the hydronic chillers is out of commission.



The boiler plant consists of a Kewanee 150hp (6277 MBH input) forced draft 10 psi steam boiler and two high-pressure (80-90 psi) steam boilers that were installed about 2000. There is a large steam leak from the low pressure boiler through the pressure relief piping that should be stopped (see picture to the right), but the staff reports that the water chemistry becomes poor if the relief piping valve is shut. Therefore, large amounts of steam are discharged to the floor drain in order to preserve water chemistry, a procedure that has significant energy cost implications. The staff has expressed an interest to renovating the boiler system so that space heating could be accomplished with hot water and steam generation would be limited to humidification and sterilization processes.

General Notes Lighting:
The Hospital currently utilizes 32-watt T8 fixtures in the majority of the facility. The Maintenance Staff has considered re-lamping the existing fixtures with 28-watt T8s to improve the energy efficiency of the system. To recommend this change, the spaces would need to be over-illuminated with the existing 32-watt lamps in order for the reduced lumen output of the 28-watt lamps to not induce a situation in which the new lamps do not produce enough light to satisfy the IESNA recommended illumination levels in the spaces. The Hospital should expect light levels to decrease between 8 and 10% if they elect to change to the 28-watt lamps. This calculation is based on the fact that 28-watt, 3500K lamps typically produce 2562 mean lumens, compared to 2800 average mean lumens for a 32-watt, 3500K lamp.

4.0 ENERGY PERFORMANCE INDICATORS:

In order to easily assess energy utilization and current levels 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" (BTU's). 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 BTU's are then divided by the building area.

EUI = [Electricity BTU's + Gas BTU's] 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 (EPI) FOR :

HILL COUNTRY MEMORIAL HOSPITAL

CAMPUS	ENERGY UTILIZATION INDEX (EUI) (Btu/sf-year)	ENERGY COST INDEX (ECI) ($/sf-year)
2008 Hill Country Memorial	301,818	$5.35
2004 Hill Country Memorial	349,016	$3.40
Average Central Tx Hospital:	*302,250*	*$3.05*

Comparison to Average: From the **EUI** and **ECI** comparisons with other school facilities *within the region*, several energy related issues are apparent:

2008 EPI Comparison to 2004 EPI for Hill Country Memorial:
The Hospital has decreased their EUI 13% over the last four years. This should be a direct reflection of the energy conservation efforts, particularly the chiller plant renovations, which have been implemented since 2005. The costs have increased dramatically over the same period, but this rise in costs is predominantly attributable to the increase in costs for electricity and natural gas over that same time period.

2008 EPI Comparison to Average Central Texas Hospital EPI:
The decrease in EUI for Hill Country Memorial has brought the energy utilization index to less than the Central Texas Hospital average EUI. The ECI remains considerably higher than the average ECI, but most of the cost increases experienced since 2006 are not reflected in this data as the averages were calculated using 2005 and 2006 cost data. Therefore, the direct comparison of the 2006 average ECI to the 2008 ECI for Hill Country Memorial will not necessarily result in appropriate conclusions about the Hospital's energy costs and operational practices.

5.0 RATE SCHEDULE ANALYSIS:

ELECTRICITY PROVIDER: **City of Fredericksburg**

Customer Charge:	=	$1,000.00 per meter
Distribution Charge:	=	$0.006800 per kWh
Power Cost Pass Thru Charge:	=	$0.067826 per kWh
Average Savings for consumption = $0.0068/kWh + $0.067826/kWh	=	**$0.074626 / kWh**
Average Savings for demand	=	**$0.00**

GAS UTILITY: **Atmos Energy**

GAS RATE: Not available; Cost/mcf determined from billing.

$193,033 was spent to purchase 19,257MCF of natural gas during the billing cycle.
$193,033 / 19,257MCF = $10.02 per MCF

Total Average Savings per Mcf Natural Gas Consumption = **$10.02/mcf**

6.0 RECOMMENDATIONS:

A. MAINTENANCE AND OPERATIONS PROCEDURES

1. Weather-stripping around the exterior doors needs to be installed, and around all operable portions of the windows.

   Several doors checked during the survey were leaking air into the building. It is suggested that the Maintenance staff be allowed to install/replace weather protection on all windows and doors to minimize this uncontrolled outside load.

2. Install vending misers on vending machines to limit operation of the lighting to only times when the motion sensor is activated.

   The device also cycles the compressor to turn off during low occupancy periods, but it will cycle operation to not allow beverages to become warmer than a programmed temperature.

B. CAPITAL EXPENSE PROJECTS

Recommended Replacement Projects:

HVAC

A. Renovate existing steam boilers to hydronic hot water for space heating. A small steam generator will be required to maintain humidification and sterilization activities. Hot water pumps need to be replaced. 1970 air handlers should be replaced and other air handlers renovated with hot water coils to replace steam coils.
B. Install new piping to renovate existing 2-pipe system to 4-pipe system for improved occupant comfort and reduced time for changeover.

Estimated Installed Cost	=	$ 840,000
Estimated Energy Cost Savings	=	$ 72,000
Simple Payback Period	=	11-1/2 Years

Financing:
For renovation projects such as this one, we recommend that the Hospital consider the state administrated *LoanSTAR Loan Program.* This program is discussed in detail in Appendix I.

Other Financing Options of large projects may be provided using a variety of methods such as Bond Programs, municipal leases, or state financing programs. In fact, should the Hospital decide to pursue a wide scale renovation program, it is possible that a combination of these financing methods would be the best solution. Descriptions of these financing solutions can be found in Appendix I.

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

Solution Center

How to Finance Your Energy Program

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

Selecting a Cost/Benefit Analysis Method

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

Simple Payback Analysis

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

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

Simple Payback

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

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

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

Life-Cycle Cost Analysis

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

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

continued

How to Finance Your Energy Program *continued*

project, including the base date (the date to which all future costs are discounted), the service date (the date when the new system will be put into service), the study period (the life of the project or the number of years over which the investor has a financial interest in the project), and the discount rate. When two or more design alternatives are compared (or even when a single alternative is compared with an existing design), these variables must be the same for each to assure that the comparison is valid. It is meaningless to compare the LCC of two or more alternatives if they are computed using different study periods or different discount rates.

Decision makers in both the public and private sectors have long used LCC analysis to obtain an objective assessment of the total cost of owning, operating, and maintaining a building or building system improvement over its useful life. Nevertheless, an LCC analysis does require a good understanding of acceptable alternatives, useful life, equipment efficiencies, and discount rates.

Selecting the "Best" Alternatives

Generally, all project alternatives should be screened using simple payback analyses. A more detailed and costly LCC analysis should be reserved for large projects or those improvements that entail a large investment, since a detailed cost analysis would then be a small part of the overall cost. Both simple payback and LCC analyses will allow you to set priorities based on measures that represent the greatest return on investment. In addition, these analyses can help you select appropriate financing options:

- Energy-efficiency measures with short payback periods, such as one to two years, are economically very attractive and should be implemented using operating reserves or other readily available internal funds, if possible.
- Energy-efficiency measures with payback periods from three to five years may be considered for funding from available internal capital investment monies, or may be attractive candidates for third-party financing through energy service companies or equipment leasing arrangements.
- Frequently, short payback measures can be combined with longer payback measures (10 years or more) in order to increase the number of measures that can be cost-effectively included in a project. Projects that combine short- and long-term paybacks are recommended to avoid "cream-skimming" (implementing only those measures that are highly cost effective and have quick paybacks) at the expense of other worthwhile measures. A selected set of measures with a combination of payback periods can be financed either from available internal funds or through third party alternatives.

If simple payback time is long, 10 or more years, economic factors can be very significant and LCC analysis is recommended. In contrast, if simple payback occurs within three to five years, more detailed LCC analysis may not be necessary, particularly if price and inflation changes are assumed to be moderate.

Weighing Non-Cost Impacts

Some factors related to building heating, air conditioning, and lighting system design are not considered in either simple payback or LCC analyses. Examples include the thermal comfort of occupants in a building and the adequacy of task lighting, both of which affect productivity. A small loss in productivity due to reduced comfort or poor lighting can quickly offset any energy cost savings.

Conventional cost/benefit analyses also normally do not consider the ancillary societal benefits that can result from reduced energy use (e.g., reduced carbon emissions, improved indoor air quality). In some cases, these ancillary benefits can be assigned an agreed upon monetary value, but the values to be used are strongly dependent on local factors. In general, if societal benefits have been assigned appropriate monetary values by a local utility, they can be easily considered in your savings calculations. However, your team should discuss this issue with your local utility or with consultants working on such values in your area.

Finally, in any cost analysis, it can be very important to include avoided cost as part of the benefit of the retrofit. When upgrading or replacing building equipment, the avoided cost of maintaining existing equipment should be considered a cost savings provided by the improvement.

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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

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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.

4

How to Finance Your Energy Program *continued*

infrastructure (such as lighting) to a complete package of measures for multiple buildings and facilities. Generally, the service provider will guarantee savings as a result of improvements in both energy and maintenance efficiencies. Flat-fee payments tend to be structured to maintain a positive cash flow to the customer with whom the agreement is made. With the increasing deregulation of conventional energy utilities, several larger utilities have formed unregulated subsidiaries that offer a full range of energy-efficiency services under performance agreements.

An energy performance contract must define the methodology for establishing the baseline costs and cost savings and for the distribution of those savings among the parties. The contract must also specify how those savings will be determined, and must address contingencies such as utility rate changes and variations in the use and occupancy of a building. While several excellent guidance documents exist for selecting and negotiating energy performance contracts, large or complicated contracts should be negotiated with the assistance of experienced legal counsel.

Utility Incentives

Some utilities still offer financial incentives for the installation of energy-efficient systems and equipment, although the number and extent of such programs appears to be decreasing as utility deregulation proceeds. These incentives are available for a variety of energy-efficient products including lighting, HVAC systems, energy management controls, and others. The most common incentives are equipment rebates, design assistance, and low-interest loans.

In general, the primary purpose of utility incentives is to lower peak demand; overall energy-efficiency is an important, but secondary consideration. Incentives are much more commonly offered by electric utilities than by natural gas utilities.

Additional Financing Sources and Considerations

State and Federal Assistance. Matching grants, loans, or other forms of financial assistance (in addition to those listed above) may be available from the Federal government or state governments. If your community is considering energy-efficiency improvements for public or assisted multifamily housing, your program could be eligible to receive assistance through various programs of the U.S. Department of Housing and Urban Development. A variety of state-administered programs for building efficiency improvements may also be available, some of which are funded through Federal block grants and programs. Federal assistance available through states include Federal block grants and State Energy Conservation Program funds. An example of individual state programs is the Texas LoanSTAR program, which provides low-interest loans for state agencies and schools.

Utility Assistance

Equipment Rebates. Some utilities offer rebates on the initial purchase price of selected energy-efficient equipment. The amount of the rebate varies substantially depending on the type of equipment. For example, a rebate of $.50 to $1 may be offered for the replacement of an incandescent bulb with a more efficient fluorescent lamp, while the installation of an adjustable speed drive may qualify for a rebate of $10,000 or more.

Design Assistance. A smaller number of utilities provide direct grants or financial assistance to architects and engineers for incorporating energy-efficiency improvements in their designs. This subsidy can be based on the square footage of a building, and/or the type of energy-efficiency measures being considered. Generally, a partial payment is made when the design process is begun, with the balance paid once the design has been completed and installation has commenced.

Low-Interest Loans. Loans with below-market rates are provided by other utilities for the purchase of energy-efficient equipment and systems. Typically, these low-interest loans will have an upper limit in the $10,000 to $20,000 range, with monthly payments scheduled over a two- to five-year period.

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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

Rebuild America
U.S. Dept. of Energy

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APPENDIX II

[Sample]

Resolution for Senate Bill 12 / House Bill 3693

[SAMPLE]
ENERGY CONSUMPTION REDUCTION PLAN
for

_____
(ISD)

_____
(Date)

Mission Statement:
Recognizing our responsibility as Trustees of _____, we believe that every effort should be made to conserve energy and natural resources. We also believe that energy efficient operations will reduce operating costs and is in the best interest of the district. As a result, we have resolved to create this *Energy Consumption Reduction Plan* which is to be implemented within each of our facilities and around all of our campuses. It is desired, through this policy, to produce a safe and productive environment for our students, while simultaneously providing prudent management of our financial and energy resources.

Energy Consumption Reduction Plan Resolution:
In response to requirements within Senate Bill 12 and House Bill 3693, signed by the Governor in June 2007 and effective as of September 1, 2007, our district now establishes a goal to reduce annual electric consumption by five percent (5%) each state fiscal year for the next six (6) years.

Commitment to Implementation of Plan:
Implementation of this plan shall be the joint responsibility of the trustees, administrators, staff and support personnel.

Specific efforts that shall be considered as potential action items are:
1. Efficient Lighting Systems
2. Solar Electric Generation Panels
3. Efficient Appliance Purchases
4. Vending Machine operating controls
5. General Maintenance and Operations revisions

Recording and Reporting of Utility Consumption:
In response to House Bill 3693, Section 8, the district shall record in an electronic repository the metered amount of electricity, water or natural gas consumed for which the district is responsible to pay and the aggregate costs of those utility services. The district shall then report the recorded information on a publicly accessible Internet website with an interface designed for ease of navigation if available, or at another publicly accessible location.

Having considered the responsibility of the district to conserve energy and to preserve our nations natural energy resources, improve the district's efficiency of operation, and eliminate unnecessary expenditures for energy, the _____ board of trustees does hereby adopt this *Energy Consumption Reduction Plan*.

Adopted this _____ day of _____, 200__.

Signature: _____
President, Board of Trustees

Attest: _____
Secretary, Board of Trustees

APPENDIX III

ELECTRIC UTILITY RATE SCHEDULE

Search
Site Map

Large Power Utility Rates

Home
Up
Animal Shelter
Appraisal District
Boards / Committees
Building / Development
City Council
Comments & Questions
Emergency Management
Employment Opportunities
Frequently Asked Questions
History
Maps
Meetings / Notices
Ordinances
Organization / Departments
Police Department
Recreation
Restaurant Scores / Health
RV Park / Camping
Tourism / Visitor Info

Large Power Electric Rate Schedule LP

MONTHLY RATE:

Customer Charge:	$1,000.00
Distribution Charge:*	All kWh per month @.006800
Power Cost Pass Thru Charge:**	All kWh per month @.067826

*This is the portion of your bill that the City of Fredericksburg charges for maintaining the electric lines, transformers, etc from the substation to the customer.

**This is the portion of your bill that is charged by the Lower Colorado River Authority and others for generation, transmission, etc from the power plant to the sub-station. This is charged to the City of Fredericksburg and is passed thru to the customer.

Security Lighting Rate Schedule:

MONTHLY RATE:

100 Watt High Pressure Sodium:	$7.50
250 Watt High pressure Sodium Flood Light:	$17.50
400 Watt High pressure Sodium Flood Light:	$22.50

WATER - COMMERCIAL (UP TO 2,000,000 GALLONS PER MONTH)

Commercial Water Rates (Inside City Limits)		Commercial Water Rates (Outside City Limits)	
MONTHLY RATE:		MONTHLY RATE:	
0-2,000 Gallons (Minimum)	$12.40	0-2,000 Gallons (Minimum)	$24.80
2,001-10,000 Gallons	$1.63 per 1000 Gallons	2,001-10,000 Gallons	$3.26 per 1000 Gallons
Over 10,000 Gallons	2.20 per 1000 Gallons	Over 10,000 Gallons	4.40 per 1000 Gallons

OR

WATER - INDUSTRIAL (OVER 2,000,000 GALLONS PER MONTH)

Industrial Water Rates (Inside City Limits)		Industrial Water Rates (Outside City Limits)	
MONTHLY RATE:		MONTHLY RATE:	
0-2,000 Gallons	$235.50 (Minimum)	0-2,000 Gallons	$471.00 (Minimum)
2,001-2,000,000 Gallons	$1.70 per 1000 Gallons	2,001-2,000,000 Gallons	$3.40 per 1000 Gallons
2,000,001-6,500,000 Gallons	1.94 per 1000 Gallons	2,000,001-6,500,000 Gallons	3.88 per 1000 Gallons
Over 6,500,000 Gallons	2.63 per 1000 Gallons	Over 6,500,000 Gallons	5.26 per 1000 Gallons

WASTEWATER

Commercial Wastewater Rates (Inside City Limits)		Commercial Wastewater Rates (Outside City Limits)	
MONTHLY RATE:		MONTHLY RATE:	
0-3000 Gallons	$12.00 (Minimum)	0-3000 Gallons	$24.00 (Minimum)
Over 3000 Gallons	2.75 per 1000 Gallons	Over 3000 Gallons	5.50 per 1000 Gallons

Wastewater rates are adjusted annually based on water consumption during the months of December, January and February.

OR

HIGH STRENGTH WASTE DISCHARGE CUSTOMERS

MONTHLY RATE:	
PER 1000 Gallons water used	$2.33
plus	
Biological Oxygen Demand ("A" Factor)	$0.439 per lb
plus	
Total Suspended Solids ("B" Factor)	$0.072 per lb
plus	
COD ("C" Factor)	$0.085 per lb

Home | Animal Shelter Web Site | Appraisal Info | Boards/Committees | Building & Development Information | City Council | Comments & Questions | Disclaimer | Emergency Services | Employment | Frequently Asked Questions | History | Maps | Meetings/Notices | Ordinances | Organization | Police Web Site | Recreation | Restaurant Scores | RV Park & Camping | Tourism Info | Utility Rates | Local Weather

Contact Information

Telephone:

General Information, Utilities, City Hall:	830-997-7521
Park / Camping:	830-997-4202
Golf:	830-997-4010
Landfill:	830-997-3459

To report electric/water outage after hours: **830-997-8080**

Fax: 830-997-1861

Postal address: 126 W. Main St., Fredericksburg, TX 78624-3708

Electronic mail General Information

Send mail to Webmaster with questions or comments about this web site.

APPENDIX IV

GAS RATE SCHEDULE

Unavailable – Unit Cost established via Utility Analysis

APPENDIX V

UTILITIES CONSUMPTION HISTORY

OWNER: Hill Country Memorial Hospital **BUILDING:** Main

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	2009	379,500	0	0	0	27,498	1,881	$16,736
FEBRUARY	2008	398,250	0	0	0	30,637	1,145	$8,468
MARCH	2008	453,750	0	0	0	33,997	2,746	$17,226
APRIL	2008	454,500	0	0	0	35,928	1,495	$9,435
MAY	2008	521,250	0	0	0	42,080	1,579	$9,931
JUNE	2008	591,750	0	0	0	43,897	1,319	$21,738
JULY	2008	588,750	0	0	0	65,753	1,411	$21,698
AUGUST	2008	542,250	0	0	0	58,692	1,390	$11,635
SEPTEMBER	2008	672,000	0	0	0	65,864	1,373	$16,919
OCTOBER	2008	573,750	0	0	0	53,748	1,376	$15,372
NOVEMBER	2008	475,500	0	0	0	41,632	1,924	$21,591
DECEMBER	2008	417,000	0	0	0	26,392	1,618	$22,284
TOTAL		**6,068,250**	**0**	**0**	**0**	**$526,118**	**19,257**	**$193,033**

Annual Total Energy Cost = $719,151 Per Year

Total KWH x 0.003413 = 20,710.94 x 106
Total MCF x 1.03 = 19,834.71 x 106
Total Other x ____ x 106
Total Site BTU's/yr 40,545.65 x 106

Floor area: 134,338 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) = 301,818 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) = $5.35 $/s.f. yr

Electric Utility	Account #	Meter#	Gas Utility	Account #
City of Fredericksburg	Multiple		Atmos	Multiple

APPENDIX VI

[Sample]

ENERGY POLICY

ENERGY POLICY

[Name of Institution]

Recognizing our responsibility as Trustees of _____,
we believe that every effort should be made to conserve energy and natural resources. As a result, we are establishing this Energy Management Policy which shall be implemented within each of our facilities. We believe that this policy will be beneficial for taxpayers and community residents in the prudent management of our financial and energy resources.

The fulfillment of this policy shall be the joint responsibility of the trustees, administrators, staff and support personnel. The success of the policy is dependent upon total cooperation from all levels within the system.

The board will designate an Energy Manager to coordinate and implement the overall Energy Policy. The Energy Manager will also maintain accurate records of energy consumption and cost on a monthly and annual basis. Energy audits will be conducted annually at each facility and recommendations will be made for updating and improving the energy program. Energy efficiency guidelines and procedures will be reviewed and accepted or rejected by the board. In addition, the procedures required for implementation of the program, and the results achieved from its administration, will be published for administrative and staff information.

Adopted this_____day of _____, 200 .

_____
President, Board of Trustees

Attest: _____
Secretary, Board of Trustees

APPENDIX VII

Preliminary Energy Assessment Service Agreement

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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 HILL COUNTRY MEMORIAL HOSPITAL, FREDERICKSBURG, 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 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 and recommendations to 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: 4/2/09

Name (Mr./Ms./Dr.) MR. MARK D PETERSON Title: EXEC. DIRECTOR - FACILITIES

Organization: HILL COUNTRY MEMORIAL HOSPITAL Phone: 830-990-6636

Street Address: 1020 S. STATE HWY. 16 Fax: 830-990-6639

Mailing Address: FREDERICKSBURG TX. 78624 EMail: MPETERSON@HCMHS.ORG

County GILLESPIE

CONTACT INFORMATION:

Name (Mr./Ms./Dr.): MR. JOHN BREWER Title: DIRECTOR OF ENGINEERING & BIO-MED

Phone: 830-990-1400 Fax: 830-990-6639

E-Mail: JBREWER@HCMHS.ORG County GILLESPIE

Please sign & FAX or mail to Glenda Baldwin at State Energy Conservation Office. **FAX: 512-475-2569**
Address: LBJ State Office Building, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-463-1731
AND also, please fax a copy to your SECO Contractor: ESA Energy Systems Associates, Inc.; Attn: Yvonne Huneycutt **FAX: 512-388-3312** Phone: 512-258-0547 x124

APPENDIX VIII

Texas Energy Managers Association (TEMA)

ANNOUNCING!

TEMA

TEXAS ENERGY MANAGERS ASSOCIATION

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

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

WWW.TEXASEMA.ORG

Check the website for Membership and Association information.

SECO
State Energy Conservation Office

APPENDIX IX

UTILITY CHARTS ON DISKETTE