Susan Combs
Texas Comptroller of Public Accounts

# Facility Preliminary Energy Assessments and Recommendations

Prepared by:

ESA ENERGY SYSTEMS ASSOCIATES, Inc.

A TERRACON COMPANY

100 East Main Street

Round Rock, Texas 78664

(512) 258-0547

## Cotton Center Independent School District

October 18, 2011

ESA Energy Systems Associates, Inc.
A Terracon COMPANY

SECO
State Energy Conservation Office

# Table of Contents

## 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: | Stephen Ross |
| Phone: | 512-463-1770 |
| Address: | State Energy Conservation Office<br>LBJ State Office Building<br>111 E. 17th Street<br>Austin. Texas 78774 |

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

In September 2011, **SECO** received a request for technical assistance from Rocky Stone, Superintendent for **Cotton Center I.S.D.** **SECO** responded by sending ESA **Energy Systems Associates, Inc.**, a registered professional engineering firm, to prepare this preliminary report for the school district. This report is intended to provide support for the district as it determines the most appropriate path for facility renovation, especially as it pertains to the energy consuming systems around the facility. It is our opinion that significant decreases in annual energy costs, as well as major maintenance cost reductions, can be achieved through the efficiency recommendations provided herein.

This study has focused on energy efficiency and systems operations. To that end, an analysis of the utility usage and costs for **Cotton Center ISD,** (hereafter known as CCISD ) was completed by ESA **Energy Systems Associates, Inc**., (hereafter known as *Engineer*) to determine the annual energy cost index (ECI) and energy use index (EUI) for each campus or facility. A complete listing of the Base Year Utility Costs and Consumption is provided in Section 3.0 of this report.

Following the utility analysis and a preliminary consultation with *Mr. Sanders*, the CCISD head of maintenance, a walk-through energy analysis was conducted throughout the campus. Specific findings of this survey and the resulting recommendations for both operation and maintenance procedures and cost-effective energy retrofit installations are identified in Section 7.0 of this report.

<u>We estimate that as much as **$17,735** may be saved annually if all recommended projects are implemented</u>. The estimated installed cost of these projects should total approximately **$174,495** yielding an average simple payback of **10 years**.

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

| SUMMARY: | ECRM DESCRIPTION | IMPLEMENTATION COST | ESTIMATED SAVINGS | SIMPLE PAYBACK |
|---|---|---|---|---|
| Building Envelope ECRM #1 | Replace single pane windows | $2,220 | $215 | 10-1/2 Years |
| Lighting ECRM #1 | Retrofit gym lighting | $11,200 | $1,600 | 7 Years |
| Lighting ECRM #2 | Retrofit remaining T12 lighting | $16,750 | $2,800 | 6 Year |
| HVAC ECRM #1 | Replace package rooftop units | $144,325 | $13,120 | 11 Years |
| **TOTAL PROJECTS** | | **$ 174,495** | **$17,735** | **10 Years** |

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

Our final "summary" comment is that **SECO** views the completion and presentation of this report as a beginning, rather than an end, of our relationship with CCISD. 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
A Terracon Company

## 2.0 ENERGY ASSESSMENT PROCEDURE:

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

1. Designing and monitoring customized procedures to control the run times of energy consuming systems.
2. Analyze systems for code and standard compliance in areas such as cooling system refrigerants used, outside air quantity, and lighting illumination levels.
3. Develop an accurate definition of system and equipment replacement projects along with installation cost estimates, estimated energy and cost savings and analyses for each recommended project.
4. Develop a prioritized schedule for replacement projects.
5. Developing and drafting an overall Energy Management Policy.
6. Assist in the development of guidelines for efficiency levels of future equipment purchases.

## 3.0 ENERGY PERFORMANCE INDICATORS:

In order to easily assess the *Partner's* energy utilization and current level of efficiency, there are two key "Energy Performance Indicators" calculated within this report.

### 1. Energy Utilization Index

The Energy Utilization Index (EUI) depicts the total annual energy consumption per square foot of building space, and is expressed in "British Thermal Units" (BTUs).

To calculate the EUI, the consumption of electricity and gas are first converted to equivalent BTU consumption via the following formulas:

ELECTRICITY Usage

[ Total KWH /yr] x [ 3413 BTUs/KWH] = __________ BTUs / yr

NATURAL GAS Usage

[Total MCF/yr ] x [1,030,000 BTUs/MCF] = ________ BTUs / yr

After adding the BTU consumption of each fuel, the total BTUs are then divided

by the building area.

EUI = [ Electricity BTUs + Gas BTUs] divided by [Total square feet]

### 2. Energy Cost Index

The Energy Cost Index (ECI) depicts the total annual energy cost per square foot of building space.

To calculate the ECI, the annual costs of electricity and gas are totaled and divided by the total square footage of the facility:

ECI = [ Electricity Cost + Gas Cost ] divided by [ Total square feet ]

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

| OWNER: | Cotton Center | | | | BUILDING: | K-12 | | |
|---|---|---|---|---|---|---|---|---|
| MONTH / YEAR | | ELECTRIC | | | | | NAT'L GAS / FUEL | |
| | | | DEMAND | | | | | |
| | | CONSUMPTION | METERED | CHARGED | COST OF | TOTAL ALL ELECTRICAL | CONSUMPTION | $ |
| MONTH | YEAR | KWH | KW/KVA | KW/KVA | DEMAND | COSTS $ | CCF | COSTS |
| JANUARY | 2011 | 26,750 | 0 | 0 | 0 | 3,436 | 6,009 | $3,688 |
| FEBRUARY | 2011 | 39,241 | 0 | 0 | 0 | 3,768 | 6,738 | $3,953 |
| MARCH | 2011 | 30,846 | 0 | 0 | 0 | 3,123 | 1,977 | $1,270 |
| APRIL | 2011 | 28,652 | 0 | 0 | 0 | 2,951 | 740 | $559 |
| MAY | 2011 | 30,563 | 0 | 0 | 0 | 3,085 | 626 | $489 |
| JUNE | 2011 | 35,352 | 0 | 0 | 0 | 3,438 | 287 | $297 |
| JULY | 2011 | 34,981 | 0 | 0 | 0 | 3,634 | 838 | $671 |
| AUGUST | 2011 | 40,348 | 0 | 0 | 0 | 3,870 | 185 | $250 |
| SEPTEMBER | 2011 | 53,939 | 0 | 0 | 0 | 5,494 | 220 | $283 |
| OCTOBER | 2010 | 30,742 | 0 | 0 | 0 | 3,727 | 373 | $271 |
| NOVEMBER | 2010 | 30,129 | 0 | 0 | 0 | 3,051 | 2,876 | $1,839 |
| DECEMBER | 2010 | 31,502 | 0 | 0 | 0 | 3,161 | 3,189 | $2,050 |
| **TOTAL** | | **413,045** | **0** | **0** | **0** | **$42,738** | **24,058** | **$15,620** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | **Energy Use Index:** | | | |
| Annual Total Energy Cost = | | $58,358 | Per Year | Total Site BTU's/yr | | 46,488 | BTU/s.f.yr |
| | | | | Total Area (sq.ft.) | | | |
| Total KWH x 0.003413 = | | 1,409.72 | x 106 | | | | |
| Total MCF x 1.03 = | | 24,779.74 | x 106 | **Energy Cost Index:** | | | |
| Total Other x ____ | | | x 106 | Total Energy Cost/yr | | $1.04 | $/s.f. yr |
| Total Site BTU's/yr | | 26,189.46 | x 106 | Total Area (sq.ft.) | | | |
| Floor area: | | 56,336 | s.f. | | | | |
| **Electric Utility** | | **Account #** | | **Gas Utility** | **Account #** | | |
| South Plains Electric | | 7240 | | Atmos | 3473 | | |
| | | 2993 | | | 764 | | |
| | | 6911 | | | 5642 | | |
| | | 6507 | | | 863 | | |

Note: The above utility data and square footage includes the houses owned by Cotton Center ISD.

Cotton Center ISD purchases electricity from South Plains Electric Cooperative.

The rate schedule analysis for the district is shown in Section 4.0.

A copy of the rate schedule is included in Appendix I.

## 4.0 RATE SCHEDULE ANALYSIS:

### ELECTRICITY PROVIDER:

**ELECTRIC PROVIDER: South Plains Electric Co-op** Contract price: $0.092733 per kWh

| | |
|---|---|
| **ELECTRIC UTILITY:** | **South Plains Electric Coop** |
| **ELECTRIC RATE:** | **57** |
| **CUSTOMER CHARGE:** | $75.00/month |
| **ENERGY CHARGE:** | |
| All monthly kWh | $ 0.092733 |

Total *Average* Savings per Reduced kWh Electrical Consumption= **$0.092733/kWh**

Under Rate Schedule 57, there is no charge for demand.

---------------------------------------------------------------------------------------------------------------

**GAS UTILITY:** **Atmos Energy**

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

### ENERGY CHARGE:

Total Average Savings per CCF Natural Gas Consumption = **$0.65/ccf**

## 5.0 CAMPUS DESCRIPTIONS:

**Cotton Center ISD** consists of a single K-12 educational campus which is located in Hale County, Texas.

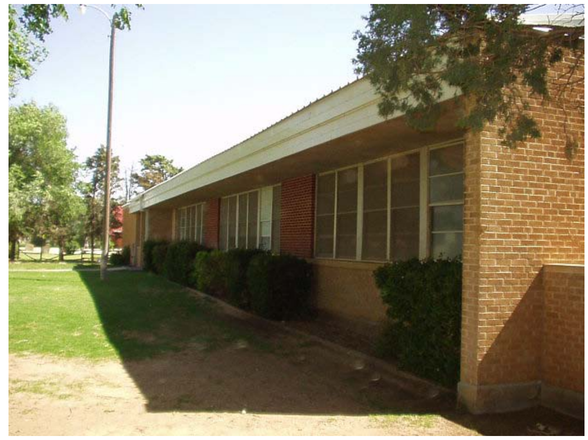
**Table 2: School Facilities Analyzed For This Report**

| Facility | Year originally Constructed | Approximate Square Footage | Basic HVAC Cool/Heat | Basic HVAC Air Distribution | Basic Lighting System Description | Basic Control System Description |
|---|---|---|---|---|---|---|
| Cotton Center K-12 | 1930's, 1954, 1970's | 56,336 | Evaporative Coolers, Splits, Packaged RTU | SZAHU, RTU | T8 & T12 | DDC |

Note: SZAHU = Single-Zone Air Handling Unit, RTU-Rooftop Unit

## 6.0 ENERGY RECOMMENDATIONS:

### Building Envelope ECRM 1: REPLACE OR ENCLOSE SINGLE PANE WINDOWNS



While surveying the campus we noticed many older, single pane windows. These windows are less effective at minimizing heat gain to a conditioned space than modern insulated dual pane units. *We recommend the district replace all single pane windows with tinted, double pane windows.*

Because there are more windows than required, *we recommend enclosing one-half of the existing windows.*

The scope of work included in the cost estimate is to replace half the single pane windows in an average classroom (see picture above)and to build/install insulated wooden window enclosures for every other window.

Estimated Cost: $2,220 Estimated Savings: $215 Estimated Payback: 10 1/2 Years

### Lighting ECRM 1: REPLACE EXISTING GYM LIGHTING

The Gymnasium was noted to be utilizing 400watt metal halide fixtures and various sizes of compact fluorescent lamps. One characteristic of metal halide fixtures is their inherently long re-strike. This means that if the fixtures are ever turned off, it can take up to 15 minutes for them to come back on. This long re-strike encourages staff to leave the lights on throughout the day, even if the space is not occupied. *We recommend replacing the metal halides and large compact florescent lamps with 6-each T5 fluorescent high bay lamp fixtures and the smaller compact fluorescent lamps with 4-each T8 fluorescent lamp fixtures.*

Estimated Cost:$11,200 Estimated Savings: $1,600 Estimated Payback: 7 Years

### Lighting ECRM 2: RETROFIT REMAINING T12 LIGHTING

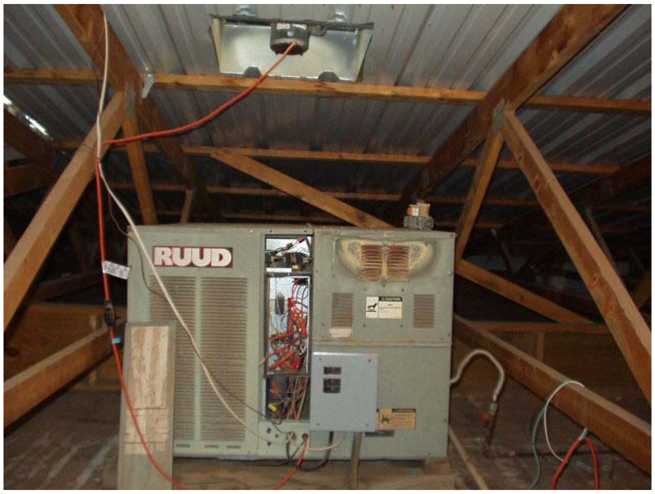
Many parts of the campus, including the cafeteria, were noted to still be utilizing T12 components in their linear fluorescent lighting fixtures. T12 components produce approximately 18% less light and consume about 20% more energy than the T8 lamps and electronic ballasts that may be retrofit into the existing linear fluorescent fixtures. Senate Bill 300 requires Texas school districts to install the most efficient lamps and ballasts possible in their existing fixtures. *Therefore we recommend the district retrofit all remaining T12 fixtures with T8 lamps and electronic ballasts.*

It was determined that approximately 50% of the building is still utilizing T12 components. The Cafeteria was also noted to be entirely T12. The below cost estimate is to retrofit the remaining 50% of the campus lighting and the entire cafeteria lighting.

Estimated Cost: $16,750 Estimated Savings: $2,800 Estimated Payback: 6 Years

### HVAC ECRM 1: REPLACE EXISTING ROOFTOP UNITS

The HVAC systems installed at the campuses consist primarily of packaged roof-mounted direct expansion cooling Rooftop Units (RTUs) with natural gas heating sections at the High School and Split Systems (S/Ss) at the Elementary School. Many of the units serve two classrooms; consequently there are minor comfort issues between different classroom occupants. The High School has a total of six (6) 1992 rooftop units that are now 16 years old and nearing the end of their useful life at the district. A similar unit was just recently replaced because the unit failed.




These rooftop units were not relocated from the flat built-up roof that was original to the building when the new sloping metal roof was installed. The roof protects the units from the weather but also makes transferring the heat rejected from the building to the atmosphere more difficult. The district has installed exhaust fans above each rooftop unit and interlocked them with the RTU operation to exhaust the heat from the facility (pictured to the right). The process works but requires more energy than necessary as the system now uses two exhaust fans (one integral to the RTU and one installed in the sloping roof) where only one would normally be required. *We recommend that the district replace the existing rooftop units with split system components.* The air handlers can be installed where the existing rooftop unit resides. All of the ancillary components are present: natural gas lines, condensate lines, electrical connections and control wiring.

Condensing units can be installed on an unused concrete slab immediately behind the building and below the new air handler penthouse. The condensing units would be ground mounted and would need heavy duty coil guards to protect them from student vandalism and hail. The secondary exhaust fans can be removed and the existing roof penetrations can be retrofit into an outside air intake for the air handler. The intake will require a backdraft damper and bird screening. The enclosed roof area will also need to be insulated. Spray-in insulation is available for approximately $2.25 per square foot. Because the size of the space needing to be insulated is unknown, the cost estimate found below does not include the cost of spray-in insulation.

*We recommend replacing the seven (7) High School RTUs with new split systems and the six (6) Elementary school split systems with new split systems, all tied in to the existing DDC system. This retrofit represents approximately sixty-five (65) tons of cooling capacity*

Estimated Cost: $144,325 Estimated Savings: $13,120 Estimated Payback: 11 Years

## 7.0 MAINTENANCE AND OPERATION RECOMMENDATIONS

| | |
|---|---|
| HVAC | • Comb fins on damaged condensing units<br>• Insulate hot water piping<br>• Insulate refrigerant lines<br>• Seal exhaust fan while conditioning gym<br>• Relocate cafeteria thermostat<br>• Relocate kitchen cooler/freezer condensing units outside<br>• Reseal air handler cabinet |
| Lighting | • Turn off lights in unoccupied spaces |
| Building Envelope | • Replace weatherstripping |
| Safety | • Relocate and secure kitchen natural gas line |

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

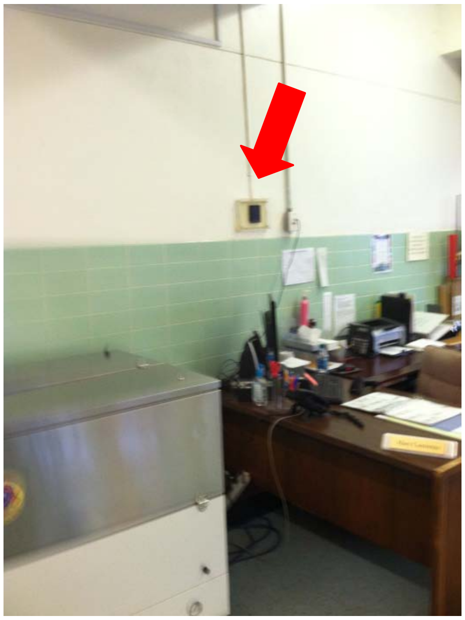
*HVAC M&O #1*
At CCISD, the HVAC M&O opportunities begin with combing any crushed or bent condenser fins [combs available for less than $10]. Damage to just 10% of the coil fins on an HVAC unit can result in up to a 30% loss of efficiency for the unit. One unit identified to be in need of combing was the 5-ton Carrier unit at the Cafeteria, serial #1893E02126.

*HVAC M&O #2*
It was noted during the survey that some of the hot water piping at the Kitchen was not insulated. The majority of the energy losses in a hot water system occur in the hot water piping. *We recommend the district insulate the hot water piping to minimize energy losses in the hot water system.*

*HVAC M&O #3*
It was noted during the survey that some DX equipment had damaged or missing refrigerant piping insulation. This condition minimizes the ability of the refrigerant to absorb heat from the conditioned space as it instead absorbs heat from the outdoors. *We recommend the district replace damaged or missing refrigerant piping insulation on all condensing units.*

*HVAC M&O #4*
At the gym, we noticed a large exhaust fan at the ridgeline with a gravity damper that would not completely close. This will allow a large portion of the heat being generated by the unit heaters to escape during heating season. *We recommend the district place a cover over the opening whenever the gym is being heated.*

*HVAC M&O #5*
At the cafeteria, we noticed the thermostat was mounted on the wall behind a freezer-cooler and above a computer monitor. The heat being rejected from the equipment will be detected by this thermostat causing the HVAC system to run more hours than necessary in an attempt to satisfy the false reading. *We recommend relocating this thermostat unit away from all appliances where it can accurately sample the cafeteria room temperature.*



*<u>HVAC M&O #6</u>*

It was noted during the survey that the condensing units for the kitchen cooler-freezer unit are currently mounted above the cooler unit, inside conditioned space of the kitchen. Because this allows all rejected heat to be released into the kitchen, *we recommend mounting these condensing units outside where the rejected heat will not affect the kitchen temperature.*

*<u>HVAC M&O #7</u>*

At the in-school suspension (ISS) room, it was noted that the air handler cabinet was not properly sealed, allowing the conditioned air to escape into the small air handler closet. Because the escaping conditioned air never reaches the ISS room, the HVAC unit must run longer to achieve the desired temperature setpoint. *We recommend resealing the air handler cabinet ensuring all conditioned air makes it into the ISS room.*

*<u>Lighting M&O #1</u>*

Some areas of the buildings were noted to have light fixtures left operating in unoccupied spaces. The least expensive remedy for this issue is to train staff to not turn on fixtures not needed during daytime hours and to turn off fixtures in unoccupied spaces. If the behavioral modification is unsuccessful, the district may elect to invest capital into automatic controls for the fixtures.

*<u>Building Envelope M&O #1</u>*

It was noted during the survey that some exterior doors had missing or damaged weatherstripping. *We recommend the district inspect and replace all damaged weatherstripping to minimize the loss of conditioned air and the introduction of dust and contaminants.*

*<u>Safety M&O #1</u>*

An unsecured natural gas line at the kitchen was noted to be a tripping hazard. If the line was kicked, it could create a gas leak within the kitchen. *We recommend moving the gas line so it is no longer a tripping hazard and secure it so it can not be accidentally contacted.*

## 8.0 FINANCIAL EVALUATION

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

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

| | | | | |
|---|---|---|---|---|
| Proposal: | Perform recommended ECRMs | | | |
| Assumptions: | | | | |
| 1. Equipment will last at least 15 years prior to next renovation | | | | |
| 2. No maintenance expenses for first five years (warranty period) | | | | |
| 3. $1,000 maintenance expense next 5 years | | | | |
| 4. $2,000 maintenance expense next 5 years | | | | |
| 5. Savings decreases 5% per year after year 5 | | | | |
| | | | | |
| **Cash Flow** | **Project Cost** | **Project Savings** | **Maintenance Expense** | **Net Cash Flow** |
| Time 0 | ($174,495) | | 0 | ($174,495) |
| Year 1 | | $ 17,735.00 | 0 | $17,735 |
| Year 2 | | $ 17,735.00 | 0 | $17,735 |
| Year 3 | | $ 17,735.00 | 0 | $17,735 |
| Year 4 | | $ 17,735.00 | 0 | $17,735 |
| Year 5 | | $ 17,735.00 | 0 | $17,735 |
| Year 6 | | $ 16,848.25 | ($1,000) | $15,848 |
| Year 7 | | $ 15,961.50 | ($1,000) | $14,962 |
| Year 8 | | $ 15,074.75 | ($1,000) | $14,075 |
| Year 9 | | $ 14,188.00 | ($1,000) | $13,188 |
| Year 10 | | $ 13,301.25 | ($1,000) | $12,301 |
| Year 11 | | $ 12,414.50 | ($2,000) | $10,415 |
| Year 12 | | $ 11,527.75 | ($2,000) | $9,528 |
| Year 13 | | $ 10,641.00 | ($2,000) | $8,641 |
| Year 14 | | $ 9,754.25 | ($2,000) | $7,754 |
| Year 15 | | $ 8,867.50 | ($2,000) | $6,868 |
| | | | | |
| | | | **Internal Rate of Return** | **2.26%** |

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

APPENDIX I: SUMMARY OF FUNDING AND PROCUREMENT OPTIONS

## 9.0 GENERAL COMMENTS

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

# APPENDICES

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

## SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

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

**LoanSTAR Program:**

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

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

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

**Loans on Commercial Market:**

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

**Leasing Corporations:**

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

**Bond Issue:**

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

## SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

**State Purchasing:**

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

**Design/Bid/Build (Competitive Bidding):**

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

**Design/Build:**

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

**Purchasing Standardization Method:**

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

**Performance Contracting:**

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

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 SCHEDULE

| South Plains Electric Cooperative<br>Tariff for Electric Service | Section 20 |
|---|---|
| Applicable to All Areas<br>Effective: June 2010 | |

| RATE SCHEDULE | 57 | Public Schools – Non Demand Metered | SHEET 44 |
|---|---|---|---|

**Availability:**
Available to public schools for lighting and power service. Rate is not available for service to any facility of any four year state university upper level institution, Texas state technical college, or college to which the Cooperative is required to discount the base rates as provided in PURA 95, Section 2.2141.

**Type of Service:**
Single phase and three phase at available primary and secondary voltages; motors having a rated capacity in excess of ten horsepower must be three phase. Frequency and voltage shall be subject to reasonable variation.

**Rate:**

Customer Charge: $75.00 per month

Energy Charge: $0.092733 for all kWh per month

**Billing Adjustments:**
Reference Tariff Section 20.01.

**Terms of Payment:**
Each bill for utility service(s), regardless of the nature of the service(s), is due upon receipt and delinquent 16 days after issuance unless such day falls on a holiday or weekend, in which case payment is due on the next work day. If full payment is not received in the office of the Cooperative on or before the date such bill is due, the customer's account will be considered delinquent and subject to disconnection in accordance with the rules of the regulatory authority.

## APPENDIX IV - PRELIMINARY ENERGY ASSESSMENT SERVICE AGREEMENT

SECO
State Energy Conservation Office

OFFICE OF THE COMPTROLLER TEXAS

## 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 _Cotton Center 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: Rocky J. Stone | Date: 9-12-2011 |
| Name (Mr./Ms./Dr.)_Mr. Rocky J. Stone | Title: _Superintendent |
| Organization: __Cotton Center ISD | Phone: _806 879-2160 |
| Street Address: ___2345 FM 179 | Fax: __806 879-2175 |
| Mailing Address: __P.O. Box 350 | E-Mail:__rjstone@esc17.net |
| ______Cotton Center, Tx 79021 | County: __Hale |

**Contact Information**:

| | |
|---|---|
| Name (Mr./Ms./Dr.):_________SAME AS ABOVE | Title: |
| Phone: | Fax: |
| E-Mail: | County: |

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

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

## APPENDIX V - TEXAS ENERGY MANAGERS ASSOCIATION (TEMA)

ANNOUNCING!

TEMA

# TEXAS ENERGY MANAGERS ASSOCIATION

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


- 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.

Texas Energy Managers Association

SECO
State Energy Conservation Office

## APPENDIX VI - UTILITY CHARTS ON CD