**Susan Combs**
Texas Comptroller of Public Accounts

# Facility Preliminary Energy Assessments and Recommendations

Prepared by:

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## Bloomington Independent School District

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ESA-Energy Systems Associates, Inc.
F-4882

SECO
State Energy Conservation Office

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## 1.0 EXECUTIVE SUMMARY:

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



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

In March 2010, **SECO** received a request for technical assistance from *Brad Williams*, Superintendent for Bloomington I.S.D. **SECO** responded by sending ESA **Energy Systems Associates, Inc.**, a registered professional engineering firm, to prepare this preliminary report for the school district. This report is intended to provide support for the district as it determines the most appropriate path for facility renovation, especially as it pertains to the energy consuming systems around the facility. It is our opinion that significant decreases in annual energy costs, as well as major maintenance cost reductions, can be achieved through the efficiency recommendations provided herein.

This study has focused on energy efficiency and systems operations. Typically, an analysis of the utility usage and costs for **Bloomington ISD,** (hereafter known as BISD) would have been 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. The utility data necessary for this analysis was unavailable at the district beyond the current fiscal year's electric bills. Therefore, the energy cost data in this report will be supported through the Rate Schedule Analysis in Section 3.0, rather than the EUI and ECI calculations.

Following the utility analysis and a preliminary consultation with *Mr. Williams,* a walk-through energy analysis was conducted throughout the Junior/Senior High campus. Specific findings of this survey and the resulting recommendations for both operation and maintenance procedures and cost-effective energy retrofit installations are identified in Section 5.0 of this report.

We estimate that as much as **$8,000** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$60,850**, yielding an average simple payback of **7-3/4** years.

| SUMMARY: | IMPLEMENTATION COST | ESTIMATED SAVINGS | SIMPLE PAYBACK |
|---|---|---|---|
| HVAC ECRM #1 | $51, 250 | $6,400 | 8 Years |
| Lighting ECRM #1 | $ 9,600 | $1,600 | 6 Years |
| **TOTAL PROJECTS** | **$60,850** | **$8,000** | **7-3/4 Years** |

Although additional savings from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Return of Investment (ROI), for this retrofit program has been calculated and shown in Section 6.0 of this report.

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

*ESA Energy Systems Associates, Inc. James W. Brown (512) 258-0547

## 2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities. After receipt of the PEASA, an initial visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state to review the program elements that SECO provides to school districts and determine which elements could best benefit the district. ESA then 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 RATE SCHEDULE ANALYSIS:

### ELECTRICITY PROVIDER:

**RETAIL ELECTRIC PROVIDER (REP): Direct Energy [ $0.087850 per kWh ]**

**AGGREGATION FEE: $0.0015 per kWh**

**TRANSMISSION AND DISTRIBUTION (T&D): AEP**

**Electric Rate: Secondary Service > 10 kW**

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

Average Savings for consumption (from billings) = $0.08785 + $0.0015 + $0.000662 + $0.000047 + $0.000065 + $0.000288 = **$0.090412 / kWh**

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

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

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

## 4.0 CAMPUS DESCRIPTIONS:

**Bloomington ISD** consists of three separate campuses. There is a Junior High/High School campus, as well as an Elementary School (Grades Pre-K – 3) campus, in Bloomington, Texas. In Placedo, Texas, six miles east of the High School, is an additional elementary campus (Grades 4-6). Beginning next school year, the incoming sixth grade class may be moved to one of the Bloomington campuses.

The study focused on the Junior/Senior High campus only, which is operated from mid- August through late May on a weekday schedule of 7:00 A.M. to 4:00 P.M. The Administrative area is open all year, and portions of the facility are occupied by the maintenance/custodial staff throughout the summer. The building is brick faced and has flat built-up gravel or low sloping metal roofs. The main building was constructed in 1958. There have been several additions and renovations culminating with the current construction of a new Science Building (11,500 sf) and Field House (6,500 sf) due to open January, 2011.

The district has recently completed an HVAC system renovation during which most of the campuses rooftop units were replaced and programmable thermostats were installed. Consequently, the majority of the energy savings available to the district is found within Maintenance and Operations practices. The measures are low-cost, no-cost measures which offer significant energy savings and typically have simple paybacks of one year or less.

Figure 1: Exterior door does nor close securely

It was noted during the survey that some exterior doors do not close securely, which allows conditioned air to escape and contaminants to enter the building (See Figure 1). *We recommend repairing the doors so they may close securely.* It was also noted that many of the exterior doors have missing or damaged weatherstripping. *We recommend the district replace any damaged or missing weatherstripping and prevent air infiltration or energy loss at these exterior doors.*

During the survey, it was discovered that the operable awning windows in the gymnasium were open while the new HVAC system is operating. *We recommend all operable windows be closed securely while the HVAC system is operating.*

Figure 2: Open window in gymnasium

*HVAC System Description:*

The building is predominantly a combination of rooftop units and split systems. Most units have been installed within the last year (2010). The majority of the remaining units are 15+ years old. There are four Carrier 38YKB060 units installed in 1992 at the existing science building and a Lennox 12ACB60-2P unit installed in 1996 to services the Band Hall. The Band Hall unit has severe coil fin damage (refer to Figure 3) and missing or damaged refrigerant line insulation. Damage to just 10% of the coil fins can reduce the operating efficiency of the unit by up to 30% as the unit loses its ability to dissipate heat to to the atmosphere. Poor refrigerant line insulation allows the unit to absorb heat from the surrounding environment, reducing its ability to absorb heat from the conditioned space. *We recommend the Band Hall unit be replaced. We also recommend the existing Science Building units be replaced if the building will be commissioned for additional use at the campus.*

**Figure 3: Damaged coil fins on condensing unit**

*Control System Description:*

Most of the HVAC systems at the campus received new programmable thermostats as they were replaced within the last year. *Other units have conventional thermostats that we recommend be replaced during the next HVAC renovation project.*

*Lighting System Description: M*uch of the campus presently utilizes T8 lighting systems. The gymnasium lobby has five each 2-lamp T12 fixtures (combined with two 4-lamp T8 lay-in type fixtures that have been surface mounted to the ceiling). We recommend replacing all seven of these fixtures with new T8 layin fixtures. The gymnasium has 20 each 400-watt metal halide fixtures and 4 each 200-watt incandescent fixtures over bleachers. These metal halide fixtures are relatively efficient by themselves, but their long re-strike issue discourages personnel from turning them off during periods of inactivity because they do not want to wait the 5-10 minutes required to re-start the fixtures when gym activities resume. Therefore, the fixtures may operate 11-12 hours per day. *We recommend the district consider renovating the fixtures with new T5HO or T8 fluorescent high bay fixtures.* These fixtures do offer energy reductions from comparable metal halide fixtures, but more importantly, they do not have the re-strike issue inherent to metal halides and therefore may be turned off during inactive times of the day. *We recommend utilizing 4-lamp fixtures over the bleachers and general walkway areas and 6-lamp fixtures directly over the gymnasium court.*

The gymnasium also has 4 exit fixtures which do not currently operate as shown in figure 4. *We recommend replacing these fixtures with new LEC exit fixtures.*


Figure 4: Un-lit exit sign in gymnasium

Both the gymnasium and junior high buildings have 2 vending machines with lighting operating around the clock. *We recommend installing a vending miser for each machine to limit illumination of the advertisement lighting and cycle the compressor so that it does not run all of the time, based upon occupancy of the immediate area.*


Figure 5: Uncontrolled vending machines

Figure 6: Unnecessary daytime lighting in JH lobby

There are some interior fixtures operating in naturally lit areas, particularly in the Junior High lobby, as shown in figure 6, that should be off during daylight hours. *We recommend these fixtures be controlled by photocell or time-clock to limit their operation to required nighttime activities.*

There are numerous exterior fixtures which were operating during the daytime. It is estimated that one-half of all exterior sconces and wall packs were operating in the middle of the day at the time of the survey. *We recommend the district install a timeclock and photocell to control the operation of the exterior fixtures.*

Figure 7: Exterior fixtures operating at daytime

The junior high library was fully lit when unoccupied. *We recommend installing occupancy sensors or timeclocks to control two lamps in each fixture while leaving the light switch to control the other lamp to prevent the room from appearing completely dark.*

# 5.0 RECOMMENDATIONS

## A. MAINTENANCE AND OPERATIONS PROCEDURES

| | |
|---|---|
| Lighting | •Install vending misers on vending machines<br>•Control exterior lights and daylit area indoor fixtures to not operate during daytime hours<br>•Install occupancy sensors in library |
| HVAC | •Comb fins on damaged condensers; Install heavy duty coil guards to protect in future |
| Building Envelope | •Repair exterior doors that do not close securely<br>•Closeoperable windows when HVAC operating<br>•Check weatherstrip at all exterior doors, replace as needed |

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

*Lighting System M&O #1*

Currently, the vending machines in the junior high building and gymnasium are illuminated and operating around the clock. We recommend installing a vending miser that limits the time the advertising lighting and compressor operates.

*Lighting System M&O #2*

Currently, most exterior lights and some interior lights in naturally lit areas are turned on during the day. We recommend installing photocells or time clocks to limit the operational hours of these lights.

*Lighting System M&O #3*

Currently, the lights in the Junior High library operate when no one is occupying the room. We recommend installing occupancy sensors for the outboard lamps of each fixture while leaving the inboard lamps on the existing light switch.

*HVAC M&O #2*

Currently, some of the older HVAC units have sustained moderate to significant damage to the coil fins. We recommend the district comb the fins straight and install heavy duty hail guards to protect the coil in the future.

*Envelope M&O #1*

Currently, some exterior doors in the facility do not close completely which allows conditioned air to escape from the building and contaminants to enter. We recommend fixing these doors so that the close securely.

*Envelope M&O #2*

Currently, the gymnasium windows are operable and can be left open during occupied hours allowing conditioned air to escape the building. We recommend securing these windows while the HVAC system is operating.

*Envelope M&O #3*

It was noted there were several exterior doors around the buildings that suffered from missing or damaged weatherstripping. We recommend that the weatherstripping be replaced as needed.

## B. CAPITAL EXPENSE PROJECTS

| | |
|---|---|
| HVAC | •Replace air conditioning units servicing existing science building and band hall |
| Lighting | •Replace metal halide gymnasium fixtures with T5HO fluorescent high-bay fixtures |

*HVAC ECRM*

*ECRM #1: Replace air conditioning units servicing existing science building and band hall.*

This includes 4 each 1992 5-ton Carrier split systems servicing the existing Science Building and one (1) 1996 5-ton Lennox split system servicing the Band Hall.

| | | |
|---|---|---|
| Estimated Installed Cost | = | $ 51,250 |
| Estimated Energy Cost Savings | = | $ 6,400 |
| Simple Payback Period | = | 8 years |

*LIGHTING ECRM*

*ECRM #1: Replace metal halide and incandescent high-bay fixtures with T5 or T8 High Bay linear fluorescent fixtures*

BISD has 20 each 400-watt metal halide fixtures in the Gymnasium and four 200-watt incandescent fixtures above the bleachers. We recommend replacing these lights with new 4-lamp T5 or T8 high-bay linear fluorescent fixtures over the bleachers and new 6-lamp T5 or T8 fixtures over the court. These fixtures will allow the lights to be turned off during inactive periods of the day, saving as much as 4-6 hours of operation per day.

| | | |
|---|---|---|
| Estimated Installed Cost | = | $ 9,600 |
| Estimated Energy Cost Savings | = | $ 1,600 |
| Simple Payback Period | = | 6 years |

**SUMMARY TABLE:**
If BISD was to implement all recommended projects, the summary payback would be:

| | | |
|---|---|---|
| Estimated Installed Cost | = | $ 60,850 |
| Estimated Energy Cost Savings | = | $ 8,000 |
| Simple Payback Period | = | 7-3/4 years |

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

| | |
|---|---|
| 1. Lighting ECRM #1 | Taking advantage of the ability to turn off the gymnasium fixtures during inactive periods of the day will generate energy savings and eliminate unnecessary heat generated in the gym which has to be overcome by the HVAC system. |
| 2. HVAC ECRM #1 | The existing HVAC units at the Band Hall and existing Science Building have reached the end of their operational life expectancy of 15-20 years and should be replaced. |

## 6.0 FINANCIAL EVALUATION

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

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

| | | | | |
|---|---|---|---|---|
| Proposal: | Perform recommended ECRMs | | | |
| Assumptions: | | | | |
| 1. Equipment will last at least 15 years prior to next renovation | | | | |
| 2. No maintenance expenses for first five years (warranty period) | | | | |
| 3. $500 maintenance expense next 5 years | | | | |
| 4. $1000 maintenance expense last 5 years | | | | |
| 5. Savings decreases 2% per year after year 5 | | | | |
| | | | | |
| **Cash Flow** | **Project Cost** | **Project Savings** | **Maintenance Expense** | **Net Cash Flow** |
| Time 0 | ($60,850) | | 0 | ($60,850) |
| Year 1 | | $ 8,000 | 0 | $8,000 |
| Year 2 | | $ 8,000 | 0 | $8,000 |
| Year 3 | | $ 8,000 | 0 | $8,000 |
| Year 4 | | $ 8,000 | 0 | $8,000 |
| Year 5 | | $ 8,000 | 0 | $8,000 |
| Year 6 | | $ 7,840 | ($500) | $7,340 |
| Year 7 | | $ 7,680 | ($500) | $7,180 |
| Year 8 | | $ 7,520 | ($500) | $7,020 |
| Year 9 | | $ 7,360 | ($500) | $6,860 |
| Year 10 | | $ 7,200 | ($500) | $6,700 |
| Year 11 | | $ 7,040 | ($1,000) | $6,040 |
| Year 12 | | $ 6,880 | ($1,000) | $5,880 |
| Year 13 | | $ 6,720 | ($1,000) | $5,720 |
| Year 14 | | $ 6,560 | ($1,000) | $5,560 |
| Year 15 | | $ 6,400 | ($1,000) | $5,400 |
| | | | | |
| | | | **Internal Rate of Return** | **8.25%** |

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

# APPENDICES

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

## SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

**LoanSTAR Program:**

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

**TASB (Texas Association Of School Boards) Capital Acquisition Program:**

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

**Loans On Commercial Market:**

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

**Leasing Corporations:**

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

**Bond Issue:**

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

## SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

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

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

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

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

Solution Center

# How to Finance Your Energy Program

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

## Selecting a Cost/Benefit Analysis Method

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

## Simple Payback Analysis

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

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

### Simple Payback

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

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

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

## Life-Cycle Cost Analysis

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

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

continued

## 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

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

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

## 6.1.1.1.3 SECONDARY VOLTAGE SERVICE GREATER THAN 10 KW

**AVAILABILITY**

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

**TYPE OF SERVICE**

Delivery Service will be single-phase 60 hertz, at a standard secondary voltage. Delivery Service will be metered using Company's standard meter provided for this type of Delivery Service. Any meter other than the standard meter will be provided at an additional charge. Where Delivery Service of the type desired is not available at the Point of Delivery, additional charges and special arrangements may be required prior to Delivery Service being furnished, pursuant to Section 5.7 and 6.1.2 of this Tariff.

**MONTHLY RATE**

**I. Transmission and Distribution Charges:**

| | | |
|---|---|---|
| Customer Charge | | |
| Non-IDR Metered | $3.26 | per Retail Customer per Month |
| IDR Metered | $26.52 | per Retail Customer per Month |
| Metering Charge | $15.81 | per Retail Customer per Month |
| Transmission System Charge | | |
| Non-IDR Metered | $1.286 | per NCP kW Billing Demand |
| IDR Metered | $1.793 | per 4CP kW Billing Demand |
| Distribution System Charge | $3.314 | per NCP kW Billing Demand |

**II. System Benefit Fund:** $0.000662 per kWh See SBF 6.1.1.4

**III. Transition Charge:** See Riders TC 6.1.1.2.1.1 and TC-2 6.1.1.2.2.1

**IV. Nuclear Decommissioning Charge:** See Rider NDC 6.1.1.5.1

**V. Transmission Cost Recovery Factor:** See Rider TCRF 6.1.1.6.2.1

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**VI. Excess Mitigation Credit:** Not Applicable

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

**VIII. Competitive Metering Credit:** See Rider CMC 6.1.1.6.6

**IX. Other Charges or Credits:**

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

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

**C. Energy Efficiency Rider** See Rider EECRF 6.1.1.6.4.1

**D. Advanced Metering System Rider** See Rider AMSCRF 6.1.1.6.9

**COMPANY-SPECIFIC APPLICATIONS**

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

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

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

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

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

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

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

**Determination of Billing Demand for Transmission System Charges**

Determination of NCP kW

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

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

Determination of 4 CP kW For IDR Metered Customers

If the Billing Meter is an IDR Meter that was installed at the Retail Customer's request, or by Commission rule, the transmission system charges will be calculated using the 4CP billing kW demand as determined in this section. The 4 CP kW demand applicable under the Monthly Rate section shall be the average of the sum of the Retail Customer's integrated 15-minute demands at the time of the monthly ERCOT system 15-minute peak demand for the months of June, July, August and September of the previous calendar year. The Retail Customer's average 4 CP kW demand will be updated effective on January 1 of each calendar year and remain fixed throughout the calendar year. Retail Customers without previous history on which to determine their 4 CP kW demand will be billed at the applicable NCP kW demand rate under the "Transmission System Charge" using the Retail Customer's NCP kW demand.

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

**Determination of Billing Demand for Distribution System Charges**

Determination of NCP kW Billing Demand

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

**Determination Of Billing Demand When Meter Readings Cannot be Obtained**

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

**NOTICE**

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

# APPENDIX III - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

OFFICE OF THE COMPTROLLER TEXAS

SECO
State Energy Conservation Office

## Public Schools, Colleges and Non-Profit Hospitals

### Preliminary Energy Assessment
### Service Agreement

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

**Description of the Service**

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with Bloomington ISD, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

**Principles of the Agreement**

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- ✓ Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- ✓ SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- ✓ Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

**Acceptance of Agreement**

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: _____ Date: 4/12/10

Name (Mr./Ms./Dr.) Brad W. Williams Title: Superintendent

Organization: Bloomington ISD Phone: 361-897-1652

Street Address: _____ Fax: 361-897-1214

Mailing Address: P.O. BOX 158 E-Mail: brad.williams@bisd-tx.org

Bloomington TX 77929 County: Victoria

**Contact Information:**

Name (Mr./Ms./Dr.): _____ Title: _____

Phone: _____ Fax: _____

E-Mail: _____ County: _____

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

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

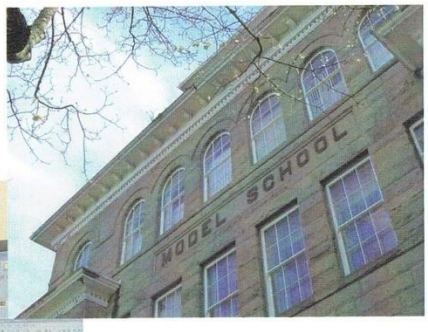
# APPENDIX IV - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

ANNOUNCING!

TEMA

# TEXAS ENERGY MANAGERS ASSOCIATION

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




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

**WWW.TEXASEMA.ORG**

Check the website for Membership and Association information.

SECO
State Energy Conservation Office