Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Capital Metropolitan Transportation Authority

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Austin, Texas 78702

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Local Government Energy Management Program
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1.0 EXECUTIVE SUMMARY

Capital Metropolitan Transportation Authority, now referred to as Capital Metro, 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 Capital Metro 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 Capital Metro for the purpose of planning, funding, and implementing energy saving measures, which will ultimately reduce Capital Metro'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.

Implementation Cost Estimate (Est.):	$645,504
Est. Annual Energy Cost Savings:	$70,730
Est. Annual MMBTUs Savings	3,197 MMBTU
Est. Greenhouse Gas Emissions Reduction	538 Ton CO_{2e}
Simple Payback:	9.1

Recommendations and information of interest to Capital Metro is provided in this report regarding Energy Consumption and Performance (Section 3.0), Energy Accounting (Section 4.0), Energy Legislation Overview (Section 5.0), Sample Screenshots of EMS (Section 6.0), Recommended Maintenance & Operation Procedures (Section 7.0), Retrofit Opportunities (Section 8.0), Facility Improvement Measures (Section 9.0), Energy Management Policy (Section 10.0), and Funding Options for Capital Energy Projects (Section 11.0). A follow-up visit to Capital Metro 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 Capital Metro may require in planning, funding and implementing the recommendations of this report. Capital Metro is encouraged to direct any questions or concerns to either of the following contact persons:

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

Group 1: Admin HQ

Buildings:	Administration Building
Stories:	Three stories
Area (estimated):	43,000 SF
Bldg. Components:	Brick building, flat built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Chilled water cooling system, air-cooled chiller and gas boiler
HVAC Controls:	Energy Management System (EMS) – Manufacturer Automatic Logic (ALC)

Buildings:	Fuel & Wash Facilities
Stories:	One story
Area (estimated):	16,830 SF
Bldg. Components:	Brick wall, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX system in offices and electric unit heaters in bays
HVAC Controls:	T-stat

Group 2: Maint. HQ

Buildings:	Maintenance Service Center
Stories:	Two stories
Area (estimated):	105,000 SF
Bldg. Components:	Brick wall, flat built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in warehouse area
HVAC:	Chilled water cooling system, air-cooled chiller and gas boiler heating
HVAC Controls:	Pneumatic controls - Johnson controls

Group 3: Admin Annex

Buildings:	Annex Building
Stories:	Two stories
Area (estimated):	25,000 SF
Bldg. Components:	Concrete wall, flat built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units with electric heat
HVAC Controls:	Standard non-programmable thermostats

Group 4: Ops/Metro access

Buildings:	Ops/Metro Access Building
Stories:	Two stories
Area (estimated):	12,048 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts in offices, High Intensity Discharge (HID) fixtures in warehouse area
HVAC:	Chilled water cooling system, air-cooled chiller and gas boiler heating
HVAC Controls:	EMS – Manufacturer ALC

Group 5: North Ops Maintenance

Buildings:	Maintenance Building
Stories:	Two stories
Area (estimated):	54,452 SF
Bldg. Components:	Concrete walls, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts in offices, High Intensity Discharge (HID) fixtures in warehouse area
HVAC:	Packaged DX units with gas heat for office areas, gas boiler and unit heaters for warehouse heating
HVAC Controls:	EMS – Manufacturer ALC

Group 6: North Ops Service Island

Buildings:	North Ops Service Building
Stories:	One story
Area (estimated):	25,664 SF
Bldg. Components:	Concrete walls, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in warehouse area
HVAC:	Packaged DX units
HVAC Controls:	Standard thermostats

Group 7: North Ops Rail

Buildings:	Rail
Stories:	One story
Area (estimated):	30,444 SF
Bldg. Components:	Concrete walls, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in warehouse area
HVAC:	None
HVAC Controls:	None

Group 8: North Ops Warehouse

Buildings:	Warehouse
Stories:	One story
Area (estimated):	177,450 SF
Bldg. Components:	Concrete walls, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in warehouse area
HVAC:	Split DX unit
HVAC Controls:	Standard thermostat

3.0 ENERGY CONSUMPTION AND PERFORMANCE

A site survey was conducted at several of Capital Metro's facilities. The facilities surveyed comprised a total gross area of approximately 489,888 square feet.

Annual electric and natural gas invoices for the buildings surveyed were $844,603 for the 12-month period ending July 2010. A summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

To help Capital Metro evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). 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 selected facilities are listed below:

Energy Cost and Consumption Benchmarks

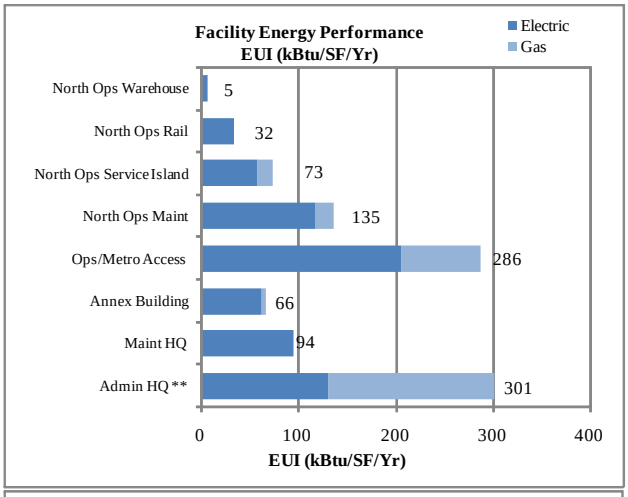
		Electric			Natural Gas			Total	Total	EUI	ECI	Energy Rate	
	Building	KWH/Yr	MMBTU/Yr	$Cost/Yr	MCF/Yr	MMBTU/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	$/MMBTU	SF
1	Admin HQ*,**	2,276,692	7,770	183,993	9,938	10,236	82,957	266,950	18,006	301	4.46	14.83	59,830
2	Maint HQ*	2,895,000	9,881	226,892	0	0	482	227,374	9,881	94	2.17	23.01	105,000
3	Annex Building	450,800	1,539	40,281	99	102	1,032	41,313	1,640	66	1.65	25.19	25,000
4	Ops/Metro Access	723,900	2,471	56,026	949	978	8,533	64,559	3,448	286	5.36	18.72	12,048
5	North Ops Maint	1,857,300	6,339	145,303	1,006	1,036	8,454	153,756	7,375	135	2.82	20.85	54,452
6	North Ops Service Island	430,800	1,470	38,054	384	395	3,831	41,885	1,866	73	1.63	22.45	25,664
7	North Ops Rail	286,800	979	29,628	0	0	0	29,628	979	32	0.97	30.27	30,444
8	North Ops Warehouse	270,000	922	18,576	0	0	559	19,135	922	5	0.11	20.77	177,450
		KWH/Yr	MMBTU/Yr	$Cost/Yr	MCF/Yr	MMBTU/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr		SF
		9,191,292	31,370	738,754	12,375	12,746	105,849	844,603	43,195	90	1.72	19.55	489,888

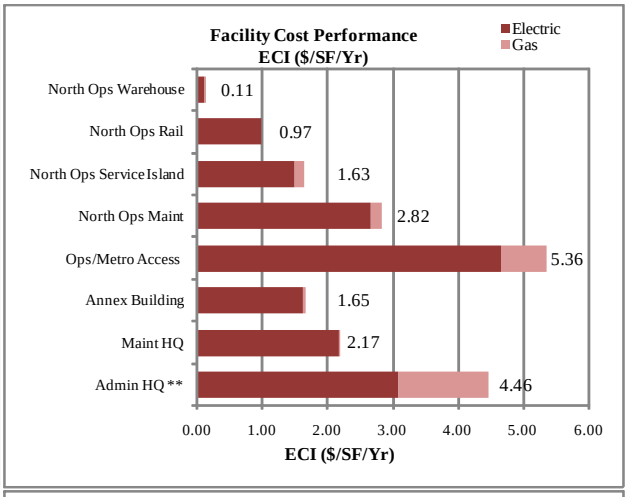
* Facility Square footage is based on estimate.

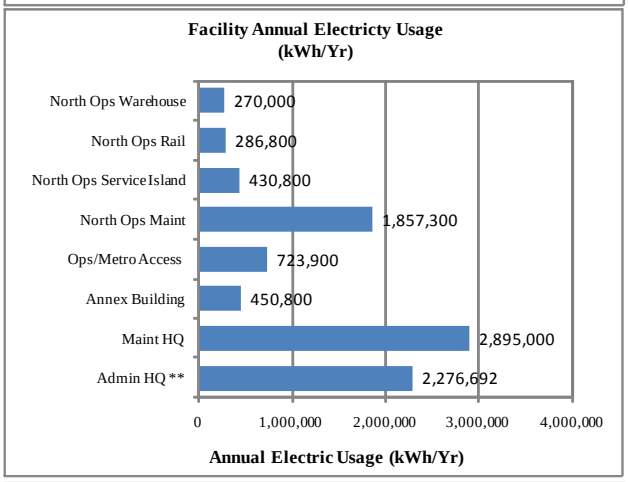
** Includes fuel and wash facility, operation building and site lighting.

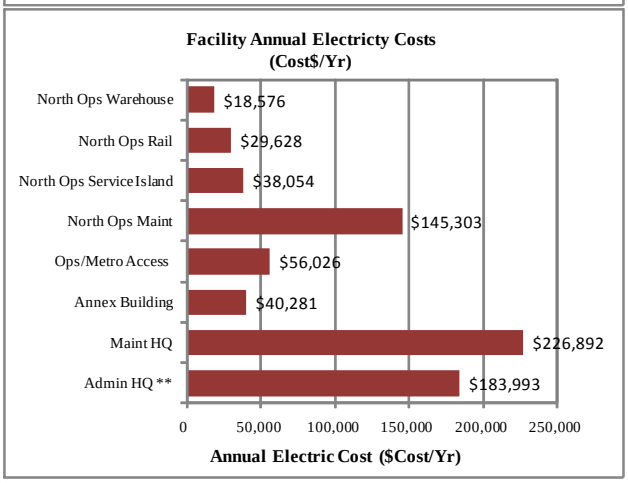
Knowing the EUI and ECI of each facility is useful to help determine Capital Metro's overall energy performance. In addition, the Capital Metro's EUI was compared to TEESI's database of local government facilities. See **Appendix D** to determine how these facilities' EUI compared to other local government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

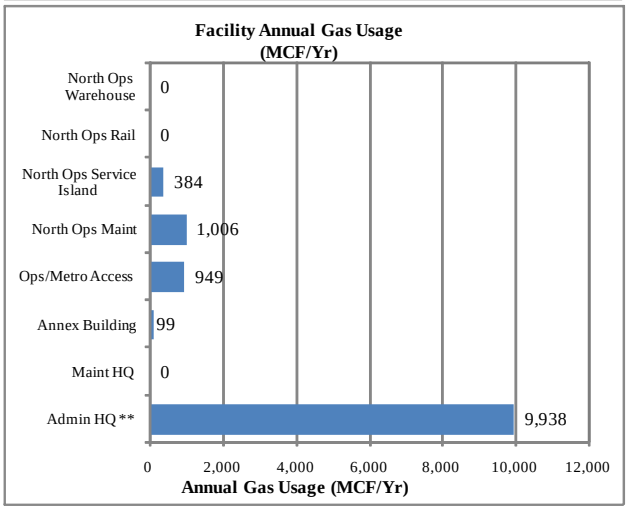
The following charts summarize the data presented in the previous table. See **Appendix C** for further detail.

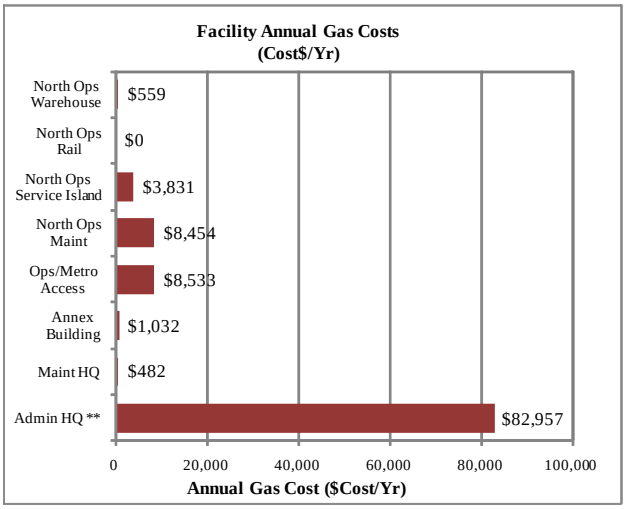






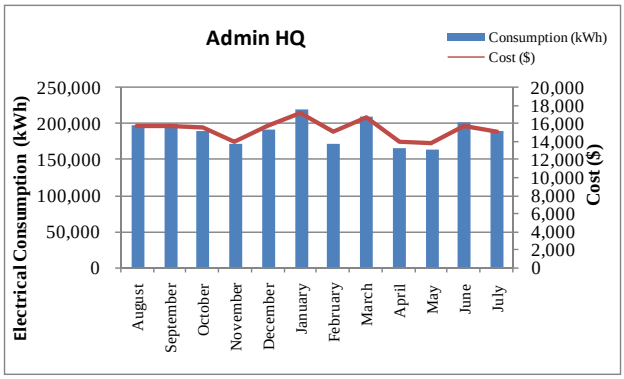


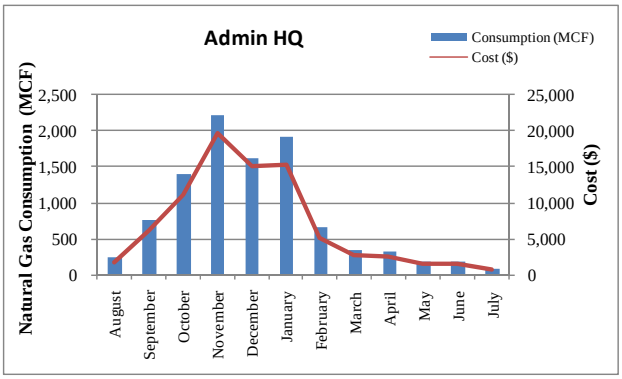


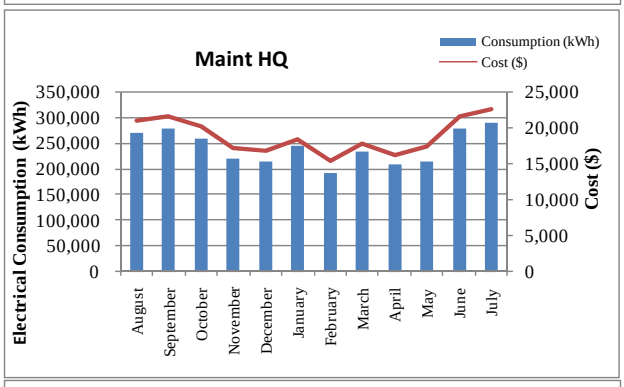


**Electric meter serves fuel & wash facility, operation building and site lighting. Gas meter serves the admin HQ and maint HQ

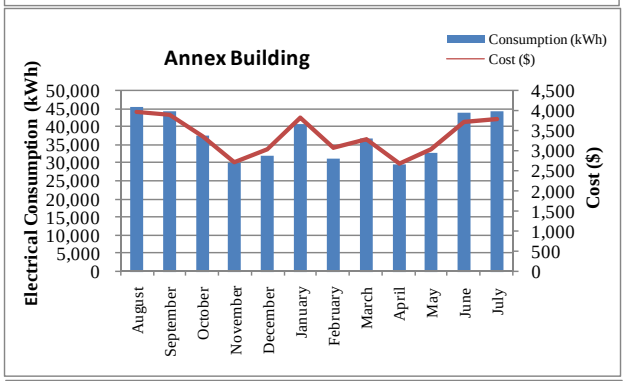
The following charts summarize each facilities monthly utility data. See **Appendix C** for further detail.

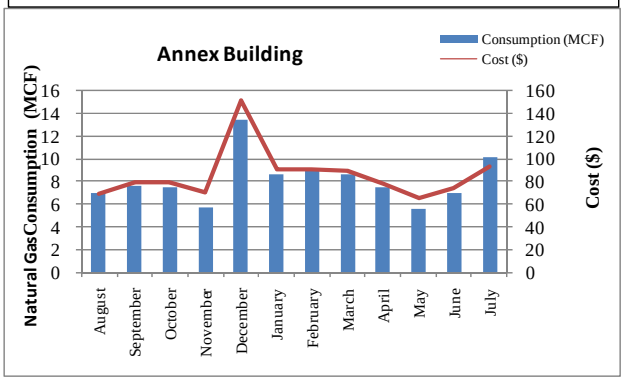


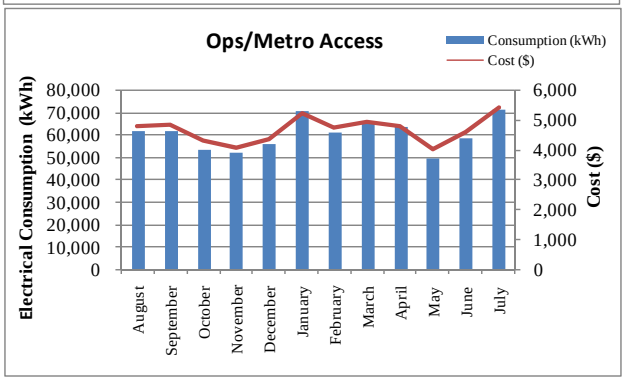


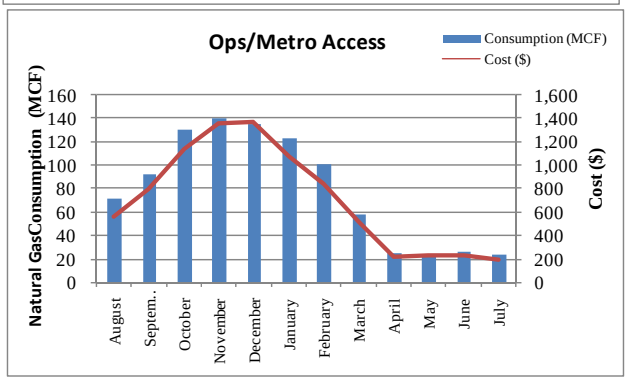


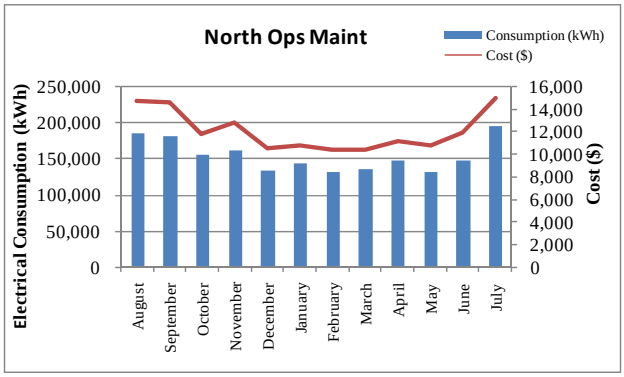
NATURAL GAS DATA INCLUDED IN THE ADMIN HQ

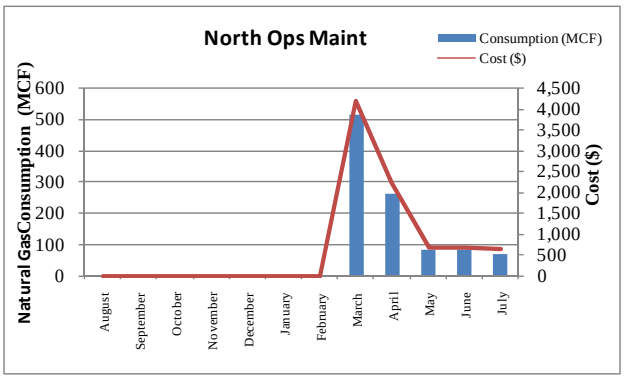


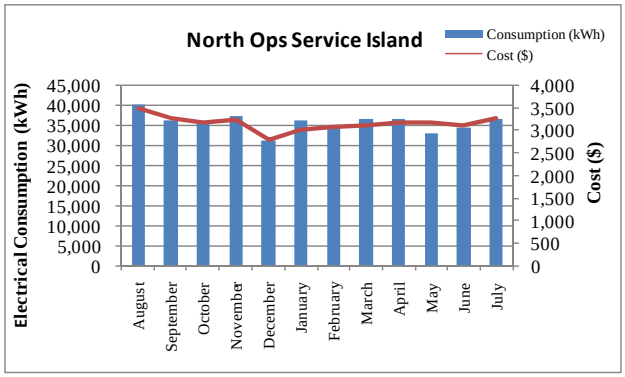


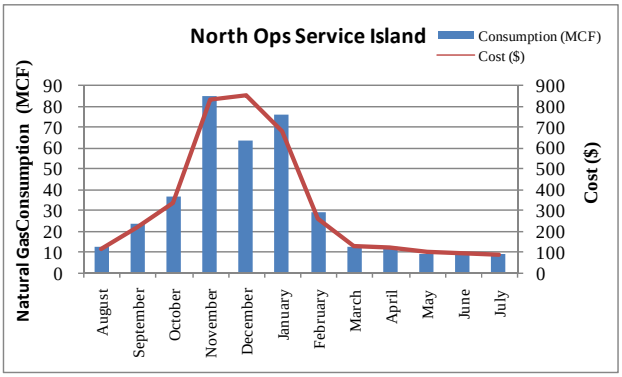


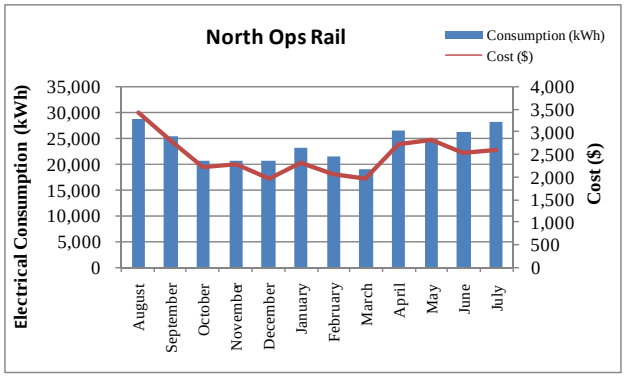




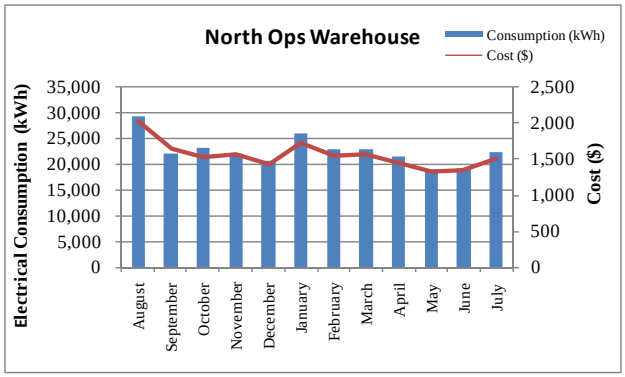








NO NATURAL GAS DATA FOR THIS FACILITY



NO NATURAL GAS DATA FOR THIS FACILITY

4.0 ENERGY ACCOUNTING

UTILITY PROVIDERS

Austin Energy provides electric service to Capital Metro. Texas Gas provides natural gas service to Capital Metro.

MONITORING AND TRACKING

An effective energy tracking system is an essential tool by which an energy management program's activities are monitored. The system should be centralized and available for all engaged staff members to use in verifying progress toward established targets and milestones.

Capital Metro has recently implemented several energy tracking procedures (such as assigning a group to track and record its facilities utility). To ensure the effectiveness of an energy tracking program the system should be centralized and readily accessible. Capital Metro should ensure all utility accounts are accounted for (i.e., Electricity, Natural Gas, Propane, Water, etc.) into an electronic spreadsheet (or a software program). A simple example of the type of data gathered can be found on the following page. Along with total utility costs ($), utility consumption should be recorded as well (i.e., kWh, MCF, gallons, etc.). Capital Metro can use this data to track utility consumption patterns and budget utility expenses. **Having this historical data improves the Capital Metro's awareness of their energy performance and will help in tracking their energy reduction goals.**

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 where required. Please see Section 5.0 for additional information regarding these requirements.

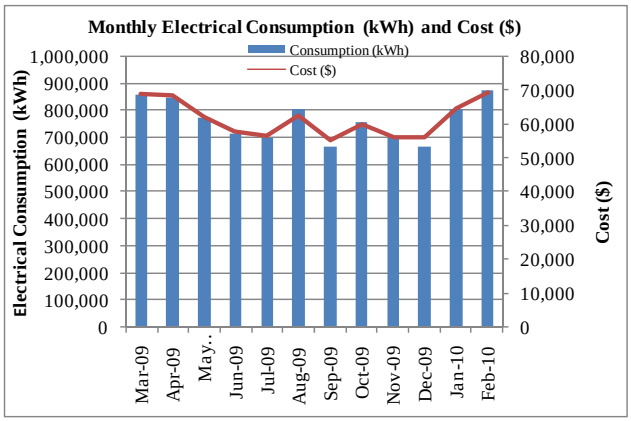
Furthermore, below is a sample format Capital Metro can customize to help summarize their overall utility usage and costs.

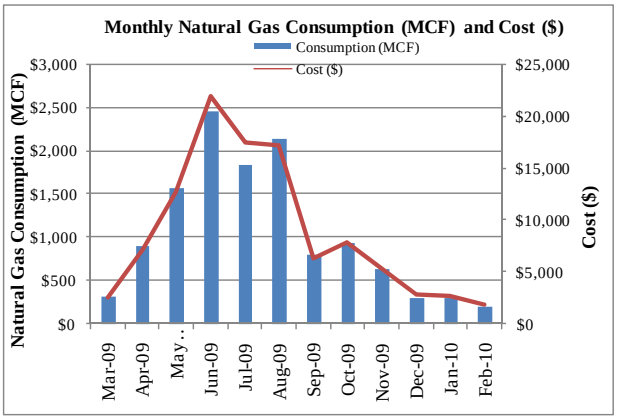
The data presented below is a summation of the data provided by Capital Metro. This data below includes only selected utility accounts and is for reference purposes only and does not represent Capital Metro's total utility data. See **Appendix C** for further detail regarding each utility account represented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

Capital Metro - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Mar-09	859,231	69,093	$0.0804	$322	$2,561	$8.0
Apr-09	850,683	68,495	$0.0805	$893	$7,203	$8.1
May-09	775,975	62,096	$0.0800	$1,569	$12,775	$8.1
Jun-09	716,783	57,959	$0.0809	$2,455	$21,962	$8.9
Jul-09	700,074	56,579	$0.0808	$1,829	$17,520	$9.6
Aug-09	806,277	62,615	$0.0777	$2,133	$17,148	$8.0
Sep-09	666,830	55,368	$0.0830	$802	$6,342	$7.9
Oct-09	759,986	59,830	$0.0787	$939	$7,798	$8.3
Nov-09	699,866	56,318	$0.0805	$632	$5,307	$8.4
Dec-09	668,920	56,345	$0.0842	$303	$2,769	$9.2
Jan-10	808,642	64,750	$0.0801	$297	$2,625	$8.9
Feb-10	878,025	69,306	$0.0789	$202	$1,839	$9.1
Total	9,191,292	$738,754	$0.0804	12,375	$105,849	$8.6

Gross Building Area:	489,888	SF





ECAD and ENERGY STAR Portfolio Manager

Recently, the City of Austin passed the Energy Conservation Audit and Disclosure (ECAD) Ordinance. The ECAD ordinance requires Austin commercial buildings that receive electricity from Austin Energy to have an energy rating by June 1, 2011. The buildings can use any of the two Austin Energy-approved energy rating systems. The two approved rating systems are ENERGY STAR Portfolio Manager and Austin Energy Business Energy Analysis Rating Tool.

Following is a link to this ordinance.
http://www.austinenergy.com/About%20Us/Environmental%20Initiatives/ordinance/index.htm

Capital Metro is required to submit their building's energy rating to Austin Energy. However some of Capital Metro's facilities may not be required to submit an energy rating since they can be classified as a "Specialized" or "High Energy Use" Facilities. If a facility cannot be rated by any of the rating tools because it is "Specialized" or classified as a "High Energy Use" facility, the facility can apply for a Variance to this ordinance.

Of the facilities evaluated during this Preliminary Energy Assessment, two facilities (the Administration Headquarters Building and the Annex Building) would be required to submit an energy rating, since they can be rated using the above-mentioned rating tools.

TEESI was able to prepare the Annex Building's energy performance rating using ENERGY STAR Portfolio Manager (see Appendix H for documentation). Please note these rating were generated using "Default" input values and would require editing by Capital Metro to confirm the data inputs. Below is a link and login information to obtain the ENERGY STAR Portfolio Manager data. Once logged in the data can be edited and modified by Capital Metro. TEESI will be available to provide guidance regarding the editing of the ENERGYSTAR Portfolio Manager data.

Website: https://www.energystar.gov/istar/pmpam/
Username: Provided by TEESI
Password: Provided by TEESI

Capital Metro's Admin Headquarters Administration Building cannot be rated as per ENERGY STAR Portfolio Manager because the electric and natural gas meters serve both the Admin HQ building and fuel & wash facilities. In order to properly rate the Admin HQ Building the electric and natural gas consumption serving the Admin HQ would need to be sub-metered (or estimated). Therefore, Capital Metro should consider sub-metering the electric and natural gas serving the Admin HQ Building.

As for the remaining facilities (i.e. Maintenance Headquarters, Ops/Metro Access, North Ops, etc.) these facilities are considered as maintenance/service buildings, and therefore may not require a rating. TEESI consulted with an ENERGY STAR representative to verify if these facilities could be rated using Portfolio Manager. The ENERGY STAR representative indicated that those facilities cannot be rated currently using Portfolio Manager since they are classified as Space Type "Other – Maintenance/Service Facilities". See Appendix H to view the email correspondence regarding this subject.

In summary, utilizing ENERGYSTAR Portfolio Manager to track Capital Metro energy performance should be considered. TEESI inputted utility data for all facilities included in this report into Portfolio Manager. Even though several of these facilities cannot be rated using this system, ENERGYSTAR Portfolio Manager can help in tacking progress and assessing energy performance goals. TEESI provided Capital Metro with a formal training session regarding how to input data into Portfolio Manager, as well as how this information is analyzed, how benchmarking facilities works, and how goals can be set for the facilities. Sign-in sheet for the training session is included in Appendix H.

5.0 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).

6.0 SAMPLE SCREENSHOTS OF ENERGY MANAGEMENT SYSTEM (EMS)

During the preliminary walk-through, several snap shots of the facility's Energy Management System (EMS) frontend were taken. The EMS snap shots help provide a snapshot of the HVAC equipment settings (Temperature Setpoints, Equipment On/Off Status, etc.). Below are example charts illustrating the results of snap shots and trend data from the EMS.

While this information only provides a brief sample of the indoor conditions, this information is helpful in providing a general understanding of a facility's HVAC system operations. Since the HVAC system is the major energy consumer in most facilities, investigating these systems can help identify energy reduction opportunities. Below are some examples of the information obtained using the EMS. Please note the following images were obtained during the month of October 2010 for the headquarter administration building, Ops/Metro access and North Ops maintenance building.

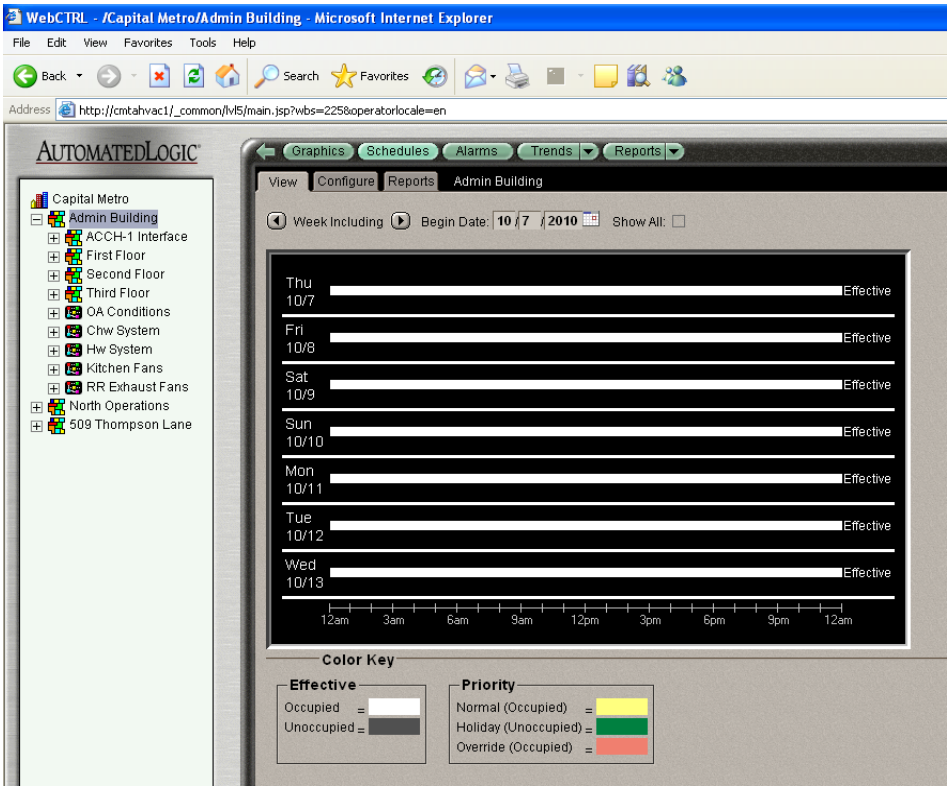


Figure 1. EMS screenshot of air-conditioning units operating schedule. At present, all the air conditioning units are operating 24/7 except AHU-3 in headquarter administration building.

Hot Water Valve Operation Trend

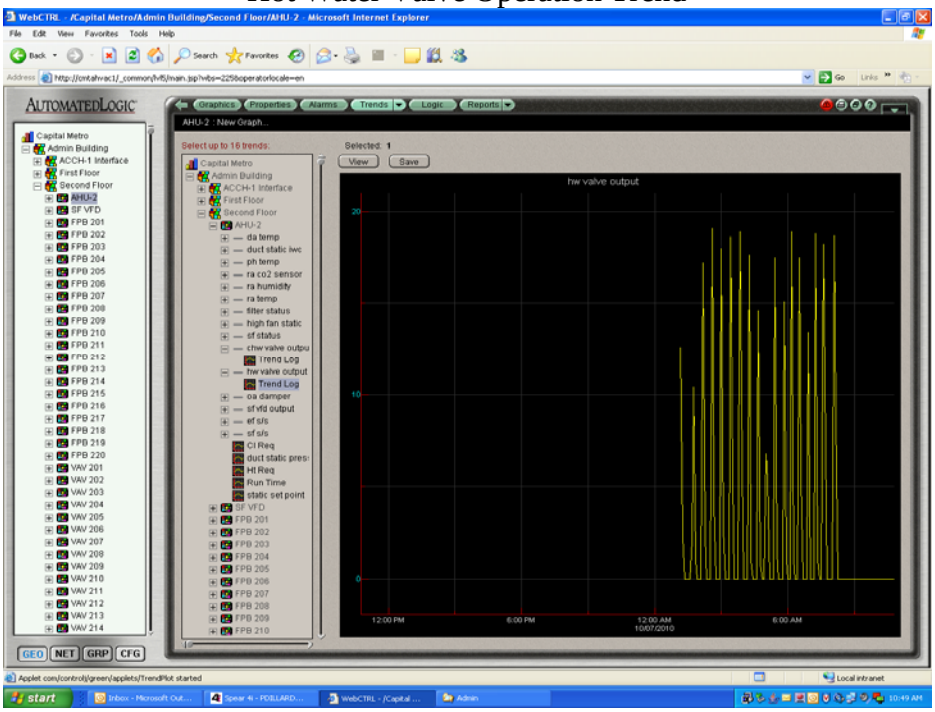


Figure 2. AHU -2 hot water valve trend data. The trend data shows that the valve opened and closed frequently, which causes sudden, wide variations in supply air temperature and also premature failure of the valve. This control can be optimized by fine tuning the PID loop control for the hot water valve.

Each facility utilizes one outside air temperature and humidity sensor to measure the outdoor conditions. Capital Metro should consider installing additional outdoor air temperature and humidity sensors for reliability. In this way, the control system can compare the readings and alert the operator if any sensor is out of calibration.

Upon investigation of the facilities' EMS, it was found that several Energy Management techniques could be implemented to increase energy efficiency. These EMS programming measures can be achieved through HVAC and control system commissioning. Efficient control of HVAC operation along with proper up keep of maintenance issues will result in reduced energy consumption and costs.

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. Some of the recommendations noted below are currently being practiced by Capital Metro. The following maintenance and operation procedures should be instituted/maintained to ensure sustainable energy savings.

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. Capital Metro should establish a goal to reduce the number of small appliances and to limit their usage. For example, the use small space heaters should be discouraged; hence, all space heating should be accomplished by Capital Metro'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 Capital Metro'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 including 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.

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 incandescent lights.

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.

INSTALL ENERGY SAVING DEVICES ON VENDING MACHINE

Install energy saving devices on vending machines with non-perishable food items to reduce the equipment power usage. These devices shut the vending machines down during unoccupied periods. There are several commercially available devices that can be easily installed on existing vending machines. These devices typical have a motion sensor which powers down the equipment after periods of inactivity. For example if the motion sensor does not sense activity within 15 minutes the device will shutdown the vending machine and turn on once motion is sensed. These devices range in price from $100 to $250 and have a typical annual savings of $20 to $150 per vending machine.

HAIL GUARDS ON CONDENSING AND PACKAGED ROOFTOP UNITS

When an HVAC unit is replaced the Capital Metro should ensure the new unit be specified with hail guards. The hail guards protect the condensing unit's heat exchanger coils from hail damage. Damage to the condensing unit heat exchangers reduces the efficiency of the units. It is recommended if any existing unit(s) have damaged condensing coil fins the condensing fins should be straightened using a fin comb.

8.0 RETROFIT OPPORTUNITIES

Energy retrofit projects with associated costs and savings identified during the preliminary analysis are detailed below.

REPLACE EXISTING T8 FLUORESCENT LAMPS WITH LOWER WATTAGE LAMPS

Low-wattage T8 fluorescent lamps are available in 30, 28 and 25-watt versions. It is recommended replacing existing 32-watt T8 Fluorescent lamps with lower wattage lamps (where applicable). Changing to a lower wattage T8 Lamp is a relatively straightforward process however, lower wattage T8 lamps do have limitations and are only suitable for certain applications. Lower wattage T8 lamps have reduced lighting levels therefore, it is important to ensure recommended lighting levels are maintained. Lighting levels should be verified prior to and after lamp replacement. 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 T8 lamps will have sustainable energy savings with minimal impact. For example, replacing a 32-watt T8 lamp with a 28-watt T8 lamp will reduce energy use by approximately 12% while only reducing the lighting level by about 4%.

The estimated costs and savings noted below are based on replacement of existing 32-watt T8 lamps and does not account for ballast replacements (if existing are incompatible) or changing the number of lamps (if necessary to achieve the lowest acceptable light level). Estimates are based on a preliminary walkthrough of the facilities. A detailed lighting analysis will be required to determine exact cost, quantities and configuration to maximize the energy savings and lighting performance.

LOW WATTAGE T8 FLUORESCENT LIGHTING RETROFIT			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Admin HQ	$7,800	$1,700	4.6
Maint HQ	$2,853	$630	4.5
Annex Building	$2,862	$460	6.2
North Ops Maint	$1,294	$200	6.5
TOTAL	**$14,809**	**$2,990**	**5.0**

Estimated Energy savings (MMBtu)= 127.5 MMBtu/yr .

INSTALLATION OF OCCUPANCY SENSORS FOR INDOOR LIGHTING CONTROL

It is recommended Capital Metro 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 uses, are typically good candidates for occupancy sensors (i.e. storage rooms, hallways, administration offices, break rooms, etc.).

MOTION SENSOR INSTALLATION			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Admin HQ	$6,500	$800	8.1
Maint HQ	$1,100	$140	7.9
Annex Building	$8,600	$1,100	7.8
North Ops Maint	$1,700	$200	8.5
TOTAL	**$17,900**	**$2,240**	**8.0**

Estimated Energy savings (MMBtu)= 95.5 MMBtu/yr

HID TO FLUORESCENT FIXTURE LIGHTING RETROFIT

The Capital Metro utilizes High Intensity Discharge (HID) fixtures to light the warehouse and maintenance area. It is recommended that Capital Metro replace the existing HID fixtures with fluorescent fixtures suitable for high bay applications. Fluorescent fixtures offer improved control, reduce energy consumption and improve lighting levels. In addition, due to the long re-strike times associated with HID fixtures, they cannot be effectively switched on/off during unoccupied periods. This causes the HID lamps to operate longer, which both consumes more energy and affects lamp life. The cost and savings estimates below are based on preliminary observations and analysis, assuming no reduction in operating hours; just efficiency improvement.

HID TO FLUORECENT			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Fuel & wash facilities (Admin HQ)	$14,044	$1,900	7.4
Maint HQ	$101,135	$16,700	6.1
Ops/Metro Access	$16,869	$2,100	8.0
North Ops Maint	$29,356	$4,400	6.7
North Ops Service Island	$10,126	$1,500	6.8
North Ops Rail	$17,217	$2,800	6.1
TOTAL	**$188,747**	**$29,400**	**6.4**

Estimated Energy savings (MMBtu)= 1,253.9 MMBtu/yr

RETROFIT OUTDOOR PARKING LOT LIGHTING

The Admin HQ utilizes High Intensity Discharge (HID) fixtures to light the parking lot and canopy area. It is recommended that Capital Metro replace the existing 400-watt HID fixtures with lower wattage Pulse-start 320-watt HID Lamps for the parking lot areas, and replace the existing 250-watt HID fixtures with lower wattage Pulse-start 200-watt HID Lamps for the canopy. Lower wattage Pulse-start HID lamps have lower energy consumption and higher lamp life. Lighting levels should be verified prior to and after lamp replacement.

The estimated costs and savings noted below are based on replacement of existing lamps and ballasts, but does not account for changing the number of lamps (if necessary to achieve the lowest acceptable light level). Estimates are based on a preliminary walkthrough of the facilities. A detailed lighting analysis will be required to determine exact cost, quantities and configuration to maximize the energy savings and lighting performance.

RETROFIT OUTDOOR PARKING LOT LIGHTING			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Admin HQ	$27,300	$3,400	8.0
TOTAL	**$27,300**	**$3,400**	**8.0**

Estimated Energy savings (MMBtu)= 145 MMBtu/yr

REPLACE CHILLER SYSTEMS

Replace existing chillers with new high efficiency units at the facilities indicated in the table below. The existing systems are inefficient, nearing the end of their useful life and require extensive maintenance. Units to be replaced are listed below:

Maint HQ: One chiller along with the remote outdoor air-cooled condenser totaling approximately 100 tons (22 years old).

Ops/Metro access: One air-cooled chiller with a total capacity of approximately 27 tons (10 years old). Existing chiller is inefficient and the condenser fins are severely damaged (See picture below). Several compressor failures have occurred during hot weather causing maintenance issues and facility disruptions.

The table below summarizes the estimated cost and savings from efficiency improvement and maintenance cost reduction for replacing the units indentified in each facility.

CHILLER REPLACEMENT			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Maint HQ	$145,545	$8,700	16.7
Ops/Metro Access	$54,303	$2,600	20.9
TOTAL	**$199,848**	**$11,300**	**17.7**

Estimated Energy savings (MMBtu)= 481.9 MMBtu/yr

INSTALL ENERGY MANAGEMENT SYSTEM (EMS)

Install Direct Digital Control (DDC) Energy Management System (EMS) to provide optimum scheduling and precise temperature supervision for the HVAC systems throughout each facility listed in the table below. The EMS will minimize the run time of the units while maintaining comfort throughout the facility. List of the proposed EMS projects follows:

Maint HQ: Existing HVAC systems are controlled by pneumatic thermostats. The proposed EMS project will install EMS with remote access capability, integrate the HVAC system into EMS and replace all the pneumatic thermostats and actuators with DDC controls.

Annex building: Existing HVAC systems are controlled by standard non-programmable thermostats. The proposed EMS upgrade will integrate the HVAC systems into EMS with remote access capability.

North Ops Service Island: Existing HVAC systems are controlled by standard thermostats with limited control capability. The proposed EMS upgrade will integrate the HVAC systems into the EMS with remote access capability. The building is a bus service center with low and intermittent occupancy. The HVAC systems could also be controlled by integrating the existing occupancy sensors into the EMS.

The EMS systems proposed in the estimation below will have basic functions such as remote access capabilities, multiple scheduling, space temperature reset and optimum start/stop features. The table below summarizes the estimated cost and saving for these projects.

EMS INSTALLATION			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Maint HQ	$100,200	$9,100	11.0
Annex Building	$46,800	$3,600	13.0
North Ops Service Island	$17,000	$1,400	12.1
TOTAL	**$164,000**	**$14,100**	**11.6**

Estimated Energy savings (MMBtu)= 601.4 MMBtu/yr

HVAC SYSTEMS COMMISSIONING (Cx)

Detailed HVAC & Control system commissioning in an existing building involves analysis of existing systems to ensure compliance with original set-up/design conditions and, where feasible, conduct basic research to adjust operating parameters to enhance comfort and reduce energy consumption. For more information regarding building commissioning, the different forms of commissioning, list of certification bodies, typical costs and benefits see **Appendix F**.

Overall, the goals of commissioning are to deliver a facility that operates as it was intended or better and meets the needs of the building owner and occupants; and to train facility operators to operate the system efficiently. To reach this goal, it is necessary for the commissioning process to provide documentation and verification of the performance of all building equipment and systems. For the process to work successfully, it is equally important to have good communications between all participants (owners, operators and the commissioning agent) and to keep all parties involved and informed of all pertinent decisions.

HVAC Retro-commissioning (RCx) involves the optimization of an existing building's energy usage through testing and documentation. Typically, this procedure will review and improve a building's energy consumption levels by documenting staff and occupant observations as well as improving the building systems to meet the original design intent, and possibly incorporate available improvements. This process is ideal for buildings that have not been commissioned previously. While most commissioning programs focus on bringing a building to the original design intent, Continuous Commissioning® focuses on optimizing the HVAC system operation to the current building conditions. This type of commissioning process is ideal for existing buildings with relatively complex HVAC systems.

Preliminary examination (utility data review, discussion with staff, EMS review, and walkthrough) of Capital Metro facilities indicate potential for energy cost savings primarily in the HVAC systems operations. The facilities would greatly benefit by implementing a comprehensive building Commissioning (Cx) program that ensures the optimization of HVAC systems for the building's existing conditions, works to improve the building air quality, increase comfort levels, and resolve any operating problems. The Commissioning program chosen by Capital Metro should require collaborative efforts between the commissioning engineers and the facility staff, and is an ongoing process that continues to both commission the building as well as train the facility staff.

Cx is typically characterized as fast payback, usually 12 - 48 months. Examples include verification and adjustment of the chiller, boiler, air handler and terminal box operation and sequences; calibration of control systems and temperature settings; balancing conditioned air and/or chilled water flows; etc.

At the building level, typical commissioning measures will look into opportunities to verify and optimize the operations of HVAC equipment. Detailed commissioning measures at the building level may include the following:

Central Plant Optimization.

- Select enabled chiller set (and speed, if variable) for best chiller efficiency.
- Optimize Chilled Water (CHW) flows between chillers for peak combined efficiency.

- Select each hydronic loop pump set to match the head/flow^2 ratio of that loop.
- Control each hydronic loop pump relative speed from most open valve and/or highest relative pump speed of downstream tier.
- Boiler start/stop operation and reset schedule.

Optimize AHU operations.

- Develop base schedule of occupancy (expressed as people count) for each AHU.
- Develop base optimal start schedule (or optimized start routine, if supported by EMS) for each AHU.
- Develop means of easily accommodating after-hours use.
- Develop optimal discharge temperature setpoint routine for each AHU heating and cooling coil.
- Add or expand economizer cycle use where feasible.
- Develop minimum ventilation assurance routine. Use CO_2, moisture, or heat to detect occupant count in assembly areas. Use heat/person ratio to set fresh air fraction limits in low-occupant-density areas with little shell load. Use fresh air measurement to control to scheduled occupancy in predictable occupancy areas.
- Optimize air distribution where necessary.

Recalibrate sensors.

- Temperature: occupied spaces, return air, discharge air, cold and hot deck, outdoor.
- Differential Pressure: primary supply duct – space, space – outdoors, ChWS – ChWR, HWS – HWR.
- Humidity: occupied spaces, return air, humidifier discharge, outdoor.
- Airflow Measurement: Outdoor intake, supply air, return, relief and exhaust where applicable, zone terminal unit (hot, cold and/or mixed, as applicable).

Set up trends for major parameters.

- Air Temperatures: discharge (cold and hot deck, as applicable), return, zone supply, occupied spaces, outdoor.
- Duct static pressures.
- Run status (and speed if variable) for each chiller, AHU and pump.
- kW, Tons, SST & SCT for each chiller.
- Run status and capacity fraction for each boiler.
- AHU airflows, where available; supply (hot & cold), outdoor intake.
- Hydronic valve opening fractions.
- Hydronic loop differential pressures, and pump differential pressures where available.
- Hydronic system flows (as available) directly read or by equipment pressure drop or pump head and speed.
- Hydronic system supply and return temperatures.
- Chiller plant load, tons.
- Heating plant load, MBH.

Identify malfunctioning devices.

- Failed or disconnected valve and damper actuators.
- Valves and dampers that do not travel through full range.
- Leaky valves and dampers.

- Disconnected damper linkages.

Reprogram control sequences where required

- Air Handling Systems.
- Terminal Boxes.
- Central Plant (Chillers, Boilers, Cooling Towers, Pumps etc.)

The cost and savings estimates presented here are for a detailed commissioning program. The project implementation duration is typically 12 months.

The following estimates are based on a preliminary walkthrough, available utility data analysis, and discussion with staff. Also included in the estimated implementation cost are deferred maintenance costs which may include minor repairs and upgrades to the HVAC and control system (leaking valves, faulty actuators/sensors, loose belts, etc.), minor sequence changes that may need re-programming by the EMS vendor, and personnel training on operation of the EMS. Deferred maintenance items are typically identified in the commissioning survey and included on the facility action list for the Owner to address. Project (detailed assessment plan, analysis and implementation), if authorized, would normally be accomplished by an organization/firm with professional engineers specializing in Cx techniques and project implementation. The following table summarizes the implementation costs, annual savings and payback for the above project.

BUILDING COMMISSIONING (Cx)			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Admin HQ	$32,900	$7,300	4.5
TOTAL	**$32,900**	**$7,300**	**4.5**

Estimated Energy savings (MMBtu)= 492.2 MMBtu/yr

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)**	**Simple Payback (years)**
LOW WATTAGE T8 FLUORESCENT LIGHTING RETROFIT	$14,809	$2,990	5.0
MOTION SENSOR INSTALLATION	$17,900	$2,240	8.0
HID TO FLUORECENT	$188,747	$29,400	6.4
RETROFIT OUTDOOR PARKING LOT LIGHTING	$27,300	$3,400	8.0
CHILLER REPLACEMENT	$199,848	$11,300	17.7
EMS INSTALLATION	$164,000	$14,100	11.6
BUILDING COMMISSIONING (Cx)	$32,900	$7,300	4.5
TOTAL:	**$645,504**	**$70,730**	**9.1**

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 Capital Metro requirements, and construction management would be provided by the engineering group who prepared the drawings and specifications.

9.0 FACILITY IMPROVEMENT MEASURES

This section is intended to describe the Facility Improvement Measures (FIMs) that have energy savings opportunities but cannot be justified solely based on the potential energy savings alone. The following are the capital improvement projects recommended for Capital Metro.

SUBMETER ADMIN HQ

Currently, the admin HQ electricity meters both the administration building and fuel & wash facilities. The gas meter also meters both the admin HQ and maint HQ. It is recommended to separate or sub meter the admin HQ, fuel & wash facilities and maint HQ from each other. This will allow Capital Metro to better survey the energy usage of each facility, rather than sharing electricity and gas usage. The following table describes the cost estimation for installing additional meters in order to split the facilities.

CAPITAL RETROFIT - UTILITY SUBMETERING	
Project Description	**Estimated Implementation Cost**
Admin HQ	$4,000
TOTAL	**$4,000**

REPLACE HVAC SYSTEMS NEARING END OF USEFUL LIFE

The Maintenance HQ has six air handling units nearing the end of their useful life. The average age of these systems is twenty-two years. Capital Metro should budget and plan to replace these units in the next two (2) to four (4) years. Replacing these systems with high-efficiency units and variable-frequency drives will save energy and reduce maintenance costs. The six (6) air handling units totaling approximately 89 tons are included in this category. The table below summarizes the estimated cost for replacing these units.

CAPITAL RETROFIT - HVAC REPLACEMENT	
Project Description	**Estimated Implementation Cost**
Maint HQ	$84,271
TOTAL	**$84,271**

REPLACE HEATING BOILER NEARING END OF USEFUL LIFE

The HQ administration building and Maint HQ have two boiler systems nearing the end of their useful life. The average age of the boilers are twenty two years. Capital Metro should budget and plan to replace the units in the next two (2) to four (4) years. Replace these systems with high efficiency units will have energy savings and help reduce maintenance costs. The table below summarizes the estimated cost for replacing the units.

CAPITAL RETROFIT - BOILER REPLACEMENT	
Project Description	**Estimated Implementation Cost**
Admin HQ	$92,400
Maint HQ	$42,000
TOTAL	**$134,400**

HVAC DUCTWORK MODIFICATION

At the Ops/Metro access building, the cafeteria and adjacent front offices area is experiencing comfort problems. Preliminary observation indicate that the fan powered VAV box cannot maintain the required space temperature. The VAV box and ductwork system may need to be modified to provide required airflow. Estimated costs below includes air balance, additional fan power boxes (4) and associated ductwork modification.

CAPITAL RETROFIT - HVAC DUCTWORK MODIFICATION	
Project Description	**Estimated Implementation Cost**
Ops/Metro Access	$35,000
TOTAL	**$35,000**

The following table summarizes the implementation costs for the above capital improvement projects:

SUMMARY OF CAPITAL IMPROVEMENT PROJECTS	
Project Description	**Estimated Implementation Cost**
UTILITY SUBMETERING	$4,000
HVAC REPLACEMENT	$84,271
BOILER REPLACEMENT	$134,400
HVAC DUCTWORK MODIFICATION	$35,000
TOTAL	**$257,671**

The above projects implementation costs are estimated based on a preliminary examination of the facilities. 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 Capital Metro requirements, and construction management would be provided by the engineering group who prepared the drawings and specifications.

10.0 ENERGY MANAGEMENT POLICY

Furthermore, Capital Metro is committed to improving their energy performance and this is evident by the request to perform a Preliminary Energy Assessment (PEA) report. This PEA report will help Capital Metro in their energy management activities. To maximize the effectiveness of Capital Metro's energy management activities it is important to have support and commitment for top management. Capital Metro recently approved and implemented a Sustainability Policy and is in process of undergoing ISO 14000 Energy Management System Training. Activities such as these send a strong signal that resource and energy management is an institutional priority

In order to ensure and sustain long-term energy efficient practices the following items should be considered and be incorporated in Capital Metro energy management activities:

- Establish an energy steering committee to review energy cost and consumption on a regular basis.
- Outline energy cost reduction measures and implementation strategies.
- Assign energy manager duties to existing staff positions, with defined roles and responsibilities.
- Establish acceptable equipment operating parameters and schedules, such as HVAC space heating and cooling set points, availability and duration of overrides, etc.
- Promote awareness of energy conservation by publishing goals and progress of energy conservation measures.
- Establishment of a tracking method for utility cost and consumption. Establish energy performance targets using 3rd Party energy rating programs such as ENERGY STAR Portfolio Manager (*) or Austin Energy Business Energy Analysis Rating Tool.

(*) *As indicated in section 4.0 of the report, Capital Metro has already started this process, TEESI provided Portfolio Manager account setup and basic training to the staff.*

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, Capital Metro proceeds to implement funded projects through the traditional bid/specification process. Contact: Eddy Trevino (512/463-1080).

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 Capital Metro 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.

12.0 ANALYST IDENTIFICATION

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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 Capital Metros, 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 Capital Metros 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 Capital Metros 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 Capital Metros; 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:

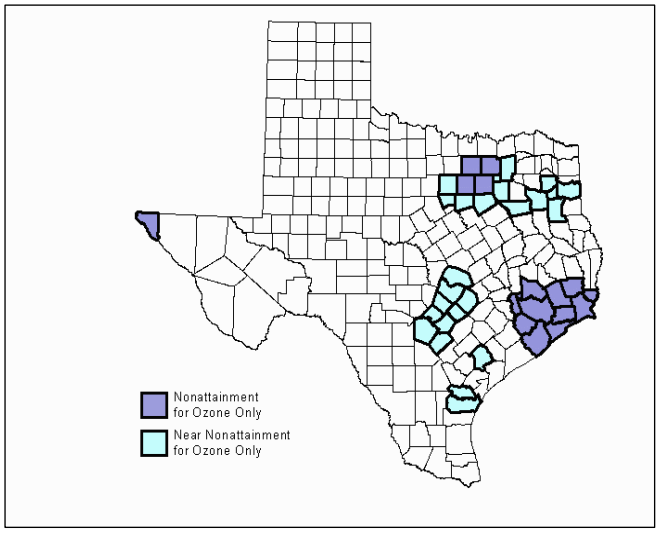
• installation of insulation and high-efficiency windows and doors • modifications or replacement of HVAC systems, lighting fixtures and electrical systems • installation of automatic energy control systems • installation of energy recovery systems or renewable energy generation equipment • building 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 - 512-463-1080
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Schools Partnership Program:
Juline Ferris - 512-936-9283
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Engineering (Codes / Standards):
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Innovative / Renewable Energy:
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Energy / Housing
Partnership Programs:
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Alternate Fuels / Transportation:
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Mary-Jo.Rowan@cpa.state.tx.us

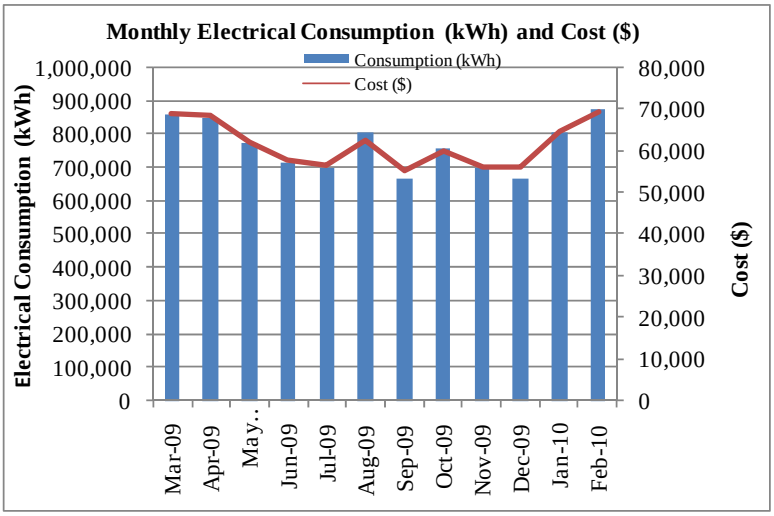
APPENDIX B

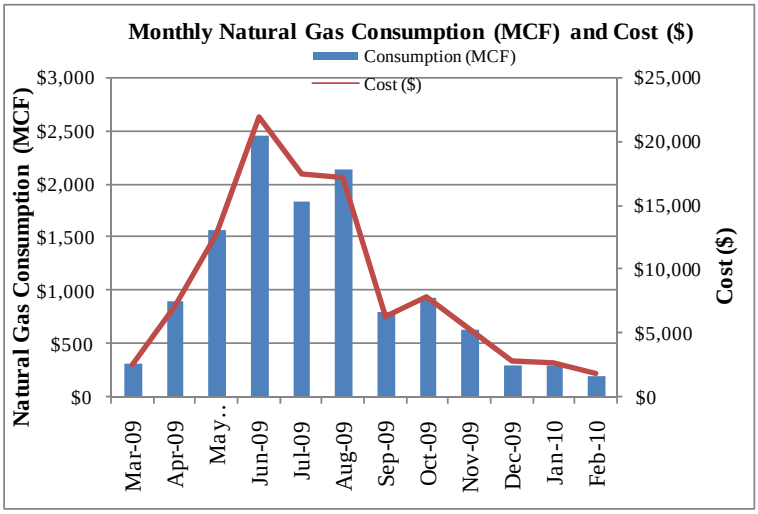
SAMPLE UTILITY DATA REPORTING FORM

Capital Metro - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Mar-09	859,231	69,093	$0.0804	$322	$2,561	$8.0
Apr-09	850,683	68,495	$0.0805	$893	$7,203	$8.1
May-09	775,975	62,096	$0.0800	$1,569	$12,775	$8.1
Jun-09	716,783	57,959	$0.0809	$2,455	$21,962	$8.9
Jul-09	700,074	56,579	$0.0808	$1,829	$17,520	$9.6
Aug-09	806,277	62,615	$0.0777	$2,133	$17,148	$8.0
Sep-09	666,830	55,368	$0.0830	$802	$6,342	$7.9
Oct-09	759,986	59,830	$0.0787	$939	$7,798	$8.3
Nov-09	699,866	56,318	$0.0805	$632	$5,307	$8.4
Dec-09	668,920	56,345	$0.0842	$303	$2,769	$9.2
Jan-10	808,642	64,750	$0.0801	$297	$2,625	$8.9
Feb-10	878,025	69,306	$0.0789	$202	$1,839	$9.1
Total	9,191,292	$738,754	$0.0804	12,375	$105,849	$8.6

Gross Building Area:	489,888	SF





APPENDIX C

BASE YEAR CONSUMPTION HISTORY

Energy Cost and Consumption Benchmarks

		Electric			Natural Gas			Total	Total	EUI	ECI	Energy Rate	
	Building	KWH/Yr	MMBTU/Yr	$Cost/Yr	MCF/Yr	MMBTU/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	$/MMBTU	SF
1	Admin HQ*,**	2,276,692	7,770	183,993	9,938	10,236	82,957	266,950	18,006	301	4.46	14.83	59,830
2	Maint HQ*	2,895,000	9,881	226,892	0	0	482	227,374	9,881	94	2.17	23.01	105,000
3	Annex Building	450,800	1,539	40,281	99	102	1,032	41,313	1,640	66	1.65	25.19	25,000
4	Ops/Metro Access	723,900	2,471	56,026	949	978	8,533	64,559	3,448	286	5.36	18.72	12,048
5	North Ops Maint	1,857,300	6,339	145,303	1,006	1,036	8,454	153,756	7,375	135	2.82	20.85	54,452
6	North Ops Service Island	430,800	1,470	38,054	384	395	3,831	41,885	1,866	73	1.63	22.45	25,664
7	North Ops Rail	286,800	979	29,628	0	0	0	29,628	979	32	0.97	30.27	30,444
8	North Ops Warehouse	270,000	922	18,576	0	0	559	19,135	922	5	0.11	20.77	177,450
		KWH/Yr	MMBTU/Yr	$Cost/Yr	MCF/Yr	MMBTU/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr		SF
		9,191,292	31,370	738,754	12,375	12,746	105,849	844,603	43,195	90	1.72	19.55	489,888

* Facility Square footage is based on estimate.

** Includes fuel and wash facility, operation building and site lighting.

Entity Capital Metro

ACCOUNT# 0368519-5 5758011-0 5974595-0 5758000-3 Electric

0365816-1 Gas

BUILDING: Admin HQ

FLOOR AREA: 59,830 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 ($)
August	2009	197,771		350		15,697	230	1,723
September	2009	200,743		340		15,726	769	6,024
October	2009	189,635		370		15,541	1,395	11,139
November	2009	172,603		360		13,967	2,224	19,609
December	2009	191,654		410		15,635	1,617	15,061
January	2010	219,657		410		17,161	1,925	15,212
February	2010	172,550		440		14,975	662	5,064
March	2010	210,586		410		16,670	344	2,797
April	2010	165,486		390		13,963	326	2,579
May	2010	164,560		340		13,753	183	1,586
June	2010	201,742		340		15,781	174	1,437
July	2010	189,705		340		15,125	90	726
TOTAL		2,276,692				183,993	9,937.6	82,957

Annual Total Energy Cost = 266,950 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 301 kBTU/SF/year

Total KWH/yr x 0.003413 = 7,770.35 MMBTU/year

Total MCF/yr x 1.03 = 10,235.73 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 18,006 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 4.46 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 0796260-8 Electric

1329142 Gas

BUILDING: Maint HQ

FLOOR AREA: 105,000 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 ($)
August	2009	270,000		450		21,037	0	40
September	2009	277,000		470		21,699	0	40
October	2009	259,000		430		20,156	0	40
November	2009	219,000		420		17,255	0	40
December	2009	213,000		410		16,801	0	40
January	2010	245,000		410		18,546	0	40
February	2010	191,000		400		15,475	0	40
March	2010	233,000		410		17,892	0	40
April	2010	209,000		390		16,330	0	40
May	2010	213,000		410		17,367	0	40
June	2010	277,000		470		21,699	0	40
July	2010	289,000		490		22,634	0	40
TOTAL		2,895,000				226,892	0.0	482

* Natural Gas service not included in this summary.

Annual Total Energy Cost = 227,374 $/year

Total KWH/yr x 0.003413 = 9,880.64 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 9,881 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 94 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 2.17 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 5243765-4 Electric

1638570 Gas

BUILDING: Annex Building

FLOOR AREA: 25,000 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 ($)
August	2009	45,800		104		3,957	7	70
September	2009	44,600		104		3,891	8	79
October	2009	37,600		94		3,369	8	80
November	2009	30,200		84		2,709	6	71
December	2009	32,200		100		3,021	14	151
January	2010	41,000		124		3,804	9	90
February	2010	31,200		108		3,068	9	90
March	2010	37,000		100		3,283	9	89
April	2010	29,600		84		2,677	8	78
May	2010	32,800		88		3,023	6	66
June	2010	44,200		92		3,701	7	75
July	2010	44,600		96		3,779	10	93
TOTAL		450,800				40,281	98.7	1,032

Annual Total Energy Cost = 41,313 $/year

Total KWH/yr x 0.003413 = 1,538.58 MMBTU/year

Total MCF/yr x 1.03 = 101.66 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 1,640 MMBTU/year

Energy Use Index:

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

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.65 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 0290642-8 Electric

1352148 Gas

BUILDING: Ops/Metro Access

FLOOR AREA: 12,048 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 ($)
August	2009	61,500		102		4,785	71	564
September	2009	61,800		105		4,843	92	795
October	2009	53,400		99		4,301	130	1,132
November	2009	52,200		96		4,061	140	1,361
December	2009	55,800		102		4,333	135	1,368
January	2010	70,200		111		5,232	123	1,080
February	2010	61,200		111		4,741	101	844
March	2010	65,100		108		4,916	58	511
April	2010	63,300		105		4,780	25	224
May	2010	49,800		93		4,020	24	227
June	2010	58,200		102		4,605	25	229
July	2010	71,400		108		5,409	24	196
TOTAL		723,900				56,026	949.2	8,533

Annual Total Energy Cost = 64,559 $/year

Total KWH/yr x 0.003413 = 2,470.67 MMBTU/year

Total MCF/yr x 1.03 = 977.68 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,448 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 286 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 5.36 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 5838524-6 Electric

1624212 Gas

BUILDING: North Ops Maint

FLOOR AREA: 54,452 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 ($)
August	2009	185,700		324		14,672	0	0
September	2009	182,700		333		14,635	0	0
October	2009	156,900		231		11,797	0	0
November	2009	162,600		318		12,889	0	0
December	2009	134,700		258		10,609	0	0
January	2010	144,600		234		10,845	0	0
February	2010	132,000		255		10,424	0	0
March	2010	135,600		240		10,430	515	4,187
April	2010	147,600		252		11,236	260	2,215
May	2010	131,700		261		10,843	81	702
June	2010	147,300		279		11,947	81	702
July	2010	195,900		306		14,976	69	649
TOTAL		1,857,300		3291		145,303	1,005.8	8,454

Annual Total Energy Cost = 153,756 $/year

Total KWH/yr x 0.003413 = 6,338.96 MMBTU/year

Total MCF/yr x 1.03 = 1,035.97 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 7,375 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 135 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 2.82 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 5120063-2 Electric

1624213 Gas

BUILDING: North Ops Service Island

FLOOR AREA: 25,664 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 ($)
August	2009	40,500		93		3,513	13	117
September	2009	36,500		92		3,281	24	217
October	2009	35,700		89		3,195	37	338
November	2009	37,400		96		3,254	85	834
December	2009	31,500		85		2,793	64	854
January	2010	36,500		81		3,015	77	678
February	2010	34,600		95		3,088	30	257
March	2010	36,700		89		3,127	13	127
April	2010	36,700		93		3,178	13	125
May	2010	33,200		98		3,185	10	102
June	2010	34,600		89		3,135	10	95
July	2010	36,900		91		3,289	9	87
TOTAL		430,800		1091		38,054	383.9	3,831

Annual Total Energy Cost = 41,885 $/year

Total KWH/yr x 0.003413 = 1,470.32 MMBTU/year

Total MCF/yr x 1.03 = 395.42 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 1,866 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 73 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.63 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 5884216-2 Electric

Gas

BUILDING: North Ops Rail

FLOOR AREA: 30,444 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 ($)
August	2009	28,800		132		3,422	0	0
September	2009	25,500		99		2,779	0	0
October	2009	20,700		78		2,223	0	0
November	2009	20,700		90		2,267	0	0
December	2009	20,700		66		1,964	0	0
January	2010	23,400		81		2,301	0	0
February	2010	21,600		69		2,051	0	0
March	2010	19,200		72		1,958	0	0
April	2010	26,700		99		2,708	0	0
May	2010	24,900		105		2,831	0	0
June	2010	26,400		78		2,534	0	0
July	2010	28,200		75		2,590	0	0
TOTAL		286,800		1044		29,628	0.0	0

Annual Total Energy Cost = 29,628 $/year

Total KWH/yr x 0.003413 = 978.85 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 979 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 32 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.97 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

Entity Capital Metro

ACCOUNT# 56011877 Electric

1474003 Gas

BUILDING: North Ops Warehouse

FLOOR AREA: 177,450 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 ($)
August	2009	29,160		44		2,011	0	47
September	2009	21,840		44		1,641	0	47
October	2009	23,040		29		1,513	0	47
November	2009	22,080		40		1,556	0	47
December	2009	20,520		35		1,424	0	47
January	2010	25,920		36		1,710	0	47
February	2010	22,680		36		1,546	0	47
March	2010	22,800		36		1,555	0	47
April	2010	21,480		32		1,446	0	47
May	2010	18,960		30		1,321	0	47
June	2010	19,200		31		1,348	0	47
July	2010	22,320		31		1,506	0	47
TOTAL		270,000		425		18,576	0.0	559

Annual Total Energy Cost = 19,135 $/year

Total KWH/yr x 0.003413 = 921.51 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 922 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 5 kBTU/SF/year

Energy Cost Index:

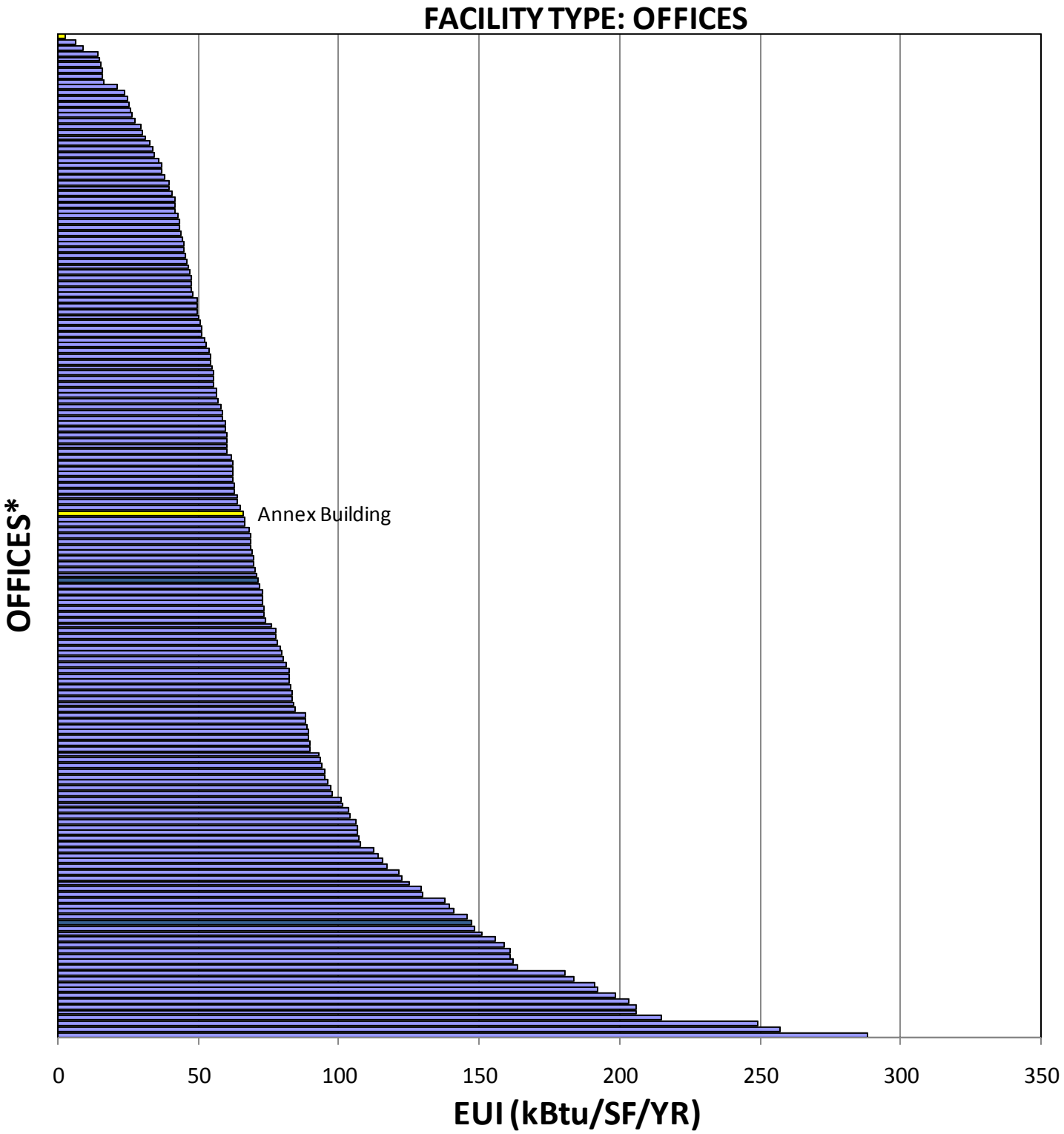
Total Energy Cost/Yr ÷ Total Area (SF) = 0.11 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

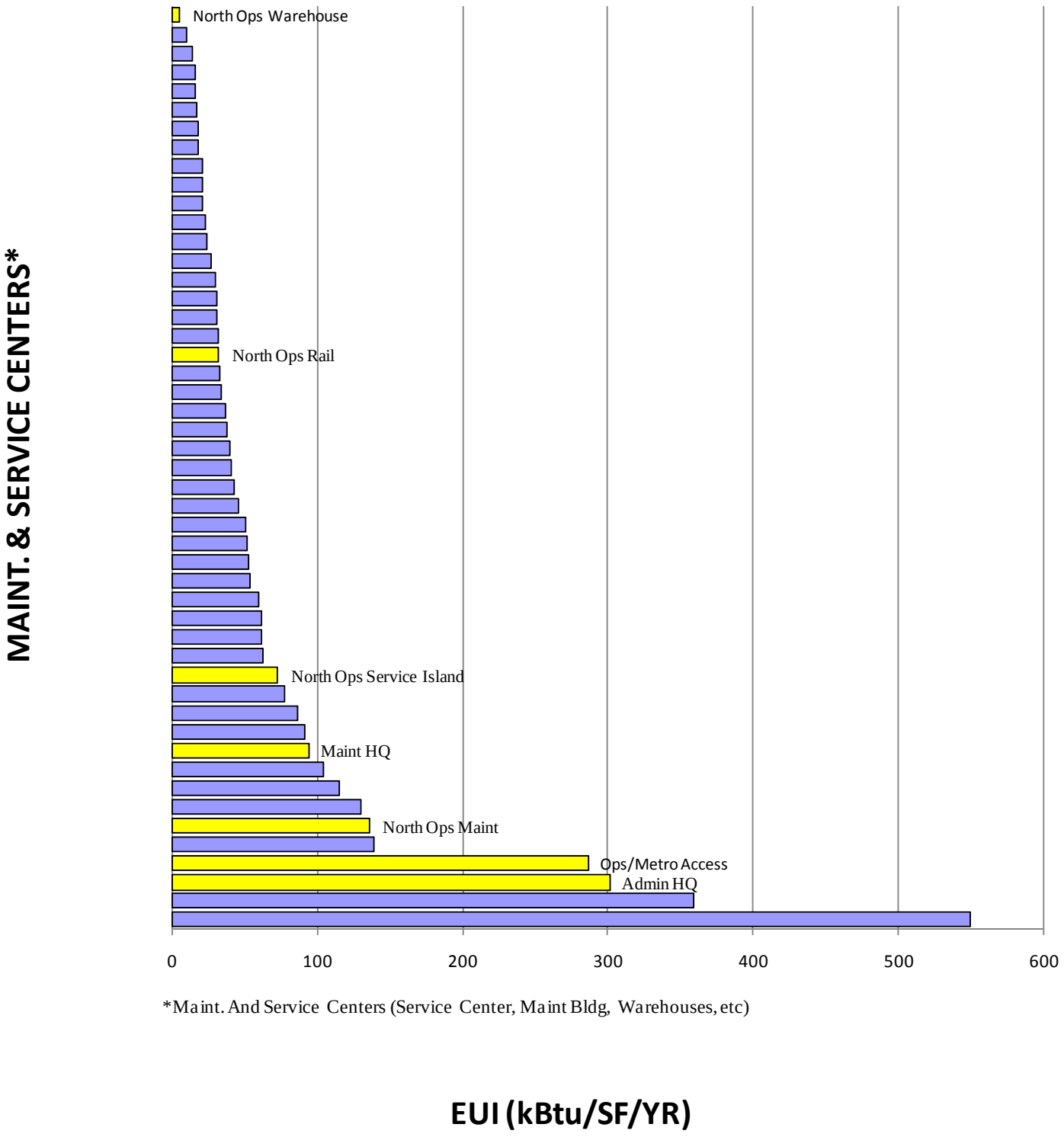
APPENDIX D

ENERGY PERFORMANCE COMPARISON CHARTS



*Offices (INCL: City Hall, Courthouse, Administrative Offices, Public Works Buildings)

TEESI DATABASE OF LOCAL GOVERNMENT FACILITIES IN TEXAS
EUI COMPARISON CHART
FACILITY TYPE: MAINT. & SERVICE CENTER



*Maint. And Service Centers (Service Center, Maint Bldg, Warehouses, etc)

*Admin HQ meter includes the fuel & wash facilities, maintenance building and site lighting

APPENDIX E

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Boilers Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Boiler use/sequencing	Turn off/sequence unnecessary boilers	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Follow manufacturer's recommended procedures in lubricating all components	Compare temperatures with tests performed after annual cleaning	X			
Check steam pressure	Is variation in steam pressure as expected under different loads? Wet steam may be produced if the pressure drops too fast	X			
Check unstable water level	Unstable levels can be a sign of contaminates in feedwater, overloading of boiler, equipment malfunction	X			
Check burner	Check for proper control and cleanliness	X			
Check motor condition temperatures	Check for proper function	X			
Check air temperatures in boiler room	Temperatures should not exceed or drop below design limits	X			
Boiler blowdown	Verify the bottom, surface and water column blow downs are occurring and are effective	X			
Boiler logs	Keep daily logs on: • Type and amount of fuel used • Flue gas temperature • Makeup water volume • Steam pressure, temperature, and amount generated Look for variations as a method of fault detection	X			
Check oil filter assemblies	Check and clean/replace oil filters and strainers	X			
Inspect oil heaters	Check to ensure that oil is at proper temperature prior to burning	X			
Check boiler water treatment	Confirm water treatment system is functioning properly	X			
Check flue gas temperatures and composition	Measure flue gas composition and temperatures at selected firing positions - recommended O2% and CO2% Fuel / O2 % / CO2% Natural gas / 1.5 / 10 No. 2 fuel oil / 2.0 / 11.5 No. 6 fuel oil / 2.5 / 12.5 Note: percentages may vary due to fuel composition variations		X		

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Check all relief valves	Check for leaks		X		
Check water level control	Stop feedwater pump and allow control to stop fuel flow to burner. Do not allow water level to drop below recommended level.		X		
Check pilot and burner assemblies	Clean pilot and burner following manufacturer's guidelines. Examine for mineral or corrosion buildup.		X		
Check boiler operating characteristics	Stop fuel flow and observe flame failure. Start boiler and observe characteristics of flame.		X		
Inspect system for water/ steam leaks and leakage opportunities	Look for: leaks, defective valves and traps, corroded piping, condition of insulation		X		
Inspect all linkages on combustion air dampers and fuel valves	Check for proper setting and tightness		X		
Inspect boiler for air leaks	Check damper seals		X		
Check blowdown and water treatment procedures	Determine if blowdown is adequate to prevent solids buildup			X	
Flue gases	Measure and compare last month's readings flue gas composition over entire firing range			X	
Combustion air supply	Check combustion air inlet to boiler room and boiler to make sure openings are adequate and clean			X	
Check fuel system	Check pressure gauge, pumps, filters and transfer lines. Clean filters as required.			X	
Check belts and packing glands	Check belts for proper tension. Check packing glands for compression leakage.			X	
Check for air leaks	Check for air leaks around access openings and flame scanner assembly.			X	
Check all blower belts	Check for tightness and minimum slippage.			X	
Check all gaskets	Check gaskets for tight sealing, replace if do not provide tight seal			X	
Inspect boiler insulation	Inspect all boiler insulation and casings for hot spots			X	
Steam control valves	Calibrate steam control valves as specified by manufacturer			X	
Pressure reducing/regulating valves	Check for proper operation			X	

Boilers Checklist (contd)

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Perform water quality test	Check water quality for proper chemical balance			X	
Clean waterside surfaces	Follow manufacturer's recommendation on cleaning and preparing waterside surfaces				X
Clean fireside	Follow manufacturer's recommendation on cleaning and preparing fireside surfaces				X
Inspect and repair refractories on fireside	Use recommended material and procedures				X
Relief valve	Remove and recondition or replace				X
Feedwater system	Clean and recondition feedwater pumps. Clean condensate receivers and deaeration system				X
Fuel system	Clean and recondition system pumps, filters, pilot, oil preheaters, oil storage tanks, etc.				X
Electrical systems	Clean all electrical terminals. Check electronic controls and replace any defective parts.				X
Hydraulic and pneumatic valves	Check operation and repair as necessary				X
Flue gases	Make adjustments to give optimal flue gas composition. Record composition, firing position, and temperature.				X
Eddy current test	As required, conduct eddy current test to assess tube wall thickness				X

9.4.8 Chillers Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Semi-Annually	Annually
Chiller use/sequencing	Turn off/sequence unnecessary chillers	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Check setpoints	Check all setpoints for proper setting and function	X			
Evaporator and condenser coil fouling	Assess evaporator and condenser coil fouling as required		X		
Compressor motor temperature	Check temperature per manufacturer's specifications		X		
Perform water quality test	Check water quality for proper chemical balance		X		
Leak testing	Conduct leak testing on all compressor fittings, oil pump joints and fittings, and relief valves		X		
Check all insulation	Check insulation for condition and appropriateness		X		
Control operation	Verify proper control function including: • Hot gas bypass • Liquid injection		X		
Check vane control settings	Check settings per manufacturer's specification			X	
Verify motor load limit control	Check settings per manufacturer's specification			X	
Verify load balance operation	Check settings per manufacturer's specification			X	
Check chilled water reset settings and function	Check settings per manufacturer's specification			X	
Check chiller lockout setpoint	Check settings per manufacturer's specification				X
Clean condenser tubes	Clean tubes at least annually as part of shutdown procedure				X

Building Controls Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Semi-Annually	Annually
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Verify control schedules	Verify in control software that schedules are accurate for season, occupancy, etc.	X			
Verify setpoints	Verify in control software that setpoints are accurate for season, occupancy, etc.	X			
Time clocks	Reset after every power outage	X			
Check all gauges	Check all gauges to make sure readings are as expected		X		
Control tubing (pneumatic system)	Check all control tubing for leaks		X		
Check outside air volumes	Calculated the amount of outside air introduced and compare to requirements		X		
Check setpoints	Check setpoints and review rational for setting		X		
Check schedules	Check schedules and review rational for setting		X		
Check deadbands	Assure that all deadbands are accurate and the only simultaneous heating and cooling is by design		X		
Check sensors	Conduct thorough check of all sensors - temperature, pressure, humidity, flow, etc. - for expected values			X	
Time clocks	Check for accuracy and clean			X	
Calibrate sensors	Calibrate all sensors: temperature, pressure, humidity, flow, etc.				X

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

BUILDING COMMISSIONG INFORMATON

BUILDING COMMISSIONING GENERAL INFORMATION

Commissioning is common in all types of building systems, including heating, ventilating, and air-conditioning (HVAC), lighting, electric, and safety controls such as fire protection and security.

Commissioning is available in many forms, the first of which is new construction commissioning. This type aims to construct a facility that obtains the performance and operation requirements of its occupants and owner, and begins during the pre-design portion of the project. If it is comprehensive commissioning, the process starts with the criteria for the facility's functionality, and constantly verifies this in all parts of the facility's creation, including design, construction, and building operation. Construction phase commissioning occurs when the Owner does not include commissioning requirements in the original design, and begins when construction is already underway.

The second form is existing building commissioning, which is identified by two types. Retro-commissioning involves buildings that have never before been commissioned, and involves documenting methods to improve the building's systems and reach the original design intentions. It is an involved process starting with obtaining utility bills, talking to the building's occupants, performing diagnostic tests on the building, and preparing the information for the owner. The second type is re-commissioning, which is different from retro-commissioning in that the building's systems have previously had commissioning performed at some point, whether in the design or construction phases. However, it is similar to retro-commissioning because it arises from system performance problems or inadequacies.

A more specific form of HVAC systems commissioning for existing building is Continuous Commissioning® (CC®). Unlike the other forms, Continuous Commissioning ensures the optimization of HVAC systems for the building's existing conditions. It also works to improve the building air quality, increase comfort levels, and resolve any operating problems. When implemented, Continuous Commissioning can decrease energy usage by 20% on average[1]. It is a joint effort between the commissioning engineers and the facility staff, and is an ongoing process that continues to both commission the building as well as train the facility staff.

All of these forms of commissioning can be used to meet several of the requirements under the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system. The LEED rating system considers building commissioning to be an essential step towards sustainability. This is evident by the fact that many of the LEED rating systems (LEED-EB, LEED-NC, etc) require building commissioning as a pre-requisite.

The scope of commissioning can involve a wide range of building systems, selectable by the building owner. Mechanical systems including HVAC systems, plumbing, piping, boilers, heaters, and valves can be commissioned. Electrical systems such as lighting, transformers, and lighting control is often included, as well as other systems like fire safety, security, and standby power systems.

[1] *Continuous Commissioning Guidebook for Federal Energy Managers* (Energy Systems Laboratory at Texas A&M University)

The costs of commissioning for the owner vary from each form, as well as from building to building. The cost per square foot (SF) of the facility to be commissioned may vary from $.40/SF to $2.00/SF. However, there are general estimates in place. The following lists the percentages of the commissioning costs for each system.

- 2% to 3% of mechanical cost for Mechanical Systems (HVAC and controls)[2]
- 1% to 2% of electrical cost for Electrical Systems[3]
- 0.5% to 1.5% of construction cost for HVAC, controls, and light electrical

There are many benefits to commissioning for the designer, the building's owner, and its occupants.

- HVAC systems simultaneously operate adequately, resulting in less expense during construction and after occupancy. Satisfied occupants also lead to increased productivity.
- Commissioning reviews decrease errors in the design phase, which ultimately reduces callbacks for the engineer.
- More efficient scheduling and design coordination reduce construction errors for the contractor, and thus reduces cost and keeps the project on schedule.
- Documentation helps prevent assumptions made during design, which reduces unnecessary expenditures.

Selecting a commissioning service provider is a vital step in the process. First, the provider should be a certified commissioning professional by an industry accepted certification body (see sample certification bodies below). Next, the owner makes a formal request of the provider's qualifications in commissioning. An independent, third party commissioning provider is mostly recommended because they can objectively perform the work using practical experience. Other requirements for the provider include documentation, communication, and organization skills. This ensures the commissioning process is performed effectively. In addition, the earlier the commissioning authority can be implemented into the facility's construction or design, the more effective the process will be.

[2] Wilkison, R. (2000) Establishing Commissioning Fees, ASHRAE Journal 42 (4): 41-47
[3] PECI, 2000. The National Conference of Building Commissioning Proceedings, Portland Energy Conservation Inc. OR.

Sample list of Building Commissioning Certifications and Organizations:

AABC Commissioning Group (ACG) - "Certified Commissioning Authority (CxA)"
www.commissioning.org

Building Commissioning Association (BCA) - "Certified Cx Professional (CxP)"
www.bcxa.org

Association of Energy Engineers (AEE) - "Certified Building Cx Professional"
www.aeecenter.org

National Environmental Balancing Bureau (NEBB) - "Systems Cx Administrator"
www.nebb.org

Testing Adjusting and Balancing Bureau - "Certified Commissioning Contractor"
www.tabbcertified.org

For more information on building commissioning, you may contact any of the above. Below is contact info for two of organizations listed above:

Building
Commissioning
Association
1400 SW 5th Ave, Suite
700
Portland, OR 97201
Phone: (877) 666-2292
Fax: (503) 227-8954
info@bcxa.org

AABC Commissioning
Group
1518 K Street KW
Washing, DC 20005
Phone: (202) 737-7775
Fax: (202) 638-4833
info@commissioning.org

For more information on Continuous Commissioning, you may contact:

Energy Systems Laboratory
Texas A&M University
3581 TAMU
214 Wisenbaker Engineering Research Center
Bizzel Street
College Station, Texas 77943
Phone: (979) 845-9213
Fax: (979) 862-8687

Additional Reference:

"Building Commissioning - A Golden Opportunity for Reducing Energy Costs and Greenhouse-Gas Emissions" by Even Mills, Ph.D., Lawrence Berkeley National Laboratory, July 21, 2009, http://cx.lbl.gov/2009-assessment.html

APPENDIX G

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) 463-1080

APPENDIX H

ENERGYSTAR PORFOLIO MANAGER AND TRAINING

ENERGY STAR PORTFOLIO MANAGER TRAINING ATTENDEES

#	NAME	SIGNATURE	ORGANIZATION
1	TODD HEMINGSON	Todd Hagg	CAPITAL METRO
2	DONNY AHLHORN	Donny Ahlhorn	✓
3	JENN GOUECH	Jenn	CAPITAL METRO
4	Bryan Simler	Bryan Simler	TEESI
5			
6			
7			
8			
9			
10			

David Rocha

Subject: FW: Austin Texas - Capital Metro

-----Original Message-----
From: Totten, Melissa [mailto:Melissa_Totten@sra.com]
Sent: Friday, October 15, 2010 10:11 AM
To: drocha@teesi.com
Cc: Hon Chau; Bryan Simler; Saleem Khan,PE
Subject: RE: Austin Texas - Capital Metro

David,

Thank you for contacting us. I checked into your question and unfortunately, PM does not currently have a space type model for Maintenance/Service facilities in the system, so it is not eligible for a rating at this time.

If a facility is comprised entirely of non-eligible space types, it should be entered into Portfolio Manager as an "Other" space type. For a list of "Other" space type sub-categories, please visit https://www.energystar.gov/istar/pmpam/help/Eligibility_Rulesets__Other.htm.

It seems that your facility would be classified as "Service (Vehicle Repair/Service, Postal Service)." Please note, if your entire facility is listed as any of the "Other" space types, it is not eligible to receive a national energy performance rating, however, we encourage you to enter your space and utility data in order to track your weather normalized source energy use over time. In other words, you can still track energy use, establish reductions goals, and track progress, even if your facility is ineligible at the time for an energy performance rating. Also, you can compare to a National Average energy intensity for other similar building types by creating a view and selecting the National Average columns to display. Instructions on how to create a view can be found at: https://www.energystar.gov/istar/pmpam/help/Create_a_View.htm.

EPA is continually working to expand the available space types. As new space types become available, you will be able to reclassify your spaces accordingly if they have previously been entered as "Other". I will gladly forward your suggestion to EPA for Maintenance/Service facilities as an eligible space type.

Please let me know if this does not answer your question.

Thanks,
Melissa

Melissa Totten
Sentech, now a part of SRA International, Inc.
Working in support of the ENERGY STAR Program
7475 Wisconsin Ave
Suite 900
Bethesda, MD 20814

Melissa_Totten@sra.com

-----Original Message-----
From: David Rocha [mailto:drocha@teesi.com]
Sent: Wednesday, October 13, 2010 12:37 PM
To: Totten, Melissa
Cc: 'Hon Chau'; 'Bryan Simler'; 'Saleem Khan,PE'
Subject: Austin Texas - Capital Metro

Hi Melissa,

The City of Austin has established a resolution to have all commercial facilities be rated using EnergySTAR.

We are helping Capital Metro here in Austin rate their facilities. You can compare it to your Montgomery County Transit.

They have Admin Office Buildings, but the majority of their facilities are Maintainance and Service Warehouse Factilities. So the energy consumptions is high due to all type of mechanical equipment (i.e. Car Wash, Exhaust Fans, Compressor, Paint Boots, Etc).

My question is what would be the best (if any) EnergySTAR Portfolio Manager facility type to use to assess performance.

Regards,

David Rocha, CEM, LEED-AP
Texas Energy Engineering Services, Inc.
1301 Capital of TX Highway, Suite B325
Austin, TX 78746
o: 512-328-2533 ext. 202
f: 512-328-2544
c: 512-983-0881
drocha@teesi.com

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Annex building

Building ID: 2493884
For 12-month Period Ending: July 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: October 29, 2010

Facility
Annex building
624 pleasant valley road
Austin, TX 78702

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 2005
Gross Floor Area (ft²): 25,000

Energy Performance Rating[2] (1-100) 50

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	1,538,130
Natural Gas (kBtu)[4]	101,746
Total Energy (kBtu)	1,639,876

Energy Intensity[5]	
Site (kBtu/ft²/yr)	66
Source (kBtu/ft²/yr)	210

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	277

Electric Distribution Utility
Austin Energy

National Average Comparison	
National Average Site EUI	66
National Average Source EUI	211
% Difference from National Average Source EUI	-1%
Building Type	Office

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Certifying Professional
N/A

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, Licensed Professional facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Annex building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	624 pleasant valley road, Austin, TX 78702	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Annex (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	25,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	65 Hours (Default)	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	58 (Default)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 5.3 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	55 (Default)	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

ENERGY STAR® Data Checklist
for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Austin Energy

Fuel Type: Electricity		
Meter: Electricity meter (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
07/01/2010	07/31/2010	44,600.00
06/01/2010	06/30/2010	44,200.00
05/01/2010	05/31/2010	32,800.00
04/01/2010	04/30/2010	29,600.00
03/01/2010	03/31/2010	37,000.00
02/01/2010	02/28/2010	31,200.00
01/01/2010	01/31/2010	41,000.00
12/01/2009	12/31/2009	32,200.00
11/01/2009	11/30/2009	30,200.00
10/01/2009	10/31/2009	37,600.00
09/01/2009	09/30/2009	44,600.00
08/01/2009	08/31/2009	45,800.00
Electricity meter Consumption (kWh (thousand Watt-hours))		**450,800.00**
Electricity meter Consumption (kBtu (thousand Btu))		**1,538,129.60**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,538,129.60**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Gas meter (kcf (thousand cubic feet)) **Space(s):** Annex		
Start Date	**End Date**	**Energy Use (kcf (thousand cubic feet))**
07/01/2010	07/31/2010	10.00
06/01/2010	06/30/2010	7.00
05/01/2010	05/31/2010	6.00
04/01/2010	04/30/2010	8.00
03/01/2010	03/31/2010	9.00
02/01/2010	02/28/2010	9.00
01/01/2010	01/31/2010	9.00
12/01/2009	12/31/2009	14.00
11/01/2009	11/30/2009	6.00
10/01/2009	10/31/2009	8.00

09/01/2009	09/30/2009	8.00
08/01/2009	08/31/2009	7.00
Gas meter Consumption (kcf (thousand cubic feet))		**101.00**
Gas meter Consumption (kBtu (thousand Btu))		**103,929.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**103,929.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Annex building
624 pleasant valley road
Austin, TX 78702

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Annex building	
Gross Floor Area Excluding Parking: (ft^2)	25,000
Year Built	2005
For 12-month Evaluation Period Ending Date:	July 31, 2010

Facility Space Use Summary

Annex	
Space Type	Office
Gross Floor Area(ft^2)	25,000
Weekly operating hours[d]	65
Workers on Main Shift[d]	58
Number of PCs[d]	55
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 07/31/2010)	**Baseline** (Ending Date 07/31/2010)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	50	50	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	66	66	49	N/A	66
Source (kBtu/ft²)	210	210	156	N/A	211
Energy Cost					
$/year	$ 41,314.00	$ 41,314.00	$ 30,733.59	N/A	$ 41,553.32
$/ft²/year	$ 1.65	$ 1.65	$ 1.23	N/A	$ 1.66
Greenhouse Gas Emissions					
$MtCO_2e$/year	277	277	206	N/A	279
$kgCO_2e/ft^2$/year	11	11	8	N/A	11

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Admin HQ

Building ID: 2493947
For 12-month Period Ending: July 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: November 01, 2010

Facility
Admin HQ
2810 East 5th street
austin, TX 78702

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1985
Gross Floor Area (ft²): 59,830

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	7,768,073
Natural Gas (kBtu)[4]	9,939
Total Energy (kBtu)	7,778,012

Energy Intensity[5]	
Site (kBtu/ft²/yr)	130
Source (kBtu/ft²/yr)	434

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	1,373

Electric Distribution Utility
Austin Energy

National Average Comparison	
National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	138%
Building Type	Office

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Certifying Professional
N/A

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, Licensed Professional facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Admin HQ	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	2810 East 5th street, austin, TX 78702	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Administration building (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	43,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	65 Hours (Default)	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	99 (Default)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 5.3 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	95 (Default)	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Fuel & wash facilities (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑

Gross Floor Area	16,830 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	N/A(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist
for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Austin Energy

Fuel Type: Electricity		
Meter: Electricity meter (kWh (thousand Watt-hours)) **Space(s):** Administration building, Fuel & wash facilities **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
07/01/2010	07/31/2010	189,705.00
06/01/2010	06/30/2010	201,742.00
05/01/2010	05/31/2010	164,560.00
04/01/2010	04/30/2010	165,486.00
03/01/2010	03/31/2010	210,586.00
02/01/2010	02/28/2010	172,550.00
01/01/2010	01/31/2010	219,657.00
12/01/2009	12/31/2009	191,654.00
11/01/2009	11/30/2009	172,603.00
10/01/2009	10/31/2009	189,635.00
09/01/2009	09/30/2009	200,743.00
08/01/2009	08/31/2009	197,771.00
Electricity meter Consumption (kWh (thousand Watt-hours))		**2,276,692.00**
Electricity meter Consumption (kBtu (thousand Btu))		**7,768,073.10**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**7,768,073.10**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Gas meter (kBtu (thousand Btu)) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (kBtu (thousand Btu))**
07/01/2010	07/31/2010	90.00
06/01/2010	06/30/2010	174.00
05/01/2010	05/31/2010	183.00
04/01/2010	04/30/2010	326.00
03/01/2010	03/31/2010	344.00
02/01/2010	02/28/2010	662.00
01/01/2010	01/31/2010	1,925.00
12/01/2009	12/31/2009	1,617.00
11/01/2009	11/30/2009	2,224.00
10/01/2009	10/31/2009	1,395.00

09/01/2009	09/30/2009	769.00
08/01/2009	08/31/2009	230.00
Gas meter Consumption (kBtu (thousand Btu))		**9,939.00**
Gas meter Consumption (kBtu (thousand Btu))		**9,939.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**9,939.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Admin HQ
2810 East 5th street
austin, TX 78702

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Admin HQ	
Gross Floor Area Excluding Parking: (ft^2)	59,830
Year Built	1985
For 12-month Evaluation Period Ending Date:	July 31, 2010

Facility Space Use Summary

Administration building		Fuel & wash facilities	
Space Type	Office	Space Type	Other - Other
Gross Floor Area(ft^2)	43,000	Gross Floor Area(ft^2)	16,830
Weekly operating hours[d]	65	Number of PCs[o]	N/A
Workers on Main Shift[d]	99	Weekly operating hours[o]	N/A
Number of PCs[d]	95	Workers on Main Shift[o]	N/A
Percent Cooled	50% or more		
Percent Heated	50% or more		

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 07/31/2010)	**Baseline** (Ending Date 07/31/2010)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	130	130	51	N/A	77
Source (kBtu/ft^2)	434	434	169	N/A	182
Energy Cost					
$/year	$ 273,019.00	$ 273,019.00	$ 106,267.40	N/A	$ 161,711.25
$/$ft^2$/year	$ 4.56	$ 4.56	$ 1.77	N/A	$ 2.70
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,373	1,373	534	N/A	813
$kgCO_2e/ft^2$/year	23	23	9	N/A	14

More than 50% of your building is defined as Office. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Office. This building uses X% less energy per square foot than the CBECS national average for Office.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

APPENDIX I

REQUEST FOR ENERGY ASSISTANCE

SECO
State Energy Conservation Office

Local Governments and Municipalities

Preliminary Energy Assessment Service Agreement

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

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with Capital Metro, 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: Todd Hemingson
Date: 06.02.10
Name (Mr./Ms./Dr.) TODD HEMINGSON
Title: VP Strategic Planning & Development
Organization: CAPITAL METRO
Phone: 512.369.6036
Street Address: 2910 E. 5th ST. AUSTIN, TX 78702
Fax: 512.389.7529
Mailing Address: same as above
E-Mail: todd.hemingson@capmetro.org
County: Travis

Contact Information:

Name (Mr./Ms./Dr.): JENNIFER GOLECH
Title: Transportation Planner
Phone: 512.369.6586
Fax: 512.389.7529
E-Mail: jennifer.golech@capmetro.org
County: Travis

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.**