Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Fort Stockton ISD

101 W. Division,
Fort Stockton, Texas 79735

Prepared by:

Texas Energy Engineering Services, Inc.
1301 S. Capital of Texas Highway
Capital View Center – Suite B-325
Austin, Texas 78746
(512) 328-2533
TBPE# F-3502

November 2012

M. Saleem Khan, P.E.
Texas Registration #98125

SECO
State Energy Conservation Office

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Schools & Hospitals Energy Management Program
Fort Stockton ISD
101 W. Division
Fort Stockton, TX 79735
Contact Person: Ralph Traynham, Superintendent
Phone: 432-336-4000

1.0 EXECUTIVE SUMMARY

Fort Stockton Independent School District, now referred to as the District, requested that Texas Energy Engineering Services, Inc. (TEESI) perform a Preliminary Energy Assessment (PEA) of their facilities. This report documents that analysis.

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

The annual cost savings, implementation cost estimate and simple payback for all Utility Cost Reduction Measures (UCRM's) identified in this preliminary analysis are summarized below. Individual UCRM's are summarized in Section 9.0 of this report.

Implementation Cost Estimate (Est.):	$932,000
Annual Energy Saving (MMBTU/Yr):	2,661
Est. Annual Greenhouse Gas Emissions Reduction (Metric Ton CO_2e/Yr):	373
Est. Annual Cost Savings:	$100,000
Simple Payback (Yrs):	9.3

This report includes a summary of the facilities surveyed along with energy consumption and costs, opportunities for energy savings, and information regarding energy management and options for funding retrofit projects. A follow-up visit to the District will be scheduled to address any questions pertaining to this report, or any other aspect of this program.

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

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

TEESI / Saleem Khan
(512) 328-2533

2.0 FACILITY DESCRIPTIONS

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

Buildings:	Fort Stockton ISD Administration
Stories:	Single story
Area (estimated):	7,371 SF
Bldg. Components:	Brick building, built up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units, Packaged Units
Controls:	Standalone programmable thermostats from White-Rodgers

Buildings:	Fort Stockton High School
Stories:	Single story
Area (estimated):	206,739 SF
Bldg. Components:	Brick building, built up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in Panther Gym High Intensity Discharge (HID) fixtures in Event Center
HVAC:	Split-DX units, Packaged Units, Hot Water (HW) boiler for natatorium heating, HW boiler for swimming pool heating
Controls:	Energy Management System (EMS) - Schneider Electric I/NET, but being replaced with standalone programmable thermostats from White-Rodgers

Buildings:	Fort Stockton Middle School
Stories:	Single story
Area (estimated):	166,252 SF
Bldg. Components:	Brick building, built up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in gym
HVAC:	Split-DX units, Packaged Units
Controls:	Energy Management System (EMS) - Schneider Electric I/NET, but being replaced with standalone programmable thermostats from White-Rodgers

Buildings:	Fort Stockton Intermediate School
Stories:	Three story
Area (estimated):	187,232 SF
Bldg. Components:	Brick building, built up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in gym
HVAC:	Split-DX units, Packaged Units
Controls:	Energy Management System (EMS) - Schneider Electric I/NET, but being replaced with standalone programmable thermostats from White-Rodgers

Buildings:	Alamo Elementary
Stories:	Single story
Area (estimated):	66,734 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in gym
HVAC:	Split-DX units, Packaged Units
Controls:	Energy Management System (EMS) - Schneider Electric I/NET, but being replaced with standalone programmable thermostats from White-Rodgers

Buildings:	Apache Elementary
Stories:	Single story
Area (estimated):	105,000 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in gym
HVAC:	Packaged Units, Air-cooled Chiller Chilled Water (ChW) System, HW Boiler HW System
Controls:	Formerly Schneider Electric I/NET EMS, has since been converted to standalone programmable thermostat (White-Rodgers) control with chiller/boiler enabled based on time schedule and outside air temperature.

Buildings:	Butz Alternative School
Stories:	Single story
Area (estimated):	26,445 SF
Bldg. Components:	Brick building, built up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in gym
HVAC:	Packaged Units
Controls:	Standalone programmable thermostats from White-Rodgers

Buildings:	Fort Stockton Recreation
Stories:	Single story
Area (estimated):	47,911 SF
Bldg. Components:	Brick building, built up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts T5 fluorescent fixtures in gym
HVAC:	Split-DX units
Controls:	Standalone programmable thermostats from White-Rodgers

3.0 ENERGY CONSUMPTION AND PERFORMANCE

A site survey was conducted at several of the District's facilities. The facilities surveyed comprised a total gross area of approximately 854,656 square feet.

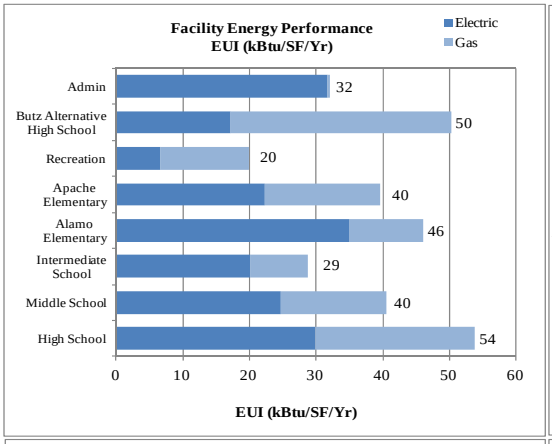
Annual electric and natural gas invoices for the buildings surveyed were $815,139 for the 12-month period ending January 2012. A summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

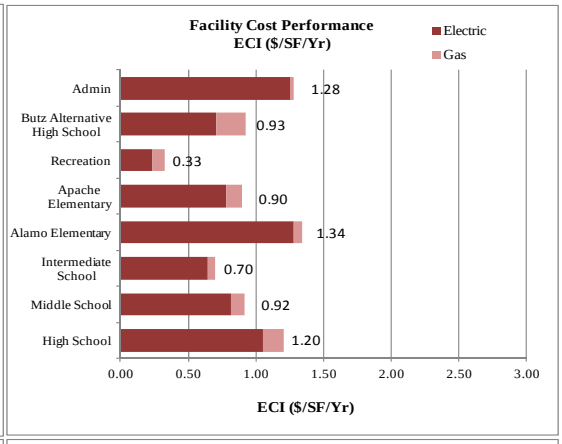
To help the District evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI represents a facility's annual energy usage per square foot; it is measured in thousands of BTUs per square foot per year (kBTU/SF/Year).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

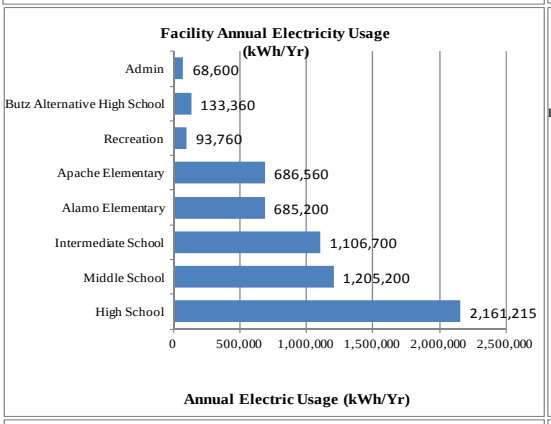
Energy Cost and Consumption Benchmarks														
		Electric				Natural Gas				Total	Total	EUI	ECI	
	Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	MCF/kSF	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	High School	2,161,215	7,376	8.72	260,315	5,756	5,929	23.24	37,727	298,042	13,305	54	1.20	247,711
2	Middle School	1,205,200	4,113	7.25	135,915	2,538	2,614	15.27	16,594	152,509	6,727	40	0.92	166,252
3	Intermediate School	1,106,700	3,777	5.91	120,778	1,567	1,614	8.37	10,534	131,312	5,391	29	0.70	187,232
4	Alamo Elementary	685,200	2,339	10.27	85,100	717	739	10.74	4,464	89,564	3,077	46	1.34	66,734
5	Apache Elementary	686,560	2,343	6.54	82,463	1,757	1,810	16.73	11,624	94,086	4,153	40	0.90	105,000
6	Recreation	93,760	320	1.96	11,476	614	632	12.82	4,223	15,699	952	20	0.33	47,911
7	Butz Alternative High School	133,360	455	5.04	18,775	847	872	32.03	5,690	24,464	1,328	50	0.93	26,445
8	Admin	68,600	234	9.31	9,201	2	2	0.27	263	9,463	236	32	1.28	7,371
		kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	MCF/kSF	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		6,140,595	20,958	7.18	724,021	13,798	14,212	16.14	91,118	815,139	35,170	41	0.95	854,656

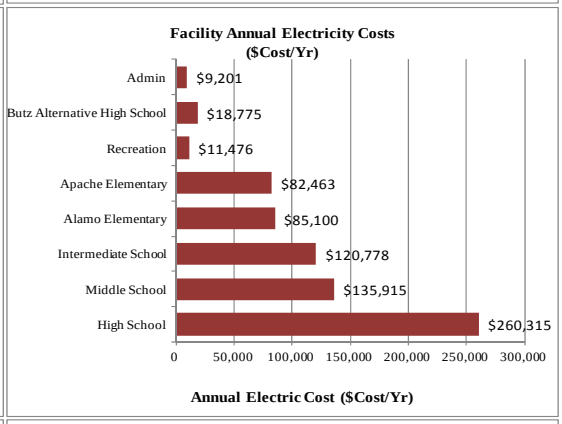
Knowing the EUI and ECI of each facility is useful to help determine the District's overall energy performance. In addition, the District's EUI was compared to TEESI's database of Texas schools. See **Appendix D** to determine how the EUIs of these facilities compared to those of other schools in Texas.

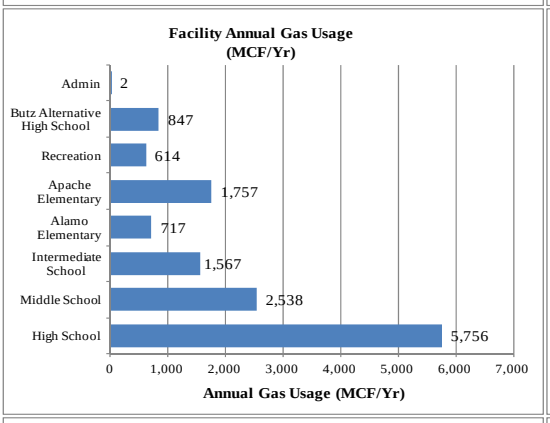
The following charts summarize the data presented in the previous table. See **Appendix C** for further detail.

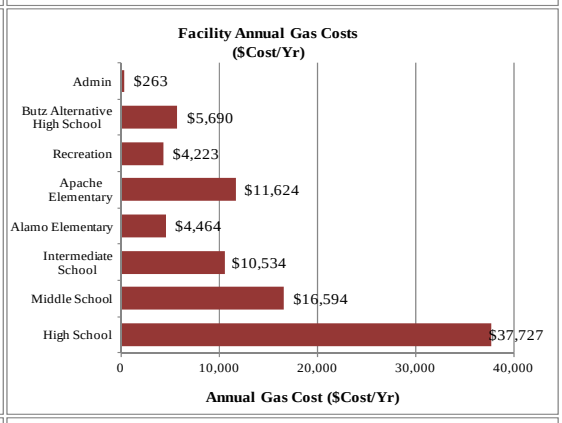


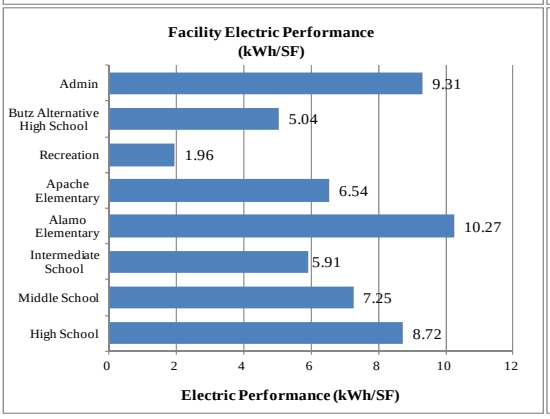


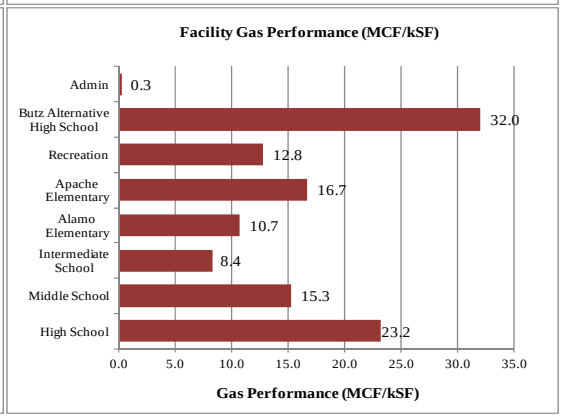




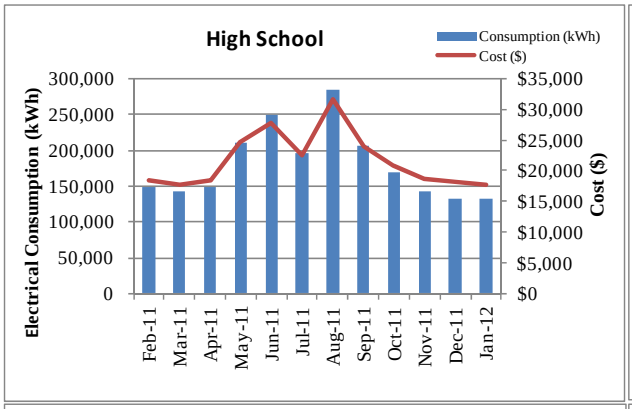


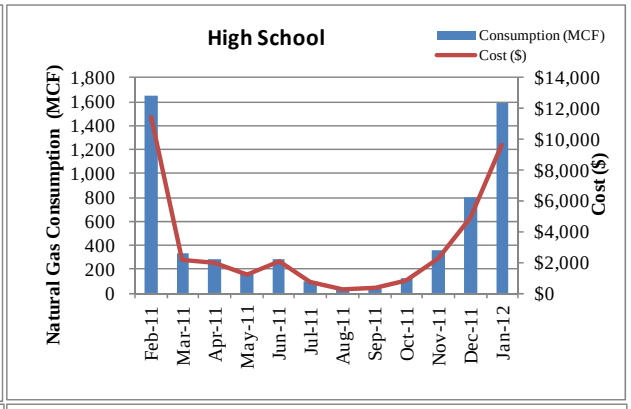


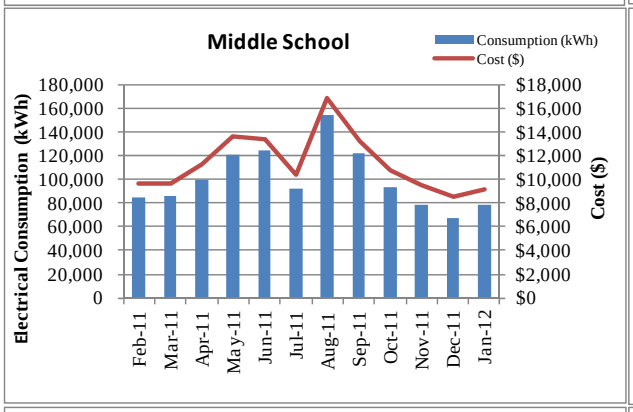


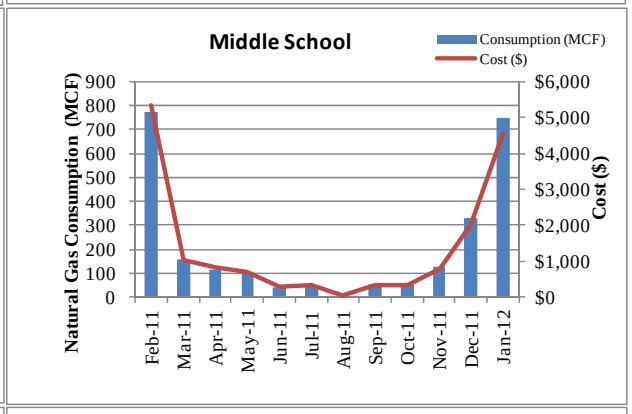


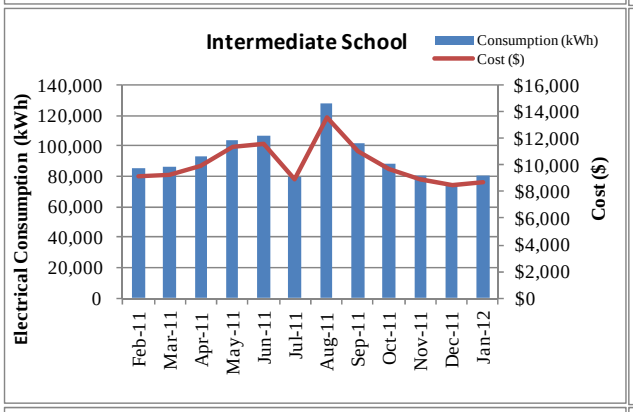
The following charts summarize the each campus monthly utility data. See **Appendix C** for further detail.

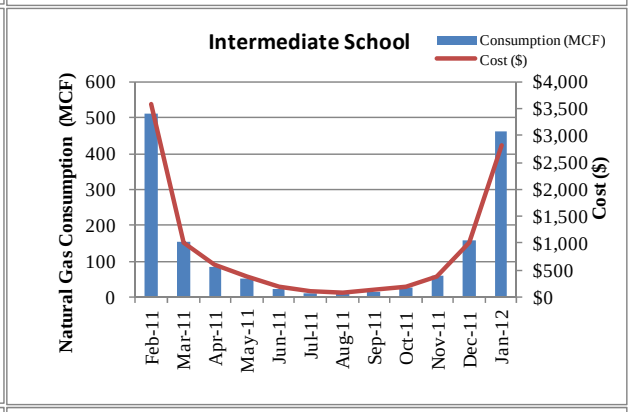


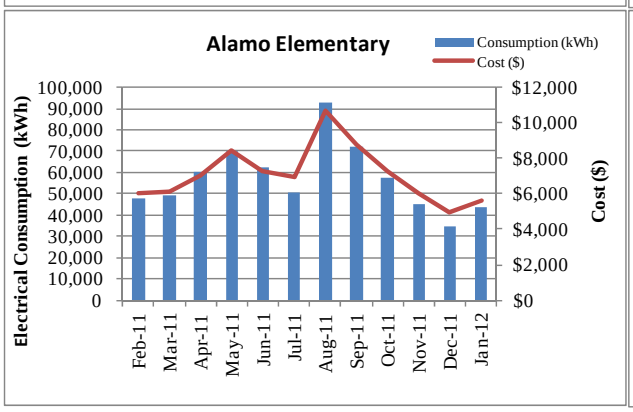


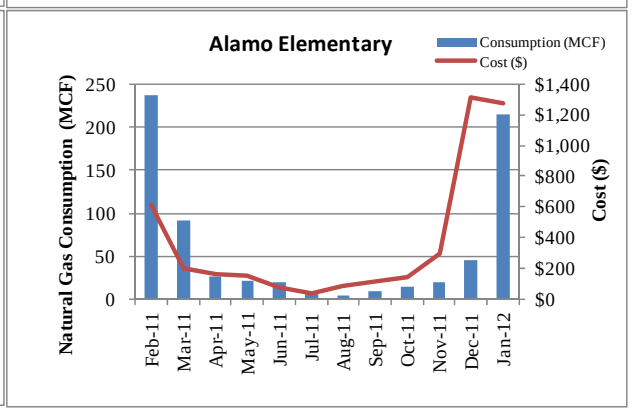


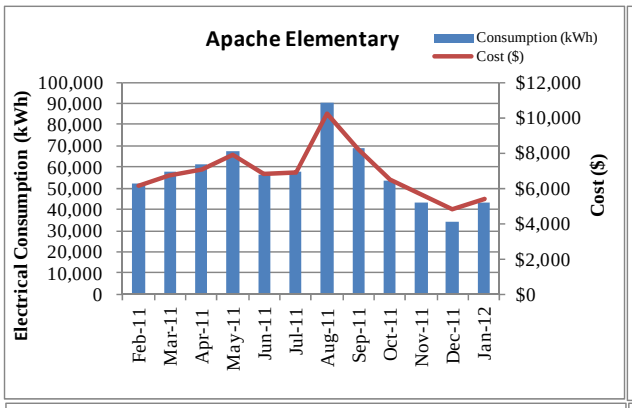


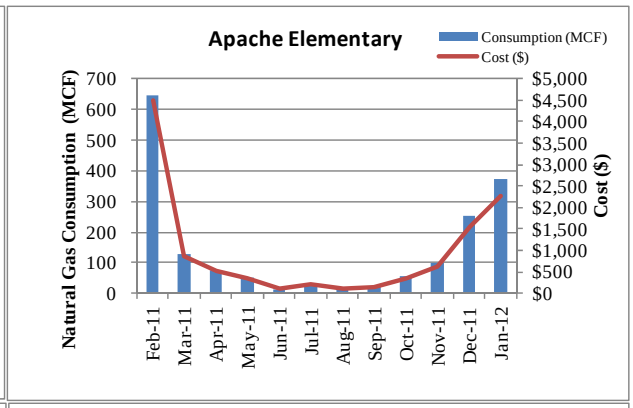


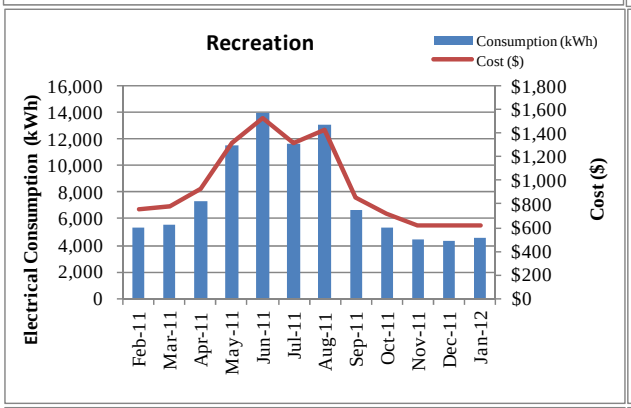


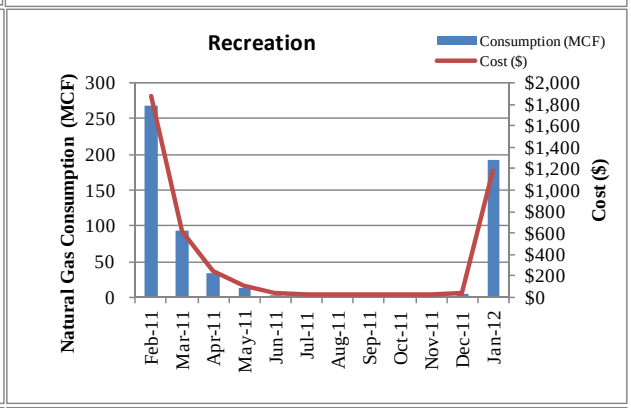


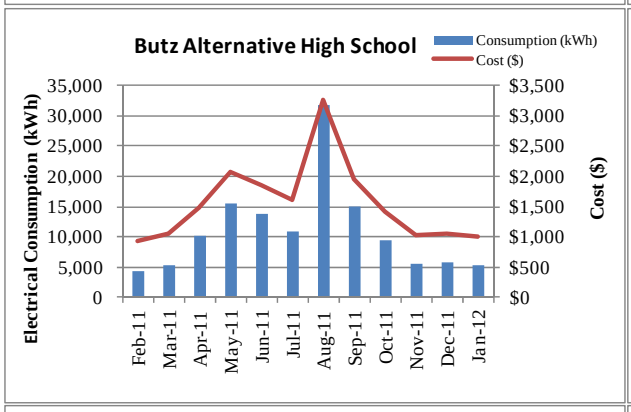


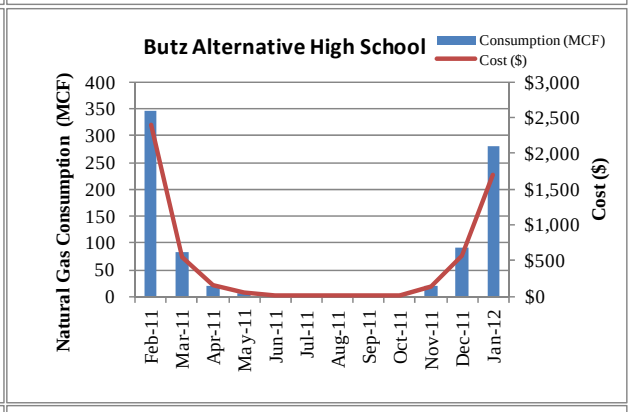

Apache Elementary
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12


Apache Elementary
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
700
600
500
400
300
200
100
0
$5,000
$4,500
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12


Recreation
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
$1,800
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12


Recreation
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
300
250
200
150
100
50
0
$2,000
$1,800
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12


Butz Alternative High School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12


Butz Alternative High School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
400
350
300
250
200
150
100
50
0
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
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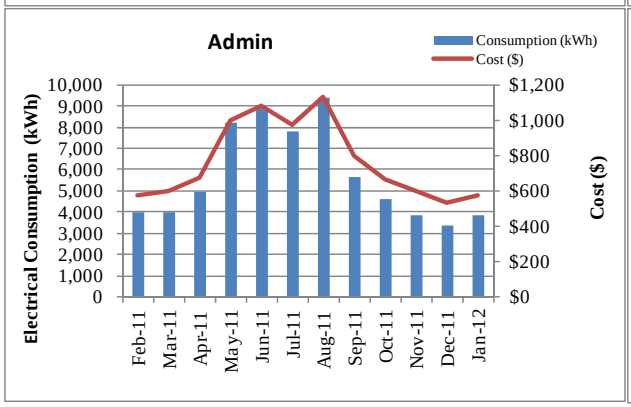
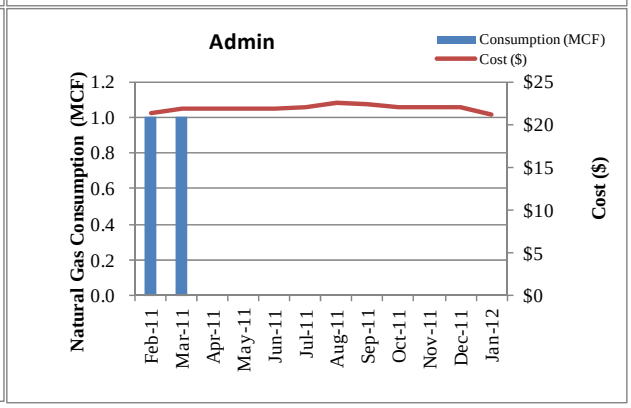
Oct-11
Nov-11
Dec-11
Jan-12


Admin
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
$1,200
$1,000
$800
$600
$400
$200
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12


Admin
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
$25
$20
$15
$10
$5
$0
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12

4.0 ENERGY STAR PORTFOLIO MANAGER

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

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

Portfolio Manger is an energy performance benchmarking tool. Portfolio Manager rates a building's energy performance on a scale of 1–100 relative to similar buildings nationwide. The rating system is based on a statistically representative model utilizing a national survey conducted by the Department of Energy's Energy Information Administration. This national survey, known as the Commercial Building Energy Consumption Survey (CBECS), is conducted every four years, and gathers data on building characteristics and energy use from thousands of buildings across the United States. A rating of 50 indicates that the building, from an energy consumption standpoint, performs better than 50% of all similar-use buildings nationwide, while a rating of 75 indicates that the building performs better than 75% of all similar-use buildings nationwide.

In addition, Portfolio Manager is used to generate a Statement of Energy Performance (SEP) for each building, summarizing key energy information such as site and source energy intensity, greenhouse gas emission, energy reduction targets and energy cost. The Statement of Energy Performance can help in applying for an ENERGY STAR Building label or satisfying LEED for Existing Buildings (LEED-EB) requirements. For example, one of the requirements to receive an ENERGY STAR Building Label is to achieve a minimum CBECS rating of **75**. A requirement to receive LEED-EB certification is an ENERGY STAR rating of **69**.

To develop the District's baseline, 12 months of utility consumption, cost data, and Building Space Use information will be required. The table on the following page is a sample of the Building Space Use data required by Portfolio Manager to generate the Energy Performance Rating. These inputs are critical and can significantly influence how Portfolio Manager computes the ENERGY STAR Rating. Many of these key inputs may vary over time and could influence the rating. If an ENERGY STAR Label is pursued, these key inputs will need to be verified and certified by a Professional Engineer. Verification of this information is required when submitting the Statement of Energy Performance for ENERGY STAR's review.

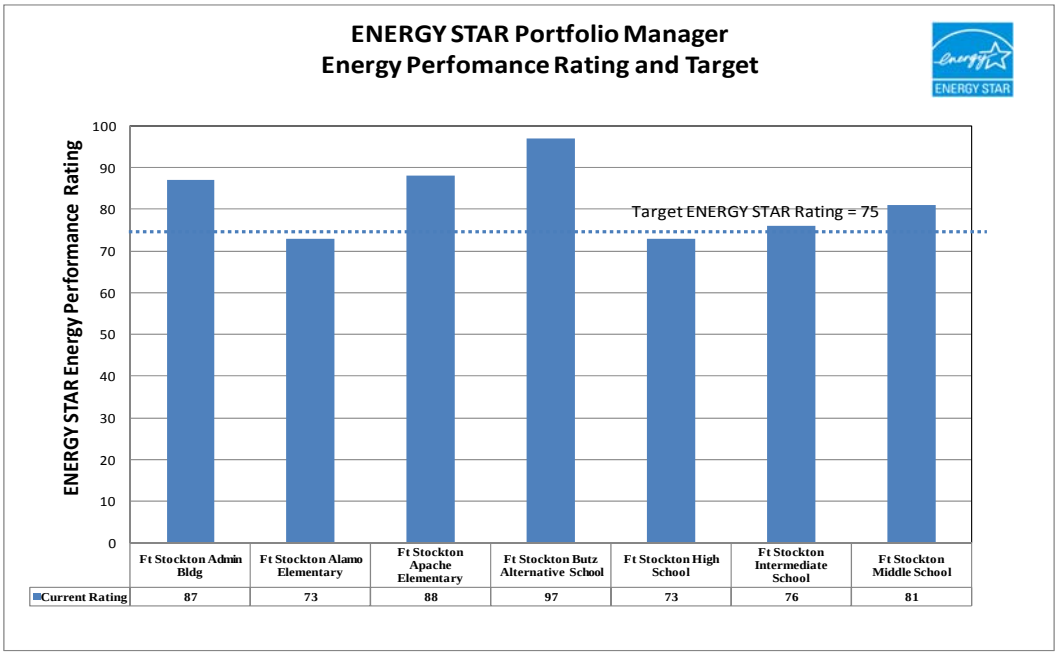
ENERGY STAR Portfolio Manager Example Space Use Data

Facility Type: K-12 School	
• 12 Months of Electric	• Presence of cooking facilities
• Gross Floor Area	• Percent Cooled
• Open Weekends (Y/N)	• Percent Heated
• # of PCs	• Months Open per Year
• # of Walk in refrigerators/freezers units	• High School (Y/N)

Each facility at the District was analyzed through the ENERGY STAR Portfolio Manager. Default values were used for the data in the table above except for utility bills and gross floor areas. It is recommended the District update these to correct values for each facility in order to achieve appropriate ENERGY STAR ratings. Note that some space types (such as the Recreation Center) are not eligible to receive a rating at this time. However, Portfolio Manager is still a useful tool for tracking the utility data for all facilities. **The table below summarizes the preliminary results of eligible facilities based on some default values.**

Facility Name	Current Rating (1-100)	Total Floor Space (Sq. Ft.)
Ft Stockton Admin Bldg	87	7,371
Ft Stockton Alamo Elementary	73	66,734
Ft Stockton Apache Elementary	88	105,000
Ft Stockton Butz Alternative School	97	26,445
Ft Stockton High School	73	206,739
Ft Stockton Intermediate School	76	131,130
Ft Stockton Middle School	81	166,252

The target for each of these schools is a rating of 75 to qualify for ENERGY STAR. The plot below shows the ratings of each eligible facility as compared to the ENERGY STAR standard of 75.



ENERGY STAR ratings for Fort Stockton ISD

A benefit of using ENERGY STAR's Portfolio Manager is its ability to set goals for energy performance. It allows an energy performance target to be set and calculates the estimated savings per year to reach the goal. With a performance target of 75 set, the estimated yearly savings for each of the schools is indicated below.

	ENERGY STAR Rating			ENERGY STAR Rating Target		
	EXISTING RATING			TARGET RATING = 75		
Facility	Current ENERGY STAR Rating	Current Utility Cost $/SF/yr	Greenhouse Gas Emissions ($MtCO_2e$/yr) / ($kgCO_2e/ft^2$/yr)	Target Utility Cost $/SF/yr	Potential Target Savings $/yr	Greenhouse Gas Emissions (MtCO2e/yr) / (kgCO2e/ft2/yr)
High School	**73**	**$1.20**	**2,221/9**	**$1.18**	**$5,961**	**2,187/9**
Middle School	81	$0.92	1,123/7	N/A	N/A	N/A
Intermediate School	76	$0.70	900/5	N/A	N/A	N/A
Alamo Elementary	**73**	**$1.34**	**494/7**	**$1.32**	**$1,791**	**484/7**
Apache Elementary	88	$0.90	693/7	N/A	N/A	N/A
Butz Alternative High School	97	$0.93	222/8	N/A	N/A	N/A
Admin	87	$1.28	39/5	N/A	N/A	N/A

TEESI will provide the District with a training session regarding operating and maintaining the District facilities in ENERGY STAR Portfolio Manager at time of delivery of this report. Please refer to **Appendix H** for reference materials of the basic operation of Portfolio Manager, including topics to be reviewed during the training session.

5.0 ENERGY ACCOUNTING

UTILITY PROVIDERS

Reliant Energy provides electric service to the District. City of Ft. Stockton Utilities provides natural gas service to the District.

MONITORING AND TRACKING

Currently, the District has a spreadsheet in place to track electricity, gas, and water monetary costs. The District should consider tracking consumption and demand, where applicable, of these utilities as well. 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.

An example tracking spreadsheet of all the District's utility accounts (i.e., Electricity, Natural Gas, Water, etc.) is shown on the following page. Along with total utility costs ($), utility consumption should be recorded as well (i.e., kWh, MCF, gallons, etc.). In the case of electric bills, it is recommended that the monthly metered demand (kW) also be recorded, as this is an important part of many utility providers' rate schedules. The District can use this data to track utility consumption patterns and budget utility expenses. **Preferably, the District should also consider an electronic database such as ENERGY STAR Portfolio Manager, which will provide a means of storing and tracking utility information. For more information on ENERGY STAR Portfolio Manager, please see Section 4.0.** Having this historical data improves the District'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.

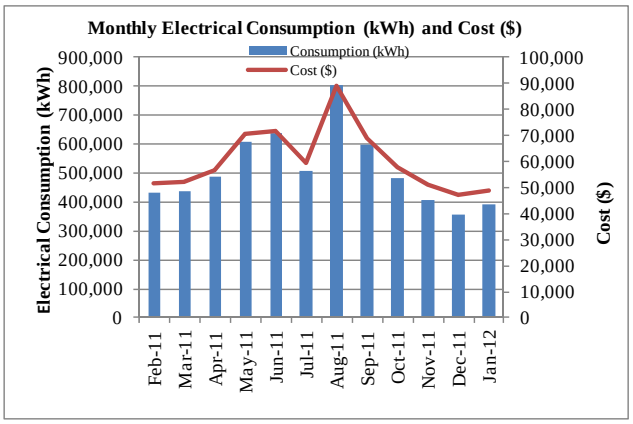
In addition, having this historical utility data would facilitate **House** and **Senate Bill(s)** reporting requirements. Please see Section 7.0 for additional information regarding these requirements.

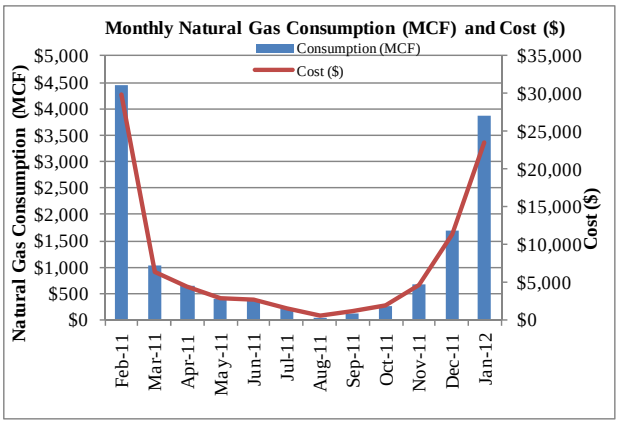
Furthermore, below is a sample format the District can customize to help summarize their overall utility usage and costs.

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

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Feb-11	433,365	51,549	$0.1190	$4,437	$29,825	$6.7
Mar-11	436,866	52,017	$0.1191	$1,041	$6,428	$6.2
Apr-11	485,114	56,788	$0.1171	$637	$4,501	$7.1
May-11	608,076	70,420	$0.1158	$410	$2,982	$7.3
Jun-11	636,293	71,526	$0.1124	$386	$2,770	$7.2
Jul-11	504,894	59,504	$0.1179	$196	$1,516	$7.7
Aug-11	804,161	88,843	$0.1105	$51	$570	$11.2
Sep-11	599,523	68,767	$0.1147	$137	$1,116	$8.1
Oct-11	480,714	57,768	$0.1202	$272	$1,952	$7.2
Nov-11	404,170	51,106	$0.1264	$681	$4,544	$6.7
Dec-11	356,263	47,057	$0.1321	$1,690	$11,428	$6.8
Jan-12	391,156	48,676	$0.1244	$3,860	$23,486	$6.1
Total	6,140,595	$724,021	$0.1179	13,798	$91,118	$6.6

Gross Building Area:	854,656	SF





6.0 ELECTRICAL DEMAND AND LOAD FACTOR ANALYSIS

The District paid approximately $244,894 in Transmission and Distribution Service Provider (TDSP) charges, which depend almost entirely on demand, for the facilities surveyed in this report over the twelve month period ending January 2012. This comprised nearly 35% of total electricity costs for these facilities during this time. Demand (kW) charges stem from a facility's peak power draw during a billing period, as opposed to consumption (kWh) charges, which total the energy usage over this period.

For all District locations except Fort Stockton High School, the primary components of each bill are calculated as follows.

- $0.075 per kWh consumed in the billing period.
- $2.42 per metered kW in the billing period.
- $6.35 per ratcheted kW* in the billing period.

**The ratcheted kW is computed from the larger of the metered kW in the billing period OR 80% of the highest metered kW in the previous 11 months.*

Fort Stockton High School is a larger account and falls under a different rate schedule. The major components of this rate are calculated as follows.

- $0.075 per kWh consumed in the billing period.
- $0.90 per metered kW in the billing period.
- $2.25 per "4CP" kW* from the previous calendar year.
- $5.35 per ratcheted kW** in the billing period.

**The "4CP" kW is computed from the average of the metered kW from June through September.*
*** The ratcheted kW is computed from the larger of the metered kW in the billing period OR 80% of the highest metered kW in the previous 11 months. Metered kW is adjusted for poor power factor (under 95%).*

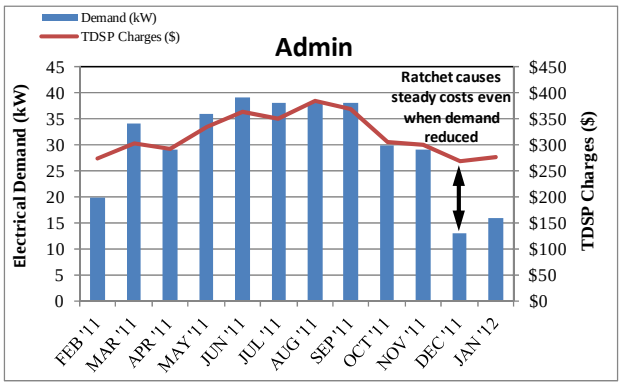
Note the power factor adjustment made to the metered kW for the High School. The power factor is equal to the ratio of the actual power being used by a facility to the apparent power that the utility provider must make available. When the apparent power (kVA) demand from the provider is significantly greater than what is actually necessary, the power factor is low and a penalty is incurred. In this case, the District is penalized when power factor for the month drops below 95%. Fort Stockton High School had an average power factor of 75% for the 12 months ending January 2012. The district could realize significant savings from improving this power factor, a potential cost reduction measure discussed further in Section 9.0.

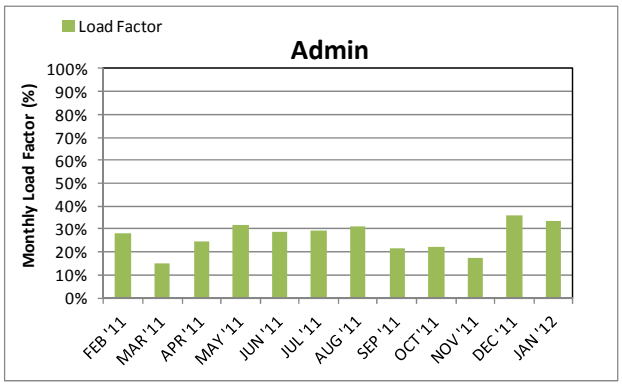
Note also that for both account types, a ratchet is in place that penalizes the district for the rest of the year when only one month experiences a "spike" in demand. It is therefore essential that the District try to manage demand peaks month to month to avoid penalties in the future.

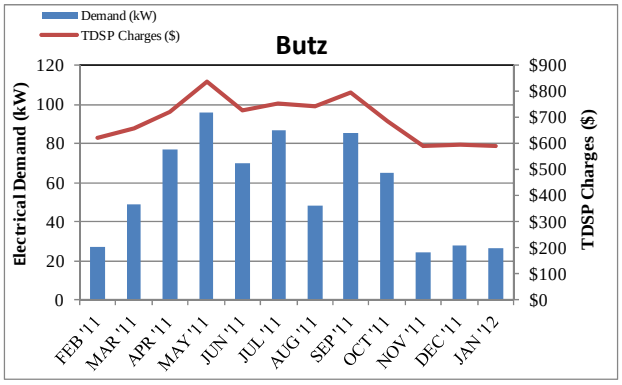
For analyzing, a facility's electrical demand from month to month, it is useful to calculate the load factor. The load factor is equal to the average demand divided by the peak demand for a given period, and represents the consistency of a facility's energy usage. Typical load factors vary depending on facility type and operating hours, as well as season and building efficiency. An average value for a single-shift building is around 30%. In general, an excessively low load

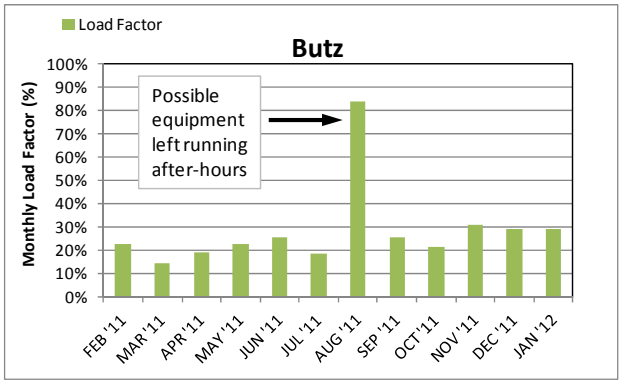
factor means higher demand peaks than total consumption would indicate, and thus higher than necessary demand charges. Excessively high load factors indicate more constant energy usage, suggesting equipment is not being shut down when it could be.

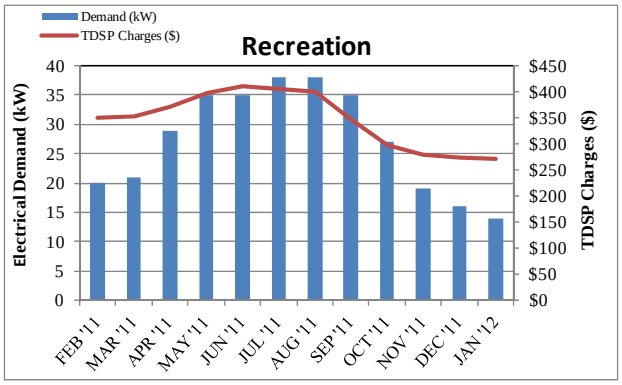
The figures on the left below and on the following page depict the metered demand at each District campus during each month, as well as the billed TDSP charges for each month. The figures on the right show the calculated monthly load factors for each facility. Notice that even when demand drops during winter months, TDSP charges stay relatively constant due to the demand ratchet.

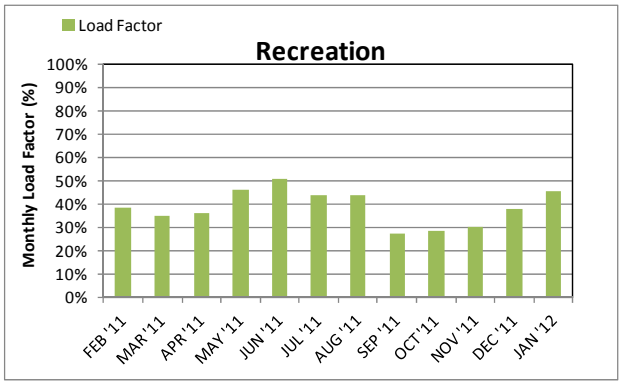

Demand (kW)
TDSP Charges ($)
Admin
Ratchet causes steady costs even when demand reduced
Electrical Demand (kW)
TDSP Charges ($)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

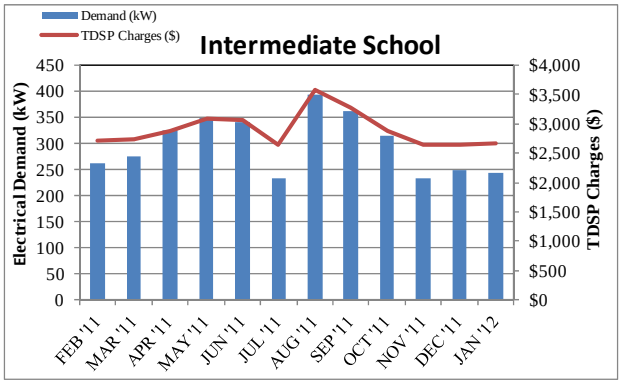

Load Factor
Admin
Monthly Load Factor (%)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

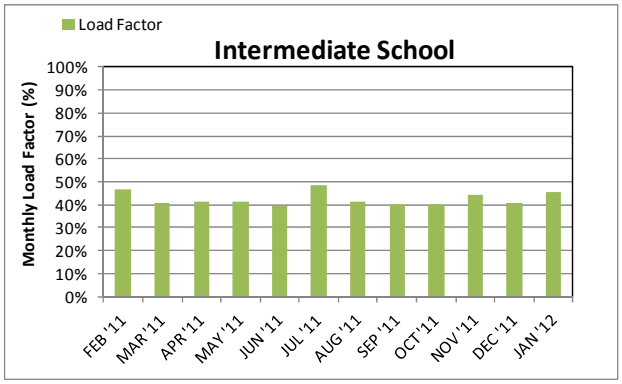

Demand (kW)
TDSP Charges ($)
Butz
Electrical Demand (kW)
TDSP Charges ($)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

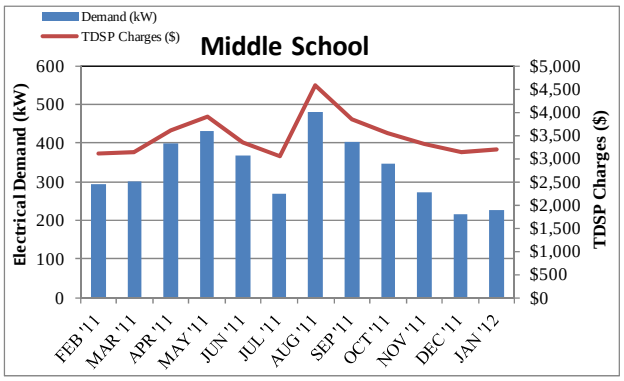

Load Factor
Butz
Possible equipment left running after-hours
Monthly Load Factor (%)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

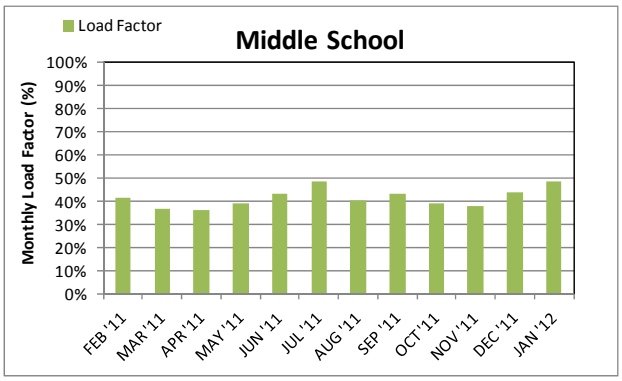

Demand (kW)
TDSP Charges ($)
Recreation
Electrical Demand (kW)
TDSP Charges ($)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

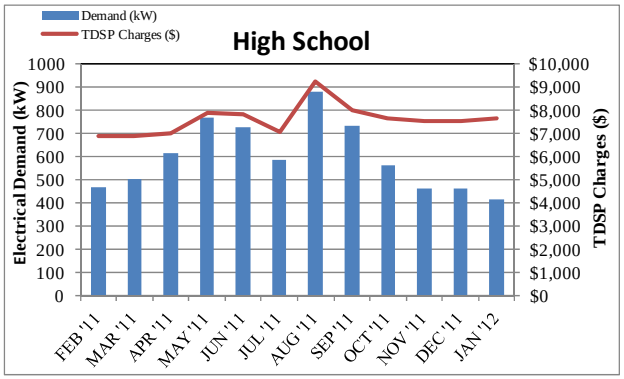

Load Factor
Recreation
Monthly Load Factor (%)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

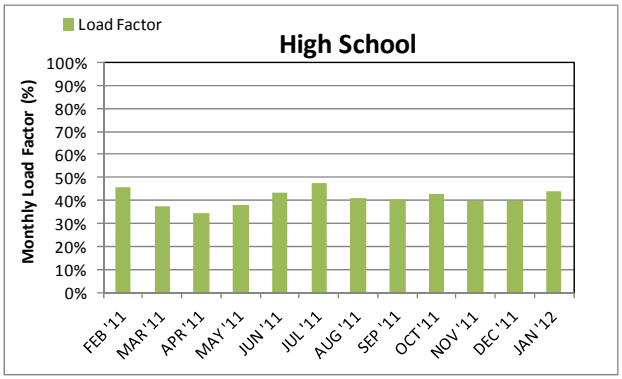

Demand (kW)
TDSP Charges ($)
Intermediate School
Electrical Demand (kW)
TDSP Charges ($)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

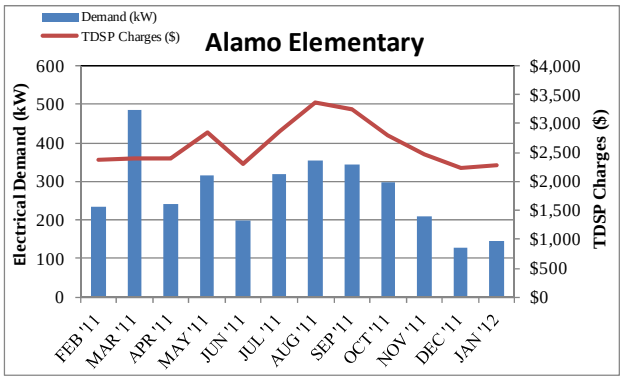

Load Factor
Intermediate School
Monthly Load Factor (%)
FEB '11 MAR '11 APR '11 MAY '11 JUN '11 JUL '11 AUG '11 SEP '11 OCT '11 NOV '11 DEC '11 JAN '12

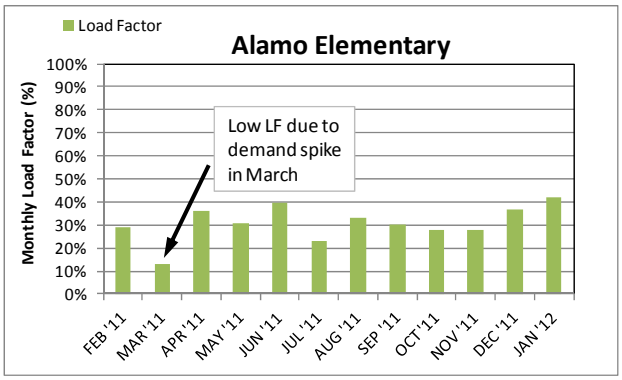


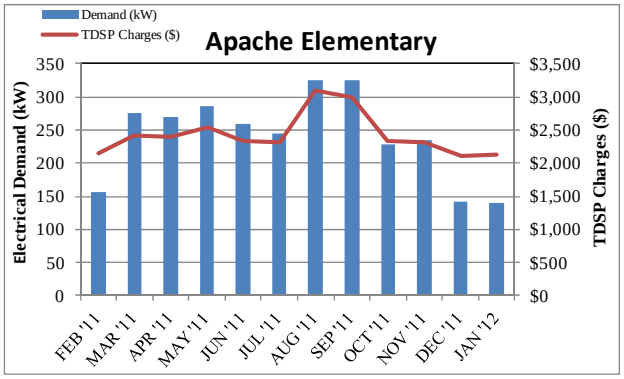


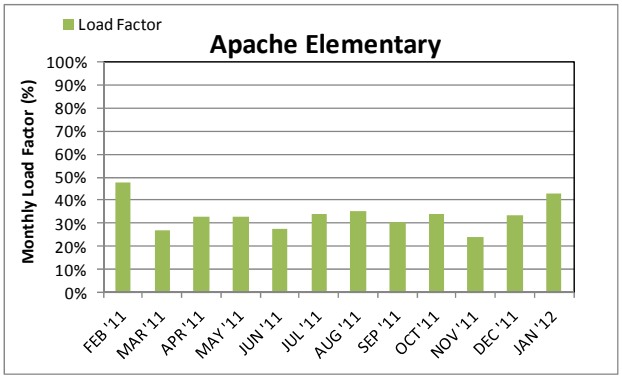












Load factors were generally within normal ranges for the months studied. Load factor tracking such as this can be helpful for alerting facilities maintenance to equipment running unnecessarily (August of 2011 at Butz Alternative School) or to equipment running simultaneously causing undue demand spikes (March 2011 at Alamo Elementary).

Following are some general recommendations for reducing demand costs.

- Follow up with the utility provider to gain a better understanding of the rate structures used and its impacts on operating costs.
- Stagger HVAC equipment startups utilizing controls where feasible.
- Install motion sensors for lighting control to prevent unnecessary simultaneous lighting consumption.
- Increase thermostat setpoints in the summer and decrease them in the winter to reduce unit cycle times.
- Use temperature setbacks and setups during unoccupied periods to avoid space temperature extremes and overworking of HVAC systems.
- During preventative maintenance startups and testing, be mindful of simultaneous equipment operation.

7.0 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.

In 2009, the 81st Texas Legislature passed Senate Bill 300 (**SB300**). This bill specifically addressed the requirement for Texas Schools. This bill repealed the requirement in HB3693 that school districts must establish a goal of reducing electric consumption by 5% each year for six years starting Fiscal Year (FY) 2007. SB300 instead requires that school districts establish a long-range energy plan to reduce the overall electricity use by 5% beginning FY 2008. Besides this change, other requirements set forth in SB12 and HB3693 applicable to schools still apply.

Following are key requirements established by the above energy legislation:

- Establish a Long-Range Energy Plan (SB300) to reduce the District's electric consumption by five percent (5%) beginning with the 2008 state fiscal year and to consume electricity in subsequent fiscal years in accordance with the plan. The Long-Range Energy Plan should include strategies in the plan for achieving energy efficiency that result in net savings or that can be achieved without financial cost to the district. The Plan should account for the initial, short-term capital costs and lifetime costs and savings that may occur from implementation of the strategy. Each strategy should be evaluated based on the total net costs and savings that may occur over a seven-year period following implementation of the strategy.

- 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. To help with the utility reporting process, a sample input form can be found in **Appendix B** of this report.

- Purchase commercially available light bulbs using the lowest wattages for the required illumination levels.

- Install energy saving devices in Vending Machines with non-perishable food products. **Not required of School Districts, but highly recommended.**

Summary descriptions of SB12, HB3693, and SB300 are available in **Appendix A.**

8.0 RECOMMENDED MAINTENANCE & OPERATION PROCEDURES

Good Maintenance and Operation procedures significantly improve operating economy, 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. The District may already be following some of the recommendations noted below. The following maintenance and operation procedures should be encouraged and continued 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. The District should establish a goal to reduce the number of small appliances and to limit their usage. For example, the use of small space heaters should be discouraged; hence, all space heating should be accomplished by the District'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.

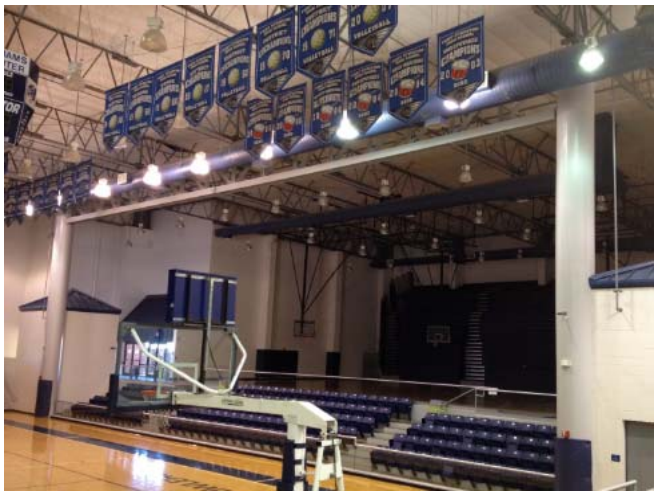
PRE-IDENTIFY PREMIUM EFFICIENCY MOTOR (PEM) REPLACEMENTS

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 and classes at lunchtime, maintenance shops, closets, exterior and parking lots during daylight hours, etc. Encouraging staff (i.e. teacher, custodial, maintenance, and students) to participate in the District's efforts to limit unnecessary lighting use would help improve this effort. The picture below provides an example of unnecessary lighting use.

Example 1 - Gym Lights - The picture below is of the High Intensity Discharge (HID) Lights in the gym at Fort Stockton High School. During the walkthrough, the lights were on during an unoccupied period. The District should establish a procedure to reduce the time gym lighting is left on during unused periods. At the time of the walkthrough, the District was considering removal of the row of lights above the bleachers as it was determined gym floor lighting levels were sufficient without them. If this is indeed the case, the project is recommended in order to conserve energy from the extra row of lights and avoid the cost of lamp replacement. The remaining fixtures should still be kept off when the space is unoccupied and natural lighting is adequate for anyone passing through. A good energy awareness campaign, a collective effort, and good communication will help ensure the success of this no/low cost energy saving strategy.



It is important to note that HID fixtures have long re-strike and warm-up times, so the lights should not be switched off for short times and should be switched on several minutes before the needed use. The District should consider replacing the HID fixtures with higher efficiency lighting types such as fluorescent, induction, or LED. These replacement types can be easily configured for multiple lighting levels, and are instant-on, allowing for a tighter lighting schedule. Lights can also be grouped for switching manually or automatically according to available daylight.

SEPARATELY SCHEDULE TEMPERATURE CONTROL AND VENTILATION

It is typically necessary to start equipment and establish temperature control an hour or more before occupancy. Fresh air intake, however, should not begin until the occupants are due to arrive. Otherwise, fresh air is heated or cooled needlessly. In hot, humid weather, the outside air also raises the indoor humidity at a time when the cooling load is too low to produce sufficient dehumidifying effect from the cooling system.

MAINTAIN ADEQUATE DEADBAND BETWEEN HEATING AND COOLING

The District currently maintains cooling and heating setpoints for all units at a constant 73°F and 71°F, respectively. The District should be commended for standardizing and enforcing these constant setpoints across the board in order to conserve cooling energy. However, it is recommended that the standard heating setpoint be further optimized to allow a sufficient deadband between unit heating and cooling modes. A 5°F deadband (heating setpoint of 68°F) is typically recommended by most energy codes.

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 boilers, chillers, etc. 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.

REPLACE INCANDESCENT LAMPS WITH COMPACT FLUORESCENTS

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

ENERGY STAR POWER MANAGEMENT

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

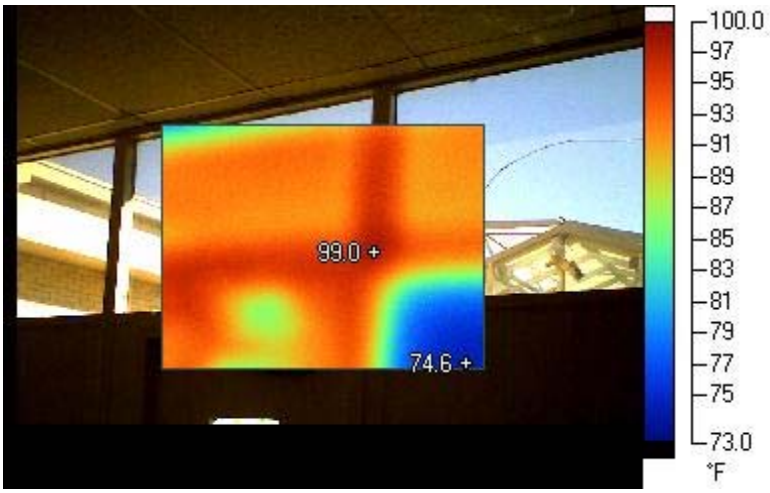
INSTALL ENERGY SAVING DEVICES ON VENDING MACHINES

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.

SHADE EAST/WEST FACING SINGLE PANE WINDOWS

The infrared image shown below was taken in the High School "V-Wing". The east-facing single pane windows above these doors transmit significant amounts of solar heat gain into the space compared to the solid door just below. This increases cooling loads and ultimately energy consumption. It is recommended to provide/install shading devices to these windows such as blinds or low-transmission window film to reduce the solar heat gain.

Ideally, it is recommended to eventually replace with double pane windows for additional conductive/radiative insulation. The existing single pane windows are energy inefficient and are susceptible to unnecessary air infiltration due to degradation of the weather seals. Replacing these windows with new energy efficient, double pane windows will help improve the building envelope's thermal performance, reduce sound transmission and enhance occupant comfort. The new energy efficient windows shall meet ENERGY STAR qualifications.



HAIL GUARDS ON CONDENSING AND PACKAGED ROOFTOP UNITS

When an HVAC unit is replaced the District 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. If any existing unit(s) have damaged condensing coil fins, the fins should be straightened using a fin comb.

9.0 UTILITY COST REDUCTION MEASURES

Utility Cost Reduction Measures (UCRMs) projects identified during the preliminary analysis are detailed below. Project cost estimates include complete design and construction management services.

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 the District replace existing 32-watt T8 fluorescent lamps with lower wattage lamps in most cases. However, lower wattage T8 lamps have reduced lighting levels, so it is important to ensure recommended lighting levels are maintained. Lighting levels should be verified prior to 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 approximately have a 12% lighting energy reduction with only a lighting level drop near 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. 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. The cost and savings calculations below are based on 48" F28T8, extended life linear fluorescent lamps. Lamp recycling is included in the cost estimates.

LOW WATTAGE T8 FLUORESCENT LIGHTING RETROFIT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
High School	$40,100	$6,700	190	6.0
Middle School	$26,900	$3,800	115	7.1
Intermediate School	$30,300	$4,300	134	7.0
Alamo Elementary	$12,000	$2,000	55	6.0
Apache Elementary	$17,000	$2,300	65	7.4
Recreation	$7,800	$900	25	8.7
Butz Alternative High School	$4,300	$600	15	7.2
Admin	$1,300	$200	5	6.5
TOTAL	**$139,700**	**$20,800**	**604**	**6.7**

GYMNASIUM HID FIXTURE LIGHTING RETROFIT

The Event Center at the High School utilizes High Intensity Discharge (HID) fixtures to light the Gym floors. It is recommended that the District replace the existing HID fixtures with high efficiency replacement fixtures suitable for gym applications. Possible replacement types include induction, compact fluorescent, and LED lighting, all of which are available in traditional high bay pendant fixture arrangements to maintain aesthetic qualities. See **Appendix G** for an example product cut sheet. These lamps offer improved control, reduced energy consumption and improved lamp life. 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, using costs for pendant fixtures**. As an option to consider, linear fluorescent light fixtures suited for high bay applications (recommended T8), would likely be lower cost and therefore faster payback than the estimate below.** A detailed analysis is necessary to identify post-retrofit lamp type and arrangement to maintain pre-existing lighting levels.

GYM HID LIGHTING RETROFIT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
High School	$113,200	$7,500	212	15.1
TOTAL	**$113,200**	**$7,500**	**212**	**15.1**

INSTALLATION OF OCCUPANCY SENSORS FOR INDOOR LIGHTING CONTROL

The District should 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 table below provides estimated costs and energy savings for the installation of these sensors based on a preliminary assessment. Exact sensor locations, technology (Infrared, Ultrasonic, and Dual Technology) and quantity can be determined during a detailed energy assessment or design phase. In general, enclosed areas with intermittent use are good candidates for occupancy sensors (e.g. classrooms, offices, break rooms and conference rooms). The costs below reflect ceiling mounted occupancy sensors.

MOTION SENSOR INSTALLATION				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
High School	$20,500	$2,700	76	7.6
Middle School	$13,600	$1,500	45	9.1
Intermediate School	$12,300	$1,400	44	8.8
Alamo Elementary	$11,700	$1,200	33	9.8
Apache Elementary	$10,600	$1,600	45	6.6
Recreation	$3,100	$300	8	10.3
Butz Alternative High School	$6,200	$500	12	12.4
Admin	$2,900	$200	5	14.5
TOTAL	**$80,900**	**$9,400**	**270**	**8.6**

REPLACE HVAC SYSTEMS

Replace existing HVAC units with new high efficiency units. The existing systems are inefficient and beyond their useful life. Units to be replaced consist of 32 split and packaged DX systems totaling approximately 160 tons (average age is 16 years). The table below summarizes the estimated cost and savings for replacing the units indentified in each school. Facilities Staff estimates the District spends approximately $30,000 per year on HVAC component repairs and replacements. Replacing with entirely new units could potentially mitigate these costs to the District as well. Potential maintenance savings are shown separately below.

HVAC REPLACEMENT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
High School	$192,000	$9,100	258	21.1
Middle School	$120,000	$5,500	166	21.8
Intermediate School	$120,000	$5,200	163	23.1
Butz Alternative High School	$45,000	$1,900	46	23.7
Estimated Maintenance Savings	-	$30,000	-	-
TOTAL	**$477,000**	**$51,700**	**633**	**9.2**

INSTALL VARIABLE FREQUENCY DRIVES ON HVAC EQUIPMENT

Install Variable Frequency Drives (VFDs) on HVAC equipment tabulated below. A VFD allows the control system to smoothly adjust the speed of a motor. This smooth adjustment reduces the stress on the motor, equipment, and electrical system that occurs when a motor starts. It also allows the control system to select the optimum operating speed for balancing performance with energy cost.

Apache Elementary Chilled Water Pump: From a preliminary analysis of pump and CHW system characteristics at Apache Elementary School, it appears the existing 15 HP pump is oversized for the application. In order to achieve the desired flow through the chiller, resistance has been added to the system by closing balancing valves as shown in the photo below of the pump room. Running the existing pump at a slower speed while opening manual balancing valves will allow the system to have the same design flow with only the inherent resistance of pipes, chiller, cooling coils, etc. This will yield a lower brake horsepower from the pump and significant energy savings over time. A slower operating speed can be accomplished by installing a VFD on the existing pump motor, manually balancing the speed to achieve the desired flow, and setting the correct speed as the new constant operating point for the motor. Modulating the pump speed is not recommended without controls upgrades and consultation with the chiller manufacturer on variable flow limitations.

Apache Elementary Air-Handling Units (AHUs): The chilled/hot water AHUs (four in total) at Apache Elementary each have a 10 HP constant speed supply fan. The fan speed could be modulated using a VFD during low load periods (based on outside air temperature for example) to conserve energy. Ideally, the fan speed should be reset based on the highest zone demand (most open damper position).

VFD INSTALLATION				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Apache Elementary CHW Pump	$6,500	$1,000	28	6.5
Apache Elementary AHU Fans	$40,000	$4,400	125	9.1
TOTAL	**$46,500**	**$5,400**	**153**	**8.6**

SOLAR THERMAL POOL HEATING

The High School Natatorium currently uses a 750,000 BTU boiler for pool heating. The pool is indoors and maintained at over 80°F year-round. It is recommended that the District install a solar thermal heating system to supplement the existing gas fired heating. A full system generally requires collector area approximately 75% of the pool area. The collector array could be installed on the roof of the natatorium. The following table provides the estimated project costs and projected energy savings associated with a solar pool heating system for the High School using plastic absorbers. In order to protect the boiler and solar thermal system from corrosion resulting from pool water chemical treatment, a heat exchanger is also recommended to separate the hydronic loops. A heat exchanger will ultimately help to extend the useful life of the system. A detailed analysis would be necessary to determine the type of system needed and the mode of integration into the existing boiler loop.

SOLAR THERMAL POOL HEATING				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
High School	$65,700	$5,200	788	12.6
Heat Exchanger	$9,000	-	-	-
TOTAL	**$74,700**	**$5,200**	**788**	**14.4**

INSTALL POWER FACTOR CORRECTION CAPACITORS

Install capacitor banks at the electrical service entrance or particular loads at Fort Stockton High School. The High School is currently charged for average monthly power factors below 95% (See Section 6.0). Installing a capacitor bank will condition the power and reduce additional costs. Capacitor banks vary in cost with the size required, which is dependent on the facility's electrical demand and the amount of power factor correction elected. If the source of low power factor is a few large motors that always have the same low power factors, it may be most cost effective to connect the capacitors to the system between the motor starter and the load, so that the correction is only applied to the system while the offending motors are enabled. The following estimated implementation costs refer to installing capacitors at the electrical service entrances, and are based off preliminary utility data review. Detailed analysis would determine actual size of capacitors necessary.

POWER FACTOR CORRECTION				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
High School	$25,500	$13,100	0	1.9
TOTAL	**$25,500**	**$13,100**	**0**	**1.9**

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

SUMMARY OF ENERGY COST REDUCTION MEASURES				
Project Description	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
LOW WATTAGE T8 FLUORESCENT LIGHTING RETROFIT	$139,700	$20,800	604	6.7
GYM HID LIGHTING RETROFIT	$113,200	$7,500	212	15.1
MOTION SENSOR INSTALLATION	$80,900	$9,400	270	8.6
HVAC REPLACEMENT*	$477,000	$51,700	633	9.2
VFD INSTALLATION	$46,500	$5,400	153	8.6
SOLAR THERMAL POOL HEATING	$74,700	$5,200	788	14.4
POWER FACTOR CORRECTION	$25,500	$13,100	0	1.9
TOTAL:	**$932,000**	**$100,000**	**2,661**	**9.3**

*Includes $30,000 of projected maintenance savings

The above projects implementation costs and annual savings are estimated based on a preliminary examination of the facilities. Furthermore, detailed assessment, contingency and any project administration costs 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 District requirements, and construction management would be provided by the engineering group who prepared the drawings and specifications.

10.0 FACILITY IMPROVEMENT MEASURES

This section describes facility improvement measures that have energy savings opportunities but cannot be justified solely based on the potential energy savings. The following are the facility improvement measures recommended for the District.

REPLACE HVAC SYSTEMS NEARING END OF USEFUL LIFE

The District has several air-conditioning units nearing the end of their useful life. The average age of these systems are fifteen (15) years. The District should budget and plan to replace these units in three (3) to five (5) years. Replacing these systems with new high efficiency units will have energy savings and help reduce maintenance costs. The HVAC systems nearing the end of their useful life consist of 157 Split-DX and packaged DX systems totaling approximately 730 tons. The table below summarizes the estimated cost for replacing the units indentified.

CAPITAL RETROFIT - HVAC REPLACEMENT	
Project Description	**Estimated Implementation Cost**
High School (Approx. 140 Tons)	$420,000
Middle School (Approx. 80 Tons)	$240,000
Intermediate School (Approx. 237 Tons)	$711,000
Alamo Elementary (Approx. 188 Tons)	$564,000
Apache Elementary (Approx. 210 Tons)	$273,000
Butz Alternative High School (Approx. 88 Tons)	$264,000
TOTAL	**$2,472,000**

11.0 ENERGY MANAGEMENT POLICY

By requesting this study, the District has demonstrated an interest in taking a more aggressive approach to energy management. In order to establish an effective Energy Management Program, it should have support from top management. An Energy Management Policy adopted by the school board sends a strong signal that energy management is an institutional priority.

Currently, the District does not have a general Energy Management Policy, and has asked TEESI to assist in developing one. The policy should cover items such as:

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

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

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

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

3. PROMOTE ENERGY AWARENESS
   The Energy Management Steering Committee members shall establish a program to publicize the District's energy goals and progress on a quarterly or semiannually basis. For example, student drawn posters of the District's energy savings can be placed in hallways. This will encourage student involvement and act as an educational tool. Continuous promotion of the District's goals will ensure the sustainability of the energy management program and help achieve further energy savings.

4. ESTABLISH ACCEPTABLE EQUIPMENT PARAMETERS
   Establish a District-wide uniform temperature set point for all HVAC units. Having a standard setpoint will help keep HVAC runtimes to a minimum. The following are some suggested temperature settings, however, the district will need to monitor and ensure that

other building parameters (humidity levels etc.) are within acceptable limits. Also, areas with special equipment (MDF/IDF, server rooms, etc.) or materials (wood flooring, paper storage, etc.) shall be maintained at the equipment supplier's recommended settings and settings appropriate to the material.

Occupied Cooling Temperature Setpoints:

Instructional Areas	73 F – 76 F
Admin Areas	72 F – 74 F

Unoccupied Cooling Temperature Setpoints:

Instructional Areas	85 F
Admin Areas	85 F

Occupied Heating Temperature Setpoints:

Instructional Areas	67 F – 69 F
Admin Areas	67 F – 69 F

Unoccupied Heating Temperature Setpoints:

Instructional Areas	55 F
Admin Areas	55 F

5. DISALLOW OR DISCOURAGE PERSONAL APPLIANCES

Establish a policy that prohibits use of personal appliances by District staff, such as mini refrigerators and space heaters. Alternatively, establish disincentives such as a periodic fee for use of such appliances. Collected fees could be used for energy awareness and management in other areas.

6. STAFF INCENTIVES AND RECOGNITION PROGRAM

Establishing a student, staff, and campus incentive and recognition program would help promote and encourage support from staff and custodial members. The District may consider implementing a staff incentive and recognition program. Following are some program examples.

- The energy accounting system can be used to monitor cost savings and compare it to the base year consumption. An energy incentive plan consisting of a 50-50 sharing with the school campus and the Energy Management Program could be employed. The school would get 50% of the savings resulting from energy cost reduction. The school would be free to use the money for educational programs such as materials, supplies, etc. The other 50% would be used for continuing energy management efforts. The following is an example of the Building savings summary report.

EXAMPLE:

High School - Total Annual Electric Cost

Baseline (2006 - 07)	Current (2007 - 08)	Savings	50% Savings
$248,483	$240,483	$8,000	$4,000

In this example, the High School saved $8,000 where 50% ($4,000) will be assigned to the school. This money would be paid in October of the following fiscal year.

- An energy flag program should be implemented. There would be three energy flags, one flag per each grade level. An energy flag would be awarded to the schools exhibiting the greatest percentage reduction in energy costs. Energy flags would be awarded on a rotating basis each summer. In order to provide motivation, maintain enthusiasm, and recognize individuals doing their part to save the District taxpayers money through the Energy Management Program, the local media (including district newsletters) should be informed of the energy flag results. The energy flags would be awarded in January and August of each year based on the energy consumption of the previous four months.

- The successes of the program should also be communicated to the public through the media to show what the District is doing to reduce costs to taxpayers.

7. NEW BUILDING AND CONSTRUCTION

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

8. ESTABLISH A WATER MANAGEMENT PROGRAM

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

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

12.0 FUNDING OPTIONS FOR UTILITY REDUCTION MEASURES

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

Texas LoanSTAR Program

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

Internal Financing

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

Private Lending Institutions or Leasing Corporations

Banks, leasing corporations, and other private lenders have become increasingly interested in the energy efficiency market. The financing vehicle frequently used by these entities is a municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase arrangement. Ownership of the financed equipment passes to the School District at the beginning of the lease, and the lessor retains a security interest in the purchase until the loan is paid off. A typical lease covers the total cost of the equipment and may include installation costs. At the end of the contract period 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 utilities in Texas 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.

Qualified School Construction Bond (QSCB)

The federal government authorizes tax-free bonds (QSCBs) through the American Recovery and Reinvestment Act (ARRA), which help school districts fund new construction and major renovation projects as well as land acquisition. In total, schools will save an estimated $10 billion in taxes using these bonds. They will also help reduce the cost of borrowing for use in construction projects for public schools. For more information, please visit http://www.qscb.us.

Build America Bonds

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

Energy Efficiency and Conservation Block Grant (EECBG)

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

Qualified Energy Conservation Bonds (QECB)

Energy projects can be eligible for QECBs, which are tax credit bonds that serve to assist with energy efficient capital projects, renewable energy usage, and reductions in energy consumption. The federal government has issued this loan program, which assists with funding of the interest costs for the bonds. These energy conservation bonds are different from tax-exempt bonds

traditionally used because they can be regarded as taxable income. For more information on QECBs, please visit http://www.dsireusa.org.

Qualified Zone Academy Bond (QZAB)

QZABs are available for school districts that can utilize the bonds form the federal government for repair and rehabilitation projects. Tax credits are provided to bondholders nearly equal to the interest that the state or community would normally be expected to pay. It can be utilized for projects that qualify for the program. More information can be found by visiting http://www2.ed.gov/programs/qualifiedzone.

APPENDICES

APPENDIX A

ENERGY LEGISLATION
(SB12, HB3693 AND SB300)

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 Districts, 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 Districts 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 Districts 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 Districts; Institutes of Higher Education; State Facilities and Buildings.

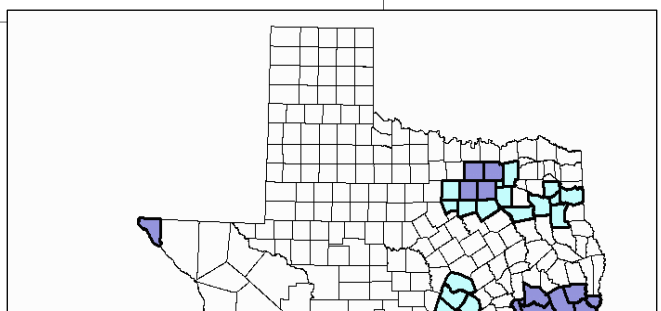
How do you define energy-efficiency measures?

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

Examples of energy-efficiency measures include:

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

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



What counties are affected?

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

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

What assistance is available for affected areas?

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

To assist jurisdictions, the Texas Energy Partnership will:

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

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

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

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

SECO Program Contact Information

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

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

Engineering (Codes / Standards):
Felix Lopez - 512-463-1080
Felix.Lopez@cpa.state.tx.us

Innovative / Renewable Energy:
Pamela Groce - 512-463-1889
pam.groce@cpa.state.tx.us

Energy / Housing
Partnership Programs:
Stephen Ross - 512-463-1770
Stephen.Ross@cpa.state.tx.us

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

BILL ANALYSIS

Senate Research Center

S.B. 300
By: Patrick, Dan
Education
7/1/2009
Enrolled

AUTHOR'S / SPONSOR'S STATEMENT OF INTENT

Many independent school districts across Texas are reporting severe financial difficulties due to several factors, including the requirement to fulfill unfunded mandates. These mandates are particularly burdensome to fast-growth school districts. In a difficult economic climate and with dwindling resources, districts are forced to fulfill unnecessary mandates rather than focus on their basic mission, which is to educate students.

S.B. 300 amends current law relating to eliminating or modifying certain mandates on school districts.

RULEMAKING AUTHORITY

This bill does not expressly grant any additional rulemaking authority to a state officer, institution, or agency.

SECTION BY SECTION ANALYSIS

SECTION 1. Amends Section 11.1513(d), Education Code, as follows:

(d) Requires that the employment policy provide that not later than the 10th school day before the date on which a district fills a vacant position for which a certificate or license is required as provided by Section 21.003, other than a position that affects the safety and security of students as determined by the board of trustees, the district is required to provide to each current district employee notice of the position by posting the position on a bulletin board at certain locations or, rather than and, the district's Internet website, if the district has a website, and a reasonable opportunity to apply for the position.

SECTION 2. Amends Section 25.112, Education Code, by amending Subsection (d) and adding Subsections (e)-(g), as follows:

(d) Authorizes the commissioner of education (commissioner), on application of a school district (district), to except the district from the limit in Subsection (a) (relating to the prohibition of more than 22 students enrolled in an elementary school class) if the commissioner finds the limit works an undue hardship on the district. Provides that an exception expires at the end of the school year for which it is granted. Deletes existing text providing that an exception expires at the end of the semester for which it is granted, and prohibiting the commissioner from granting an exception for more than one semester at a time.

(e) Requires a district seeking an exception under Subsection (d) to notify the commissioner and apply for the exception not later than the later of October 1 or the 30th day after the first school day the district exceeds the limit in Subsection (a).

(f) Authorizes the commissioner, if a district repeatedly fails to comply with this section, to take any appropriate action authorized to be taken by the commissioner under Section 39.131 (Sanctions for Districts).

(g) Requires the Texas Education Agency, not later than January 1, 2011, to report to the legislature the number of applications for exceptions under Subsection (d) submitted by

each district and for each application indicate whether the application was granted or denied. Provides that this subsection expires February 1, 2011.

SECTION 3. Amends Section 34.0021, Education Code, by amending Subsections (a) and (b) and adding Subsection (c-1), as follows:

(a) Authorizes, rather than requires, each school district, pursuant to the safety standards established by the Department of Public Safety under Section 34.002, to conduct a training session for students and teachers concerning procedures for evacuating a school bus during an emergency.

(b) Provides that a school district that chooses to conduct a training session under Subsection (a) is encouraged to conduct the school bus emergency evacuation training session in the fall of the school year. Provides that the school district is also encouraged to structure the training session so that the session applies to school bus passengers, a portion of the session occurs on a school bus, and the session lasts for at least one hour. Deletes existing text requiring a school district to conduct the school bus emergency evacuation training at least twice each school year, with one training session occurring in the fall and one training session occurring in the spring. Deletes existing text requiring that a portion of the training session occur on a school bus and requiring the training session to last for at least one hour.

(c-1) Provides that a school district, immediately before each field trip involving transportation by school bus, is encouraged to review school bus emergency evacuation procedures with the school bus passengers, including a demonstration of the school bus emergency exits and the safe manner to exit.

SECTION 4. Amends Section 44.902, Education Code, as follows:

Sec. 44.902. New heading: LONG-RANGE ENERGY PLAN TO REDUCE CONSUMPTION OF ELECTRIC ENERGY. (a) Creates this subsection from existing text. Requires the board of trustees of a district to establish a long-range energy plan to reduce the district's annual electric consumption by five percent beginning with the 2008 state fiscal year and consume electricity in subsequent fiscal years in accordance with the district's energy plan. Deletes existing text requiring the board of trustees of a district to establish a goal to reduce the school district's annual electric consumption by five percent each state fiscal year for six years beginning September 1, 2007.

(b) Requires that the plan required under Subsection (a) include strategies for achieving energy efficiency that result in net savings for the district or can be achieved without financial cost to the district and for each strategy identified under Subdivision (1), the initial, short-term capital costs and lifetime costs and savings that may result from implementation of the strategy.

(c) Requires the board of trustees, in determining under Subsection (b) whether a strategy may result in financial cost to the district, to consider the total net costs and savings that may occur over the seven-year period following implementation of the strategy.

(d) Authorizes the board of trustees to submit the plan required under Subsection (a) to the State Energy Conservation Office for the purposes of determining whether funds available through loan programs administered by the office are available to the district.

SECTION 5. Repealer: Section 44.901(b) (regarding the requirement that the board of trustees establish a goal to reduce electric consumption by five percent each year for six years), Education Code.

SECTION 6. Provides that this Act applies beginning with the 2009-2010 school year.

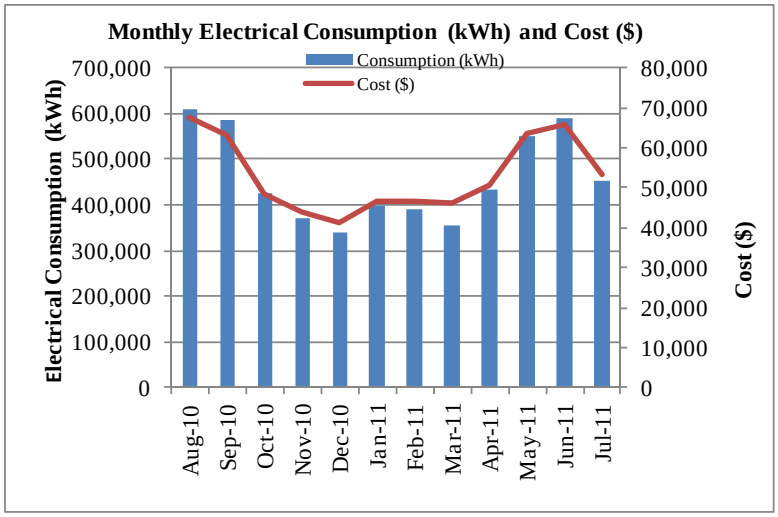
SECTION 7. Effective date: upon passage or September 1, 2009.

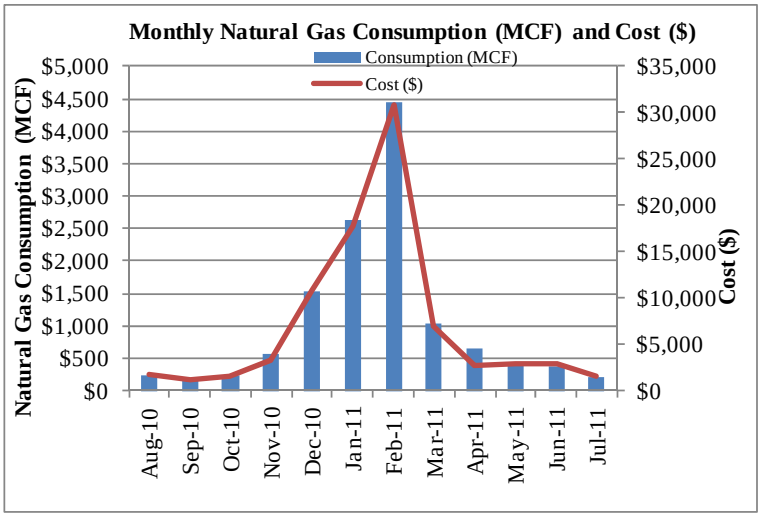
APPENDIX B

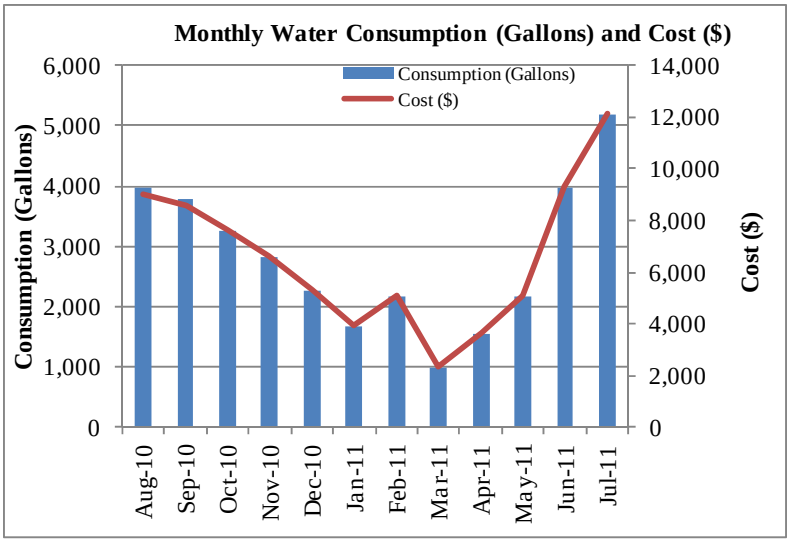
SAMPLE UTILITY DATA REPORTING FORM

MONTH	ELECTRICITY			NATURAL GAS			WATER		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF	GAL	COST $	$/GAL
Aug-10	608,469	67,509	$0.1109	$242	$1,747	$7.2	3,962	9,015	$2.27526
Sep-10	584,592	63,048	$0.1078	$163	$1,080	$6.6	3,782	8,615	$2.27798
Oct-10	423,642	48,245	$0.1139	$245	$1,606	$6.6	3,273	7,673	$2.34428
Nov-10	371,630	43,739	$0.1177	$555	$3,368	$6.1	2,837	6,651	$2.34431
Dec-10	339,127	41,370	$0.1220	$1,531	$10,727	$7.0	2,269	5,329	$2.34866
Jan-11	398,780	46,596	$0.1168	$2,640	$17,694	$6.7	1,666	3,946	$2.36846
Feb-11	391,489	46,433	$0.1186	$4,437	$30,868	$7.0	2,177	5,123	$2.35328
Mar-11	354,876	46,214	$0.1302	$1,040	$6,920	$6.7	985	2,337	$2.37243
Apr-11	433,450	50,660	$0.1169	$637	$2,768	$4.3	1,550	3,642	$2.34941
May-11	552,096	63,636	$0.1153	$410	$2,973	$7.3	2,175	5,105	$2.34706
Jun-11	589,824	65,693	$0.1114	$386	$2,823	$7.3	3,986	9,324	$2.33910
Jul-11	451,677	53,171	$0.1177	$196	$1,529	$7.8	5,179	12,110	$2.33826
Total	5,499,652	$636,314	$0.1157	12,482	$84,103	$6.7	33,841	$78,868	$2.33056

Gross Building Area:	762,829	SF







APPENDIX C

BASE YEAR CONSUMPTION HISTORY

Energy Cost and Consumption Benchmarks														
		Electric				Natural Gas				Total	Total	EUI	ECI	
	Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	MCF/kSF	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	High School	2,161,215	7,376	8.72	260,315	5,756	5,929	23.24	37,727	298,042	13,305	54	1.20	247,711
2	Middle School	1,205,200	4,113	7.25	135,915	2,538	2,614	15.27	16,594	152,509	6,727	40	0.92	166,252
3	Intermediate School	1,106,700	3,777	5.91	120,778	1,567	1,614	8.37	10,534	131,312	5,391	29	0.70	187,232
4	Alamo Elementary	685,200	2,339	10.27	85,100	717	739	10.74	4,464	89,564	3,077	46	1.34	66,734
5	Apache Elementary	686,560	2,343	6.54	82,463	1,757	1,810	16.73	11,624	94,086	4,153	40	0.90	105,000
6	Recreation	93,760	320	1.96	11,476	614	632	12.82	4,223	15,699	952	20	0.33	47,911
7	Butz Alternative High School	133,360	455	5.04	18,775	847	872	32.03	5,690	24,464	1,328	50	0.93	26,445
8	Admin	68,600	234	9.31	9,201	2	2	0.27	263	9,463	236	32	1.28	7,371
		kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	MCF/kSF	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		6,140,595	20,958	7.18	724,021	13,798	14,212	16.14	91,118	815,139	35,170	41	0.95	854,656

District: Fort Stockton ISD

ACCOUNT# 10400513148400001 Electric

10-0472-01 Gas

BUILDING: High School

FLOOR AREA: 247,711 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 ($)
Feb	2011	149,325		470		$18,336	1,654	$11,490
Mar	2011	143,466		502		$17,784	332	$2,119
Apr	2011	147,954		614		$18,331	281	$1,974
May	2011	209,976		771		$24,653	164	$1,178
Jun	2011	248,993		729		$27,893	286	$2,028
Jul	2011	195,094		588		$22,537	100	$749
Aug	2011	283,861		879		$31,698	24	$200
Sep	2011	206,843		735		$23,858	37	$297
Oct	2011	168,734		566		$20,764	124	$843
Nov	2011	143,030		464		$18,745	359	$2,263
Dec	2011	132,443		461		$18,086	804	$4,912
Jan	2012	131,496		415		$17,631	1,591	$9,673
TOTAL		2,161,215				$260,315	5,756.0	$37,727

Annual Total Energy Cost = 298,042 $/year

Total KWH/yr x 0.003413 = 7,376.23 MMBTU/year

Total MCF/yr x 1.03 = 5,928.68 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 13,305 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 54 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.20 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400513148350001 Electric

07-4232-01 Gas

BUILDING: Middle School

FLOOR AREA: 166,252 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 ($)
Feb	2011	85,280		293		$9,608	771	$5,350
Mar	2011	85,760		302		$9,625	157	$1,034
Apr	2011	99,840		398		$11,258	115	$802
May	2011	121,440		430		$13,635	102	$716
Jun	2011	124,800		366		$13,389	40	$291
Jul	2011	91,760		270		$10,358	47	$343
Aug	2011	154,720		482		$16,823	0	$22
Sep	2011	122,240		404		$13,209	50	$344
Oct	2011	93,680		346		$10,818	51	$340
Nov	2011	79,120		271		$9,526	125	$787
Dec	2011	67,840		215		$8,519	332	$2,025
Jan	2012	78,720		226		$9,145	748	$4,541
TOTAL		1,205,200				$135,915	2,538.0	$16,594

* Natural Gas service not included in this summary.

Annual Total Energy Cost = 152,509 $/year

Total KWH/yr x 0.003413 = 4,113.35 MMBTU/year

Total MCF/yr x 1.03 = 2,614.14 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 6,727 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 40 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.92 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400513148150001 Electric

06-0662-01 06-0672-01 Gas

BUILDING: Intermediate School

FLOOR AREA: 187,232 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 ($)
Feb	2011	85,200		261		$9,183	512	$3,573
Mar	2011	86,400		276		$9,287	153	$1,023
Apr	2011	93,000		324		$9,974	84	$604
May	2011	104,100		348		$11,378	53	$394
Jun	2011	107,100		342		$11,632	23	$189
Jul	2011	79,200		234		$8,904	12	$113
Aug	2011	128,100		393		$13,629	9	$93
Sep	2011	102,000		363		$11,051	16	$137
Oct	2011	87,900		315		$9,656	27	$204
Nov	2011	80,100		234		$8,907	58	$390
Dec	2011	73,500		249		$8,457	160	$1,000
Jan	2012	80,100		243		$8,718	460	$2,815
TOTAL		1,106,700				$120,778	1,567.0	$10,534

Annual Total Energy Cost = 131,312 $/year

Total KWH/yr x 0.003413 = 3,777.17 MMBTU/year

Total MCF/yr x 1.03 = 1,614.01 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 5,391 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 29 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.70 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400514037130002 Electric

03-3799-01 Gas

BUILDING: Alamo Elementary

FLOOR AREA: 66,734 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 ($)
Feb	2011	47,600		234		$6,007	237	$612
Mar	2011	48,960		486		$6,118	92	$200
Apr	2011	60,480		240		$7,041	27	$166
May	2011	69,920		315		$8,449	22	$153
Jun	2011	62,160		198		$7,306	20	$78
Jul	2011	50,800		318		$6,906	9	$43
Aug	2011	92,720		355		$10,700	4	$82
Sep	2011	72,160		344		$8,777	10	$111
Oct	2011	57,280		296		$7,247	15	$139
Nov	2011	44,960		210		$5,996	20	$294
Dec	2011	34,560		130		$4,969	46	$1,317
Jan	2012	43,600		145		$5,583	215	$1,269
TOTAL		685,200				$85,100	717.0	$4,464

Annual Total Energy Cost = 89,564 $/year

Total KWH/yr x 0.003413 = 2,338.59 MMBTU/year

Total MCF/yr x 1.03 = 738.51 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,077 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 46 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.34 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400514896410001 Electric

10-4322-01 Gas

BUILDING: Apache Elementary

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 ($)
Feb	2011	52,400		157		$6,138	647	$4,492
Mar	2011	57,440		275		$6,765	130	$859
Apr	2011	61,520		270		$7,093	76	$535
May	2011	67,440		286		$7,918	50	$358
Jun	2011	56,400		259		$6,849	13	$105
Jul	2011	57,680		244		$6,883	27	$203
Aug	2011	90,400		326		$10,179	13	$106
Sep	2011	68,880		326		$8,261	22	$160
Oct	2011	53,600		228		$6,481	54	$359
Nov	2011	43,040		234		$5,672	99	$627
Dec	2011	34,400		142		$4,816	252	$1,541
Jan	2012	43,360		140		$5,409	374	$2,279
TOTAL		686,560		2887		$82,463	1,757.0	$11,624

Annual Total Energy Cost = 94,086 $/year

Total KWH/yr x 0.003413 = 2,343.23 MMBTU/year

Total MCF/yr x 1.03 = 1,809.71 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 4,153 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 40 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.90 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400513148070001 Electric

03-3792-01 Gas

BUILDING: Recreation

FLOOR AREA: 47,911 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 ($)
Feb	2011	5,360		20		$757	269	$1,876
Mar	2011	5,600		21		$776	93	$618
Apr	2011	7,280		29		$928	34	$247
May	2011	11,520		35		$1,316	14	$111
Jun	2011	14,000		35		$1,529	3	$36
Jul	2011	11,600		38		$1,322	1	$22
Aug	2011	13,120		38		$1,428	1	$22
Sep	2011	6,640		35		$855	1	$22
Oct	2011	5,360		27		$712	1	$22
Nov	2011	4,400		19		$623	0	$22
Dec	2011	4,320		16		$615	4	$40
Jan	2012	4,560		14		$616	193	$1,184
TOTAL		93,760		327		$11,476	614.0	$4,223

Annual Total Energy Cost = 15,699 $/year

Total KWH/yr x 0.003413 = 320.00 MMBTU/year

Total MCF/yr x 1.03 = 632.42 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 952 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 20 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.33 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400513147870001 Electric

04-0642-01 Gas

BUILDING: Butz Alternative High School

FLOOR AREA: 26,445 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 ($)
Feb	2011	4,240		27		$944	346	$2,409
Mar	2011	5,280		49		$1,058	83	$554
Apr	2011	10,080		77		$1,493	20	$152
May	2011	15,440		96		$2,075	5	$49
Jun	2011	13,920		70		$1,847	1	$22
Jul	2011	10,960		87		$1,623	0	$22
Aug	2011	31,840		48		$3,260	0	$22
Sep	2011	15,120		85		$1,954	1	$22
Oct	2011	9,520		65		$1,422	0	$22
Nov	2011	5,680		24		$1,035	20	$139
Dec	2011	5,840		28		$1,060	92	$573
Jan	2012	5,440		26		$1,004	279	$1,704
TOTAL		133,360		682		$18,775	847.0	$5,690

Annual Total Energy Cost = 24,464 $/year

Total KWH/yr x 0.003413 = 455.16 MMBTU/year

Total MCF/yr x 1.03 = 872.41 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 1,328 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 50 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.93 $/SF/year

Electric Utility: Reliant

Gas Utility: City of Ft Stockton Utilities

District: Fort Stockton ISD

ACCOUNT# 10400513147820001 Electric

02-1672-01 Gas

BUILDING: Admin

FLOOR AREA: 7,371 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 ($)
Feb	2011	3,960		20		$575	1	$21
Mar	2011	3,960		34		$602	1	$22
Apr	2011	4,960		29		$671	0	$22
May	2011	8,240		36		$996	0	$22
Jun	2011	8,920		39		$1,080	0	$22
Jul	2011	7,800		38		$971	0	$22
Aug	2011	9,400		38		$1,128	0	$22
Sep	2011	5,640		38		$801	0	$22
Oct	2011	4,640		30		$667	0	$22
Nov	2011	3,840		29		$603	0	$22
Dec	2011	3,360		13		$535	0	$22
Jan	2012	3,880		16		$571	0	$21
TOTAL		68,600		360		$9,201	2.0	$263

Annual Total Energy Cost = 9,463 $/year

Total KWH/yr x 0.003413 = 234.13 MMBTU/year

Total MCF/yr x 1.03 = 2.06 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 236 MMBTU/year

Energy Use Index:

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

Energy Cost Index:

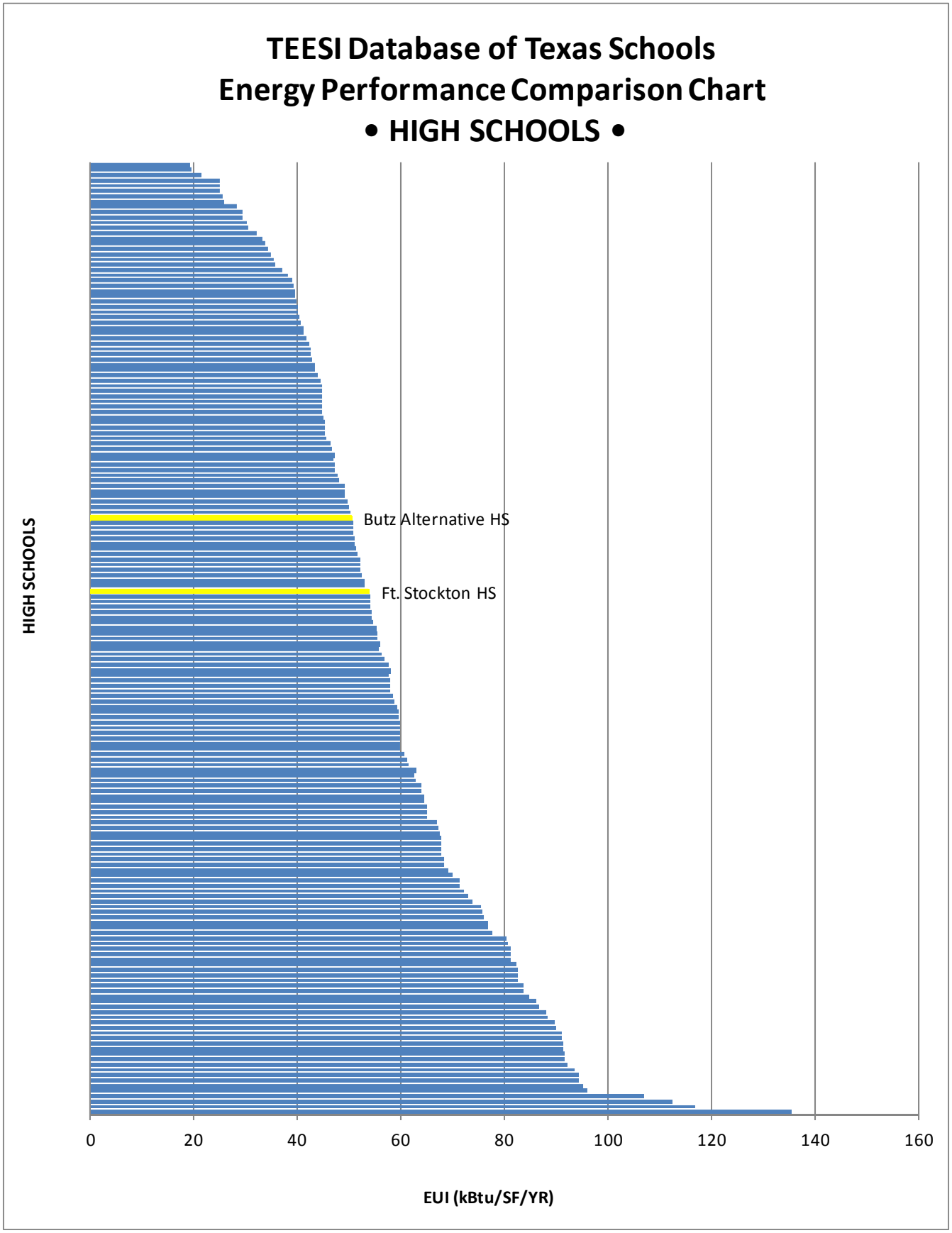
Total Energy Cost/Yr ÷ Total Area (SF) = 1.28 $/SF/year

Electric Utility: Reliant

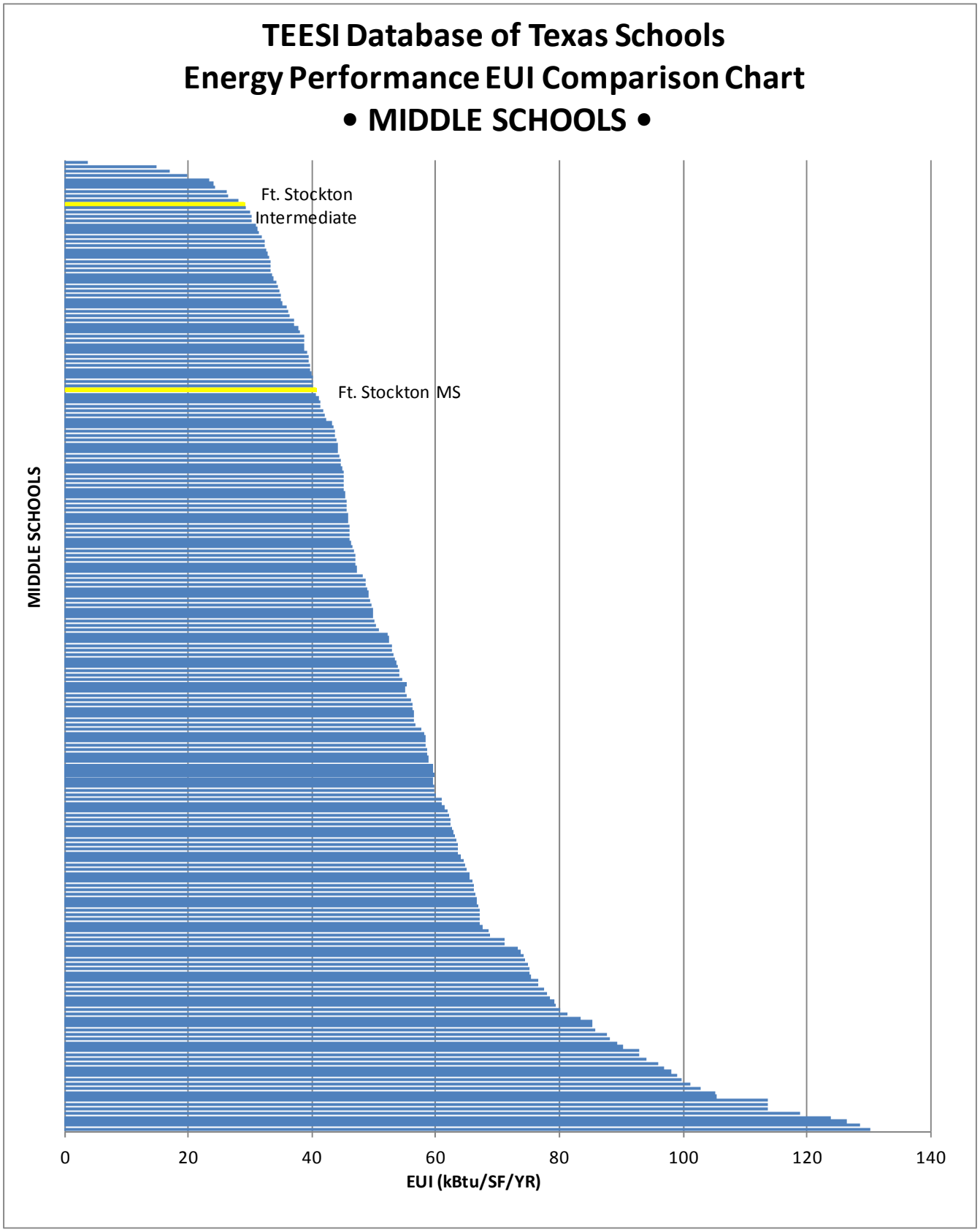
Gas Utility: City of Ft Stockton Utilities

APPENDIX D

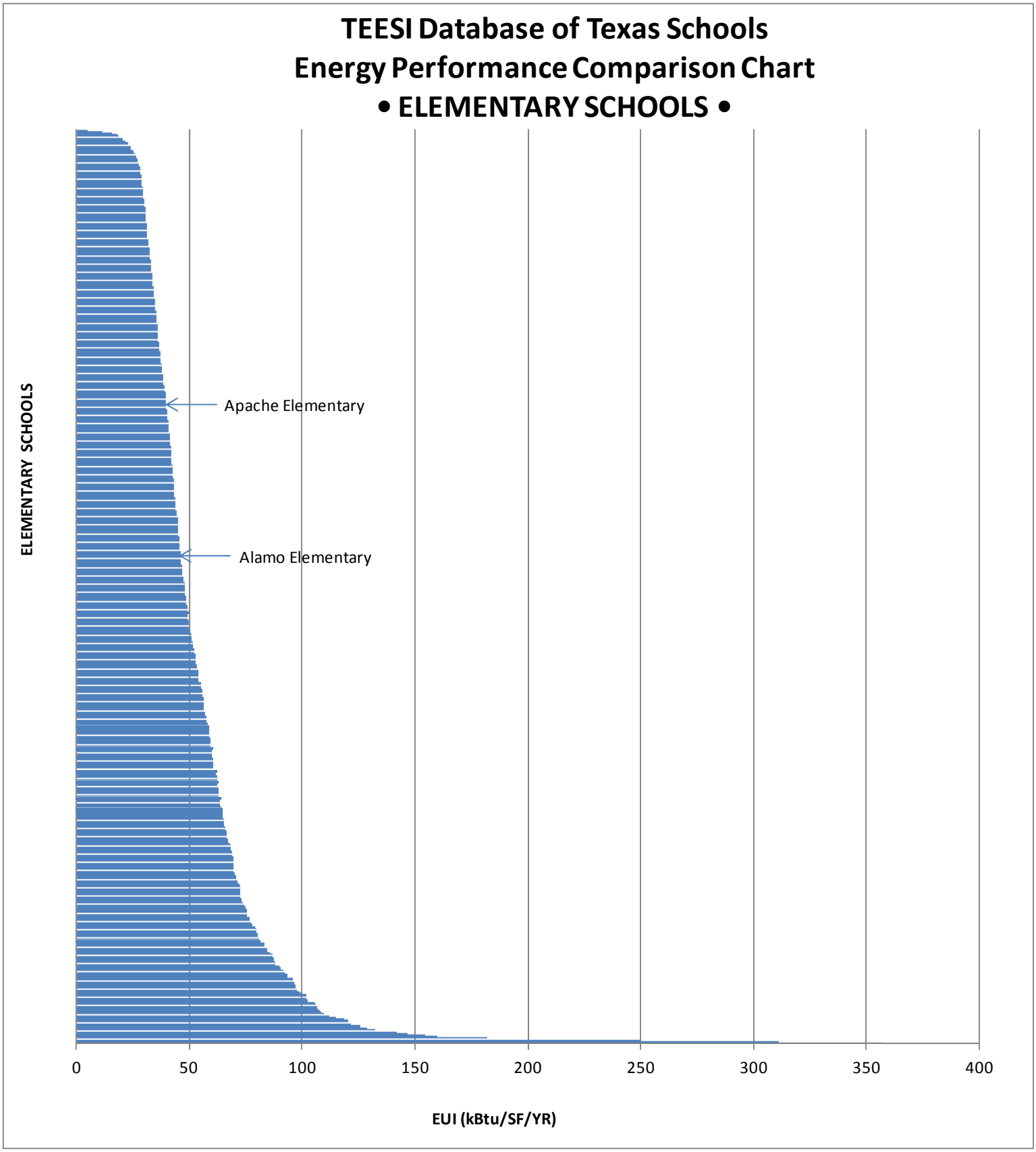
ENERGY PERFORMANCE COMPARISON CHARTS



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)

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		

Boilers Checklist (contd)

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

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

APPENDIX F

LOANSTAR INFORMATION

Texas LoanSTAR Program

FACTS ABOUT LoanSTAR

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

ELIGIBLE PROJECTS

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

PROGRAM REQUIREMENTS

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

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

SAVINGS VERIFICATION

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

For additional information regarding the
LoanSTAR program, please contact:

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

APPENDIX G

EXAMPLE RETROFIT TECHNICAL DATA

St. Clair Acrylic High Bay

*Protected by U.S. Patents No. 4,839,781, Patent Pending No. 29/398,351 and Patent Pending OptiFlec™ System Performance

Description

- Series: EHBUS-CC
- Lamp Life Rating: 100,000 hours
- Lumen Maintenance: 70% over 100,000 hours
- Light Output: 5000K, 82-90 CRI
- IP Rating: IP43
- Applications: Warehouses, factories, retail showrooms, gymnasiums, supermarkets, exhibition halls
- Warranty: 10 Year Limited

Specifications and Patent Pending Features

- Premium grade acrylic reflector with <2% Haze
- Conical lens lifts main beam and breaks diffuses image
- Stainless steel roll-form clamp band
- US Patented optics improve performance by 20% compared to competing fixtures
- Die cast aluminum ballast casing with corrosion-resistant white powder coat finish
- Electronic ballast with high power factor, flicker free instant re-strike
- Excellent vibration & shock resistance

OptiFlec™ Septum Enhancement combined with EverLast® Reflexors outperforms all other induction systems by 27%

Ordering Information

Series

EHBUS-CC — [ ] — [ ] — [ ] — [ ] — [ ] — [ ]

Wattage

100W
120W
150W
200W
250W
300W*

Voltage

120–120-277V
347–347V*
480–480V*

Color Temp

50–5000K
40–4000K*

Cord Options

X–None
3P–120W 3 Prong Plug*
L5–NEMA L5-15 120V*
L6–NEMA L6-15 250V*
L7–NEMA L7-15 277V*

Wire Guard

X– None
WG–Wire Guard*

Dimming

X– None
VD- Variable Dimming*

Bold = Standard
Grey * = Upgrade options available upon request

Example: **EHBUS-CC**-150-120-50-3P-VD

* Legal Notice: Full Spectrum Solutions owns proprietary rights in the EverLast® Series of fixtures in the form of pending patent applications in the US and PCT applications for international protection.

Call Toll Free: 888-383-7578 www.everlastlight.com

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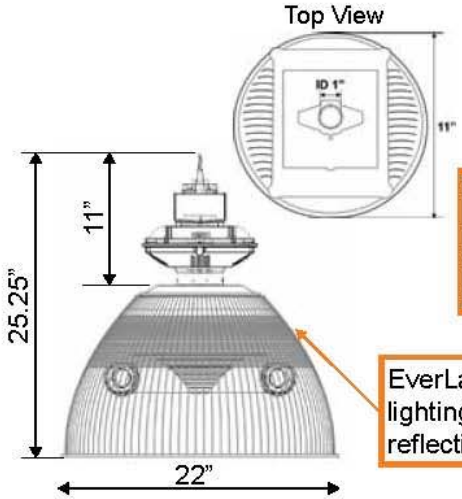
Exclusive Features

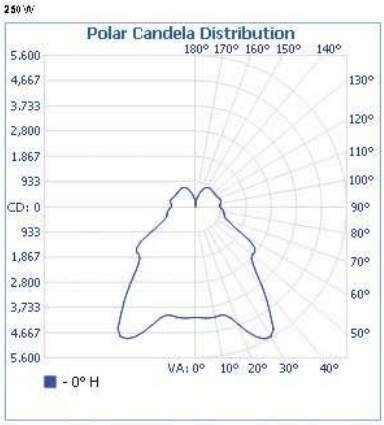


OptiFlec™ Septum Enhancement captures wasted up light directing it towards the Reflexor system as well as increasing down light at work plane

EverLast® Reflexors use high optic lighting enhanced resins tuned to high reflective properties

*Patent Pending No. 29/398,351

Photometric Data



Specifications

Lamp Specifications

Wattage	Lumens	L/W Ratio	CRI	CCT (KELVIN)	Rated Life
100W	8,400	84	82-85	5000	100,000 hours
120W	10,100	84	82-85	5000	100,000 hours
150W	12,600	84	82-85	5000	100,000 hours
200W	16,800	84	82-85	5000	100,000 hours
250W	21,000	84	82-85	5000	100,000 hours
300W	25,200	84	82-85	5000	100,000 hours

Ballast Specifications

System Wattage	Input Voltage	Input Current	Input Freq.	Power Factor	Ambient Temp	THD
111W	120-277V/480V*	0.69-0.30A / 0.17A	50/60Hz	>0.95	-40 to 130 F°	<10%
134W	120-277V/480V*	0.79-0.34A / 0.20A	50/60Hz	>0.95	-40 to 130 F°	<10%
165W	120-277V/480V*	0.98-0.43A / 0.25A	50/60Hz	>0.95	-40 to 130 F°	<10%
215W	120-277V/480V*	1.18-0.51A / 0.30A	50/60Hz	>0.95	-40 to 130 F°	<10%
265W	120-277V/480V*	2.21-1.00A / 0.56A	50/60Hz	>0.95	-40 to 130 F°	<10%
320W	120-277V/480V*	2.65-1.20A / 0.62A	50/60Hz	>0.95	-20 to 130 F°	<10%

Application Image

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APPENDIX H

ENERGY STAR PORTFOLIO MANAGER REFERENCE MATERIAL

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INTRODUCTION TO ENERGY STAR PORTFOLIO MANAGER

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

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

Portfolio Manger is also an energy performance benchmarking tool. Portfolio Manager rates a facility's energy performance on a scale of 1–100 relative to similar buildings and WWTPs nationwide. The rating system based on a statistically representative model utilizing a national survey conducted by the Department of Energy's Energy Information Administration. This national survey, known as the Commercial Building Energy Consumption Survey (CBECS), conducted every four years gathers data on building characteristics and energy use from thousands of buildings across the United States. A rating of 50 indicates that the facility, from an energy consumption standpoint, performs better than 50% of all similar facilities nationwide, while a rating of 75 indicates that the facility performs better than 75% of all similar facilities nationwide.

In addition, Portfolio Manager is used to generate a Statement of Energy Performance (SEP) for each facility, summarizing key energy information such as site and source energy intensity, greenhouse gas emission, energy reduction targets and energy cost. The Statement of Energy Performance is required for applying for ENERGY STAR Recognition from EPA/DOE. If ENERGY STAR recognition is pursued, the SEP will need to be verified and certified by a qualified professional.

Some facility types are not able to receive an ENERGY STAR rating. However, Portfolio Manager can still serve as a valuable tool for in tracking utility consumption and setting targets for performance of these facilities.

To develop an entity's baseline, 12 months of utility consumption, cost data, and Building Space Use information is required. The following is reference materials that explain how to input this information as well as perform other basic tasks within Portfolio Manager. For further information, please visit ENERGY STAR'S Portfolio Manager at:

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

LOGGING IN TO PORTFOLIO MANAGER

Log in to Portfolio Manager with user name and password. This will bring the user to the My Portfolio page, which includes a summary of the user's facilities.

Website: https://www.energystar.gov/istar/pmpam/

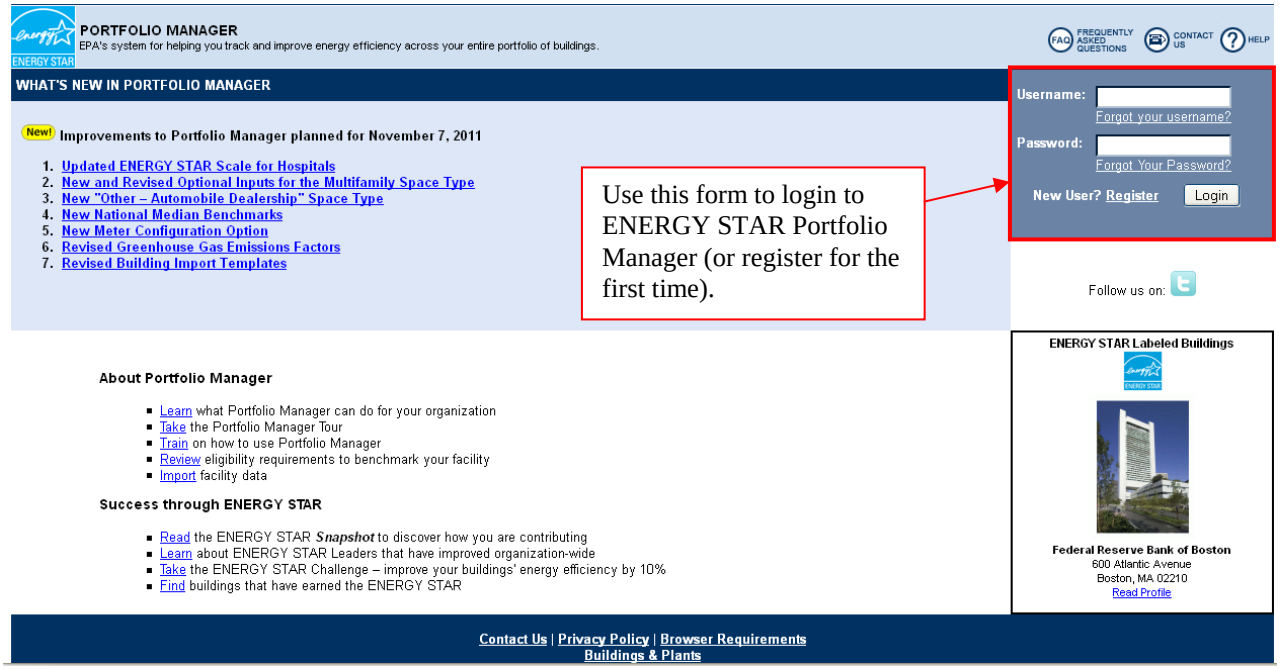


Figure 1: ENERGY STAR Portfolio Manager Homepage

ADDING A FACILITY/PROPERTY

If a facility does not already exist in Portfolio Manager, the user can use the 'Add a Property' link to create an entry in Portfolio Manager for that single facility.

Click the '*Add a Property*' selection located near the top of the main 'My Portfolio' page, as seen in Figure 2.

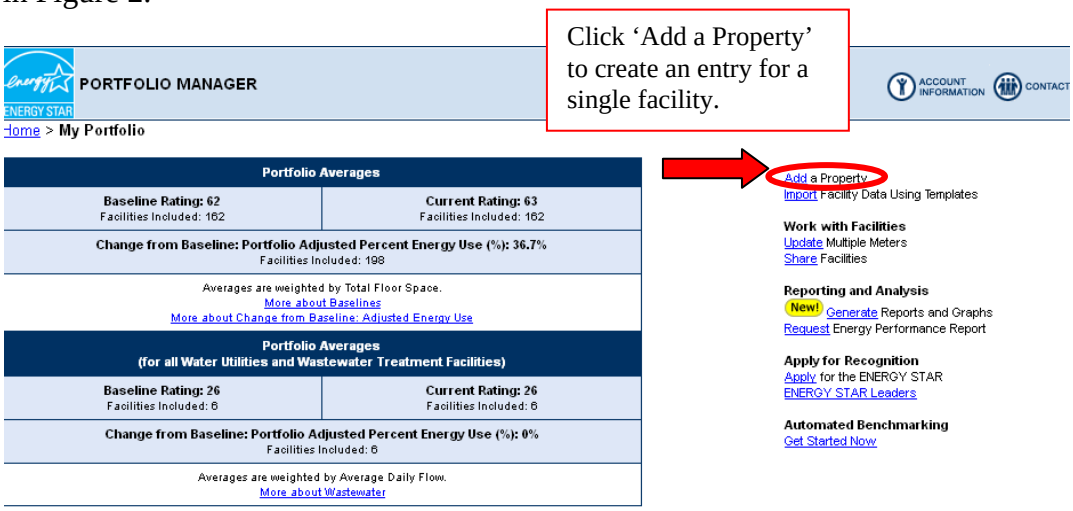


Figure 2: My Portfolio main page

In Figure 3 below, check the type of property (i.e. a single facility, wastewater treatment plant, etc.) and enter basic information about the property, including facility name, facility details, and address. Click **SAVE** when completed.

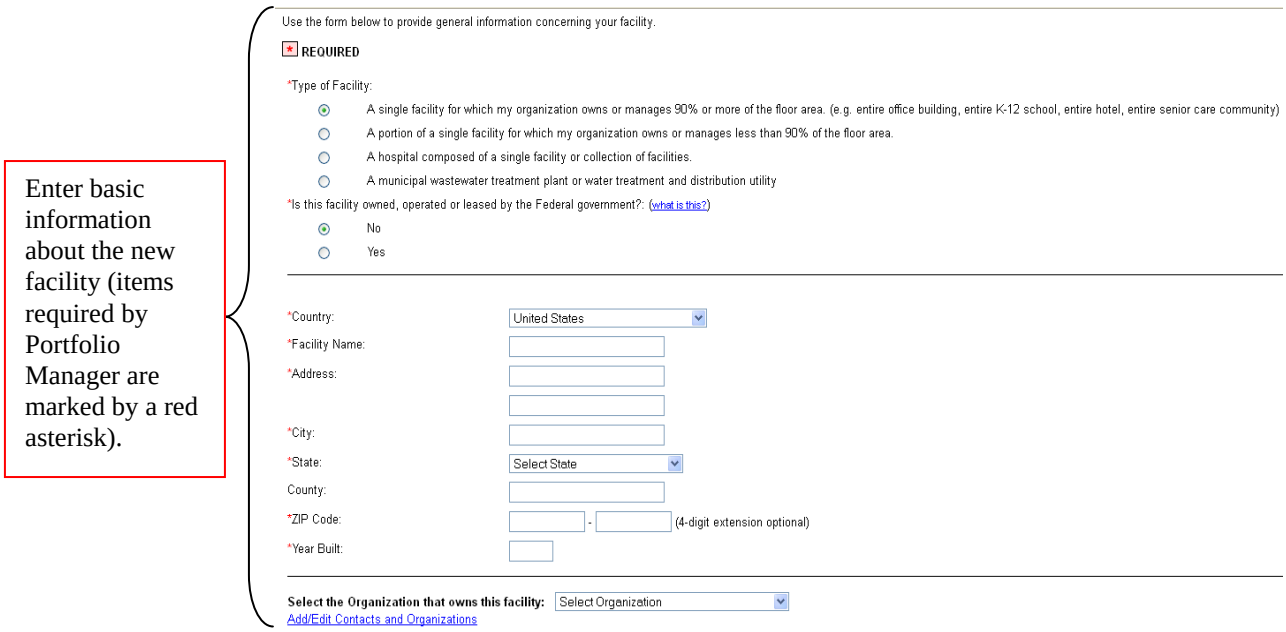


Figure 3: General Facility Information

ADDING/EDITING SPACES

From the Facility page, scroll to the 'Space Use' tab (as seen in Figure 4 below) and click 'Add Space.'

Click 'Add Space' to add a new space within a facility.

Space Use Add Space

Space Name	Space Type	Floor Area (Sq. Ft.)	% Floor Area	Alerts	
Sample Space Name	Office	15,000	100		Delete Space
Total		15,000	100		

Click Space Name to edit existing space.

Figure 4: Adding/Editing a Space from the Facility page

After clicking 'Add Space', Portfolio Manager will prompt the user to enter the Space Details, as seen below in Figure 5. They must be entered in correctly and accurately in order to be eligible for ENERGY STAR recognition. If ENERGY STAR recognition is not a primary goal, or if precise attribute values are initially unknown, default values may be used temporarily. These values can be edited at **any** time from the Facility main page (Figure 4) by clicking the assigned space name.

*Required for Benchmarking What is this?

Space Attribute	Space Attribute Value (Temporary values should only be used if an Actual value is not currently known) What is this?	Use Default Value	Units	Effective Date (when this Attribute Value was first true) What is this? (MM/DD/YYYY)
*Gross Floor Area	☐ For Temporary Use?	N/A	Sq. Ft.	01/01/2000
*Is this building normally open at all on the weekends?	○ Yes ○ No ☐ For Temporary Use?	☐	No Units	01/01/2000
*Number of PCs	☐ For Temporary Use?	☐	No Units	01/01/2000
*Number of walk-in refrigeration/freezer units	☐ For Temporary Use?	☐	No Units	01/01/2000
*Presence of cooking facilities	○ Yes ○ No ☐ For Temporary Use?	☐	No Units	01/01/2000
*Percent of the gross floor area that is cooled	Select ☐ For Temporary Use?	☐	%	01/01/2000
*Percent of the gross floor area that is heated	Select ☐ For Temporary Use?	☐	%	01/01/2000
*Is this building a high school (teaching grades 10, 11, and/or 12)?	○ Yes ○ No ☐ For Temporary Use?	☐	No Units	01/01/2000

Figure 5: Space attribute input

Check this box if current attribute value is unknown.

ADDING/EDITING ENERGY METERS

From the Facility page, scroll to the 'Energy Meters' section and click 'Add Meter' (as seen in Figure 6). To edit an existing meter, click the meter name, as shown below.

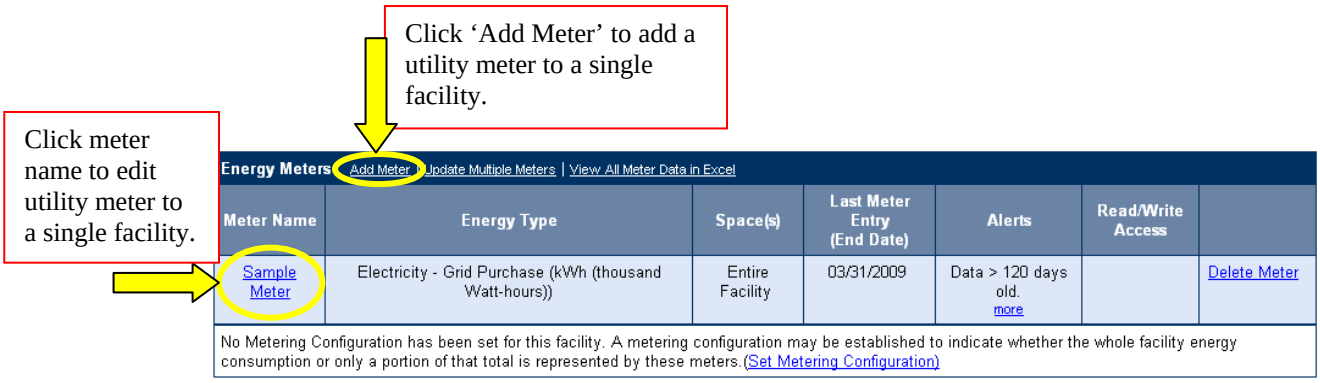


Figure 6: Adding an Energy Meter from the Facility page

Select the number of entries (in months) to add to the energy meter, input the start date of the data to be entered (form the facility utility bill) and click **CONTINUE**.

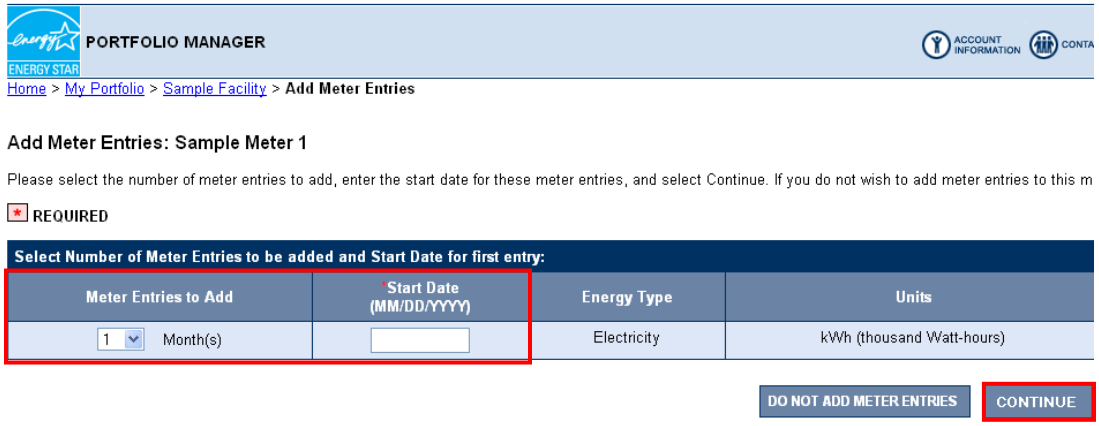


Figure 7: Configuring meter entries

Figure 9 shows a sample utility bill. Use this information to input monthly energy data (including start and end dates, energy use and cost), and click **SAVE** (see Figure 8).

Enter Energy Use: Sample Meter 1

Please enter the energy use for each meter entry below. Portfolio Manager requires that entries are for consecutive time periods; only one day of overlap or one day of gap can exist between meter entries to be eligible to generate an Energy Performance Rating.

Meter Information

Fuel Type: Electricity, Grid Purchase (kWh (thousand Watt-hours))
Space(s): Entire Facility

Add Energy Use:

Start Date (MM/DD/YYYY)	End Date (MM/DD/YYYY)	Energy Use (kWh (thousand Watt-hours))	Cost - US Dollars (optional)
05/23/2011	06/22/2011	13,120	$ 1,398.41

CANCEL SAVE

Figure 8: Entering energy data

Enter correct billing period from the monthly utility bill.

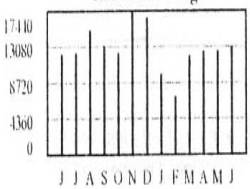
Enter monthly energy use data from utility bill.

Enter monthly cost data from utility bill.

AUSTIN ENERGY Electric Service

Meter #	Read Date	Reading
4032369	06/22/2011	1691.00
	05/23/2011	1609.00
	Read Difference	82.00
	KWH Multiplier	160
	Total Consumption in KWH	13,120
	Demand Usage	52.800

Historical Usage



Billing Rate: Gen Svc Demand Summer

Energy Charge	13,120.00	@ $ .0180000 per KWH	$236.16
Demand Charge	52.80	@ $14.0300000 per KW	$740.78
Fuel Charge	13,120.00	@ $ .0310500 per KWH	$407.38
Transmission Service Cost Adj	52.80	@ $ .2668000 per KW	$14.09
[redacted]			
TOTAL CURRENT CHARGES - Electric			$1,398.41

[redacted]

Figure 9: Sample facility utility bill

GENERATING A STATEMENT OF ENERGY PERFORMANCE

A Statement of Energy Performance (SEP) is a required document in applying for ENERGY STAR recognition. It can also be used for purposes other than applying for ENERGY STAR, such as formalizing information regarding a facility's energy performance or energy and environmental performance impacts.

Near the top of the Facility page, click 'Generate a Statement of Energy Performance', as shown below.

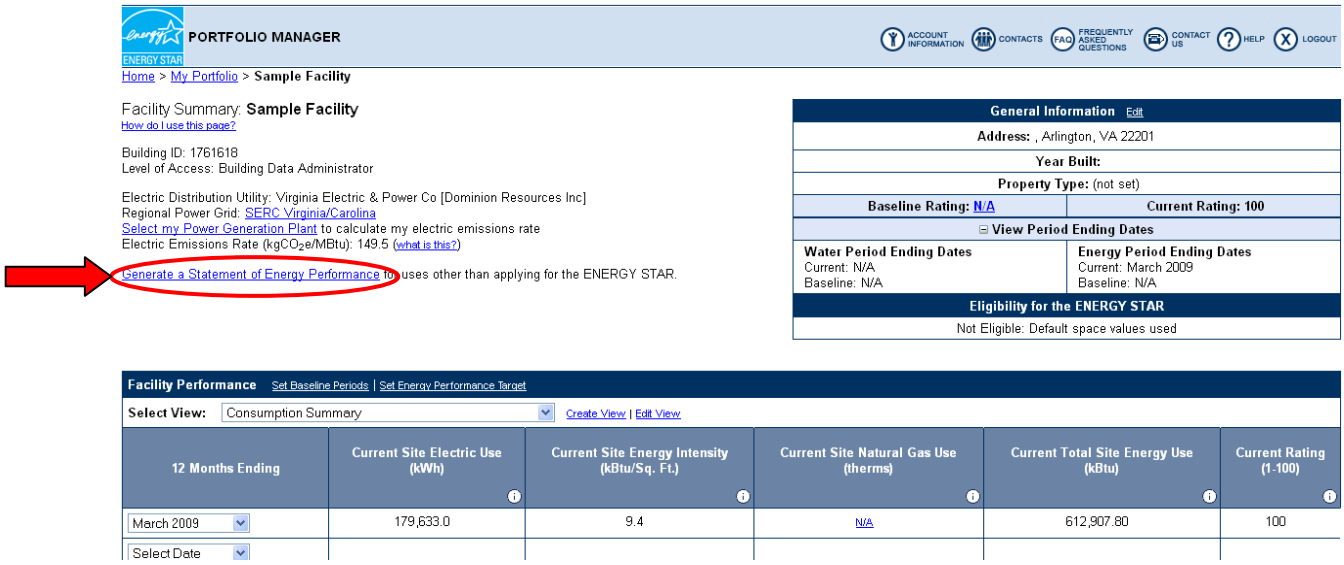


Figure 10: Generating a Statement of Energy Performance from the Facility page

Select reporting options for SEP as shown below, and click **GENERATE REPORT**.

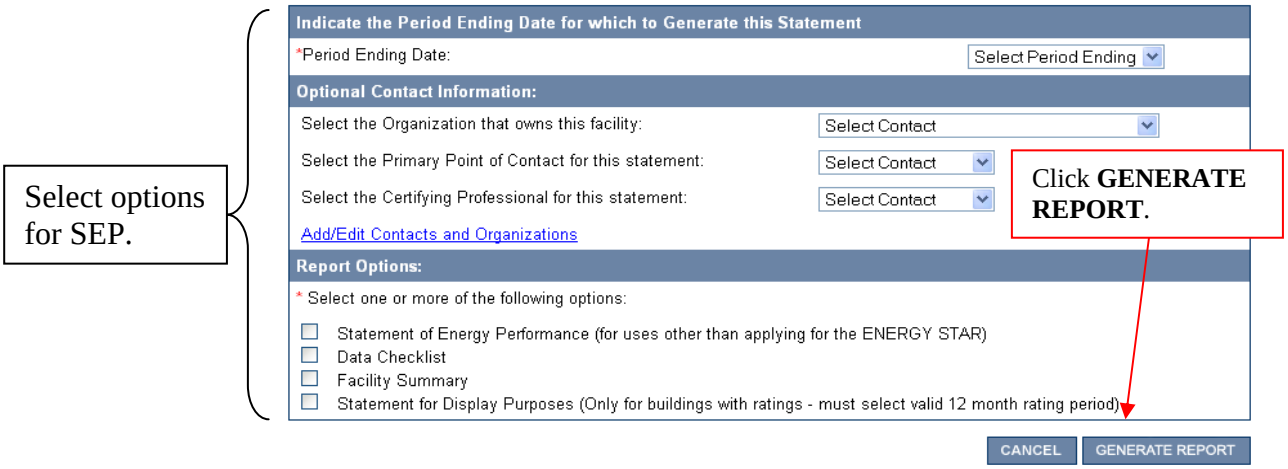


Figure 11: Setting up Statement of Energy Performance

SETTING ENERGY PERFORMANCE BASELINES AND TARGETS

An energy 'Baseline Period' for a facility is a 12-month period of complete energy data that can be compared to a facility's current energy performance. To set a baseline period for a particular facility, click 'Set Baseline Periods' on the main facility page (as shown below).

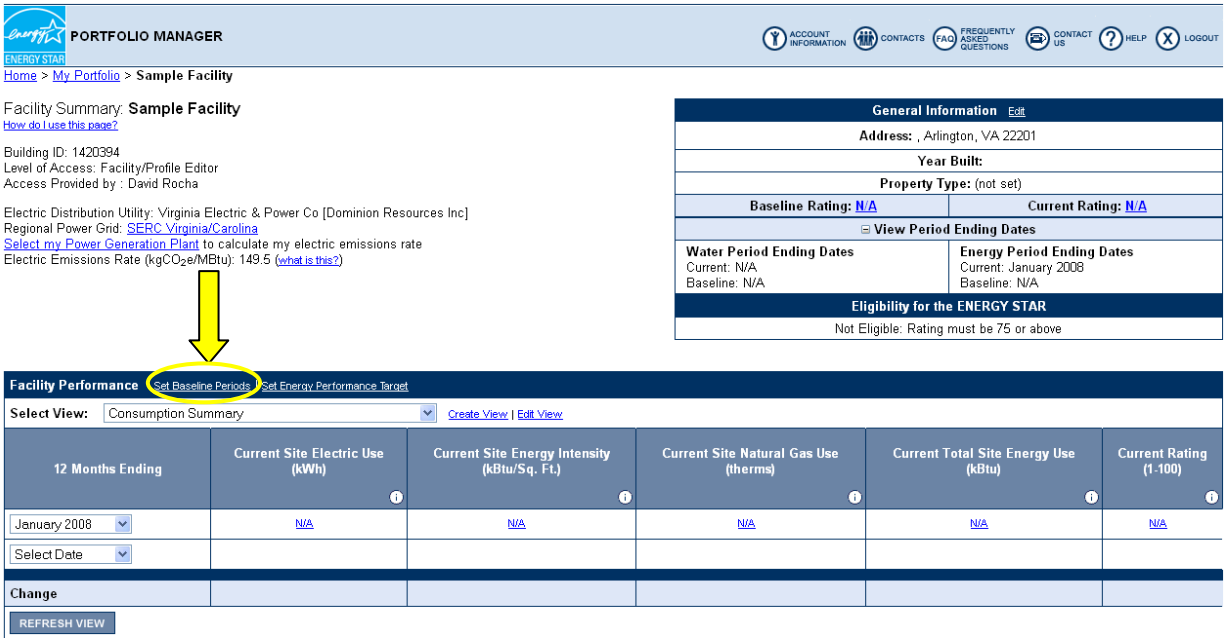


Figure 12: Setting a baseline period for a single facility from the Facility page

Use the drop down menus to select an Energy Baseline Period to compare with the current period. Then click **SAVE**. This will establish the baseline period for the facility. This period can be changed as necessary.

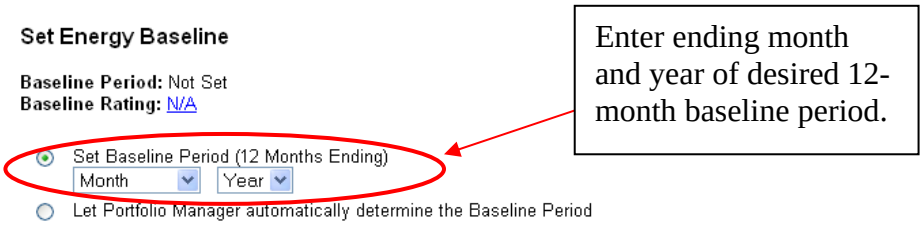


Figure 13: Setting a baseline period for a single facility

Setting an Energy Performance Target for a single facility allows the user to select a desired energy use reduction goal. It can also provide the user with the amount of total energy use reduction required to obtain a particular ENERGY STAR rating. To set an Energy Performance Target for a particular facility, click 'Set Energy Performance Target' on the main facility page (as shown below).

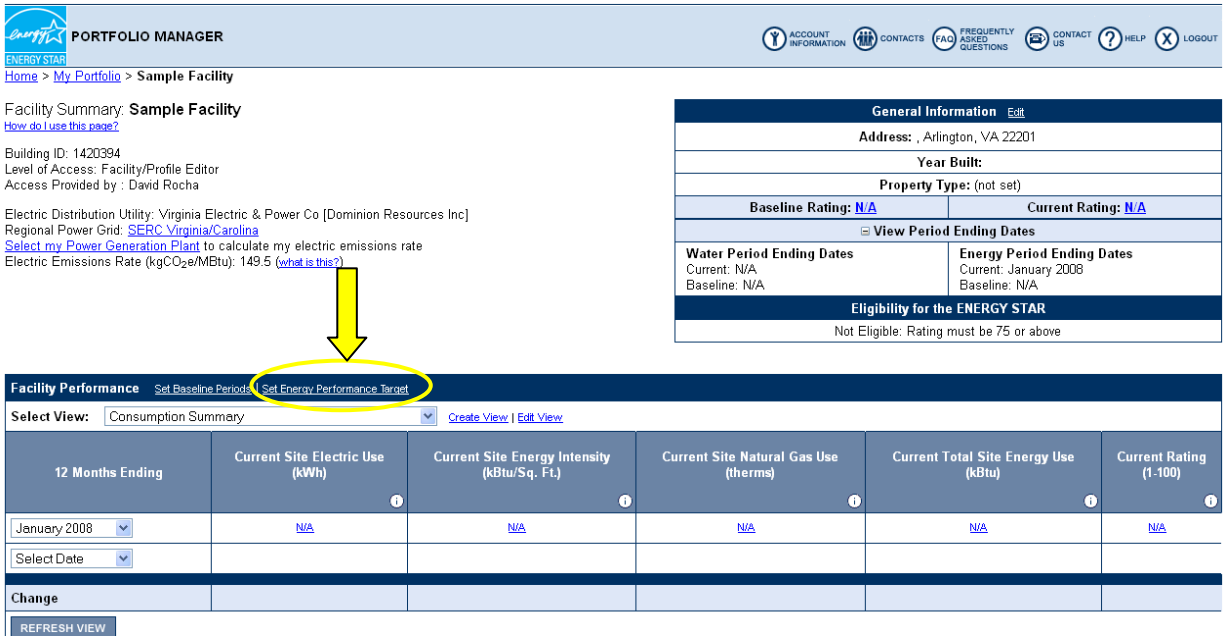


Figure 14: Setting an Energy Performance Target for a single facility from the Facility page

The user can choose one of two methods to set an energy performance target: by ENERGY STAR rating or target reduction (%). Click the desired method, and specify a desired target (as seen below). Click **RECALCULATE** to view the 'Target Energy Use' and 'Energy Cost Savings' results set by the target, and click **SAVE** to keep the current target and return to the Facility page.

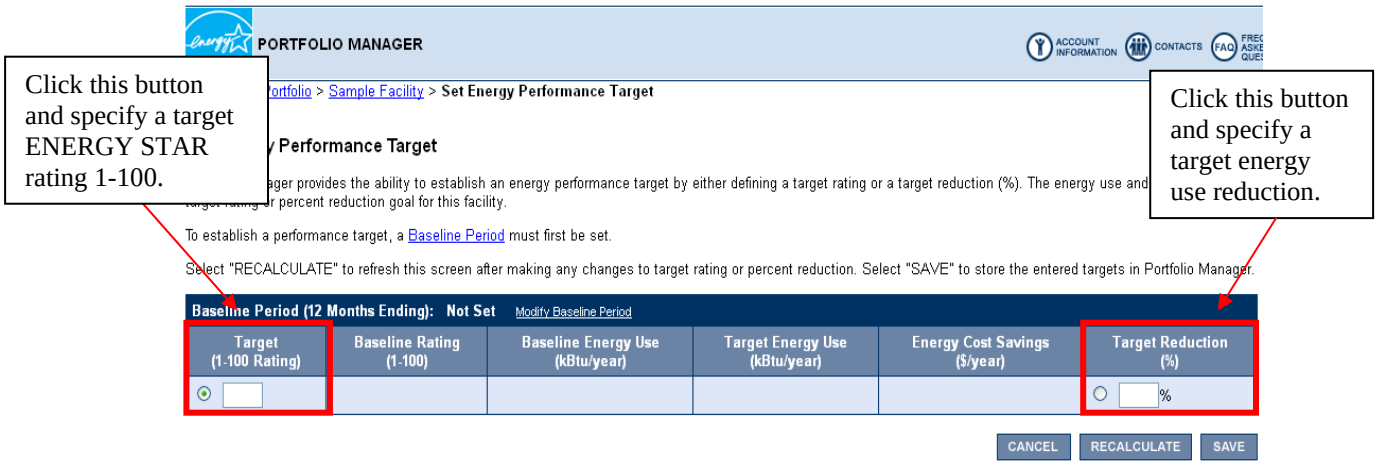


Figure 15: Setting an Energy Performance Target for a single facility

DELETING A FACILITY, SPACE, OR METER

Deleting a facility from Portfolio Manager will delete *everything* associated with that particular facility, including general information (address, year built, type of facility), any spaces designated within the facility, and any Energy/Water meters. To delete a facility, click 'Delete this Facility from Portfolio Manager' on the Main Facility Page, as shown in Figure 16 below.

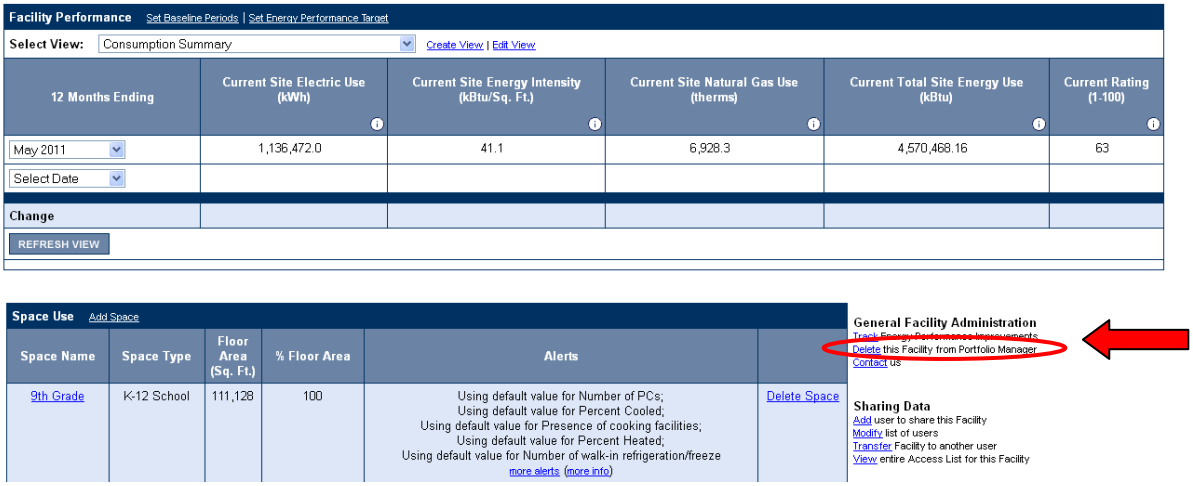


Figure 16: Deleting a facility from the Facility page

Deleting a space from within a facility will remove that single space from the Main Facility page, including any space attribute data associated with the space. To delete a single space from a facility, click 'Delete Space' on the corresponding space from the Main Facility page, as shown in Figure 17 below.

Deleting a meter from a facility will remove *any* data associated with the meter, including energy consumption and cost data. To delete a meter from a facility, click 'Delete Meter' on the corresponding meter form the Main Facility page, as shown below.

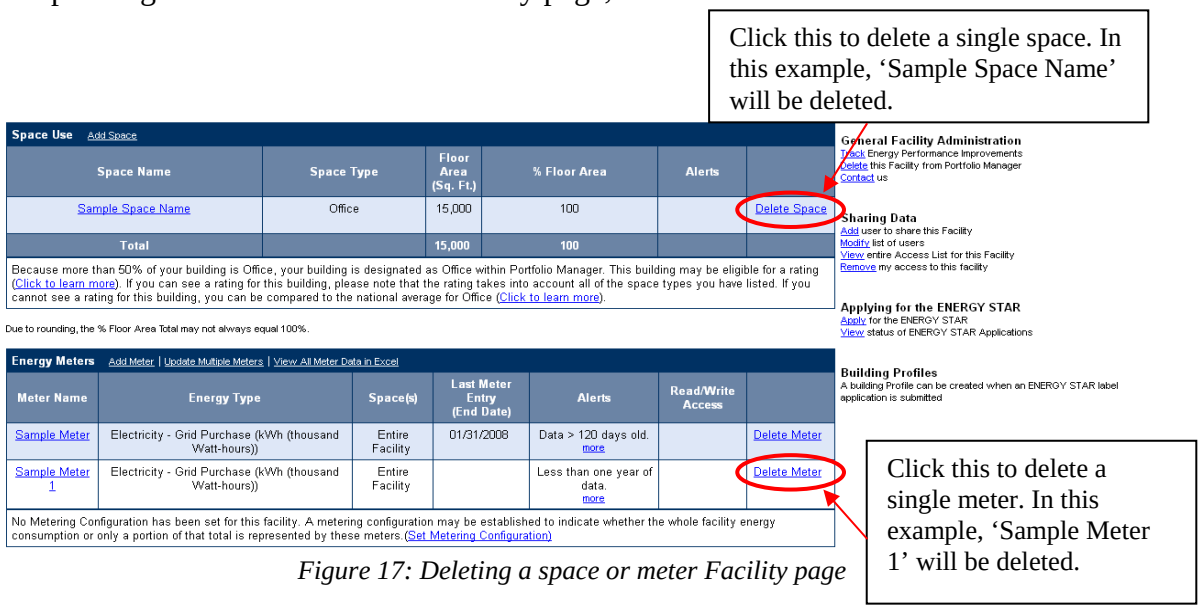


Figure 17: Deleting a space or meter Facility page

VIDEO TUTORIAL AND ONLINE HELP

ENERGY STAR provides Step-by-Step video tutorials for benchmarking using Portfolio Manager. These videos can be found at the following link:

http://www.energystar.gov/ia/business/benchmarking_training/benchmarking.html

In addition, ENERGY STAR provides a detailed 'HELP' section online, as seen in Figure 18.

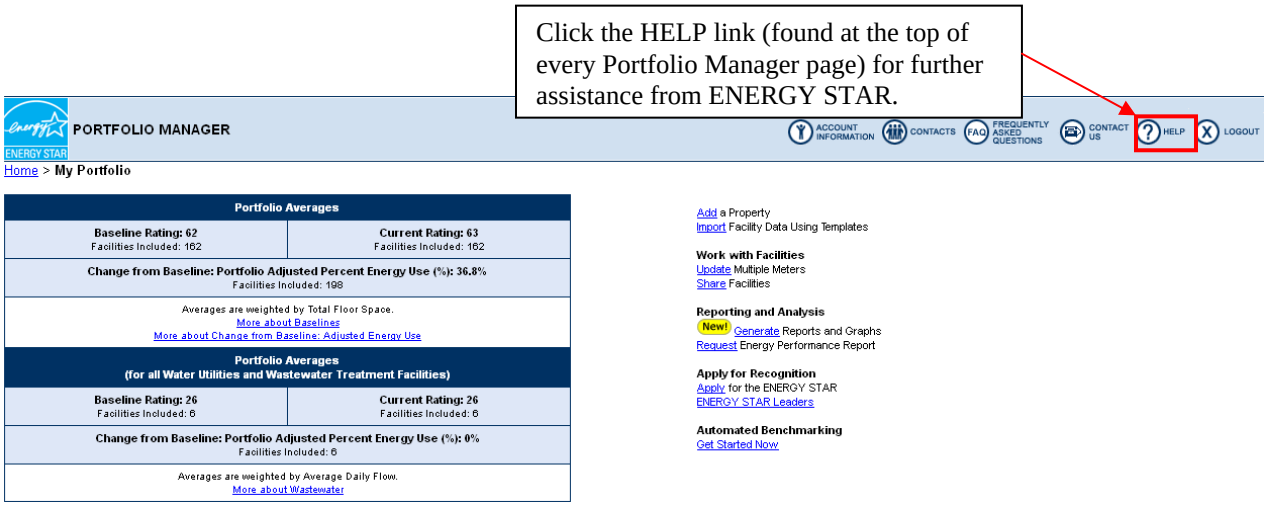


Figure 18: ENERGY STAR Portfolio Manager Help Section

It can also be found at the following link:

https://www.energystar.gov/istar/pmpam/help/portfolio_manager_online_help.htm

The information found in this section provides a wealth of information regarding operation of Portfolio Manager, including a glossary of terms, step-by-step tutorials, instructions for applying for ENERGY STAR recognition, and managing user accounts. It also includes a 'Search' function, which allows the user to locate applicable Help topics.

APPENDIX I

REQUEST FOR ENERGY ASSISTANCE

State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment
Service Agreement

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

Description of the Service

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

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

Principles of the Agreement

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

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

Acceptance of Agreement

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

Signature: Ralph Traynham
Date: 6-23-11
Name (Mr./Ms./Dr.) Mr. Ralph Traynham
Title: Superintendent
Organization: Fort Stockton ISD
Phone: 432-336-4000
Street Address: 101 W Division
Fax: 432-336-4009
Mailing Address:
E-Mail: ralph.traynham@fsisd.net
County: Pecos

Contact Information:

Name (Mr./Ms./Dr.): Ralph Traynham
Title: Superintendent
Phone: 432-336-4000
Fax: 432-336-4009
E-Mail: ralph.traynham@fsisd.net
County: Pecos

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

TEES1CM005-8R-6/27/11