Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

City of Martindale

409 Main Street
Martindale, Texas 78655

Prepared by:

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SECO
State Energy Conservation Office

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Local Government Energy Management Program
City of Martindale
409 Main Street
Martindale, TX 78655
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Phone: 512-357-2639

1.0 EXECUTIVE SUMMARY

The City of Martindale, now referred to as the City, requested that Texas Energy Engineering Services, Inc. (TEESI) perform a Preliminary Energy Assessment (PEA) of their facilities. This report documents that analysis.

This service is provided at no cost to the City through the Local Government Energy Management and Technical Assistance Program as administered by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and Texas local governments for the purpose of planning, funding, and implementing energy saving measures, which will ultimately reduce the City's annual energy costs.

The annual cost savings, implementation cost estimate and simple payback for all building energy retrofit projects identified in this preliminary analysis are summarized below. Individual building projects are summarized in Section 8.0 of this report.

Est. Implementation Cost Estimate:	$23,200
Est. Annual Energy Saving (MMBTU/Yr):	84
Est. Annual Greenhouse Gas Emissions Reduction (Metric Tons CO_2e/Yr):	15
Est. Annual Energy Cost Savings:	$3,800
Simple Payback (Yrs):	6.1

A follow-up visit to the City will be scheduled to address any questions pertaining to this report, or any other aspect of this program.

SECO is committed to providing whatever assistance the City may require in planning, funding and implementing the recommendations of this report. The City is encouraged to direct any questions or concerns to either of the following contact persons:

SECO / Mr. Stephen Ross
(512) 463-1770

TEESI / Saleem Khan
(512) 328-2533

2.0 FACILITY DESCRIPTIONS

This section provides a brief description of the facilities surveyed. The purpose of the onsite survey was to evaluate the major energy consuming equipment in each facility (i.e. Lighting, HVAC, and Controls Equipment). A description of each facility is provided below.

Municipal Complex (City Hall, Municipal Court, Police Station)

Stories:	Single story
Area (estimated):	1,868 SF
Bldg. Components:	Brick building, modified bitumen flat roof, slab on grade
Typical Lighting Fixtures:	T12 fluorescent fixtures with magnetic ballasts
HVAC:	Split-DX units and packaged window unit
Controls:	Manual and programmable thermostats

Wastewater Treatment Plant (WWTP)

The City operates one (1) Wastewater Treatment Plant (WWTP). Wastewater is conveyed to the WWTP plant by four (4) wastewater lift stations located throughout the City's service area. There are 2-10 HP 165 GPM pumps located at the WWTP's main pump station. Wastewater treatment is provided by a lagoon/pond treatment system.

Park and City Street Lighting

The City also maintains and pays utilities for a park and 52 exterior lighting fixtures at various locations. The fixtures range from 100W to 250W.

3.0 ENERGY CONSUMPTION AND PERFORMANCE

A site survey was conducted at the City's facilities. The facilities surveyed comprised a total gross area of approximately 1,868 square feet.

Annual electric invoices for the buildings surveyed were $14,821 for the 12-month period ending March 2011. The City does not use natural gas. A detailed summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

To help the City evaluate the overall energy performance of its facilities, TEESI has calculated an Energy Utilization Index (EUI) and Energy Cost Index (ECI) for the Municipal Complex. The EUI represents a facility's annual energy usage per square foot; it is measured as thousand BTU's per square foot per year (kBTU/SF/Year). Similarly, ECI is measured as cost per square foot per year ($/SF/Year). The EUI and ECI performance for the Municipal Complex are listed below:

Building Energy Cost and Consumption Benchmarks								
	Electric				Natural Gas	EUI	ECI	
Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr		kBTU/SF/Yr	$/SF/Yr	SF
Municipal Complex	36,249	124	19.41	4,261	N/A	66	2.28	1,868

Knowing the EUI and ECI of each facility is useful for determining the City's overall energy performance. In addition, the City's EUI was compared to TEESI's database of local government facilities. See **Appendix D** to determine how this facility's EUI compared to other local government facilities in Texas.

To help the City evaluate the overall energy performance of its wastewater treatment plant, TEESI has calculated its Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI was calculated based on the facility's annual energy usage per annual average effluent flow; it is measured as thousand BTUs per gallons per day per year (kBTU/GPD/Year). Similarly, ECI is measured as cost per million gallons per day per year ($/MGD/Year). The EUI and ECI performance for the wastewater treatment plant is listed below.

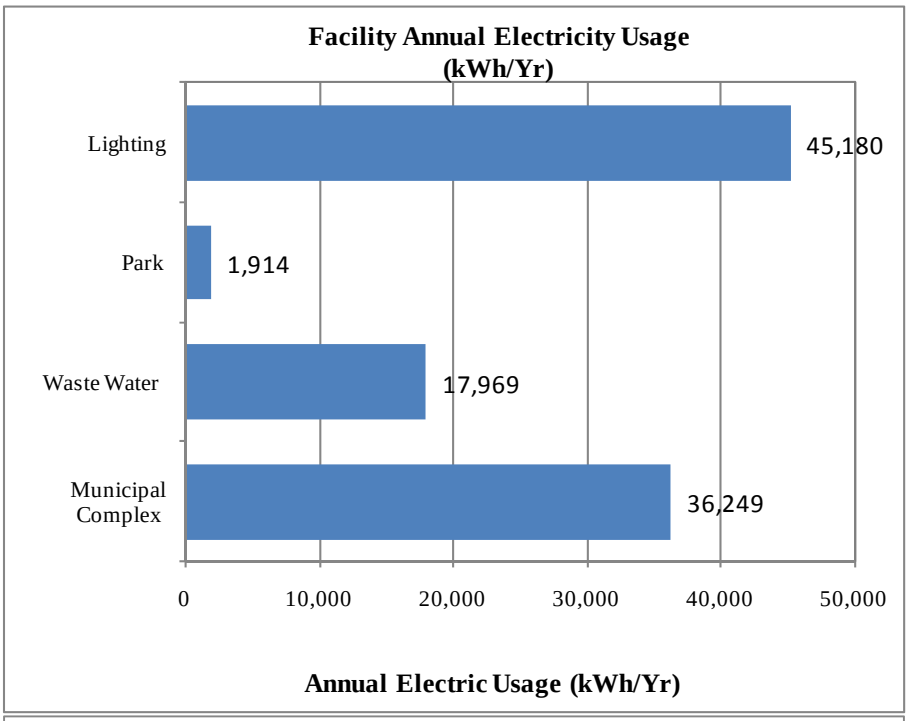
WWTP - Energy Cost and Consumption Benchmark						
Electric[1]			Design Capacity (MGD)	Average Effluent Flow (MGD)	EUI[4]	ECI[5]
kWh/Yr	kBtu/Yr[2]	$Cost/Yr			kBtu/GPD/Yr	$/MGD/Yr
17,969	61,310	$3,650	0.057	0.045	1.4	$81,111

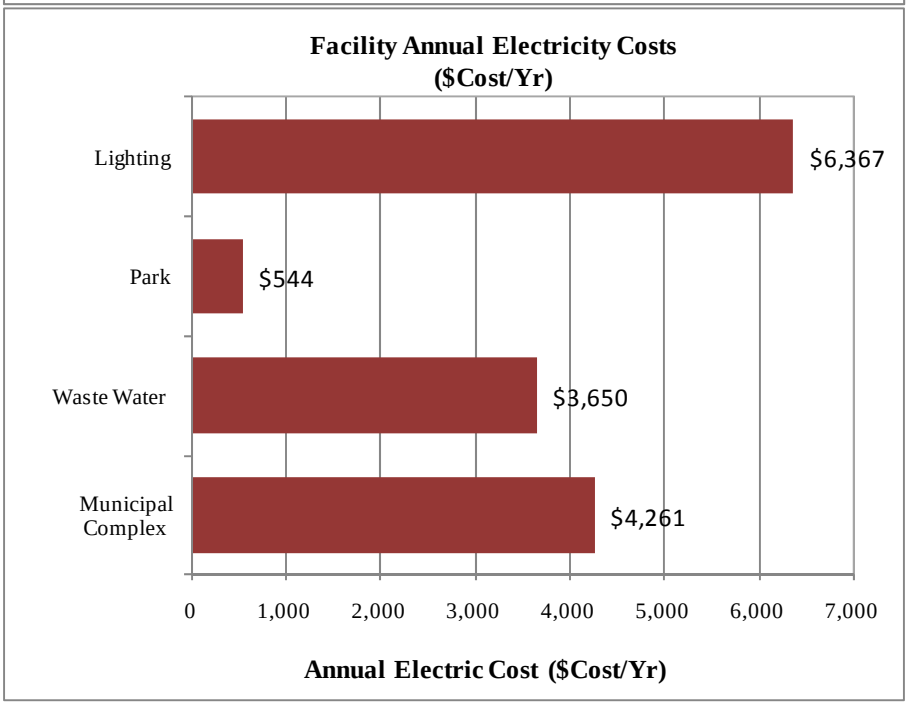
1. Electric consumption for WWTP is based on electric meter serving the main processing facility and does not account for other usage (i.e. lift stations, irrigation, etc.) which may be metered separately.
2. Electric consumption conversion based on 3.412 kBtu/kWh.
4. Energy Use Index (EUI) calculated based annual kBtu divided by the Average Effluent Flow in gallons per day (GPD).
5. Energy Cost Index (ECI) calculated based on annual energy cost divided by the Average Effluent Flow in million gallons per day (MGD).

A cost and consumption summary of all the City's metered facilities is provided in the table below.

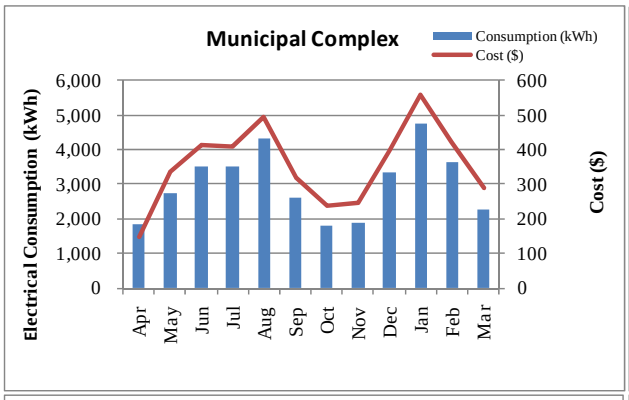
Energy Cost and Consumption Benchmarks					
		Electric			Natural Gas
	Facility	kWh/Yr	MMBTU/Yr	$Cost/Yr	
1	Waste Water	17,969	61	3,650	N/A
2	Municipal Complex	36,249	124	4,261	
3	Park	1,914	7	544	
4	Lighting	45,180	154	6,367	
		kWh/Yr	MMBTU/Yr	$Cost/Yr	
	Total	101,312	346	14,821	

The following charts summarize the data presented in the previous tables. See **Appendix C** for further detail.

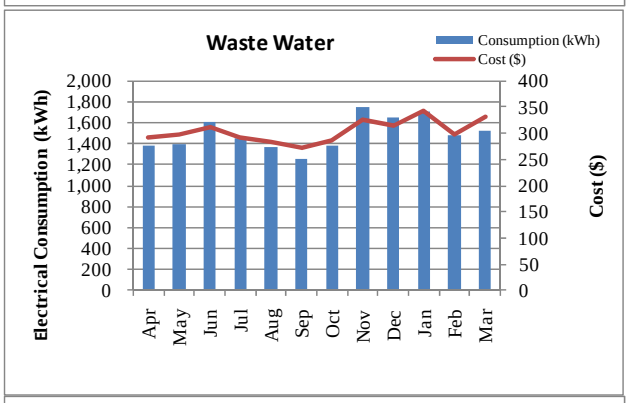




The following charts summarize the each facility's monthly utility data. See **Appendix C** for further detail.



NATURAL GAS N/A



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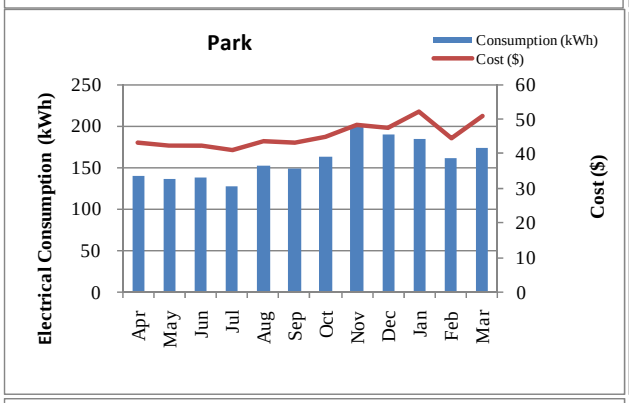
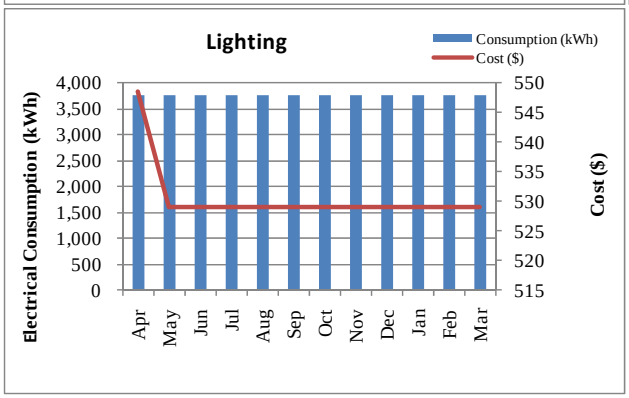


NATURAL GAS N/A



NATURAL GAS N/A

4.0 ENERGY STAR PORTFOLIO MANAGER

The City's energy baseline can be developed in ENERGY STAR's Portfolio Manager. One of the primary reasons for using ENERGY STAR Portfolio Manager is its ability to normalize the City's baseline according to several key factors (i.e. Weather, Square Feet, Hours of Operation, Number of Computers, etc.). It is also a free online resource available to all registered users, and is a user-friendly web-based tool.

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). ENERGY STAR has developed Portfolio Manager, an innovative online energy management tool, designed to help organizations track and assess energy and water consumption of their facilities. Portfolio Manager helps organizations set investment priorities, identify under-performing buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance.

Portfolio Manager also has benchmarking capabilities, and rates building and WWTP energy performance on a scale from 1 to 100 relative to similar buildings and WWTPs nationwide. Unfortunately, this benchmarking ability is only available for buildings of 5,000 ft^2 or more and WWTP with effluent flows of 0.6 MGD or more. However, even without a benchmark rating, Portfolio Manager is still an effective tool for online tracking of a facility's energy performance. TEESI has entered baseline energy consumption data in ENERGY STAR Portfolio Manager for the City of Martindale Municipal Complex and WWTP. Continued use of ENERGY STAR Portfolio Manager by the City is still recommended.

5.0 ENERGY ACCOUNTING

UTILITY PROVIDERS

Bluebonnet Electric Coop provides electric service to the City. The City does not currently use natural gas or propane at any of its facilities.

MONITORING AND TRACKING

Currently, the City does not have an energy tracking software or spreadsheet in place. An effective energy tracking system is an essential tool for monitoring an energy management program. The City should consider consolidating the tracking and recording of all its utility accounts (i.e., electricity, natural gas, propane, water, etc.) into an electronic spreadsheet similar to the chart shown on the following page. Along with total utility costs ($), utility consumption should be recorded as well (i.e., kWh, MCF, gallons, etc.). The City can use this data to track utility consumption patterns and budget utility expenses. **Having this historical data improves the City's awareness of their energy performance and will help in tracking their energy reduction goals.**

Preferably, the City should also consider an electronic database such as ENERGY STAR Portfolio Manager, which provides an online means of storing and tracking utility information. TEESI has entered the baseline data for the City. Additional information on ENERGY STAR Portfolio Manager may be found in Section 4.0.

The steps below are essential for an effective energy management tracking system:

1. Perform regular updates. An effective system requires current and comprehensive data. Monthly updates should be strongly encouraged.

2. Conduct periodic reviews. Such reviews should focus on progress made, problems encountered, and potential rewards.

3. Identify necessary corrective actions. This step is essential for identifying if a specific activity is not meeting its expected performance and is in need of review.

In addition, having this historical utility data would facilitate **House** and **Senate Bill(s)** reporting requirements. Please see Section 6.0 for additional information regarding these requirements.

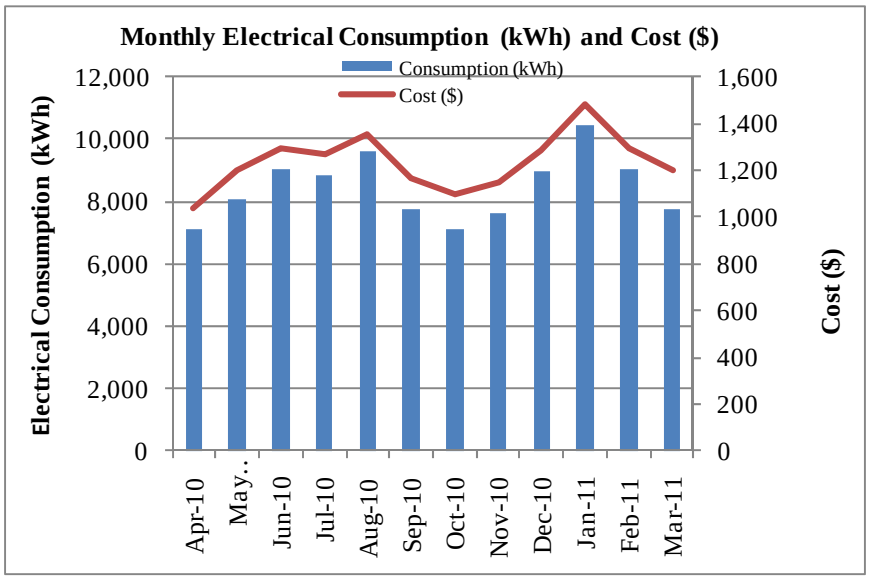
Below is a sample format the City can customize to help summarize their overall utility usage and costs.

The table presented below is a summation of the data provided by the City. The table includes only selected utility accounts. It is for reference purposes only and does not represent the City's total utility data. See **Appendix C** for further detail regarding each utility account represented below.

City of Martindale - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Apr-10	7,134	1,034	$0.1449	$0	$0	N/A
May-10	8,061	1,204	$0.1494	$0	$0	N/A
Jun-10	9,033	1,294	$0.1432	$0	$0	N/A
Jul-10	8,829	1,271	$0.1439	$0	$0	N/A
Aug-10	9,613	1,350	$0.1404	$0	$0	N/A
Sep-10	7,767	1,163	$0.1497	$0	$0	N/A
Oct-10	7,101	1,097	$0.1545	$0	$0	N/A
Nov-10	7,611	1,152	$0.1513	$0	$0	N/A
Dec-10	8,964	1,287	$0.1436	$0	$0	N/A
Jan-11	10,432	1,481	$0.1420	$0	$0	N/A
Feb-11	9,022	1,292	$0.1432	$0	$0	N/A
Mar-11	7,745	1,197	$0.1546	$0	$0	N/A
Total	101,312	$14,821	$0.1463	0	$0	N/A

Gross Building Area:	1,868	SF



6.0 ENERGY LEGISLATION OVERVIEW

In 2007, the 80th Texas Legislature passed Senate Bill 12 (**SB12**) which among other things extended the timeline set by Senate Bill 5 (**SB5**). SB5, commonly referred to as the Texas Emissions Reduction Plan, was adopted in 2001 by the 77th Texas Legislature to comply with the federal Clean Air Act standards. Also in 2007, the 80th Texas Legislature passed House Bill 3693 (**HB3693**) which amended provisions of several codes relating primarily to energy efficiency.

Following are key requirements established by the above energy legislation:

Establish a goal of reducing electric consumption by five percent (5%) each state fiscal year for six (6) years, beginning on September 1, 2007.

Record electric, water, and natural gas utility services (consumption and cost) in an electronic repository. The recorded information shall be on a publicly accessible Internet Web site with an interface designed for ease of navigation if available, or at another publicly accessible location.

Energy-efficient light bulbs for buildings, requires an institution to purchase commercially available light bulbs using the lowest wattages for the required illumination levels.

Installation of energy saving devices in Vending Machines with non-perishable food products.

A summary description of SB 12 and HB 3693 is available in Appendix A. Further detail regarding each bill can be found in the Texas Legislature website (http://www.capitol.state.tx.us/Home.aspx).

7.0 RECOMMENDED MAINTENANCE & OPERATION PROCEDURES

Sound Maintenance and Operation procedures significantly improve annual utility costs, equipment life, and occupant comfort. Generally, maintenance and operation procedural improvements can be made with existing staff and budgetary levels. Below are typical maintenance and operations procedures that have energy savings benefits. Please note that some of the recommendations below are currently being practiced by the City. With this in mind, the following maintenance and operation procedures should be encouraged/continued to ensure sustainable energy savings.

M&O Recommendations - Buildings

The following are general design and maintenance and operations recommendations that may improve energy performance for City buildings.

PUBLICIZE ENERGY CONSERVATION

Promote energy awareness at regular staff meetings, on bulletin boards, and through organizational publications. Publicize energy cost reports showing uptrends and downtrends.

MANAGE SMALL ELECTRICAL EQUIPMENT LOADS

Small electrical equipment loads consists of small appliances/devices such as portable heaters, microwaves, small refrigerators, coffee makers, stereos, cell phone chargers, desk lamps, etc. The City should establish a goal to reduce the number of small appliances and to limit their usage. For example, the use of personal space heaters should be discouraged; all space heating should be accomplished by the City's main heating system. In addition, many small devices such as radios, printers, and phone chargers can consume energy while not in use. To limit this "stand-by" power usage, these devices should be unplugged or plugged into a power strip that can act as a central "turn off" point while not in use. With an effective energy awareness campaign to encourage participation, managing small electrical loads can achieve considerable energy savings.

ESTABLISH HVAC UNIT SERVICE SCHEDULES

Document schedules and review requirements for replacing filters, cleaning condensers, and cleaning evaporators. Include particulars such as filter sizes, crew scheduling, contract availability if needed, etc. Replace filters with standard efficiency pleated units. Generally, appropriate service frequencies are as follows -- filters: monthly; condensers: annually; evaporators: 5 years.

PRE-IDENTIFY PREMIUM EFFICIENCY MOTOR (PEM) REPLACEMENTS

Pre-identify supply sources and PEM stock numbers for all HVAC fan and pump motors so that as failures occur, replacement with PEM units can take place on a routine basis. As funding allows, pre-stock PEM replacements according to anticipated demand, i.e., motors in service more than 10 years, motors in stressful service, and particular motor types that are in service at several locations.

IMPROVE CONTROL OF INTERIOR & EXTERIOR LIGHTING

Establish procedures to monitor use of lighting at times and places of possible/probable unnecessary use: Offices at lunchtime, maintenance shops, closets, exterior and parking lots

during daylight hours, etc. Encouraging staff (i.e. Custodial, maintenance) to participate in the City's efforts to limit unnecessary lighting use would help improve this effort.

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Effective operation and maintenance of equipment is one of the most cost effective ways to achieve reliability, safety, and efficiency. Failing to maintain equipment can cause significant energy waste and severely decrease the life of equipment. Substantial savings can result from good operation and maintenance procedures. In addition, such procedures require little time and cost to implement. Examples of typical maintenance checklists for common equipment are provided in **Appendix E**. These checklists from the Federal Energy Management Program (FEMP), a branch of the Department of Energy (DOE), are based on industry standards and should supplement, not replace those provided by the manufacturer.

CONTROL OUTSIDE AIR INFILTRATION

Conduct periodic inspections of door and window weather-stripping, and schedule repairs when needed. Additionally, make sure doors and windows are closed during operation of HVAC systems (heating or cooling). Unintended outside air contributes to higher energy consumption and increases occupant discomfort. Below is a thermal image taken of the Municipal Complex front door. Hot outside air is infiltrating the cooled space.

REPLACE INCANDESCENT LAMPS WITH COMPACT FLUORESCENTS

Replace existing incandescent lamps with compact fluorescent lamps as they burn out. Compact fluorescents use 50 to 75 percent less wattage for the same light output, with ten times the operating life of incandescents.

ENERGY STAR POWER MANAGEMENT

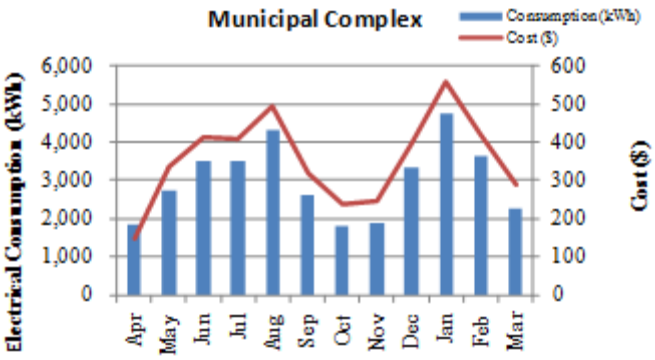
ENERGY STAR Power Management Program promotes placing monitors and computers (CPU, hard drive, etc.) into a low-power "sleep mode" after a period of inactivity. The estimated annual savings can range from $25 to $75 per computer. ENERGY STAR recommends setting computers to enter system standby or hibernate after 30 to 60 minutes of inactivity. Simply touching the mouse or keyboard "wakes" the computer and monitor in seconds. Activating sleep features saves energy, money, and helps protect the environment.

MAINTAIN INSULATION ON SPLIT A/C UNIT REFRIGERANT LINES

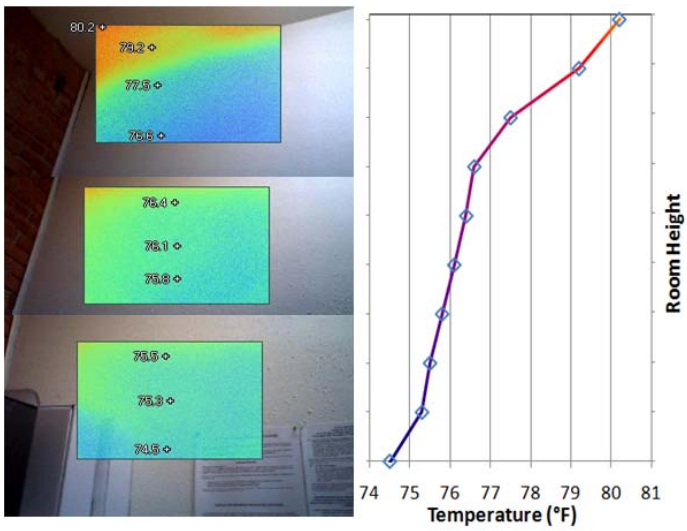
During the site visit, worn insulation was noted on split unit refrigerant lines at the Municipal Complex, as depicted below. It is recommended these lines be checked periodically and the insulation be maintained and replaced where necessary to ensure the efficiency of the units and eliminate unnecessary energy losses. In addition, it is recommended as little as possible of the refrigerant line be exposed to the elements. Overexposure increases energy losses and degrades insulation faster.

PROPERLY CIRCULATE HEATING AIR IN WINTER

The Municipal Complex actually sees higher electricity bills from electric resistance heating during peak winter months than from air conditioning during peak summer months, as evidenced in the monthly electrical consumption chart below.



Heating may be inefficient in the Municipal Complex due to its high ceilings with light insulation. Much of the hot air delivered to the building rises naturally to the ceiling where it is lost to the cold outdoors without ever heating the space. The following thermal image and plot demonstrate this temperature stratification phenomenon. Air near the ceiling is over 5°F warmer than at occupant levels.



This stratification in turn causes more occupant discomfort and higher winter thermostat settings, which ultimately increase electricity usage from the heater. Make sure return vents are unobstructed to improve air circulation through the building. Consider operating ceiling fans to deliver warm ceiling air to occupant level.

AVOID PLACING SERVER EXHAUST NEAR THERMOSTATS

The images below show hot air being exhausted from Municipal Complex computer equipment at over 85°F (left) and a room thermostat in close proximity to this hot exhaust (right). This causes A/C controls to think the room is warmer than it really is. In the summer, this increases the runtime of the unit, costing energy and money while reducing useful unit life. In all seasons the room will stay colder than its nominal setpoint, causing occupant discomfort. It is recommended the thermostat be relocated to an area representative of the actual space temperature.

M&O Recommendations - Water and Wastewater Treatment Plants

The following are general design and maintenance and operations recommendations that may improve energy performance for water system and wastewater treatment facilities.

UTILIZE HIGH EFFICIENCY PUMPS AND MOTORS

When replacing pumping units, procure high efficiency pumps and motors. Energy savings could account for 10-15% difference when compared to existing units.

EVALUATE PIPE SIZING WITHIN SERVICE AREA TO REDUCE FRICTION LOSSES

Performing a water distribution system analysis can recommend the most efficient piping size for the service area. Constructing non-restrictive piping would reduce system head requirements and save power.

ADD VARIABLE FREQUENCY DRIVE (VFD) CAPABILITY TO HIGH SERVICE PUMP STATIONS

A VFD controlled pump station could serve as an alternative system pressure control to enable elevated storage to be taken out of service for painting or repairs.

ADD VFD OR “SOFT-START” TO PUMPING UNITS 50 HP AND GREATER

A soft-start feature would reduce start-up amperage surcharge saving money when rate structures take start-up amperage draw into account.

CONTROL DISSOLVED OXYGEN LEVEL IN WWTP

Reducing aeration to maintain dissolved oxygen levels of 2.0 mg/l or less could reduce power draw. Variable Frequency Drive, dual speed motors, or simply operating fewer units to maintain minimum dissolved oxygen levels will save power.

8.0 RETROFIT OPPORTUNITIES

Energy retrofit projects identified during the preliminary analysis are detailed below. Project cost estimates include complete design and construction management services.

T12 TO T8 FLUORESCENT LIGHTING RETROFIT

The City currently has T12 Fluorescent fixtures in the municipal complex. It is recommended the City replace the existing T12 fluorescent lamps and magnetic ballasts with high efficiency T-8 fluorescent lamps and electronic ballasts. Typical four-foot, two-lamp magnetic ballast fixtures require 80 watts, while electronic ballasts and T-8 lamps in the same fixture configuration require only 50 watts. The table below indicates the facilities where T-12 fluorescent lamps were observed during the preliminary walkthrough. The cost and savings noted below are based on preliminary observations of the facilities. Exact cost, quantities, and lamp types can be identified through a detailed energy audit. In addition, a detailed lighting design calculation will help ensure the appropriate lighting replacement is selected. For example, a detailed design calculation may identify areas that could operate with fewer lamps per fixtures or with low-wattage T8 lamps while still maintaining adequate lighting levels.

T12 TO T8 FLUORESCENT LIGHTING RETROFIT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Municipal Complex	$1,200	$300	9	4.0
TOTAL	**$1,200**	**$300**	**9**	**4.0**

INSTALLATION OF OCCUPANCY SENSORS FOR INDOOR LIGHTING CONTROL

It is recommended the City consider installing occupancy sensors to improve control of interior lighting. Occupancy sensors will help ensure lights are only on when the space is occupied. The following table below provides an estimated cost and energy savings for the installation of these types of sensors. Please note this estimation is based on a preliminary assessment. Exact sensor location, technology (Infrared, Ultrasonic, and Dual Technology), and quantity can be determined during a detailed energy assessment or design phase. In general, enclosed areas with intermittent use are typically good candidates for occupancy sensors (i.e. administration offices, break rooms, etc.).

MOTION SENSOR INSTALLATION				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Municipal Complex	$2,000	$400	12	5.0
TOTAL	**$2,000**	**$400**	**12**	**5.0**

REPLACE MANUAL THERMOSTATS WITH NETWORKED PROGRAMMABLE THERMOSTATS

It is recommended the city replace existing manual thermostats in the Municipal Complex with networked programmable thermostats. These devices are able to preprogram or remotely affect temperature setbacks during unoccupied periods, saving significant energy from the HVAC systems.

NETWORKED THERMOSTATS				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Municipal Complex	$1,000	$100	3	10.0
TOTAL	**$1,000**	**$100**	**3**	**10.0**

UPGRADE CITY STREET LIGHTS WITH HIGH EFFICIENCY LAMPS

The City currently uses a combination of 150 W and 250 W high intensity discharge (HID) street lighting. It is recommended that the City replace the various lighting types with higher efficiency lamps and fixtures. The table below can be used as a general guide for retrofit options.

Existing Lamp Type and Wattage	Retrofit Option	Retrofit Lamp Type and Wattage
250 W HID	Lamp/Ballast Replacement	200 W HID
150 W HID	LED Fixture Replacement	56 W LED

NOTE: Care should be taken when developing a retrofit/replacement strategy so that minimum lighting levels are not sacrificed when the retrofit is complete. Therefore, lighting levels should be calculated to determine if the post retrofit levels are acceptable. In addition, compatibility with existing ballasts, local codes and other requirements must be verified prior to retrofitting. Nevertheless, if suitable for the application, switching to lower wattage lamps with greater lumen maintenance can have sustainable energy savings with minimal impact. A cost and savings estimate for replacing the 52 street lights in Martindale is provided in the following table.

STREET LIGHT RETROFIT				
FACILITY	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Street Lights	$14,000	$2,000	45	7.0
TOTAL	**$14,000**	**$2,000**	**45**	**7.0**

ADD RECIRCULATION PUMP AT WWTP TO REPLACE EFFLUENT IRRIGATION PUMP AS RECIRCULATION SOURCE

The City is currently using its high pressure irrigation pump to recirculate flow of the ponds. This ± 20 HP pump can be replaced by a small ±1-3 HP recirculating pump designed for this purpose. The estimated cost and savings for such a replacement are provided in the table below. Design by a professional engineer specializing in WWTPs is recommended for this project.

RECIRCULATION PUMP				
FACILITY	Estimated Implementation Cost	Estimated Annual Savings ($/yr)	Estimated Annual MMBTU Savings (MMBTU/yr)	Simple Payback (years)
Waste Water	$2,500	$500	8	5.0
TOTAL	**$2,500**	**$500**	**8**	**5.0**

The following table summarizes the implementation costs, annual savings and simple payback for the above projects:

SUMMARY OF ENERGY COST REDUCTION MEASURES				
Project Description	Estimated Implementation Cost	Estimated Annual Savings ($/yr)	Estimated Annual MMBTU Savings (MMBTU/yr)	Simple Payback (years)
T12 TO T8 FLUORESCENT LIGHTING RETROFIT	$1,200	$300	9	4.0
MOTION SENSOR INSTALLATION	$2,000	$400	12	5.0
NETWORKED THERMOSTATS	$1,000	$100	3	10.0
STREET LIGHT RETROFIT	$14,000	$2,000	45	7.0
RECIRCULATION PUMP	$2,500	$500	8	5.0
TOTAL:	**$20,700**	**$3,300**	**77**	**6.3**

The above projects' implementation costs and annual savings are estimated based on a preliminary examination of the facilities. Furthermore, maintenance cost savings are not included in this preliminary energy assessment. Final costs will be determined from detailed building assessments, engineering calculations, and contractor estimates.

Project design (drawings and specifications), if authorized, would normally be accomplished by professional engineers. Project acquisition (competitive bidding) would be in accordance with City requirements, and construction management would be provided by the engineering group who prepared the drawings and specifications.

9.0 FACILITY IMPROVEMENT MEASURES

The following are additional facility improvement recommendations for the City's consideration.

REPLACE HVAC SYSTEMS NEARING END OF USEFUL LIFE

The Municipal Complex has one (1) Split-DX air-conditioning unit totaling approximately 2.5 tons that is nearing the end of its useful life. The system is at time of writing nine (9) years old. The City should budget and plan to replace this unit in the next six (6) years. Replacing such systems with new high efficiency units will have energy savings and help reduce maintenance costs. The table below summarizes the estimated cost for replacing this unit.

CAPITAL RETROFIT - HVAC REPLACEMENT	
Project Description	**Estimated Implementation Cost**
Municipal Complex	$6,300
TOTAL	**$6,300**

CONSIDER AMENDING WWTP PERMIT TO ALLOW 10 PH

The TECQ now allows a pond system to have an upper pH limit of 10 if a major permit amendment is submitted. No energy savings would be seen, but the City would see a decrease in labor and TECQ penalties if the upper pH limit was increased.

PER CITY REQUEST INVESTIGATE FEASIBILITY OF INSTALLING SOLAR POWERED AERATORS

Solar powered aerators are cost effective when there is no other power source available at a site. In this case, conventional electric powered aerators would be a more cost-effective alternative for supplemental aeration over solar powered generators. Currently, supplemental aeration is not needed at this facility and would not be a recommended project.

10.0 ENERGY MANAGEMENT POLICY

At present, the City has not adopted a comprehensive City-wide energy management policy. By requesting this study, the City has demonstrated interest in taking a more aggressive approach to energy management. In order to establish an effective Energy Management Program, it should have support from top management. An Energy Management Policy adopted by the City sends a strong signal that energy management is an institutional priority. A formal Energy Management Policy can be as simple as a two-page document that clearly states the City's energy management objectives. The policy should cover items such as:

- who is accountable for energy management
- what your energy savings targets are
- how you will monitor, review and report on progress
- staffing and training to support the policy
- criteria for energy management investment
- working energy efficiency into new capital investments

Along with a clear energy **policy,** an energy management **plan** should be developed to ensure sustained energy savings. The energy management plan is a document that details roles, responsibilities, and objectives. Following are key items that should be included in an energy management plan:

1. <u>ESTABLISH ROUTINE ENERGY TRACKING AND REPORTING PROCEDURES</u>
   Establishing a procedure to monitor energy usage and cost will help identify energy use patterns. The data will also help determine the effectiveness of the Energy Management Program.

2. <u>ESTABLISH AN ENERGY MANAGEMENT STEERING COMMITTEE</u>
   The Energy Management Steering Committee will include representatives from a cross section of the City. The steering committee will serve as a review board to evaluate all energy management recommendations before adoption and implementation. The steering committee will meet quarterly or semiannually to review the City's energy cost and consumption. Regular meetings will ensure the City's goals are being met prior to the end of the year.

3. <u>PROMOTE ENERGY AWARENESS</u>
   The energy management steering committee members shall establish a program to publicize the City’s energy goals and progress on a quarterly or semiannual basis. Continuous promotion of the City's goals will ensure the sustainability of the energy management program and help achieve further energy savings.

4. <u>ESTABLISH ACCEPTABLE EQUIPMENT PARAMETERS</u>
   Establish a City-wide uniform temperature set point for all HVAC units. Having a standard set point will help keep HVAC unit runtimes to a minimum. The following are some suggested temperature settings; however, the City will need to monitor and ensure that other building parameters (humidity levels etc.) are within acceptable limits. In addition, areas with special equipment (MDF/IDF, server rooms, etc.) or materials (wood

flooring, paper storage, etc.) shall be maintained at the equipment supplier's recommended settings and settings appropriate to the material.

Occupied Cooling Temperature Set points: 74 F ±

Unoccupied Cooling Temperature Set points: 85 F

Occupied Heating Temperature Set points: 68 F ±

Unoccupied Heating Temperature Set point: 55 F

5. NEW BUILDING AND CONSTRUCTION

Ensure proper maintenance and operation of energy using equipment in new buildings by requiring adequate documentation of all systems and control strategies, specifying minimum content of M&O manuals; specifying contractor requirements for cleaning and adjusting equipment prior to occupancy; specifying on-site vendor training for M&O staff; and requiring as-built drawings.

6. ESTABLISH A WATER MANAGEMENT PROGRAM

Along with saving energy, the City should establish a program to reduce water consumption. The following conservation measures should be employed.

a. Investigate the use of water conserving faucets, showerheads, and toilets in all new and existing facilities.
b. Utilize water-pervious materials such as gravel, crushed stone, open paving blocks or previous paving blocks for walkways and patios to minimize runoff and increase infiltration.
c. Employ Xeriscaping, using native plants that are well suited to the local climate, that are drought-tolerant and do not require supplemental irrigation.
d. Utilize drip irrigation systems for watering plants in beds and gardens.
e. Install controls to prevent irrigation when the soil is wet from rainfall.
f. Establish a routine check of water consuming equipment for leaks and repair equipment immediately.

11.0 FUNDING OPTIONS FOR CAPITAL ENERGY PROJECTS

Institutional organizations have traditionally tapped bond money, maintenance dollars, or federal grants to fund energy-efficient equipment change outs or additions such as energy-efficient lighting systems, high efficiency air conditioning units, and computerized energy management control systems. Today, a broader range of funding options are available. A number of these are listed below.

Texas LoanSTAR Program

The LoanSTAR (Saving Taxes and Resources) Program, which is administered by the State Energy Conservation Office, finances energy-efficient building retrofits at a low interest rate (typically 3 percent). The program's revolving loan mechanism allows borrowers to repay loans through the stream of cost savings realized from the projects. Projects financed by LoanSTAR must have an average simple payback of ten years or less and must be analyzed in an Energy Assessment Report by a Professional Engineer. Upon final loan execution, the City proceeds to implement funded projects through the traditional bid/specification process. Contact: Eddy Trevino (512/463-1876).

Internal Financing

Improvements can be paid for by direct allocations of revenues from an organization's currently available operating or capital funds (bond programs). The use of internal financing normally requires the inclusion and approval of energy-efficiency projects within an organization's annual operating and capital budget-setting process. Often, small projects with high rate of return can be scheduled for implementation during the budget year for which they are approved. Large projects can be scheduled for implementation over the full time period during which the capital budget is in place. Budget constraints, competition among alternative investments, and the need for higher rates of return can significantly limit the number of internally financed energy-efficiency improvements.

Private Lending Institutions or Leasing Corporations

Banks, leasing corporations, and other private lenders have become increasingly interested in the energy efficiency market. The financing vehicle frequently used by these entities is a municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase arrangement. Ownership of the financed equipment passes to the City 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 the lessee pays a nominal amount, usually a dollar, for title to the equipment.

Performance Contracting with an Energy Service Company

Through this arrangement, an energy service company (ESCO) uses third party financing to implement a comprehensive package of energy management retrofits for a facility. This turnkey service includes an initial assessment by the contractor to determine the energy-saving potential for a facility, design work for identified projects, purchase and installation of equipment, and overall project management. The ESCO guarantees that the cost savings generated by the projects will, at a minimum, cover the annual payment due to the ESCO over the term of the contract.

Utility Sponsored Energy Efficiency Incentive Programs

Many of the State's utilities offer energy efficiency incentive programs to offset a portion of the upfront cost associated with energy efficiency measures. The program requirements and incentives range from utility to utility. For example, CenterPoint Energy provides incentives for efficiency measures such as installation of high efficiency equipment, lighting upgrades, and building commissioning. These energy efficiency programs' incentives typically cover $0.06/kWh and $175/kW of verifiable energy and demand reductions, respectively. For further information, contact your utility provider to determine what programs are available in your area.

Bluebonnet Electric Coop
1-800-842-7708
www.bluebonnetelectric.coop

Build America Bonds

Under the American Recovery and Reinvestment Act, the Build America Bond program provides funding for local and state governments in order to allow for capital projects on public buildings, including public schools, water and sewer projects, energy projects, and environmental projects. The bonds work by having the Treasury Department issue a state or local government 35 percent of an interest payment on the bonds. This will cause the borrowing costs incurred by the state of local government to be much less, allowing them to reach further sources of borrowing. For further information, please visit http://www.ustreas.gov.

Energy Efficiency and Conservation Block Grant (EECBG)

The Office of Weatherization and Intergovernmental Programs (WIP) has administered the EECBG, which provides funding to state and local governments for the purpose of improving energy usage and efficiency, as well as improving environmental effects. It is being funded under the ARRA, and can include building retrofits and audits, which aim to reduce energy use in buildings and transportation. The State Energy Conservation Office receives a portion of these funds to distribute to cities and counties interested in these projects. Further information can be found by visiting: http://www1.eere.energy.gov/wip/eecbg.html

Qualified Energy Conservation Bonds (QECB)

Energy projects can be eligible for QECBs, which are tax credit bonds that serve to assist with energy efficient capital projects, renewable energy usage, and reductions in energy consumption.

The federal government has issued this loan program, which assists with funding of the interest costs for the bonds. These energy conservation bonds are different from tax-exempt bonds traditionally used because they can be regarded as taxable income. For more information on QECBs, please visit http://www.dsireusa.org.

12.0 ANALYST(S) IDENTIFICATION

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Capital View Center, Suite B-325
1301 S. Capital of Texas Highway
Austin, Texas 78746
(512) 328-2533

M. Saleem Khan, P.E., CxA
Robert Thonhoff, P.E.

APPENDICES

APPENDIX A

ENERGY LEGISLATION
(SB12 AND HB3693)

How to comply with SB12 & HB 3693

What you need to know about Texas Senate Bill 12

The passage of Senate Bill 12 (SB12) by the 80th Texas Legislature signified the continuance of Senate Bill 5 (SB5), the 77th Texas Legislature's sweeping approach in 2001 to clean air and encourage energy efficiency in Texas. SB12 was enacted on September 1, 2007 and was crafted to continue to assist the state and its political jurisdictions to conform to the standards set forth in the Federal Clean Air Act. The bill contains energy-efficiency strategies intended to decrease energy consumption while improving air quality.

All political subdivisions in the 41 non-attainment or near non-attainment counties in Texas are required to:

*1) Adopt a goal to reduce electric consumption by 5 percent each year for six years, beginning September 1, 2007**

2) Implement all cost-effective energy-efficiency measures to reduce electric consumption by existing facilities. (Cost effectiveness is interpreted by this legislation to provide a 20 year return on investment.)

3) Report annually to the State Energy Conservation Office (SECO) on the entity's progress, efforts and consumption data.

*Note: The recommended baseline data for those reporting entities will consist of the jurisdiction's 2006 energy consumption for its facilities and based on the State Fiscal Year (September 1, 2006 to August 31, 2007).

What you need to know about Texas House Bill 3693

The passage of House Bill 3693 (HB3693) by the 80th Texas Legislature is intended to provide additional provisions for energy-efficiency in Texas. Adopted with an effective date of September 1, 2007, HB 3693 is an additional mechanism by which the state can encourage energy-efficiency through various means for School [ENTITY]s, State Facilities and Political Jurisdictions in Texas.

HB 3693 includes the following state-wide mandates that apply differently according to the nature and origin of the entity:

Record, Report and Display Consumption Data
All Political Subdivisions, School [ENTITY]s and State-Funded Institutes of Higher Education, are mandated to record and report the entity's metered resource consumption usage data for electricity, natural gas and water on a publically accessible internet page.
Note: The format, content and display of this information are determined by the entity or subdivision providing this information.

Energy Efficient Light Bulbs
All School [ENTITY]s and State-Funded Institutes of Higher Education shall purchase and use energy-efficient light bulbs in education and housing facilities.

Who must comply?
The provisions in this bill will apply to entities including: Cities and Counties; School [ENTITY]s; Institutes of Higher Education; State Facilities and Buildings.

How do you define energy-efficiency measures?

Energy-efficiency measures are defined as any facility modifications or changes in operations that reduce energy consumption. Energy-efficiency is a strategy that has the potential to conserve resources, save money** and better the quality of our air. They provide immediate savings and add minimal costs to your project budget.

Examples of energy-efficiency measures include:

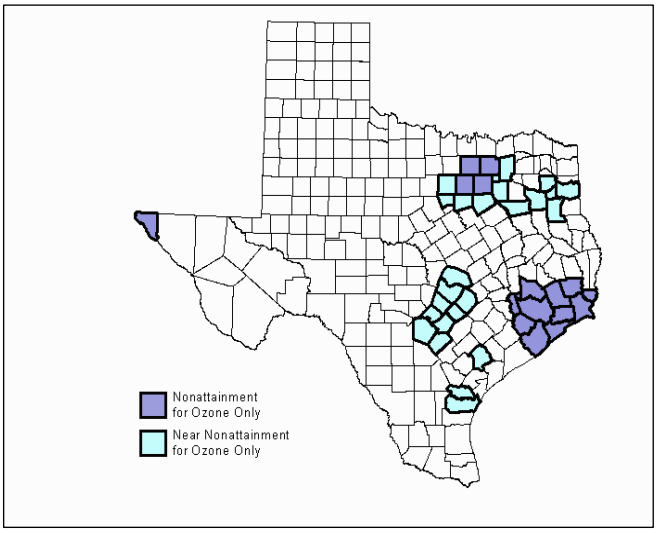
• installation of insulation and high-efficiency windows and doors • modifications or replacement of HVAC systems, lighting fixtures and electrical systems • installation of automatic energy control systems • installation of energy recovery systems or renewable energy generation equipment • building commissioning • development of energy efficient procurement specifications • employee awareness campaigns

***SECO's Preliminary Energy Assessment (PEA) program is an excellent resource for uncovering those energy-efficiency measures that can benefit your organization.*

What counties are affected?

All political jurisdictions located in the following Non-attainment and affected counties:

Bastrop Bexar Brazoria Caldwell Chambers Collin
Comal Dallas Denton El Paso Ellis Fort Bend
Galveston Gregg Guadalupe Hardin Harris Harrison
Hays Henderson Hood Hunt Jefferson Johnson
Kaufman Liberty Montgomery Nueces Orange Parker
Rockwall Rusk San Patricio Smith Tarrant Travis
Upshur Victoria Waller Williamson Wilson



What assistance is available for affected areas?

The Texas Energy Partnership is a partner with Energy Star©, who partners across the nation with the goal of improving building performance, reducing air emissions through reduced energy demand, and enhancing the quality of life through energy-efficiency and renewable energy technologies.

To assist jurisdictions, the Texas Energy Partnership will:

- Present workshops and training seminars in partnership with private industry on a range of topics that include energy services, financing, building technologies and energy performance rating and benchmarking

- Prepare information packages – containing flyers, documents and national lab reports about energy services, management tools and national, state and industry resources that will help communities throughout the region

- Launch an electronic newsletter to provide continuous updates and develop additional information packages as needed

Please contact Stephen Ross at 512-463-1770 for more information.

SECO Program Contact Information

LoanSTAR;
Preliminary Energy Assessments:
Eddy Trevino - 512-463-1876
Eddy.Trevino@cpa.state.tx.us

Schools Partnership Program:
Stephen Ross - 512-463-1770
Stephen.Ross@cpa.state.tx.us

Engineering (Codes / Standards):
Felix Lopez - 512-463-1080
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Innovative / Renewable Energy:
Pamela Groce - 512-463-1889
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Energy / Housing
Partnership Programs:
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Stephen.Ross@cpa.state.tx.us

Alternate Fuels / Transportation:
Venita Porter - 512-463-1779
Venita.Porter@cpa.state.tx.us

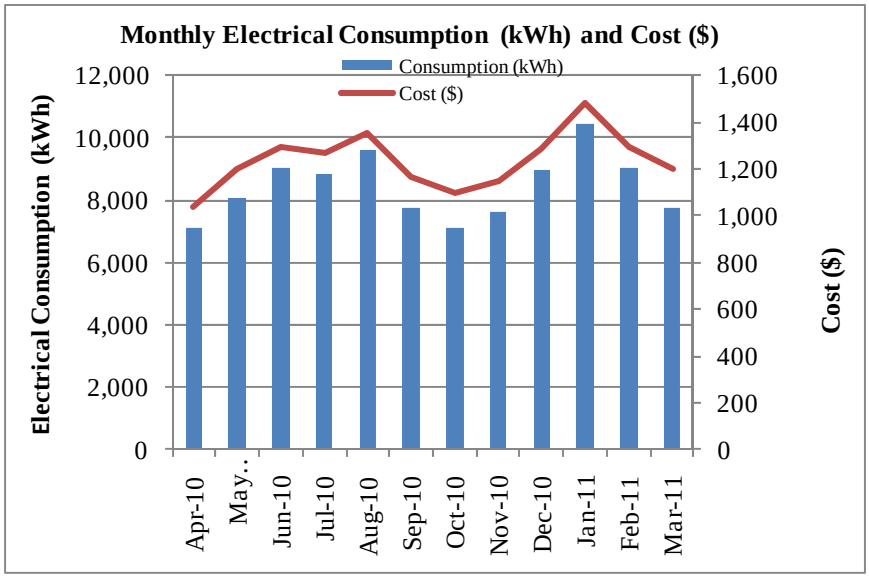
APPENDIX B

SAMPLE UTILITY DATA REPORTING FORM

City of Martindale - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Apr-10	7,134	1,034	$0.1449	$0	$0	N/A
May-10	8,061	1,204	$0.1494	$0	$0	N/A
Jun-10	9,033	1,294	$0.1432	$0	$0	N/A
Jul-10	8,829	1,271	$0.1439	$0	$0	N/A
Aug-10	9,613	1,350	$0.1404	$0	$0	N/A
Sep-10	7,767	1,163	$0.1497	$0	$0	N/A
Oct-10	7,101	1,097	$0.1545	$0	$0	N/A
Nov-10	7,611	1,152	$0.1513	$0	$0	N/A
Dec-10	8,964	1,287	$0.1436	$0	$0	N/A
Jan-11	10,432	1,481	$0.1420	$0	$0	N/A
Feb-11	9,022	1,292	$0.1432	$0	$0	N/A
Mar-11	7,745	1,197	$0.1546	$0	$0	N/A
Total	101,312	$14,821	$0.1463	0	$0	N/A

Gross Building Area:	1,868	SF



APPENDIX C

BASE YEAR CONSUMPTION HISTORY

	Electric				Natural Gas	EUI	ECI	
Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr		kBTU/SF/Yr	$/SF/Yr	SF
Municipal Complex	36,249	124	19.41	4,261	N/A	66	2.28	1,868

WWTP - Energy Cost and Consumption Benchmark

Electric[1]			Design Capacity (MGD)	Average Effluent Flow (MGD)	EUI[4]	ECI[5]	National Average[6]	
kWh/Yr	kBtu/Yr[2]	$Cost/Yr			kBtu/GPD/Yr	$/MGD/Yr	kBtu/GPD/Yr	$/MGD/Yr
17,969	61,310	$3,650	0.057	0.045	1.4	$81,111	2	$56,641

1. Electric consumption for WWTP is based on electric meter serving the main processing facility and does not account for other usage (i.e. lift stations, irrigation, etc.) which may be metered separately.
2. Electric consumption conversion based on 3.412 kBtu/kWh.
4. Energy Use Index (EUI) calculated based annual kBtu divided by the Average Effluent Flow in gallons per day (GPD).
5. Energy Cost Index (ECI) calculated based on annual energy cost divided by the Average Effluent Flow in million gallons per day (MGD).
6. National Average based on ENERGY STAR Portfolio Manager data

Energy Cost and Consumption Benchmarks

		Electric			Natural Gas
	Facility	kWh/Yr	MMBTU/Yr	$Cost/Yr	
1	Waste Water	17,969	61	3,650	N/A
2	Municipal Complex	36,249	124	4,261	
3	Park	1,914	7	544	
4	Lighting	45,180	154	6,367	
		kWh/Yr	MMBTU/Yr	$Cost/Yr	
	Total	101,312	346	14,821	

ACCOUNT# 5000062338 Electric

Gas

BUILDING: Waste Water

FLOOR AREA: 0 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Apr	2010	1,379		0		293	0	0
May	2010	1,403		0		299	0	0
Jun	2010	1,606		0		310	0	0
Jul	2010	1,449		0		292	0	0
Aug	2010	1,371		0		285	0	0
Sep	2010	1,261		0		273	0	0
Oct	2010	1,389		0		287	0	0
Nov	2010	1,749		0		326	0	0
Dec	2010	1,652		0		315	0	0
Jan	2011	1,713		0		343	0	0
Feb	2011	1,480		0		297	0	0
Mar	2011	1,517		0		330	0	0
TOTAL		17,969				3,650	0.0	0

Energy Use Index:

Annual Total Energy Cost = 3,650 $/year

Total site BTU's/Yr ÷ Total Area (SF) = N/A kBTU/SF/year

Total KWH/yr x 0.003413 = 61.33 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 61 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = N/A $/SF/year

Electric Utility: Bluebonnet

Gas Utility: N/A

ACCOUNT# 5000062338 Electric

Gas

BUILDING: Municipal Complex

FLOOR AREA: 1,868 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Apr	2010	1,851		0		150	0	0
May	2010	2,756		0		335	0	0
Jun	2010	3,524		0		412	0	0
Jul	2010	3,488		0		408	0	0
Aug	2010	4,324		0		493	0	0
Sep	2010	2,592		0		318	0	0
Oct	2010	1,784		0		237	0	0
Nov	2010	1,897		0		248	0	0
Dec	2010	3,358		0		395	0	0
Jan	2011	4,769		0		557	0	0
Feb	2011	3,616		0		421	0	0
Mar	2011	2,290		0		288	0	0
TOTAL		36,249				4,261	0.0	0

* Natural Gas service not included in this summary.

Energy Use Index:

Annual Total Energy Cost = 4,261 $/year

Total site BTU's/Yr ÷ Total Area (SF) = 66 kBTU/SF/year

Total KWH/yr x 0.003413 = 123.72 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 124 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 2.28 $/SF/year

Electric Utility: Bluebonnet

Gas Utility: N/A

ACCOUNT# 5000062338 Electric

Gas

BUILDING: Park

FLOOR AREA: 0 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Apr	2010	139		0		43	0	0
May	2010	137		0		42	0	0
Jun	2010	138		0		42	0	0
Jul	2010	127		0		41	0	0
Aug	2010	153		0		44	0	0
Sep	2010	149		0		43	0	0
Oct	2010	163		0		45	0	0
Nov	2010	200		0		48	0	0
Dec	2010	189		0		47	0	0
Jan	2011	185		0		52	0	0
Feb	2011	161		0		45	0	0
Mar	2011	173		0		51	0	0
TOTAL		1,914				544	0.0	0

Annual Total Energy Cost = 544 $/year

Total KWH/yr x 0.003413 = 6.53 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 7 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = N/A kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = N/A $/SF/year

Electric Utility: Bluebonnet

Gas Utility: N/A

ACCOUNT# 5000062338 Electric

Gas

BUILDING: Lighting

FLOOR AREA: 0 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Apr	2010	3,765		0		549	0	0
May	2010	3,765		0		529	0	0
Jun	2010	3,765		0		529	0	0
Jul	2010	3,765		0		529	0	0
Aug	2010	3,765		0		529	0	0
Sep	2010	3,765		0		529	0	0
Oct	2010	3,765		0		529	0	0
Nov	2010	3,765		0		529	0	0
Dec	2010	3,765		0		529	0	0
Jan	2011	3,765		0		529	0	0
Feb	2011	3,765		0		529	0	0
Mar	2011	3,765		0		529	0	0
TOTAL		45,180				6,367	0.0	0

Annual Total Energy Cost = 6,367 $/year

Total KWH/yr x 0.003413 = 154.20 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 154 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = N/A kBTU/SF/year

Energy Cost Index:

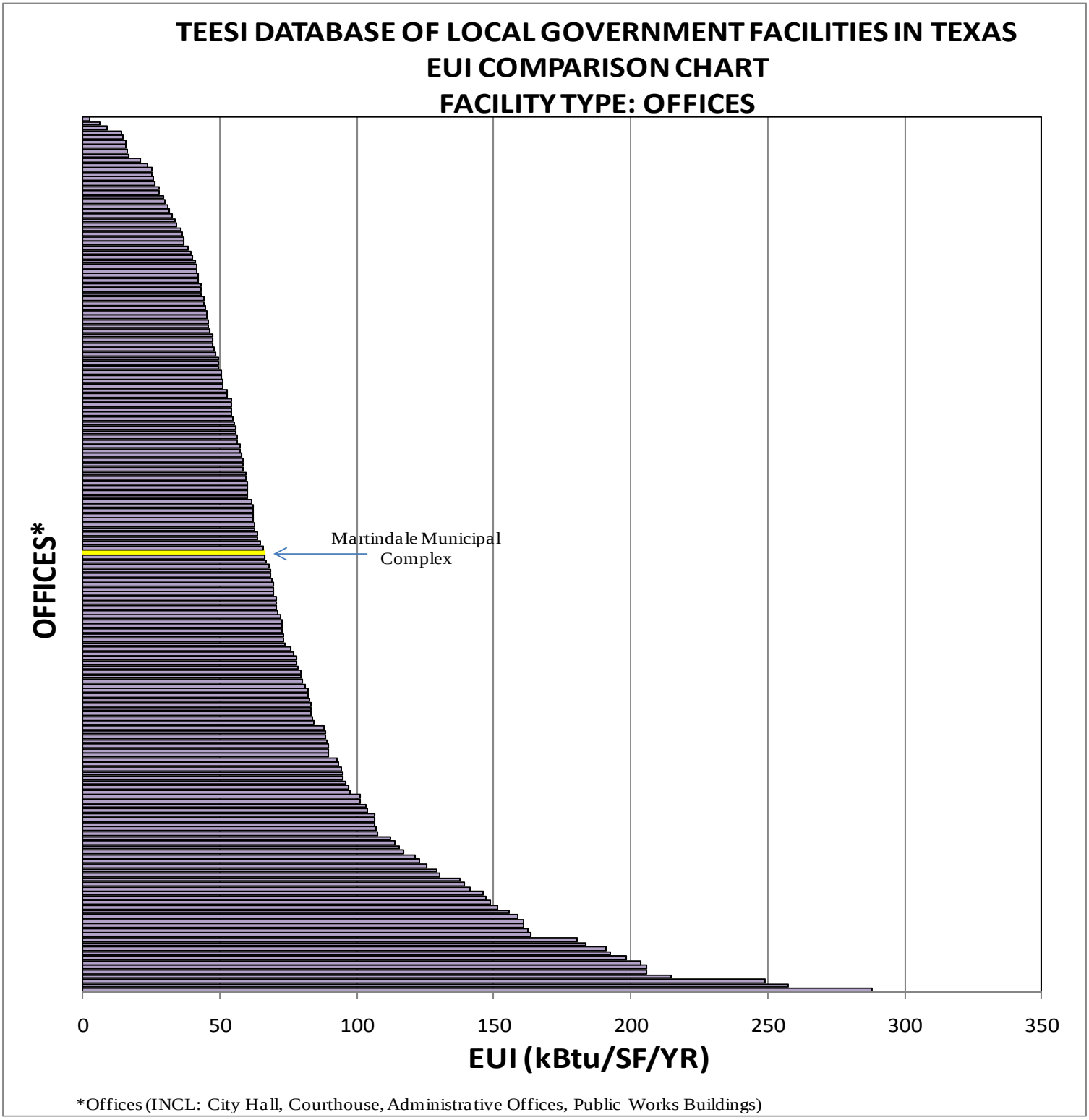
Total Energy Cost/Yr ÷ Total Area (SF) = N/A $/SF/year

Electric Utility: Bluebonnet

Gas Utility: N/A

APPENDIX D

ENERGY PERFORMANCE COMPARISON CHARTS


TEESI DATABASE OF LOCAL GOVERNMENT FACILITIES IN TEXAS
EUI COMPARISON CHART
FACILITY TYPE: OFFICES
OFFICES*
Martindale Municipal Complex
0
50
100
150
200
250
300
350
EUI (kBtu/SF/YR)
*Offices (INCL: City Hall, Courthouse, Administrative Offices, Public Works Buildings)

APPENDIX E

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Pumps Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Pump use/sequencing	Turn off/sequence unnecessary pumps	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Check lubrication	Assure that all bearings are lubricated per the manufacture's recommendation			X	
Check packing	Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals.			X	
Motor/pump alignment	Aligning the pump/motor coupling allows for efficient torque transfer to the pump			X	
Check mountings	Check and secure all pump mountings			X	
Check bearings	Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary.				X
Motor condition	Checking the condition of the motor through temperature or vibration analysis assures long life				X

Fans Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
System use/sequencing	Turn off/sequence unnecessary equipment	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Observe belts	Verify proper belt tension and alignment			X	
Inspect pulley wheels	Clean and lubricate where required			X	
Inspect dampers	Confirm proper and complete closure control; outside air dampers should be airtight when closed			X	
Observe actuator/linkage control	Verify operation, clean, lubricate, adjust as needed			X	
Check fan blades	Validate proper rotation and clean when necessary			X	
Filters	Check for gaps, replace when dirty - monthly			X	
Check for air quality anomalies	Inspect for moisture/growth on walls, ceilings, carpets, and in/outside of duct-work. Check for musty smells and listen to complaints.			X	
Check wiring	Verify all electrical connections are tight				X
Inspect ductwork	Check and refasten loose connections, repair all leaks				X
Coils	Confirm that filters have kept clean, clean as necessary				X
Insulation	Inspect, repair, replace all compromised duct insulation				X

Electric Motors Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Motor use/sequencing	Turn off/sequence unnecessary motors	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Motor condition	Check the condition of the motor through temperature or vibration analysis and compare to baseline values		X		
Check lubrication	Assure that all bearings are lubricated per the manufacture's recommendation			X	
Check packing	Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals.			X	
Motor alignment	Aligning the motor coupling allows for efficient torque transfer to the pump			X	
Check mountings	Check and secure all motor mountings			X	
Check terminal tightness	Tighten connection terminals as necessary			X	
Cleaning	Remove dust and dirt from motor to facilitate cooling			X	
Check bearings	Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary.				X
Motor condition	Checking the condition of the motor through temperature or vibration analysis assures long life				X
Check for balanced three-phase power	Unbalanced power can shorten the motor life through excessive heat build up				X
Check for over-voltage or under-voltage conditions	Over- or under-voltage situations can shorten the motor life through excessive heat build up				X

APPENDIX F

LOANSTAR INFORMATION

Texas LoanSTAR Program

FACTS ABOUT LoanSTAR

The State of Texas LoanSTAR (Saving Taxes and Resources) Program finances energy efficient facility up-grades for state agencies, public schools, institutions of higher education, local governments, municipalities, and hospitals. The program's revolving loan mechanism allows participants to borrow money and repay all project costs through the stream of **cost savings** produced.

ELIGIBLE PROJECTS

Up-grades financed through the program include, but are not limited to, (1) energy efficient lighting systems; (2) high efficiency heating, ventilation and air conditioning systems; (3) energy management systems; (4) boiler efficiency improvements; (5) energy recovery systems; (6) building shell improvements; and (7) load management projects. The prospective borrower hires a Professional Engineer to analyze the potential energy efficient projects that will be submitted for funding through the Loan STAR Program. All engineering costs are covered under the program.

PROGRAM REQUIREMENTS

Once the projects are analyzed and the prospective borrower agrees with the recommended projects, the engineer prepares an Energy Assessment Report (EAR) with the project descriptions and calculations. The EAR must be prepared according to the LoanSTAR Technical Guidelines. The EAR is reviewed and approved by the State Energy Conservation Office (SECO) technical staff before project financing is authorized. Projects financed by LoanSTAR must have an average simple payback of ten years or less. Borrowers do, however, have the option of buying down paybacks to meet the composite ten-year limit.

To ensure up-grade projects are designed and constructed according to the EAR, SECO performs a review of the design documents at the 50% and 100% completion phases. On-site construction monitoring is also performed at the 50% and 100% completion phases.

SAVINGS VERIFICATION

To ensure that the Borrower is achieving the estimated energy savings, monitoring and verification is required for all LoanSTAR funded projects. The level of monitoring and verifications may range from utility bill analysis to individual system or whole building metering depending on the size and type of retrofit projects. If whole building metering is required, metering and monitoring cost can be rolled into the loan.

For additional information regarding the
LoanSTAR program, please contact:

Eddy Trevino
SECO, LoanSTAR Program Manager
(512) 463-1876

APPENDIX G

REQUEST FOR ENERGY ASSISTANCE

State Energy Conservation Office

Local Governments and Municipalities

Preliminary Energy Assessment
Service Agreement

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

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with City of Martindale, 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: Nancy G Hempel
Date: 03-31-2011
Name (Mr./Ms./Dr.) Ms. Nancy G. Hempel
Title: City Secretary/Administrator
Organization: City of Martindale
Phone: 512-357-2639
Street Address: 489 Main St.
Fax: 512-357-9017
Mailing Address: P.O. BOX 365
E-Mail: nancyh@martindaltexas.org
Martindale Texas 78655
County: Caldwell

Contact Information:

Name (Mr./Ms./Dr.): Same as above
Title:
Phone:
Fax:
E-Mail:
County:

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

SR
TEES 1 - 04/26/11