Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Austin ISD

1111 West 6th Street
Austin, Texas 78703

Prepared by:

Texas Energy Engineering Services, Inc.

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June 2011

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Texas Registration #98125

SECO
State Energy Conservation Office

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Schools & Hospitals Energy Management Program

AUSTIN INDEPENDENT SCHOOL DISTRICT
1111 West 6th Street
Austin, TX 78703
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Phone: 512-414-0034

1.0 EXECUTIVE SUMMARY

Austin 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 8.0 of this report.

Implementation Cost Estimate (Est.):	$2,057,384
Annual Energy Saving (MMBTU/Yr):	11,389
Est. Annual Greenhouse Gas Emissions Reduction (Metric Ton CO_2e/Yr):	1,857
Est. Annual Energy Cost Savings:	$246,411
Simple Payback (Yrs):	8.35

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, P.E.
(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.

Galindo Elementary School

Stories:	Single story
Area (estimated):	85,482 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric Vista System

Norman Elementary School

Stories:	Single story
Area (estimated):	58,519 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Air-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric Vista

Pease Elementary School

Stories:	Single story
Area (estimated):	35,623 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in gym
HVAC:	Ground source heat pumps and split-DX units
HVAC Controls:	Standard thermostat

Pleasant Hill Elementary School

Stories:	Single story
Area (estimated):	65,825 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in gym
HVAC:	Water source heat pumps and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric INET system

Oak Hills Elementary School

Stories:	Single story
Area (estimated):	75,143 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water system and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric INET system

Perez Elementary School

Stories:	Single story
Area (estimated):	82,223 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in gym
HVAC:	Air-Cooled Chilled Water system and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric Vista system

St Elmo Elementary School

Stories:	Single story
Area (estimated):	48,122 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Air-Cooled Chilled Water system and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric Vista system

Williams Elementary School

Stories:	Single story
Area (estimated):	64,436 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water system and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric INET system

Dobie Middle School

Stories:	Single story
Area (estimated):	137,256 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Distech Controls

Fulmore Middle School

Stories:	Two story
Area (estimated):	159,179 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Primarily Pneumatic controls (Honeywell), Two (2) heat recovery units, and one (1) make-up air unit with Schneider Electric Vista system

Kealing Middle School

Stories:	Two story
Area (estimated):	192,552 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in gym
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric INET and Vista system

LBJ High School

Stories:	Two story
Area (estimated):	298,027 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in gym
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Heating System
HVAC Controls:	Schneider Electric INET system

Reagan High School

Stories:	Two story
Area (estimated):	255,914 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts, High Intensity Discharge (HID) fixtures in gym
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric INET system

Rosedale School

Stories:	One story
Area (estimated):	36,244 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Heat pump system
HVAC Controls:	Time clock and standard thermostat

McCallum High School

Stories:	One story
Area (estimated):	238,414 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric Vista system

Garza Independence High School

Stories:	Two story
Area (estimated):	46,155 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water source heat pumps and Hot Water Boiler for Heating
HVAC Controls:	Time clock and standard thermostat

Eastside Memorial Global Tech High School

Stories:	Single story
Area (estimated):	276,511 SF
Bldg. Components:	Brick building, built-up roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Water-Cooled Chilled Water Systems and Hot Water Boiler for Heating
HVAC Controls:	Schneider Electric INET system

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 2,155,716 square feet.

Annual electric and natural gas invoices for the buildings surveyed were $2,746,599 for the 12-month period ending December 2010. A summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

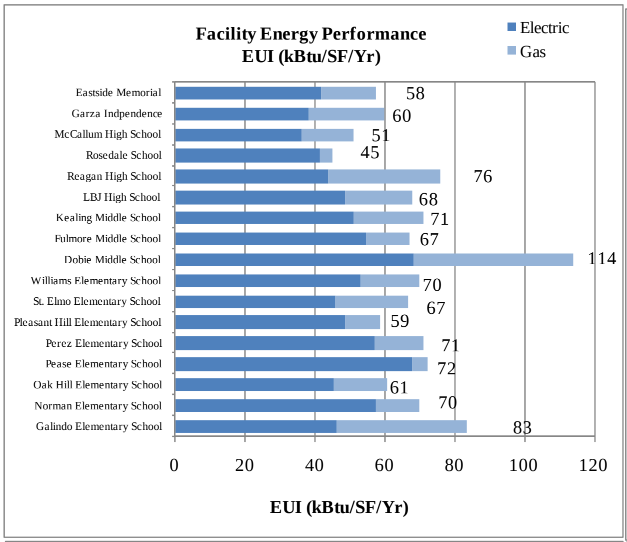
To help the District evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI represents a facility's annual energy usage per square foot; it is measured in thousands of BTUs per square foot per year (kBTU/SF/Year).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

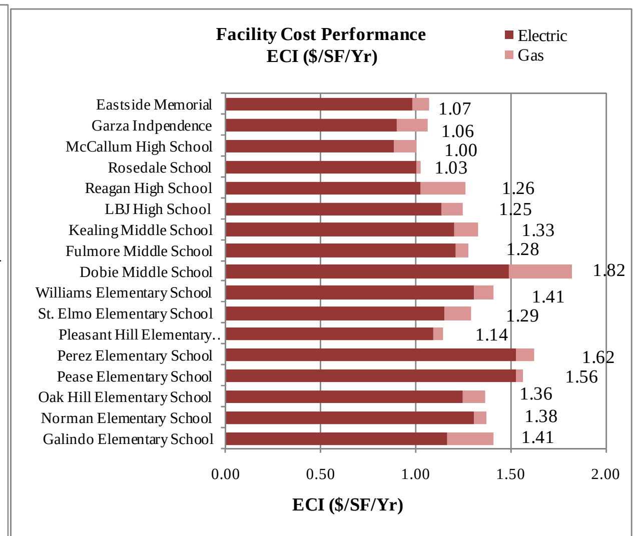
Energy Cost and Consumption Benchmarks

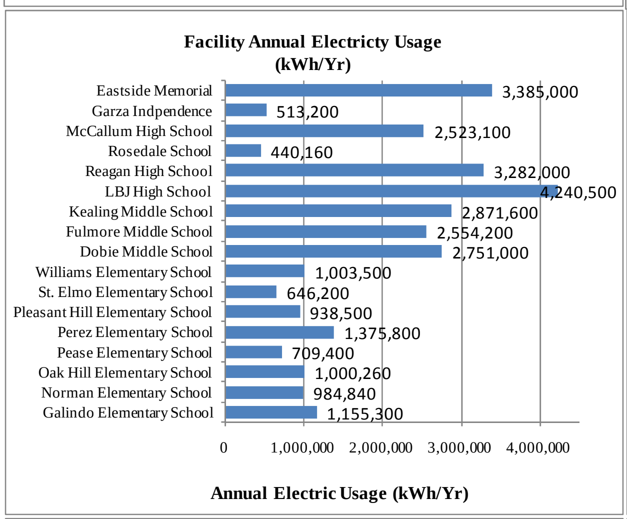
		Electric				Natural Gas				Total	Total	EUI	ECI	
	Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	CF/SF	$Cost/Yr	$Cost/Yr	MMBTU/Y	kBTU/SF/Yr	$/SF/Yr	SF
1	Galindo Elementary School	1,155,300	3,943	13.52	99,560	3,101	3,194	36.3	21,227	120,787	7,137	83	1.41	85,482
2	Norman Elementary School	984,840	3,361	16.83	76,361	693	714	11.8	4,113	80,474	4,075	70	1.38	58,519
3	Oak Hill Elementary School	1,000,260	3,414	13.31	93,702	1,108	1,141	14.7	8,733	102,435	4,555	61	1.36	75,143
4	Pease Elementary School	709,400	2,421	19.91	54,295	149	153	4.2	1,370	55,665	2,574	72	1.56	35,623
5	Perez Elementary School	1,375,800	4,696	16.73	125,881	1,108	1,141	13.5	7,638	133,519	5,837	71	1.62	82,223
6	Pleasant Hill Elementary School	938,500	3,203	14.26	71,676	638	658	9.7	3,660	75,337	3,861	59	1.14	65,825
7	St. Elmo Elementary School	646,200	2,205	13.40	55,549	986	1,016	20.5	6,558	62,107	3,221	67	1.29	48,212
8	Williams Elementary School	1,003,500	3,425	15.57	84,088	1,043	1,074	16.2	6,839	90,927	4,499	70	1.41	64,436
9	Dobie Middle School	2,751,000	9,389	20.04	204,845	6,048	6,229	44.1	45,599	250,444	15,618	114	1.82	137,256
10	Fulmore Middle School	2,554,200	8,717	16.05	192,651	1,911	1,968	12.0	10,794	203,445	10,686	67	1.28	159,179
11	Kealing Middle School	2,871,600	9,801	14.91	232,270	2,856	2,942	14.8	23,480	255,750	12,742	66	1.33	192,552
12	LBJ High School	4,240,500	14,473	14.23	339,691	5,525	5,691	18.5	32,082	371,772	20,163	68	1.25	298,027
13	Reagan High School	3,282,000	11,201	12.82	261,805	7,955	8,194	31.1	61,862	323,667	19,395	76	1.26	255,914
14	Rosedale School	440,160	1,502	12.14	36,295	120	124	3.3	964	37,260	1,626	45	1.03	36,244
15	McCallum High School	2,523,100	8,611	10.58	211,403	3,426	3,529	14.4	27,135	238,539	12,140	51	1.00	238,414
16	Garza Indpendence	513,200	1,752	11.12	41,442	985	1,015	21.3	7,572	49,014	2,766	60	1.06	46,155
17	Eastside Memorial	3,385,000	11,553	12.24	271,948	4,220	4,347	15.3	23,510	295,458	15,900	58	1.07	276,511
		kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	CF/SF	$Cost/Yr	$Cost/Yr	MMBTU/Y	kBTU/SF/Yr	$/SF/Yr	SF
		30,374,560	103,668	14.09	2,453,462	41,872	43,128	19.4	293,137	2,746,599	146,796	68	1.27	2,155,716

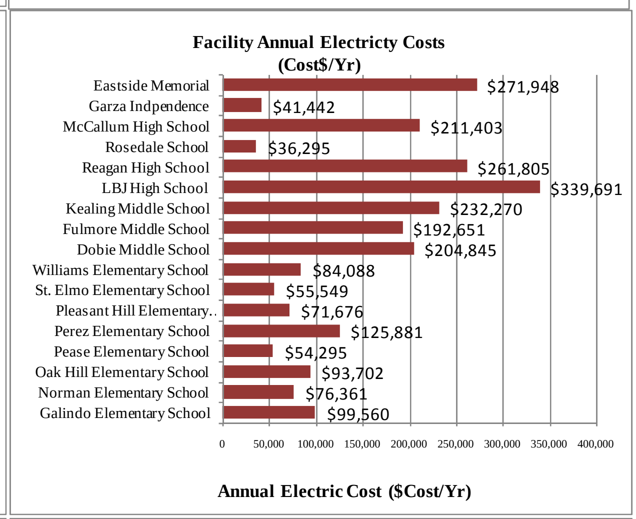
Knowing the EUI and ECI of each facility is useful to help determine the District's overall energy performance. In addition, the District's EUI was compared to TEESI's database of Texas schools. See **Appendix D** to determine how the EUIs of these facilities compared to those of other schools in Texas.

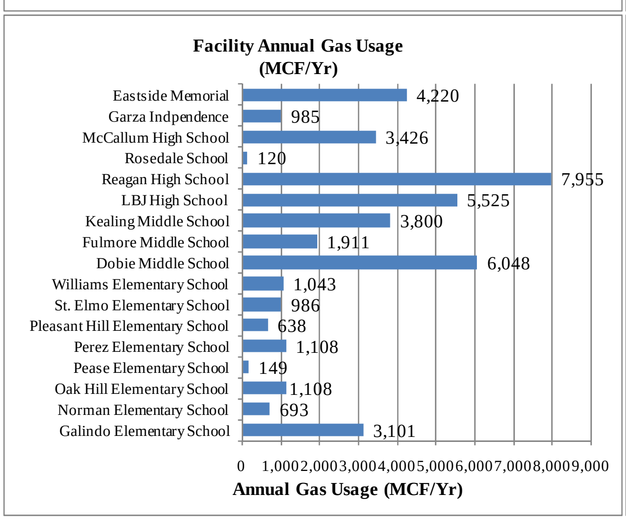
The following charts summarize the data presented in the previous table. See **Appendix C** for further detail.

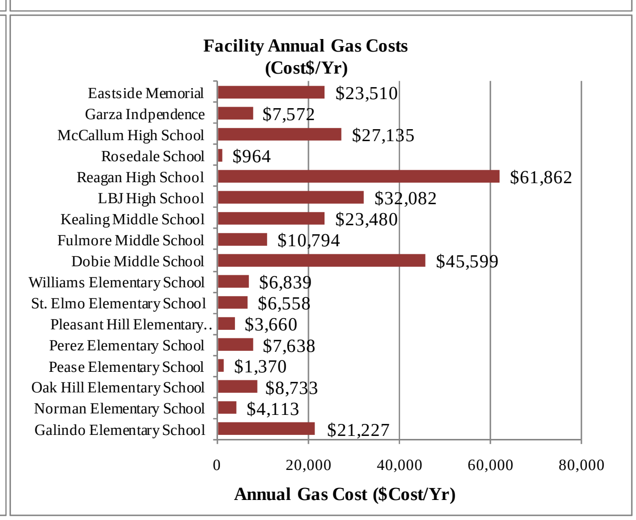


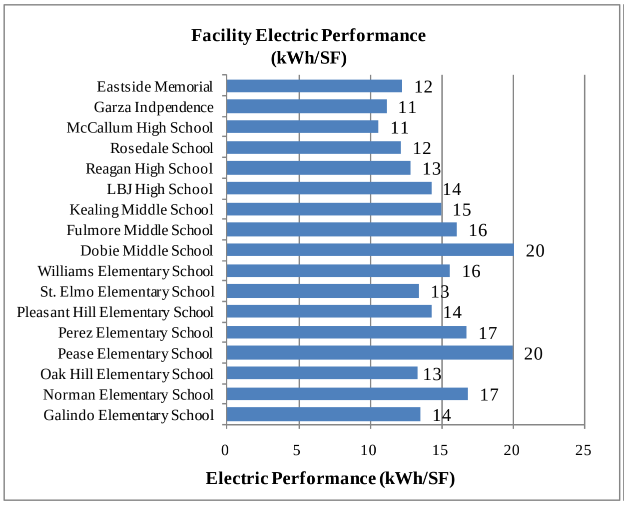


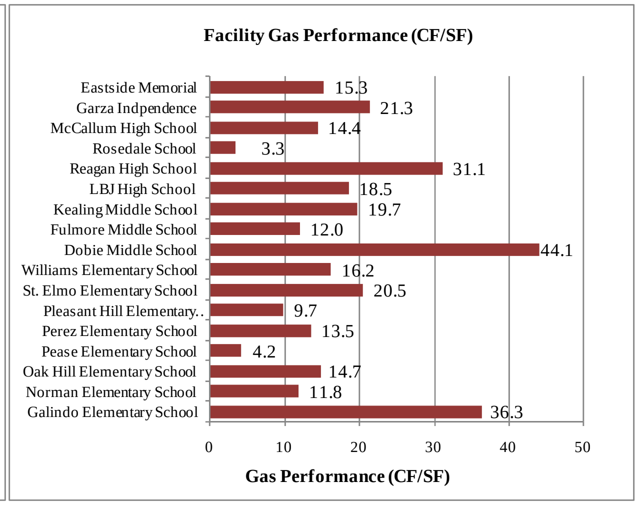




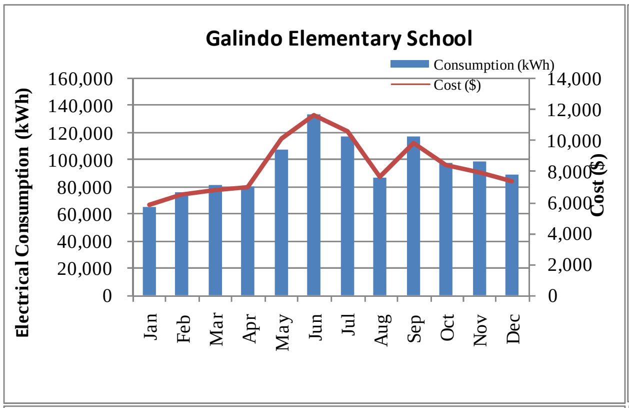


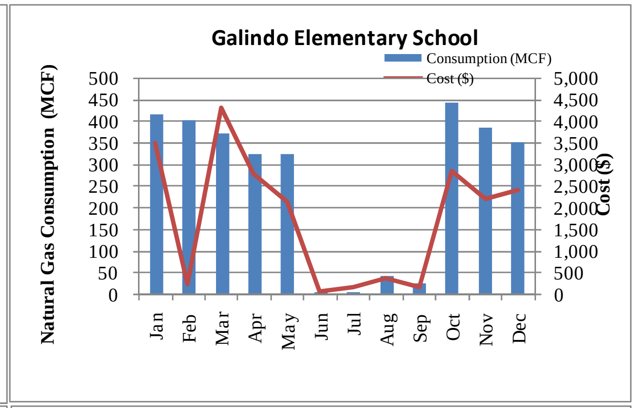


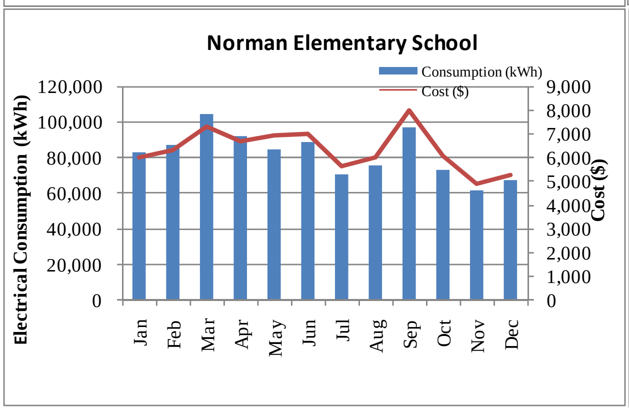

Facility Electric Performance (kWh/SF)
Eastside Memorial 12
Garza Indpendence 11
McCallum High School 11
Rosedale School 12
Reagan High School 13
LBJ High School 14
Kealing Middle School 15
Fulmore Middle School 16
Dobie Middle School 20
Williams Elementary School 16
St. Elmo Elementary School 13
Pleasant Hill Elementary School 14
Perez Elementary School 17
Pease Elementary School 20
Oak Hill Elementary School 13
Norman Elementary School 17
Galindo Elementary School 14
0 5 10 15 20 25
Electric Performance (kWh/SF)

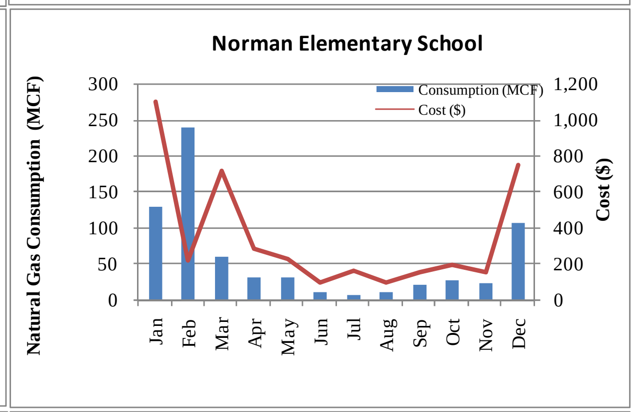

Facility Gas Performance (CF/SF)
Eastside Memorial 15.3
Garza Indpendence 21.3
McCallum High School 14.4
Rosedale School 3.3
Reagan High School 31.1
LBJ High School 18.5
Kealing Middle School 19.7
Fulmore Middle School 12.0
Dobie Middle School 44.1
Williams Elementary School 16.2
St. Elmo Elementary School 20.5
Pleasant Hill Elementary... 9.7
Perez Elementary School 13.5
Pease Elementary School 4.2
Oak Hill Elementary School 14.7
Norman Elementary School 11.8
Galindo Elementary School 36.3
0 10 20 30 40 50
Gas Performance (CF/SF)

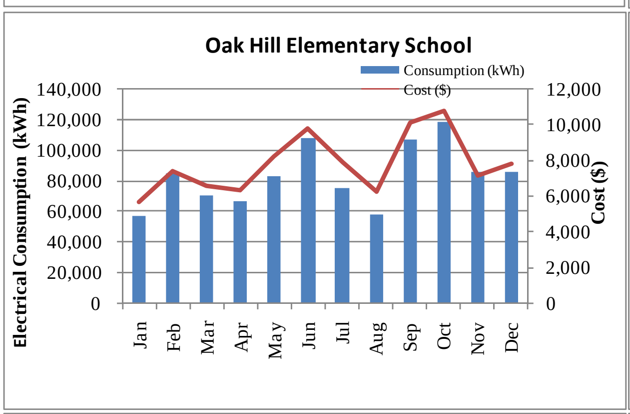
The following charts summarize the each campus monthly utility data. See **Appendix C** for further detail.

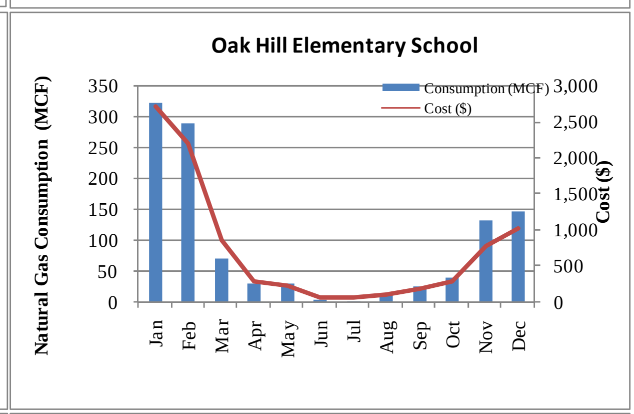


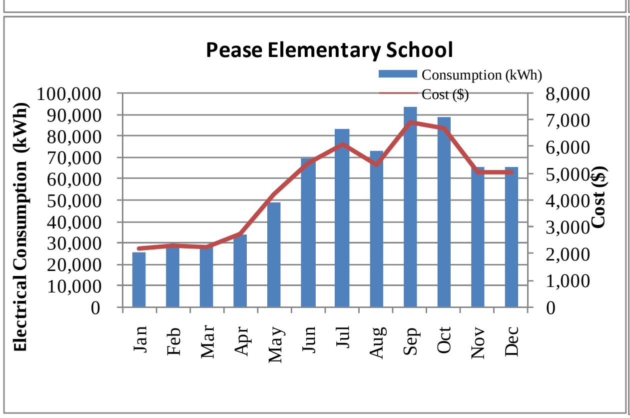


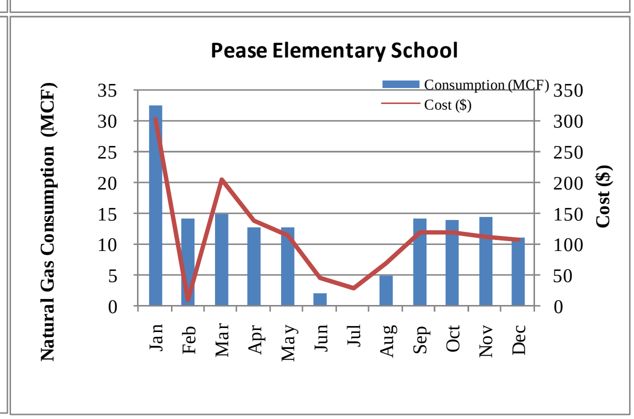


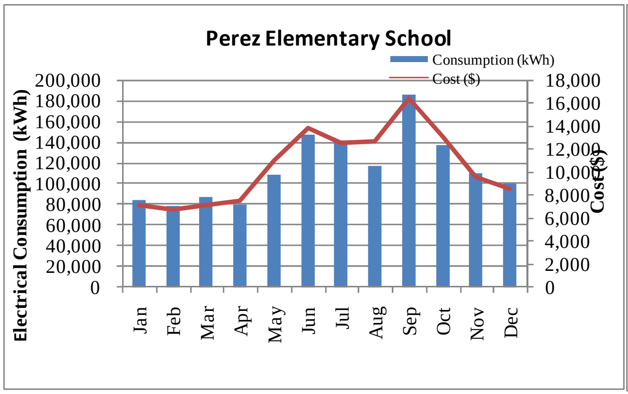


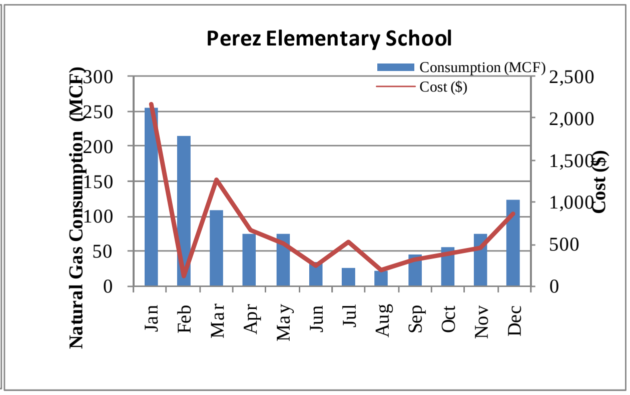


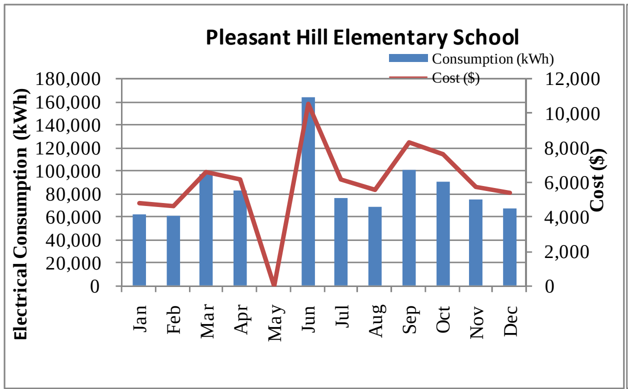


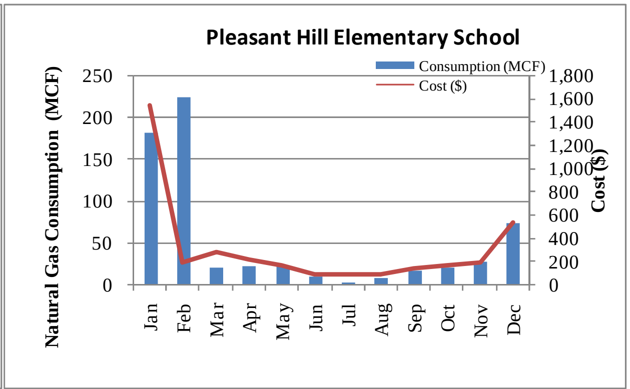





Perez Elementary School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Perez Elementary School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
300
250
200
150
100
50
0
2,500
2,000
1,500
1,000
500
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Pleasant Hill Elementary School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Pleasant Hill Elementary School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
250
200
150
100
50
0
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
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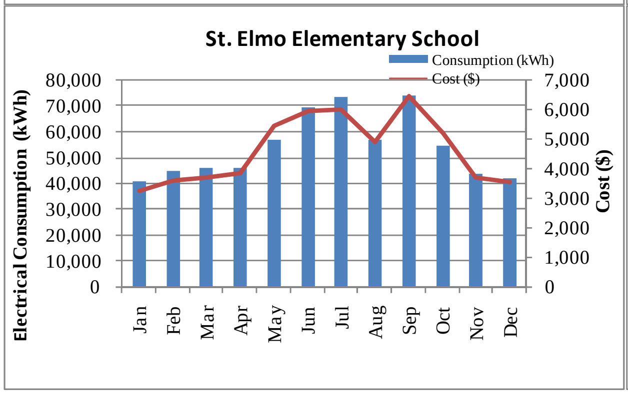
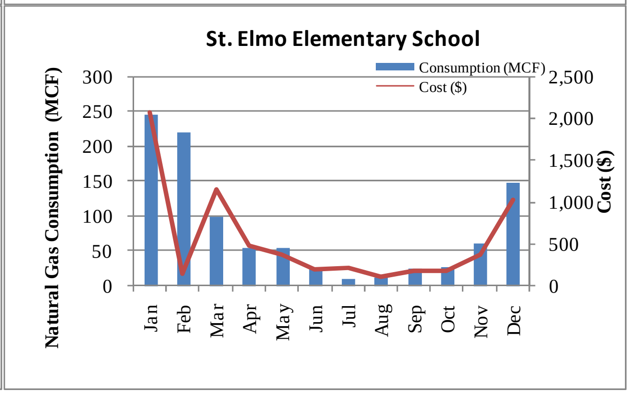
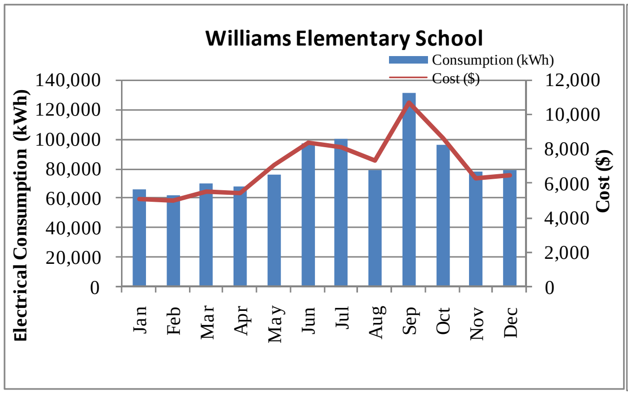

St. Elmo Elementary School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


St. Elmo Elementary School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
300
250
200
150
100
50
0
2,500
2,000
1,500
1,000
500
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Williams Elementary School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
12,000
10,000
8,000
6,000
4,000
2,000
0
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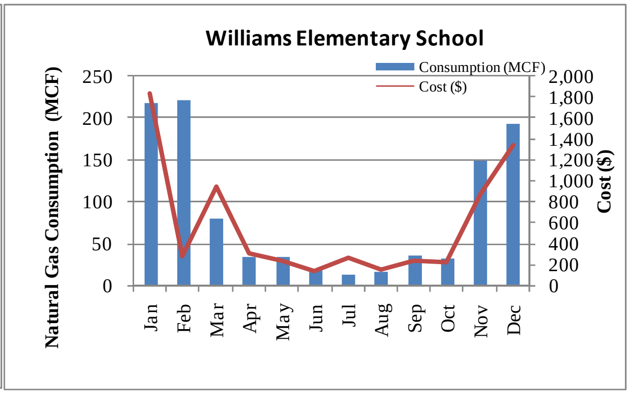
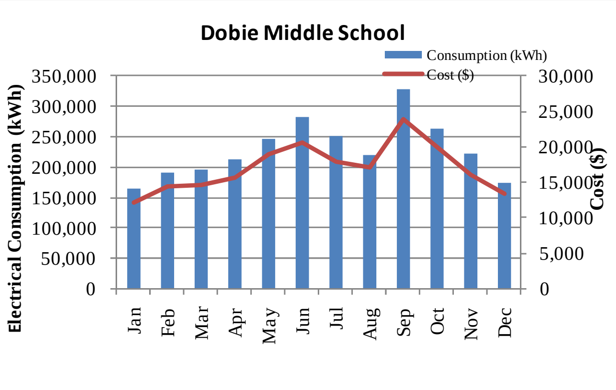
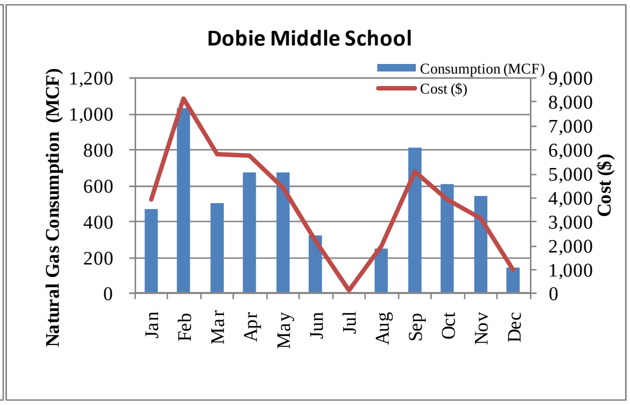

Williams Elementary School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
250
200
150
100
50
0
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Dobie Middle School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Dobie Middle School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
1,200
1,000
800
600
400
200
0
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
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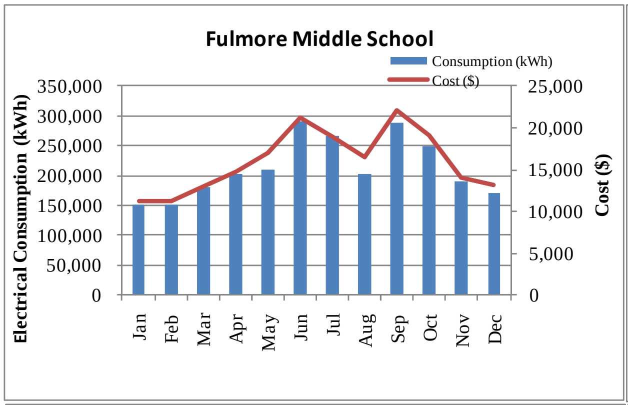
Fulmore Middle School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
25,000
20,000
15,000
10,000
5,000
0
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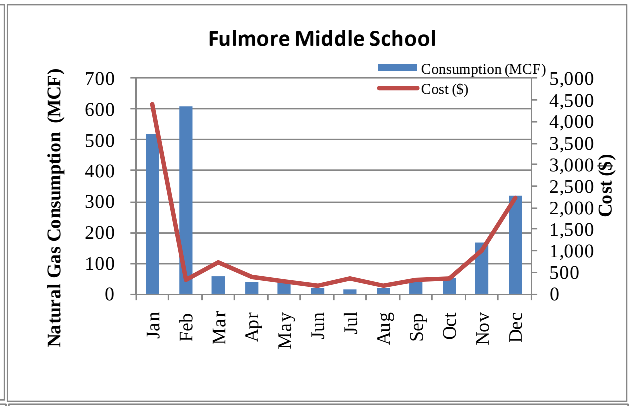
Fulmore Middle School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
700
600
500
400
300
200
100
0
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
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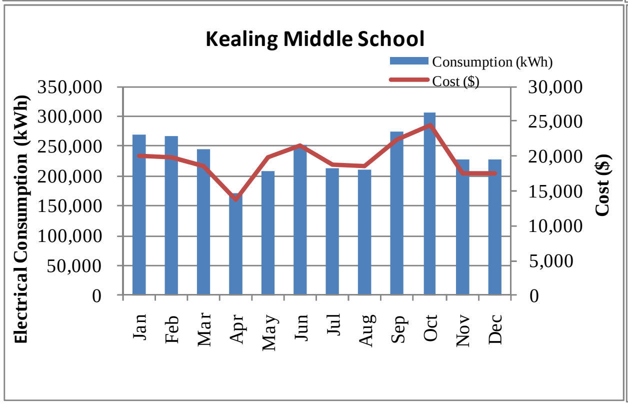
Kealing Middle School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
30,000
25,000
20,000
15,000
10,000
5,000
0
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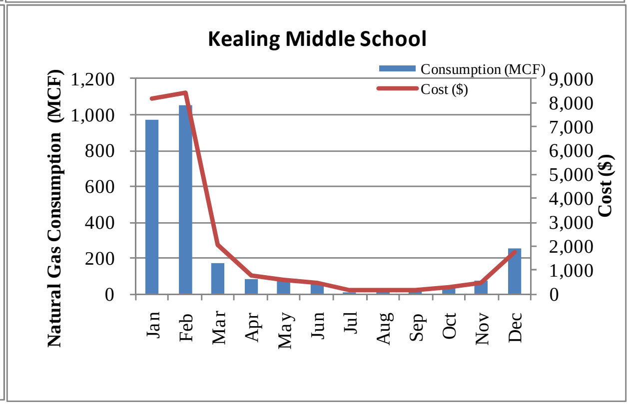
Kealing Middle School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
1,200
1,000
800
600
400
200
0
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
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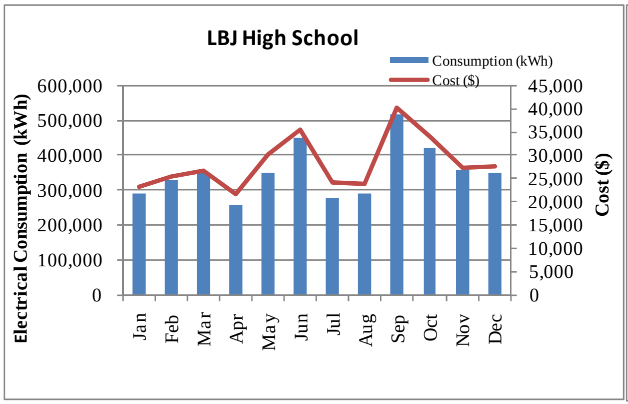
LBJ High School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
600,000
500,000
400,000
300,000
200,000
100,000
0
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
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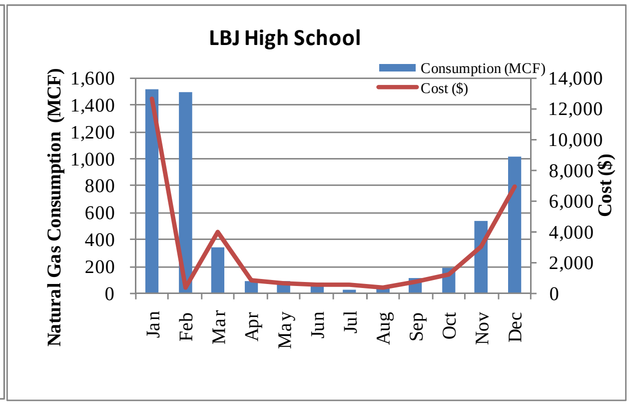
LBJ High School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
1,600
1,400
1,200
1,000
800
600
400
200
0
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
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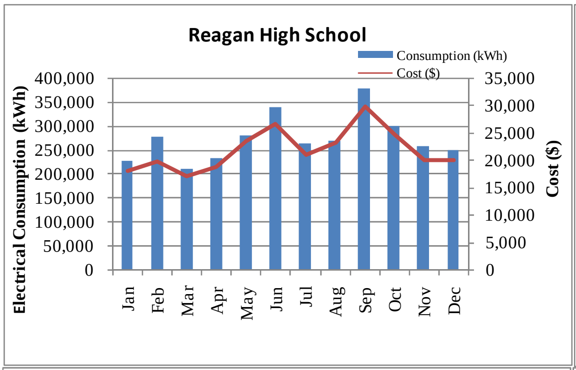
Reagan High School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
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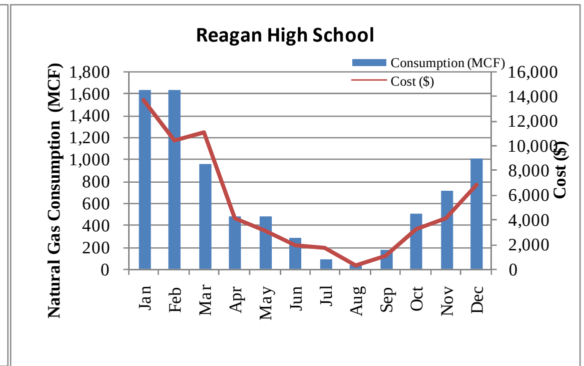
Reagan High School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
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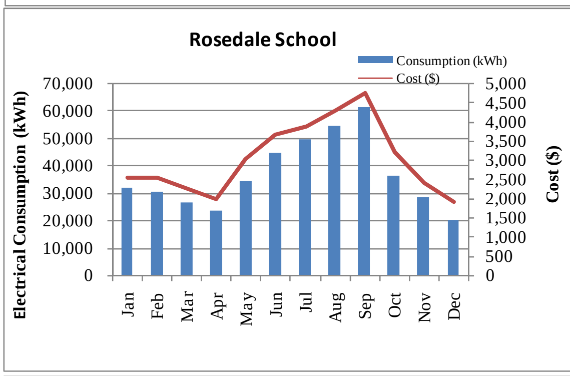
Rosedale School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
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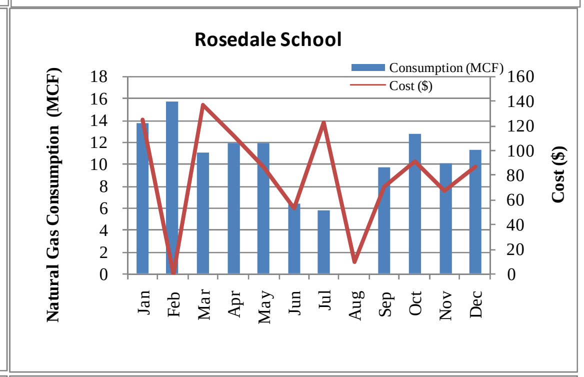
Rosedale School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
18
16
14
12
10
8
6
4
2
0
160
140
120
100
80
60
40
20
0
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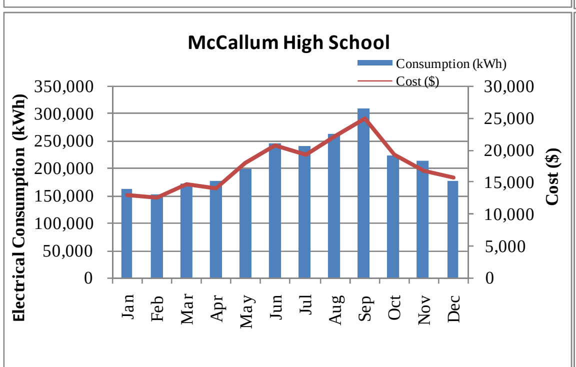
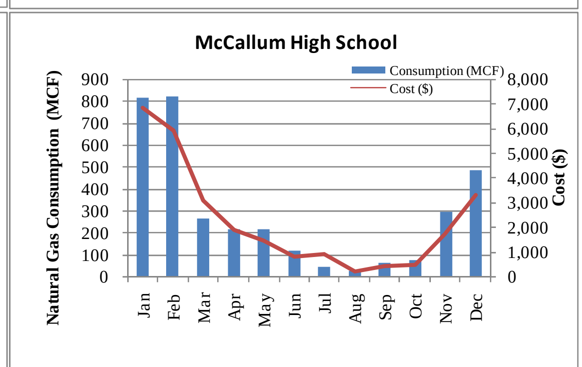
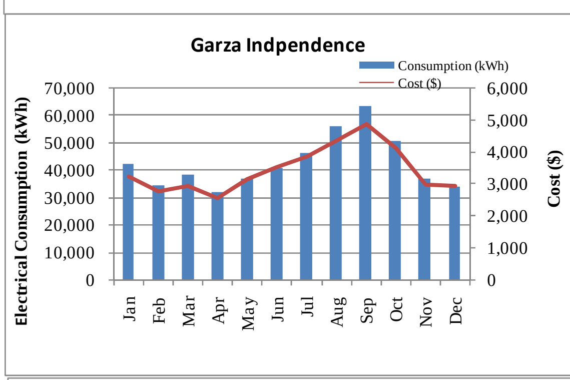
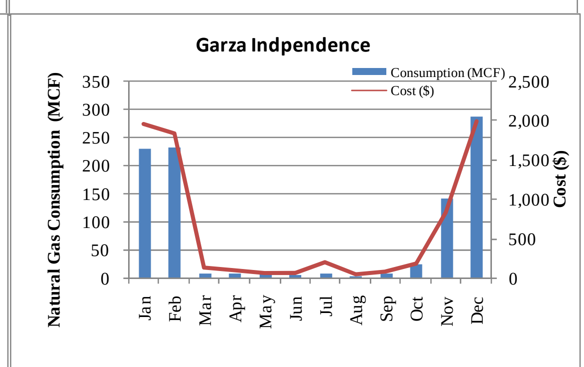
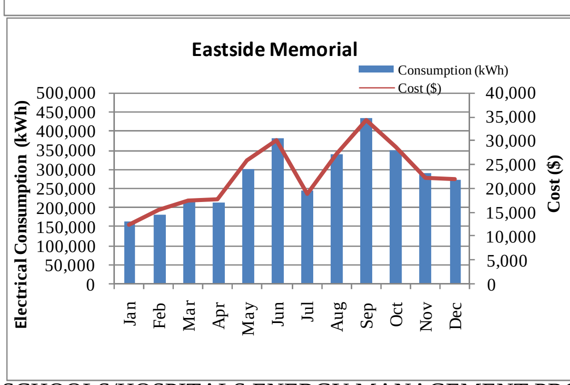
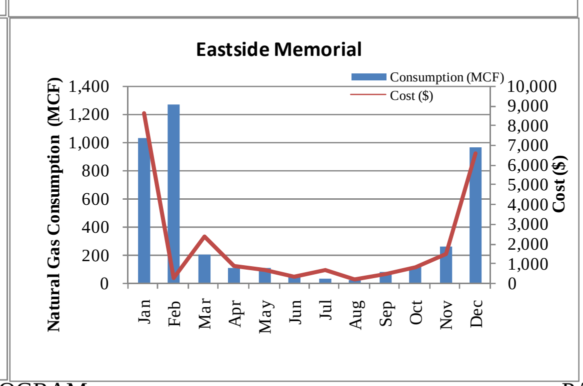

McCallum High School
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


McCallum High School
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
900
800
700
600
500
400
300
200
100
0
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Garza Indpendence
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Garza Indpendence
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
350
300
250
200
150
100
50
0
2,500
2,000
1,500
1,000
500
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Eastside Memorial
Consumption (kWh)
Cost ($)
Electrical Consumption (kWh)
Cost ($)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Eastside Memorial
Consumption (MCF)
Cost ($)
Natural Gas Consumption (MCF)
Cost ($)
1,400
1,200
1,000
800
600
400
200
0
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

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 below 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)

5.0 ENERGY ACCOUNTING

UTILITY PROVIDERS

Austin Energy provides electric service to the District. Texas Gas provides natural gas service to the District.

MONITORING AND TRACKING

Recently, the District has contracted with an outfit to develop a database for all AISD utility accounts for monitoring energy use and cost tracking purposes. An effective energy tracking system is an essential tool for monitoring an energy management program's activities. The system, once put in place, is anticipated to be available for all engaged staff members and consultants to use in verifying progress toward established targets and milestones.

Preferably, the District should also consider interfacing the new system with ENERGY STAR Portfolio Manager, which will provide a means of storing and tracking utility information and provide comparisons nationwide. 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 6.0 for additional information regarding these requirements.

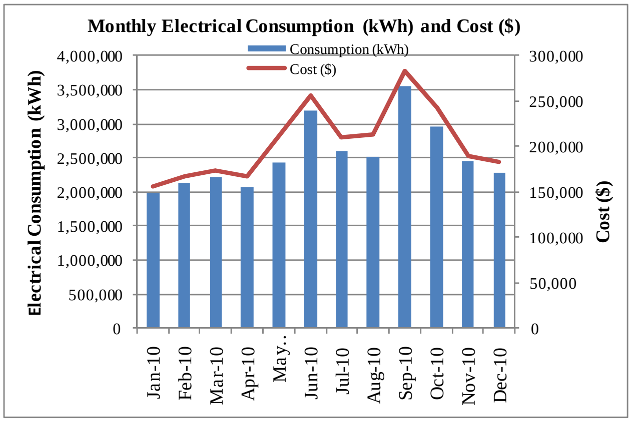
Furthermore, below is a sample format the District can customize to help summarize their overall utility usage and costs.

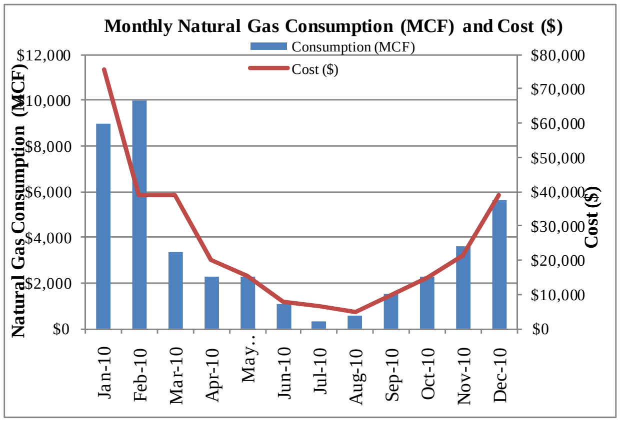
The data presented below is a summation of the data provided by the District. This data below includes only selected utility accounts and is for reference purposes only and does not represent the District's total utility data. See **Appendix C** for further detail regarding each utility account represented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

AUSTIN ISD - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Jan-10	1,984,860	$155,705	$0.0784	8,991	$75,657	$8.4
Feb-10	2,136,640	$166,634	$0.0780	9,976	$39,120	$3.9
Mar-10	2,220,160	$173,037	$0.0779	3,357	$39,149	$11.7
Apr-10	2,069,600	$166,554	$0.0805	2,290	$20,080	$8.8
May-10	2,426,380	$211,956	$0.0874	2,290	$15,436	$6.7
Jun-10	3,199,780	$255,777	$0.0799	1,062	$7,682	$7.2
Jul-10	2,591,660	$209,973	$0.0810	304	$6,477	$21.3
Aug-10	2,518,500	$212,717	$0.0845	562	$4,671	$8.3
Sep-10	3,560,940	$283,884	$0.0797	1,529	$9,937	$6.5
Oct-10	2,950,920	$244,011	$0.0827	2,278	$14,975	$6.6
Nov-10	2,442,800	$189,817	$0.0777	3,609	$21,069	$5.8
Dec-10	2,272,320	$183,397	$0.0807	5,626	$38,885	$6.9
Total	30,374,560	$2,453,462	$0.0808	41,872	$293,137	$7.0

Gross Building Area:	2,155,716	SF





6.0 ENERGY LEGISLATION OVERVIEW

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

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.**

7.0 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.

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.

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

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

CONTROL OUTSIDE AIR INFILTRATION

Conduct periodic inspections of door and window weather-stripping, and schedule repairs when needed. Additionally, make sure doors and windows are closed during operation of HVAC systems (heating or cooling). Unintended outside air contributes to higher energy consumption and increases occupant discomfort.

REPLACE INCANDESCENT LAMPS WITH COMPACT FLUORESCENTS

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

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.

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.

8.0 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 and design will be required to determine exact cost, systems compatibility with existing ballast, 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)**
Galindo Elementary School	$12,000	$2,200	87	5.5
Norman Elementary School	$8,200	$1,500	66	5.5
Oak Hill Elementary School	$10,500	$1,900	69	5.5
Pease Elementary School	$5,000	$800	36	6.3
Perez Elementary School	$11,500	$2,100	78	5.5
Pleasant Hill Elementary School	$9,200	$1,700	76	5.4
St. Elmo Elementary School	$6,700	$1,200	48	5.6
Williams Elementary School	$9,000	$1,600	65	5.6
Dobie Middle School	$19,200	$3,800	174	5.1
Fulmore Middle School	$22,300	$4,500	204	5.0
Kealing Middle School	$27,000	$5,400	228	5.0
LBJ High School	$41,700	$9,300	396	4.5
Rosedale School	$5,100	$900	37	5.7
McCallum High School	$33,400	$7,400	301	4.5
Garza Indpendence	$5,800	$1,000	41	5.8
Eastside Memorial	$38,700	$8,600	350	4.5
TOTAL	**$265,300**	**$53,900**	**2256**	**4.9**

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. Please note these estimates are 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 typically 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)
Galindo Elementary School	$18,900	$1,900	75	9.9
Norman Elementary School	$13,500	$1,600	70	8.4
Oak Hill Elementary School	$16,500	$1,700	62	9.7
Pease Elementary School	$9,300	$900	40	10.3
Perez Elementary School	$39,600	$4,100	153	9.7
Pleasant Hill Elementary School	$21,000	$2,300	103	9.1
St. Elmo Elementary School	$14,400	$1,400	56	10.3
Williams Elementary School	$17,100	$1,800	73	9.5
Dobie Middle School	$24,900	$2,500	115	10.0
Fulmore Middle School	$26,700	$2,700	122	9.9
Kealing Middle School	$58,500	$6,500	274	9.0
LBJ High School	$50,700	$5,600	239	9.1
Reagan High School	$78,000	$9,200	394	8.5
Rosedale School	$10,200	$1,400	58	7.3
McCallum High School	$70,200	$8,300	338	8.5
Garza Indpendence	$14,100	$2,200	93	6.4
Eastside Memorial	$13,500	$1,500	64	9.0
TOTAL	**$497,100**	**$55,600**	**2,328**	**8.9**

HID TO FLUORESCENT FIXTURE LIGHTING RETROFIT

Some areas in the District utilize High Intensity Discharge (HID) fixtures for lighting. It is recommended that the District replace the existing HID fixtures with T8 fluorescent fixtures suitable for high bay applications (e.g. Gym and cafeteria). Fluorescent fixtures offer improved control, reduce energy consumption and improve lighting levels. In addition, due to the long re-strike times associated with HID fixtures, they cannot be effectively switched on/off during unoccupied periods. This causes the HID lamps to operate longer, which both consumes more energy and affects lamp life. The cost and savings estimates below are based on preliminary observations and analysis.

HID TO F32T8 HBF FIXTURE RETROFIT

Building	Estimated Implementation Cost	Estimated Annual Savings ($/yr)	Estimated Annual MMBTU Savings (MMBTU/yr)	Simple Payback (years)
Pease Elementary School	$4,200	$600	27	7.0
Perez Elementary School	$5,250	$800	30	6.6
Pleasant Hill Elementary School	$2,800	$400	18	7.0
Kealing Middle School	$11,200	$1,600	67	7.0
LBJ High School	$16,800	$2,400	102	7.0
Garza Indpendence	$2,800	$400	17	7.0
Eastside Memorial	$7,000	$1,000	42	7.0
TOTAL	**$50,050**	**$7,200**	**304**	**7.0**

EXTERIOR SECURITY AND SITE LIGHTING RETROFIT

Most areas in the District utilize High Intensity Discharge (HID) fixtures for exterior lighting. It is recommended that the District replace the existing HID fixtures with a combination of Pulse Start Metal Halide (MH), LED, and Compact Fluorescent (CFL) fixtures suitable for the application. Care should be used when developing a retrofit/replacement strategy so that minimum security lighting levels are not sacrificed when retrofit is complete. Therefore, lighting levels should be calculated to determine the post retrofit levels are acceptable. In addition, compatibility with existing ballasts, local codes and other requirements must be verified prior to retrofitting. Nevertheless, if suitable for the application, switching to lower wattage lamps with greater lumen maintenance can have sustainable energy savings with minimal impact. An example retrofit strategy is shown below:

SECURITY/SITE LIGHTING RETROFIT STRATEGY			
Existing Fixture	**Existing Example Lamp Type and Wattage**	**Retrofit Scope**	**Retrofit Lamp Type and Wattage**
Pole Light	400W HID	Lamp/Ballast Replacement	320W MH
Pole Light, Short	250W HID	Lamp/Ballast Replacement	200W MH
Security Wall Pack	150W/175W HID	LED Security Wall Pack Fixture Replacement	56W LED
Security Wall Pack, Low	70 HID	LED Security Wall Pack Fixture Replacement	26W LED
Security Wall Pack, Flood	250 HID	Lamp/Ballast Replacement	200W MH
Surface Mount	150W/175W HID	LED Surface Mount Fixture Replacement	56W LED
Recessed	70 HID	Lamp Replacement with CFL	50W CFL
Incandescent Wall	100W Incandescent	Lamp Replacement with CFL	26W CFL

The estimated costs and savings noted below are based on a preliminary walkthrough of the facilities listed and the retrofit strategy indicated above. A detailed lighting analysis will be required to determine exact cost, quantities and configuration to maximize the energy savings and lighting performance.

SECURITY/SITE LIGHTING RETROFIT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Norman Elementary School	$6,045	$570	25	10.6
Pease Elementary School	$8,405	$818	36	10.3
Perez Elementary School	$13,595	$1,794	67	7.6
Pleasant Hill Elementary School	$24,415	$2,413	108	10.1
Williams Elementary School	$10,715	$1,277	52	8.4
Dobie Middle School	$10,825	$1,103	51	9.8
Fulmore Middle School	$6,525	$672	30	9.7
Kealing Middle School	$8,459	$816	34	10.4
LBJ High School	$5,325	$669	29	8.0
Garza Indpendence	$6,300	$620	26	10.2
Eastside Memorial	$21,000	$2,057	87	10.2
TOTAL	**$121,609**	**$12,811**	**546**	**9.5**

INSTALL VARIABLE FREQUENCY DRIVES ON AIR HANDLING UNITS

Install Variable Frequency Drives (VFDs) on selected Air-Handling Units (AHUs) serving the facilities listed below. The VFDs will allow the AHU's fan speed to modulate according to system demand. The application of VFDs will improve system operation and reduce energy consumption, and enhance comfort control. The estimated cost below includes the installation of VFDs and controls integration.

Oak Hill elementary school: Install VFDs for 2 AHUs with a total of 20 hp
Fulmore middle school: Install VFDs for 1 AHU with a total of 15 hp
Kealing middle school: Install VFDs for 3 AHUs with a total of 45 hp

INSTALL AHU VFDs				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Oak Hill Elementary School	$13,000	$1,600	58	8.1
Fulmore Middle School	$9,750	$1,200	54	8.1
Kealing Middle School	$29,250	$4,200	177	7.0
TOTAL	**$52,000**	**$7,000**	**290**	**7.4**

INSTALL VARIABLE FREQUENCY DRIVES ON PUMPS

Install Variable Frequency Drives (VFDs) on the selected pumps serving the facilities listed below. Cooling load, supply water temperature, and fractional distribution of the load among cooling coils, all affect how much chilled water flow is required and at what pressure. To minimize the pump power required, the number of parallel pumps operating and the speed at which they must both be optimized. The optimum number of pumps to run is a function of the system resistance and the flow rate of the pumps. The optimum pump speed is that which supplies just enough pressure for all of the loads. An excellent indicator of that is the fraction open of the most-open control valve served by that pump. If it exceeds about 90% open, the pump should speed up. If it is less open, the pump should slow down. Optionally, if the fraction open of each valve is not available to the EMS, the EMS can control the pressure at some selected point in the system to a value that is known to be sufficient for full load operation of every load served by the pump.

Provisions to ensure minimum flow through each chiller are necessary. In some cases, an automated bypass valve may be required. Any balancing valves in series with the cooling coils should be replaced with pipe, or at least opened fully. Any balancing valves in parallel with the cooling coils (where 3-way coil control valves are used) should be closed. In some cases, some coil control valves should be replaced.

INSTALL PUMP VFDs				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Annual MMBTU Savings (MMBTU/yr)**	**Simple Payback (years)**
Norman Elementary School	$28,000	$3,300	145	8.5
LBJ High School	$56,000	$6,200	264	9.0
TOTAL	**$84,000**	**$9,500**	**409**	**8.8**

INSTALL ENERGY MANAGEMENT SYSTEM (EMS)

Install Direct Digital Control (DDC) Energy Management System (EMS) to provide optimum scheduling and precise temperature supervision for the HVAC systems throughout each facility listed in the table below. The EMS will minimize the run time of the units while maintaining comfort throughout the facility. Additionally, EMS can remotely diagnose and document HVAC maintenance problems. Presently the District's HVAC systems are controlled using conventional thermostats and time clock system. Installing an EMS will improve maintenance, management and performance. The EMS systems priced below will have basic functions such as remote access capabilities, multiple scheduling, space temperature reset, and optimum start/stop features. The table below summarizes the estimated cost and saving for each proposed EMS project.

EMS INSTALLATION				
Building	Estimated Implementation Cost	Estimated Annual Savings ($/yr)	Estimated Annual MMBTU Savings (MMBTU/yr)	Simple Payback (years)
Pease Elementary School	$121,500	$7,100	317	17.1
Fulmore Middle School	$310,500	$17,300	783	17.9
Reagan HS (Performing Art Section)	$78,200	$4,500	192	17.4
TOTAL	**$510,200**	**$28,900**	**1,292**	**17.7**

HVAC SYSTEMS COMMISSIONING (Cx)

Detailed HVAC & Control system commissioning in an existing building involves analysis of existing systems to ensure compliance with original set-up/design conditions and, where feasible, conduct basic research to adjust operating parameters to enhance comfort and reduce energy consumption. Overall, the goal of commissioning is to deliver a facility that operates as it was intended, meets the needs of the building owner and occupants, and provides training of facility operators. To reach this goal it is necessary for the commissioning process to provide documentation and verification of the performance of all building equipment and systems. For the process to work successfully it is equally important to have good communications between all participants (owners, operators and the commissioning agent) and to keep all parties involved and informed of all pertinent decisions.

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

Preliminary examination (utility data review, discussion with staff, EMS review, and walkthrough) of Austin ISD facilities indicate potential for energy cost savings primarily in the HVAC systems operations. The facilities would greatly benefit by implementing a comprehensive building Commissioning (Cx) program that ensures the optimization of HVAC systems for the building's existing conditions, works to improve the building air quality, increase comfort levels, and resolve any operating problems. The Commissioning program requires collaborative efforts between the commissioning engineers and the facility staff, and is an ongoing process that continues to both commission the building as well as train the facility staff. A comprehensive commissioning program such as continuous commissioning is typically characterized as fast payback, usually 12 - 60 months. Examples include verification and adjustment of the chiller, boiler, air handler and terminal box operation and sequences; calibration of control systems and temperature settings; balancing conditioned air and/or chilled water flows; etc.

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

1. Central Plant Optimization.

   - Select enabled chiller set (and speed, if variable) for best chiller efficiency.
   - Optimize Chilled Water (CHW) flows between chillers for peak combined efficiency.
   - Select each hydronic loop pump set to match the head/flow^2 ratio of that loop.
   - Control each hydronic loop pump relative speed from most open valve and/or highest relative pump speed of downstream tier.
   - Boiler start/stop operation and reset schedule.
   - Chillers start/stop, temperature reset and scheduling.

2. Optimize AHU operations.

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

3. Recalibrate sensors.

   - Temperature: occupied spaces, return air, discharge air, cold and hot deck, outdoor
   - Differential Pressure: primary supply duct – space, space – outdoors, ChWS – ChWR, HWS – HWR.

- Humidity: occupied spaces, return air, humidifier discharge, outdoor
- Airflow Measurement: Outdoor intake, supply air, return, relief and exhaust where applicable, zone terminal unit (hot, cold and/or mixed, as applicable).

4. Set up trends for major parameters.

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

5. Identify malfunctioning devices.

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

6. Reprogram control sequences where required

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

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

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

BUILDING COMISSIONING (Cx)				
Building	Estimated Implementation Cost	Estimated Annual Savings ($/yr)	Estimated Annual MMBTU Savings (MMBTU/yr)	Simple Payback (years)
Dobie Middle School	$87,400	$19,400	1,210	4.5
Kealing Middle School	$115,500	$19,600	1,051	5.9
LBJ High School	$178,800	$32,500	1,763	5.5
Repair Cost	$95,425	-	-	-
TOTAL	**$477,125**	**$71,500**	**4,024**	**6.7**

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

SUMMARY OF UTILITY 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	$265,300	$53,900	2,273	4.9
MOTION SENSOR INSTALLATION	$497,100	$55,600	2,328	8.9
HID TO F32T8 HBF FIXTURE RETROFIT	$50,050	$7,200	304	7.0
SECURITY/SITE LIGHTING RETROFIT	$121,609	$12,811	546	9.5
INSTALL AHU VFDs	$52,000	$7,000	290	7.4
INSTALL PUMP VFDs	$84,000	$9,500	409	8.8
EMS INSTALLATION	$510,200	$28,900	1,292	17.7
BUILDING COMISSIONING (Cx)	$477,125	$71,500	3,949	6.7
TOTAL:	**$2,057,384**	**$246,411**	**11,389**	**8.35**

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

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

9.0 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.

INSTALL ENERGY MANAGEMENT SYSTEM (EMS)

Install Direct Digital Control (DDC) Energy Management System (EMS) to provide optimum scheduling and precise temperature supervision for the HVAC systems throughout each facility listed in the table below. The EMS will minimize the run time of the units while maintaining comfort throughout the facility. Additionally, EMS can remotely diagnose and document HVAC maintenance problems. Presently the District's HVAC systems are controlled using conventional thermostats and time clock. Installing an EMS will improve maintenance, management and performance. The EMS systems priced below will have basic functions such as remote access capabilities, multiple scheduling, space temperature reset, and optimum start/stop features. The table below summarizes the estimated cost and saving for each proposed EMS project.

CAPITAL RETROFIT - EMS INSTALLATION	
Project Description	**Estimated Implementation Cost**
Rosedale School	$121,500
Garza Indpendence	$99,200
TOTAL	**$220,700**

10.0 ENERGY MANAGEMENT POLICY

The District currently does have an energy management policy in place. An Energy Management Policy adopted by the school board sends a strong signal that energy management is an institutional priority. 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. The following elements should be included in the current District energy management plan; furthermore, it is recommended that item one (1) below be incorporated immediately:

1. ESTABLISH ACCEPTABLE EQUIPMENT PARAMETERS

   Establish a District-wide uniform temperature set point range for all HVAC systems. The temperature set points should be top management approved. Having a standard temperature set point will help keep HVAC runtimes to a minimum, resulting in desired energy savings as well as reduced maintenance needs. 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. In addition, areas with special equipment (MDF/IDF, server rooms, etc.) or materials (wood flooring, paper storage, etc.) should be maintained at the equipment supplier's recommended settings and settings appropriate to the material.

   Occupied Cooling Temperature Setpoints:
   Instructional Areas 74 F – 76 F
   Admin Areas 73 F – 76 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

   Shutdown:
   Complete facility shutdown should be evaluated on annual basis and implemented where feasible. This will result in HVAC system shutdown during summer and holidays.

2. 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. 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.

3. ESTABLISH A WATER MANAGEMENT PROGRAM

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

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

11.0 FUNDING OPTIONS FOR 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.

12.0 ANALYST IDENTIFICATION

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

M. Saleem Khan, P.E., CxA

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:

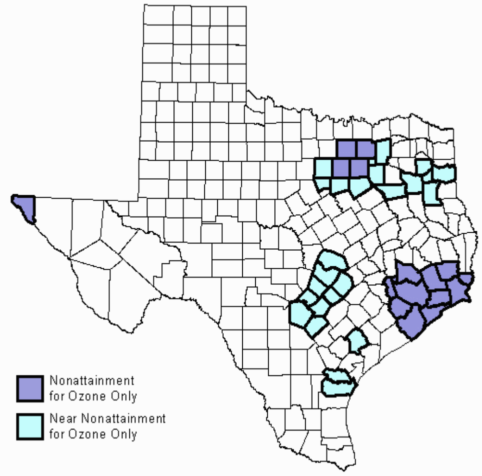
• installation of insulation and high-efficiency windows and doors • modifications or replacement of HVAC systems, lighting fixtures and electrical systems • installation of automatic energy control systems • installation of energy recovery systems or renewable energy generation equipment • building 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.

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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.

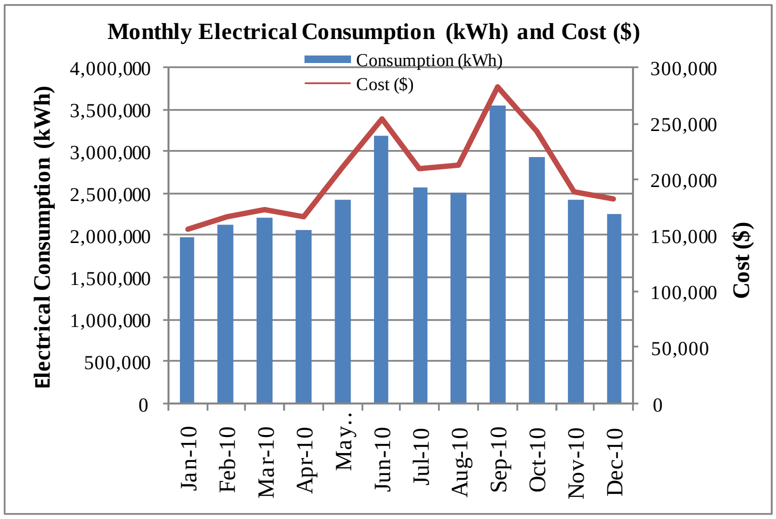
APPENDIX B

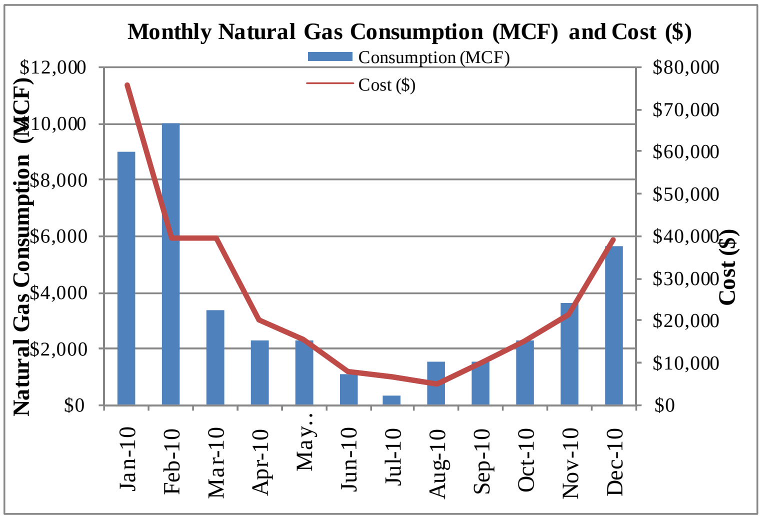
SAMPLE UTILITY DATA REPORTING FORM

AUSTIN ISD - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Jan-10	1,984,860	$155,705	$0.0784	8,991	$75,657	$8.4
Feb-10	2,136,640	$166,634	$0.0780	9,976	$39,120	$3.9
Mar-10	2,220,160	$173,037	$0.0779	3,357	$39,149	$11.7
Apr-10	2,069,600	$166,554	$0.0805	2,290	$20,080	$8.8
May-10	2,426,380	$211,956	$0.0874	2,290	$15,436	$6.7
Jun-10	3,199,780	$255,777	$0.0799	1,062	$7,682	$7.2
Jul-10	2,591,660	$209,973	$0.0810	304	$6,477	$21.3
Aug-10	2,518,500	$212,717	$0.0845	562	$4,671	$8.3
Sep-10	3,560,940	$283,884	$0.0797	1,529	$9,937	$6.5
Oct-10	2,950,920	$244,011	$0.0827	2,278	$14,975	$6.6
Nov-10	2,442,800	$189,817	$0.0777	3,609	$21,069	$5.8
Dec-10	2,272,320	$183,397	$0.0807	5,626	$38,885	$6.9
Total	30,374,560	$2,453,462	$0.0808	41,872	$293,137	$7.0

Gross Building Area:	2,155,716	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	CF/SF	$Cost/Yr	$Cost/Yr	MMBTU/Y	kBTU/SF/Yr	$/SF/Yr	SF
1	Galindo Elementary School	1,155,300	3,943	13.52	99,560	3,101	3,194	36.3	21,227	120,787	7,137	83	1.41	85,482
2	Norman Elementary School	984,840	3,361	16.83	76,361	693	714	11.8	4,113	80,474	4,075	70	1.38	58,519
3	Oak Hill Elementary School	1,000,260	3,414	13.31	93,702	1,108	1,141	14.7	8,733	102,435	4,555	61	1.36	75,143
4	Pease Elementary School	709,400	2,421	19.91	54,295	149	153	4.2	1,370	55,665	2,574	72	1.56	35,623
5	Perez Elementary School	1,375,800	4,696	16.73	125,881	1,108	1,141	13.5	7,638	133,519	5,837	71	1.62	82,223
6	Pleasant Hill Elementary School	938,500	3,203	14.26	71,676	638	658	9.7	3,660	75,337	3,861	59	1.14	65,825
7	St. Elmo Elementary School	646,200	2,205	13.40	55,549	986	1,016	20.5	6,558	62,107	3,221	67	1.29	48,212
8	Williams Elementary School	1,003,500	3,425	15.57	84,088	1,043	1,074	16.2	6,839	90,927	4,499	70	1.41	64,436
9	Dobie Middle School	2,751,000	9,389	20.04	204,845	6,048	6,229	44.1	45,599	250,444	15,618	114	1.82	137,256
10	Fulmore Middle School	2,554,200	8,717	16.05	192,651	1,911	1,968	12.0	10,794	203,445	10,686	67	1.28	159,179
11	Kealing Middle School	2,871,600	9,801	14.91	232,270	2,856	2,942	14.8	23,480	255,750	12,742	66	1.33	192,552
12	LBJ High School	4,240,500	14,473	14.23	339,691	5,525	5,691	18.5	32,082	371,772	20,163	68	1.25	298,027
13	Reagan High School	3,282,000	11,201	12.82	261,805	7,955	8,194	31.1	61,862	323,667	19,395	76	1.26	255,914
14	Rosedale School	440,160	1,502	12.14	36,295	120	124	3.3	964	37,260	1,626	45	1.03	36,244
15	McCallum High School	2,523,100	8,611	10.58	211,403	3,426	3,529	14.4	27,135	238,539	12,140	51	1.00	238,414
16	Garza Indpendence	513,200	1,752	11.12	41,442	985	1,015	21.3	7,572	49,014	2,766	60	1.06	46,155
17	Eastside Memorial	3,385,000	11,553	12.24	271,948	4,220	4,347	15.3	23,510	295,458	15,900	58	1.07	276,511
		kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	MCF/Yr	MMBTU/Yr	CF/SF	$Cost/Yr	$Cost/Yr	MMBTU/Y	kBTU/SF/Yr	$/SF/Yr	SF
		30,374,560	103,668	14.09	2,453,462	41,872	43,128	19.4	293,137	2,746,599	146,796	68	1.27	2,155,716

District: Austin ISD

ACCOUNT# 510334 Electric

1408519 1444101 Gas

BUILDING: Galindo Elementary School

FLOOR AREA: 85,482 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 ($)
Jan	2010	64,800		348		5,842	415	3,495
Feb	2010	76,200		336		6,465	403	231
Mar	2010	81,300		345		6,835	373	4,315
Apr	2010	81,000		369		6,937	323	2,791
May	2010	107,700		441		10,116	323	2,136
Jun	2010	134,400		468		11,629	7	69
Jul	2010	117,600		462		10,605	8	176
Aug	2010	87,600		315		7,671	45	360
Sep	2010	117,900		363		9,803	27	188
Oct	2010	98,400		327		8,394	442	2,838
Nov	2010	99,300		363		7,913	384	2,214
Dec	2010	89,100		342		7,350	350	2,414
TOTAL		1,155,300				99,560	3,101.2	21,227

Energy Use Index:

Annual Total Energy Cost = 120,787 $/year

Total site BTU's/Yr ÷ Total Area (SF) = 83 kBTU/SF/year

Total KWH/yr x 0.003413 = 3,943.04 MMBTU/year

Total MCF/yr x 1.03 = 3,194.21 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 7,137 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.41 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 15133 Electric
1090361 1400503 Gas
BUILDING: Norman Elementary School

FLOOR AREA: 58,519 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 ($)
Jan	2010	83,280		196		6,051	128	1,095
Feb	2010	87,360		205		6,355	238	218
Mar	2010	104,160		202		7,332	60	711
Apr	2010	91,680		220		6,692	30	282
May	2010	84,480		234		6,953	30	220
Jun	2010	88,440		232		7,016	11	96
Jul	2010	70,800		193		5,673	7	158
Aug	2010	75,240		204		6,029	10	93
Sep	2010	97,320		287		7,990	20	147
Oct	2010	72,840		224		6,058	27	192
Nov	2010	62,040		220		4,920	23	153
Dec	2010	67,200		220		5,293	107	748
TOTAL		984,840				76,361	692.9	4,113

Annual Total Energy Cost = 80,474 $/year

Energy Use Index:
Total site BTU's/Yr ÷ Total Area (SF) = 70 kBTU/SF/year

Total KWH/yr x 0.003413 = 3,361.26 MMBTU/year
Total MCF/yr x 1.03 = 713.68 MMBTU/year
Total Other x ________ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 4,075 MMBTU/year

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.38 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 626043 626110 Electric

1407869 1432316 Gas

BUILDING: Oak Hill Elementary School

FLOOR AREA: 75,143 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 ($)
Jan	2010	56,540		339		5,645	321	2,709
Feb	2010	84,740		339		7,379	289	2,193
Mar	2010	70,860		339		6,536	72	844
Apr	2010	66,480		354		6,278	30	278
May	2010	82,620		333		8,207	30	217
Jun	2010	107,840		363		9,756	6	60
Jul	2010	75,780		366		7,884	2	69
Aug	2010	57,540		315		6,185	11	101
Sep	2010	107,040		402		10,114	25	174
Oct	2010	118,840		399		10,781	41	282
Nov	2010	86,300		306		7,160	133	780
Dec	2010	85,680		393		7,778	147	1,026
TOTAL		1,000,260				93,702	1,107.8	8,733

Annual Total Energy Cost = 102,435 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 61 kBTU/SF/year

Total KWH/yr x 0.003413 = 3,413.89 MMBTU/year

Total MCF/yr x 1.03 = 1,141.01 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 4,555 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.36 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 507446 Electric

1315674 1123035 1529331 Gas

BUILDING: Pease Elementary School

FLOOR AREA: 35,623 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 ($)
Jan	2010	25,760		115		2,191	33	302
Feb	2010	29,400		99		2,316	14	10
Mar	2010	29,600		90		2,271	15	204
Apr	2010	34,560		122		2,752	13	139
May	2010	49,600		150		4,240	13	114
Jun	2010	69,760		160		5,372	2	45
Jul	2010	83,520		157		6,124	0	30
Aug	2010	73,120		133		5,334	5	68
Sep	2010	93,600		182		6,926	14	119
Oct	2010	88,960		187		6,698	14	119
Nov	2010	65,760		406		5,036	14	112
Dec	2010	65,760		181		5,036	11	107
TOTAL		709,400				54,295	148.5	1,370

Annual Total Energy Cost = 55,665 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 72 kBTU/SF/year

Total KWH/yr x 0.003413 = 2,421.18 MMBTU/year

Total MCF/yr x 1.03 = 153.00 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 2,574 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.56 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 5458551 Electric

1666556 1666557 Gas

BUILDING: Perez Elementary School

FLOOR AREA: 82,223 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 ($)
Jan	2010	84,900		336		7,107	256	2,164
Feb	2010	78,600		333		6,704	216	113
Mar	2010	86,700		318		7,115	108	1,266
Apr	2010	80,700		447		7,480	75	661
May	2010	108,300		507		10,933	75	509
Jun	2010	147,000		561		13,828	33	245
Jul	2010	141,000		444		12,516	25	517
Aug	2010	116,700		651		12,613	22	183
Sep	2010	185,700		576		16,414	45	301
Oct	2010	136,500		552		13,088	55	373
Nov	2010	109,500		486		9,565	75	447
Dec	2010	100,200		405		8,519	123	859
TOTAL		1,375,800		5616		125,881	1,107.7	7,638

Annual Total Energy Cost = 133,519 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 71 kBTU/SF/year

Total KWH/yr x 0.003413 = 4,695.61 MMBTU/year

Total MCF/yr x 1.03 = 1,140.90 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 5,837 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.62 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 117456 Electric

1173630 1212423 Gas

BUILDING: Pleasant Hill Elementary School

FLOOR AREA: 65,825 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 ($)
Jan	2010	61,500		195		4,772	182	1,542
Feb	2010	61,000		180		4,673	223	193
Mar	2010	96,000		185		6,626	22	274
Apr	2010	82,000		220		6,146	22	211
May(*)	2010	0		0		0	22	166
Jun	2010	163,500		485		10,556	10	91
Jul	2010	76,500		275		6,179	4	87
Aug	2010	67,500		205		5,575	9	89
Sep	2010	100,000		310		8,327	18	134
Oct	2010	90,000		295		7,626	22	159
Nov	2010	74,000		250		5,784	29	185
Dec	2010	66,500		245		5,413	75	530
TOTAL		938,500		2845		71,676	638.5	3,660

(*) May Electricity data is not available

Annual Total Energy Cost = 75,337 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 59 kBTU/SF/year

Total KWH/yr x 0.003413 = 3,203.10 MMBTU/year

Total MCF/yr x 1.03 = 657.64 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,861 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.14 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 409287 Electric

1158658 1199106 Gas

BUILDING: St. Elmo Elementary School

FLOOR AREA: 48,212 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 ($)
Jan	2010	40,320		150		3,254	245	2,073
Feb	2010	44,520		168		3,611	220	145
Mar	2010	45,960		168		3,696	99	1,159
Apr	2010	45,840		196		3,850	55	488
May	2010	56,400		251		5,425	55	377
Jun	2010	69,360		238		5,963	26	199
Jul	2010	73,200		215		5,997	10	218
Aug	2010	56,760		197		4,892	13	116
Sep	2010	73,920		263		6,442	26	180
Oct	2010	54,480		251		5,201	27	193
Nov	2010	43,560		194		3,688	62	373
Dec	2010	41,880		174		3,530	149	1,035
TOTAL		646,200		2464		55,549	986.1	6,558

Annual Total Energy Cost = 62,107 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 67 kBTU/SF/year

Total KWH/yr x 0.003413 = 2,205.48 MMBTU/year

Total MCF/yr x 1.03 = 1,015.72 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,221 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.29 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 626759 Electric

1245162 1358438 Gas

BUILDING: Williams Elementary School

FLOOR AREA: 64,436 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 ($)
Jan	2010	65,700		231		5,120	218	1,840
Feb	2010	61,800		237		5,003	222	280
Mar	2010	69,900		249		5,518	80	947
Apr	2010	67,800		309		5,461	34	311
May	2010	75,900		327		7,071	34	242
Jun	2010	97,500		327		8,341	17	137
Jul	2010	100,500		285		8,152	12	261
Aug	2010	79,500		330		7,293	17	144
Sep	2010	131,100		378		10,705	36	242
Oct	2010	96,300		366		8,589	32	222
Nov	2010	78,300		309		6,341	149	871
Dec	2010	79,200		300		6,494	194	1,343
TOTAL		1,003,500		3648		84,088	1,043.1	6,839

Annual Total Energy Cost = 90,927 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 70 kBTU/SF/year

Total KWH/yr x 0.003413 = 3,424.95 MMBTU/year

Total MCF/yr x 1.03 = 1,074.44 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 4,499 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.41 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 247207 Electric

1105936 1362077 1459497 Gas

BUILDING: Dobie Middle School

FLOOR AREA: 137,256 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 ($)
Jan	2010	164,100		426		12,146	469	3,949
Feb	2010	191,400		537		14,414	1,036	8,145
Mar	2010	195,000		519		14,534	502	5,815
Apr	2010	211,800		555		15,739	672	5,790
May	2010	247,200		522		18,862	672	4,427
Jun	2010	281,400		522		20,603	321	2,215
Jul	2010	251,100		402		17,836	5	133
Aug	2010	220,800		537		17,192	255	1,947
Sep	2010	327,600		603		23,926	814	5,080
Oct	2010	262,500		576		19,952	613	3,938
Nov	2010	223,200		525		16,162	548	3,161
Dec	2010	174,900		525		13,479	142	997
TOTAL		2,751,000		6249		204,845	6,047.7	45,599

Annual Total Energy Cost = 250,444 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 114 kBTU/SF/year

Total KWH/yr x 0.003413 = 9,389.16 MMBTU/year

Total MCF/yr x 1.03 = 6,229.17 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 15,618 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.82 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 539051 Electric

1410601 1386501 1408887 1204211 Gas

BUILDING: Fulmore Middle School

FLOOR AREA: 159,179 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 ($)
Jan	2010	151,800		405		11,330	520	4,389
Feb	2010	151,500		396		11,268	607	324
Mar	2010	180,600		402		13,035	60	729
Apr	2010	201,600		492		14,779	41	389
May	2010	210,600		522		16,941	41	306
Jun	2010	291,600		516		21,151	22	187
Jul	2010	266,700		432		19,014	16	366
Aug	2010	201,900		588		16,557	19	180
Sep	2010	288,900		648		22,148	45	320
Oct	2010	248,700		570		19,161	52	369
Nov	2010	189,600		504		14,011	169	1,006
Dec	2010	170,700		516		13,257	320	2,228
TOTAL		2,554,200		5991		192,651	1,910.9	10,794

Annual Total Energy Cost = 203,445 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 67 kBTU/SF/year

Total KWH/yr x 0.003413 = 8,717.48 MMBTU/year

Total MCF/yr x 1.03 = 1,968.23 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 10,686 MMBTU/year

Energy Cost Index:

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

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 208915 Electric

1168113 1318516 1422407 Gas

BUILDING: Kealing Middle School

FLOOR AREA: 192,552 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 ($)
Jan	2010	270,300		675		19,929	972	8,156
Feb	2010	265,800		696		19,792	1,052	8,394
Mar	2010	244,500		684		18,481	176	2,053
Apr	2010	171,900		612		13,763	86	763
May	2010	207,600		870		19,739	86	590
Jun	2010	252,000		825		21,428	62	455
Jul	2010	212,400		795		18,855	7	179
Aug	2010	211,200		765		18,471	22	194
Sep	2010	274,500		795		22,430	25	186
Oct	2010	306,000		819		24,494	37	264
Nov	2010	227,700		720		17,444	77	471
Dec	2010	227,700		735		17,444	255	1,774
TOTAL		2,871,600		8991		232,270	2,856.0	23,480

Annual Total Energy Cost = 255,750 $/year

Energy Use Index:

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

Total KWH/yr x 0.003413 = 9,800.77 MMBTU/year

Total MCF/yr x 1.03 = 2,941.65 MMBTU/year

Total Other x________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 12,742 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.33 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 68846 5593132 Electric
1236738 1202737 1155541 1278638 Gas

BUILDING: LBJ High School

FLOOR AREA: 298,027 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 ($)
Jan	2010	290,200		940		23,119	1,512	12,684
Feb	2010	327,400		950		25,428	1,493	383
Mar	2010	351,400		930		26,732	343	3,997
Apr	2010	256,500		1,060		21,742	89	807
May	2010	348,800		1,040		30,043	89	626
Jun	2010	448,100		1,070		35,566	81	591
Jul	2010	279,200		920		24,300	29	613
Aug	2010	291,200		920		23,734	47	394
Sep	2010	519,000		1,130		40,157	109	716
Oct	2010	421,100		1,070		34,036	185	1,220
Nov	2010	358,000		1,020		27,310	533	3,087
Dec	2010	349,600		1,020		27,524	1,014	6,964
TOTAL		4,240,500		12070		339,691	5,524.9	32,082

Annual Total Energy Cost = 371,772 $/year

Energy Use Index:
Total site BTU's/Yr ÷ Total Area (SF) = 68 kBTU/SF/year

Total KWH/yr x 0.003413 = 14,472.83 MMBTU/year
Total MCF/yr x 1.03 = 5,690.61 MMBTU/year
Total Other x ________ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 20,163 MMBTU/year

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.25 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 18717 Electric

1268108 1468426 1345941 1285101 Gas

BUILDING: Reagan High School

FLOOR AREA: 255,914 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 ($)
Jan	2010	227,000		790		17,974	1,631	13,682
Feb	2010	277,000		570		19,781	1,623	10,443
Mar	2010	210,000		790		17,048	960	11,110
Apr	2010	233,000		830		18,650	480	4,151
May	2010	279,000		800		23,315	480	3,178
Jun	2010	339,000		840		26,623	284	1,971
Jul	2010	262,000		710		21,026	86	1,751
Aug	2010	269,000		910		23,055	36	314
Sep	2010	379,000		940		29,751	168	1,084
Oct	2010	299,000		890		24,696	500	3,229
Nov	2010	258,000		840		20,021	707	4,077
Dec	2010	250,000		840		19,867	1,000	6,871
TOTAL		3,282,000		9750		261,805	7,954.9	61,862

Annual Total Energy Cost = 323,667 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 76 kBTU/SF/year

Total KWH/yr x 0.003413 = 11,201.47 MMBTU/year

Total MCF/yr x 1.03 = 8,193.54 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 19,395 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.26 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 351017 Electric
1216119 Gas
BUILDING: Rosedale School FLOOR AREA: 36,244

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Jan	2010	31,920		109		2,515	14	125
Feb	2010	30,480		125		2,526	16	0
Mar	2010	26,280		118		2,234	11	137
Apr	2010	23,520		96		1,953	12	111
May	2010	34,200		124		3,030	12	87
Jun	2010	44,400		133		3,659	6	54
Jul	2010	49,200		126		3,883	6	123
Aug	2010	54,120		139		4,281	0	10
Sep	2010	60,960		148		4,750	10	70
Oct	2010	36,360		132		3,194	13	91
Nov	2010	28,560		118		2,374	10	67
Dec	2010	20,160		118		1,897	11	87
TOTAL		440,160		1484		36,295	120.0	964

Annual Total Energy Cost = 37,260 $/year

Energy Use Index:
Total site BTU's/Yr ÷ Total Area (SF) = 45 kBTU/SF/year

Total KWH/yr x 0.003413 = 1,502.27 MMBTU/year
Total MCF/yr x 1.03 = 123.62 MMBTU/year
Total Other x ________ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 1,626 MMBTU/year

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.03 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 311621 Electric

1134916 1446919 1093945 1197862 Gas

BUILDING: McCallum High School

FLOOR AREA: 238,414

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Jan	2010	161,100		597		12,990	814	6,850
Feb	2010	151,800		615		12,592	823	5,941
Mar	2010	172,500		765		14,658	263	3,076
Apr	2010	177,300		606		14,075	216	1,892
May	2010	197,100		765		17,958	216	1,454
Jun	2010	243,600		801		20,748	118	841
Jul	2010	240,000		645		19,205	43	897
Aug	2010	262,000		861		22,293	24	217
Sep	2010	307,800		846		24,950	60	414
Oct	2010	222,300		777		19,380	72	500
Nov	2010	212,100		735		16,857	295	1,724
Dec	2010	175,500		882		15,696	482	3,330
TOTAL		2,523,100		8895		211,403	3,425.9	27,135

Annual Total Energy Cost = 238,539 $/year

Energy Use Index:
Total site BTU's/Yr ÷ Total Area (SF) = 51 kBTU/SF/year

Total KWH/yr x 0.003413 = 8,611.34 MMBTU/year
Total MCF/yr x 1.03 = 3,528.72 MMBTU/year
Total Other x ________ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 12,140 MMBTU/year

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.00 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 630400 Electric

1450903 1516336 Gas

BUILDING: Garza Indpendence

FLOOR AREA: 46,155

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Jan	2010	42,640		125		3,239	232	1,959
Feb	2010	34,640		129		2,791	232	1,838
Mar	2010	38,400		120		2,965	10	136
Apr	2010	31,920		118		2,577	10	102
May	2010	36,880		118		3,170	10	83
Jun	2010	40,880		143		3,543	8	74
Jul	2010	46,160		146		3,879	10	216
Aug	2010	56,320		131		4,346	5	59
Sep	2010	63,600		143		4,862	11	87
Oct	2010	50,640		144		4,121	27	194
Nov	2010	36,880		144		3,005	142	831
Dec	2010	34,240		153		2,944	289	1,993
TOTAL		513,200		1614		41,442	985.3	7,572

Annual Total Energy Cost = 49,014 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 60 kBTU/SF/year

Total KWH/yr x 0.003413 = 1,751.55 MMBTU/year

Total MCF/yr x 1.03 = 1,014.88 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 2,766 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.06 $/SF/year

Electric Utility: Austin Energy

Gas Utility: Texas Gas

District: Austin ISD

ACCOUNT# 14774 Electric

910714835-1461567 910083286-1349756 910463(Gas

BUILDING: Eastside Memorial

FLOOR AREA: 276,511

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Jan	2010	163,000		490		12,480	1,030	8,643
Feb	2010	183,000		810		15,537	1,267	269
Mar	2010	217,000		780		17,420	203	2,374
Apr	2010	212,000		880		17,682	103	913
May	2010	300,000		980		25,951	103	704
Jun	2010	381,000		960		29,995	47	352
Jul	2010	246,000		560		18,849	33	683
Aug	2010	338,000		930		27,198	23	201
Sep	2010	433,000		1,100		34,191	75	494
Oct	2010	348,000		1,010		28,542	119	789
Nov	2010	290,000		890		22,227	259	1,507
Dec	2010	274,000		940		21,877	959	6,580
TOTAL		3,385,000		10330		271,948	4,220.3	23,510

Annual Total Energy Cost = 295,458 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 58 kBTU/SF/year

Total KWH/yr x 0.003413 = 11,553.01 MMBTU/year

Total MCF/yr x 1.03 = 4,346.87 MMBTU/year

Total Other x ________ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 15,900 MMBTU/year

Energy Cost Index:

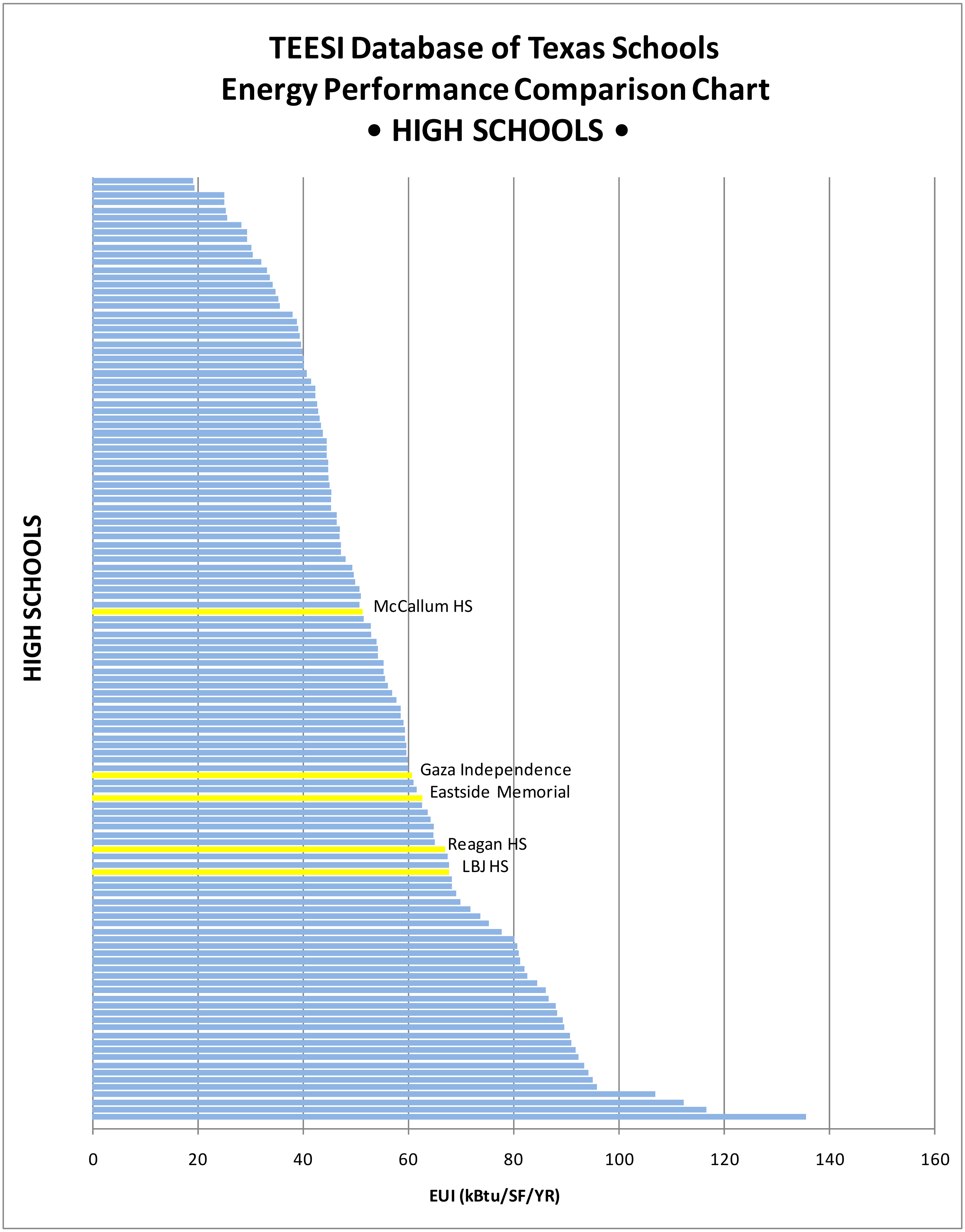
Total Energy Cost/Yr ÷ Total Area (SF) = 1.07 $/SF/year

Electric Utility: Austin Energy

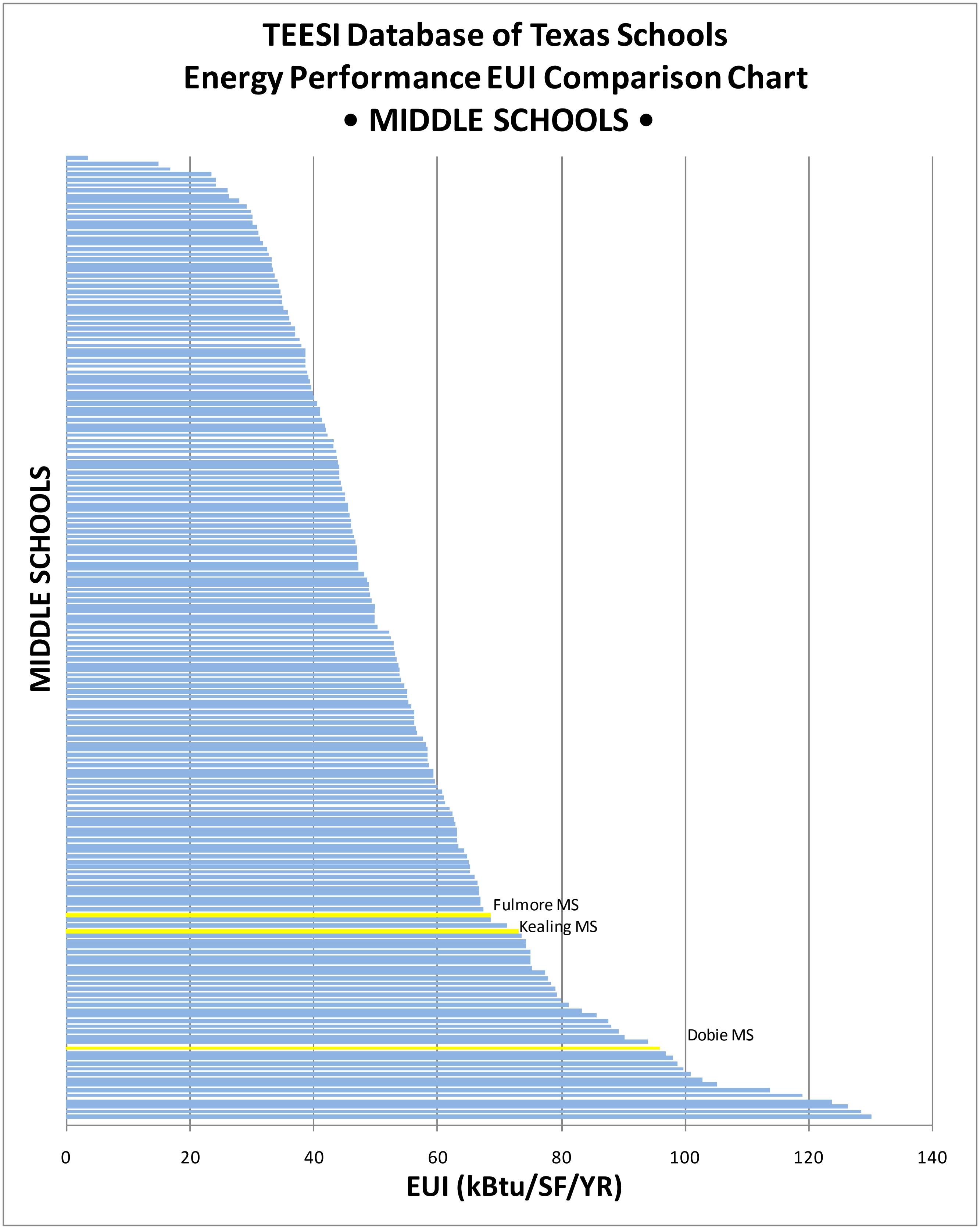
Gas Utility: Texas Gas

APPENDIX D

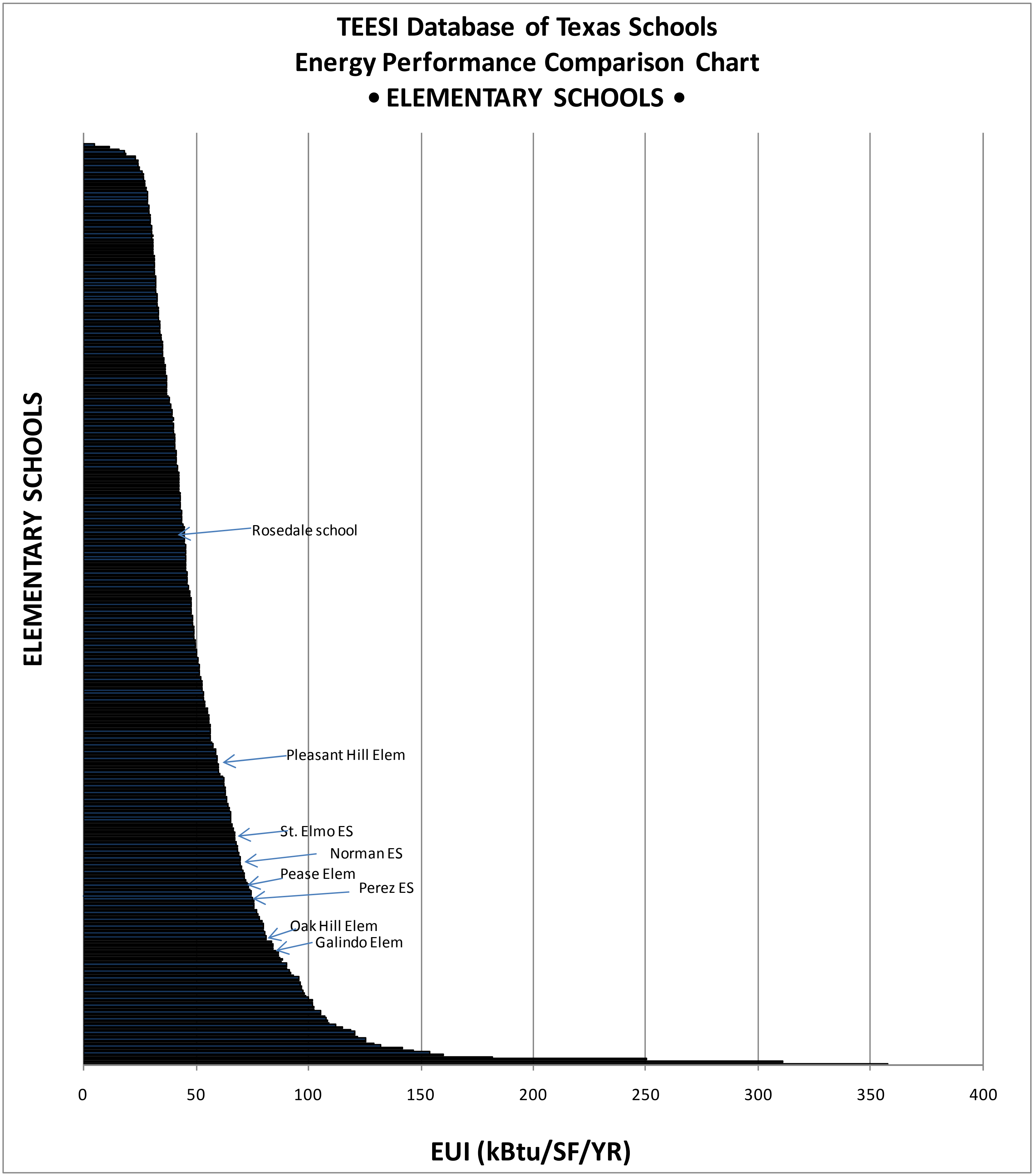
ENERGY PERFORMANCE COMPARISON CHARTS



(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 refrac-tories 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

REQUEST FOR
ENERGY ASSISTANCE

SECO
State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment
Service Agreement

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

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with ______________________________, 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: [signature] Date: 3/11 2011

Name (Mr./Ms./Dr.) Farshad Shahsavary, P.E. Title: Energy Coordinator

Organization: Austin Independent School District Phone: 512-414-0034

Street Address: 1111 W. 6th Street, B300 Fax: 512-480-0545

Mailing Address: Austin, TX 78703 E-Mail: FSHAHSAV@AUSTINISD.ORG

County: TRAVIS

Contact Information:

Name (Mr./Ms./Dr.): Same as above Title: Same as above

Phone: ______ Fax: ______

E-Mail: ______ County: ______

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