Susan Combs
Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Donna ISD

116 N. 10th St.
Donna, Texas 78537

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MAY 2011

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SECO
State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY

Donna 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 (UCRMs) identified in this preliminary analysis are summarized below. Individual UCRMs are summarized in Section 11.0 of this report. Increased savings can be achieved through implementing UCRMs with a board adopted Energy Management Plan (see Section 13.0).

Est. Implementation Cost Estimate:	$2,316,375
Est. Annual Energy Savings (MMBTU/Yr)	10,123
Est. Annual Greenhouse Gas Emissions Reduction (Metric Ton CO_2e/Yr)	1,789
Est. Annual Energy Cost Savings:	$265,400
Simple Payback (Yrs):	8.7

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	TEESI / Saleem Khan
(512) 463-1770	(512) 328-2533

2.0 FACILITY DESCRIPTIONS

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

Building:	Ochoa Elementary School
Stories:	Single story
Area (estimated):	62,811 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units
Controls:	Localized controls

Building:	Donna High School
Stories:	Two story
Area (estimated):	351,730 SF
Bldg. Components:	Main Building, Library, Fine Arts: Concrete building, pitched roof, slab on grade Career & Technology: Metal building, metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts High Intensity Discharge (HID) fixtures in gym
HVAC:	Split-DX units, Packaged Units, Aircooled Chillers
Controls:	Main building, Library, Fine Arts - Programmable thermostats Science Wing - Energy Management System (EMS) – Manufacturer Tracer Summit Gym – Energy Management System (EMS) – Manufacturer Alerton

Building:	Todd 9th Grade Center
Stories:	Single story
Area (estimated):	124,243 SF
Bldg. Components:	Main Building: Concrete building, built up roof, slab on grade Gym: Metal building, pitched metal roof, slab on grade M Building: Metal building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units, Packaged Units, Aircooled Chillers
Controls:	Main building - Standard thermostats, programmable thermostats Gym - Energy Management System (EMS) – Manufacturer Tracer Summit

Building:	LeNoir Elementary School
Stories:	Two story
Area (estimated):	87,033 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:	Split-DX units, Packaged Units
Controls:	Standard thermostats

Building:	Runn Elementary School
Stories:	Single story
Area (estimated):	59,096 SF
Bldg. Components:	Brick building, pitched roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units, Packaged Units
Controls:	Standard thermostats

Building:	Stainke Elementary School
Stories:	Single story
Area (estimated):	42,952 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units, Packaged Units
Controls:	Programmable thermostats

Building:	Caceres Elementary School
Stories:	Single story
Area (estimated):	57,390 SF
Bldg. Components:	Concrete building, built up roof, slab on grade
Typical Lighting Fixtures:	T12 fluorescent fixtures with magnetic ballasts T8 fluorescent fixtures with electronic ballasts
HVAC:	Packaged Units
Controls:	Standard thermostats, programmable thermostats

Building:	Salinas Elementary School
Stories:	Single story
Area (estimated):	87,467 SF
Bldg. Components:	Main Building: Brick building, pitched metal roof, slab on grade Gym: Metal building, pitched roof, slab on grade Cafeteria: Brick building, pitched roof, slab on grade
Typical Lighting Fixtures:	T12 fluorescent fixtures with magnetic ballasts
HVAC:	Split-DX units
Controls:	Standard thermostats, programmable thermostats

Building:	Singleterry Elementary School
Stories:	Single story
Area (estimated):	63,404 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units, Packaged Units
Controls:	Programmable thermostats

Building:	Adame Elementary School
Stories:	Single story
Area (estimated):	86,069 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Split-DX units
Controls:	Energy Management System (EMS) – Manufacturer Tracer Summit

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 1,015,195 square feet.

Annual electric and natural gas invoices for the buildings surveyed were $1,763,569 for the 12-month period ending December 2010. A summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

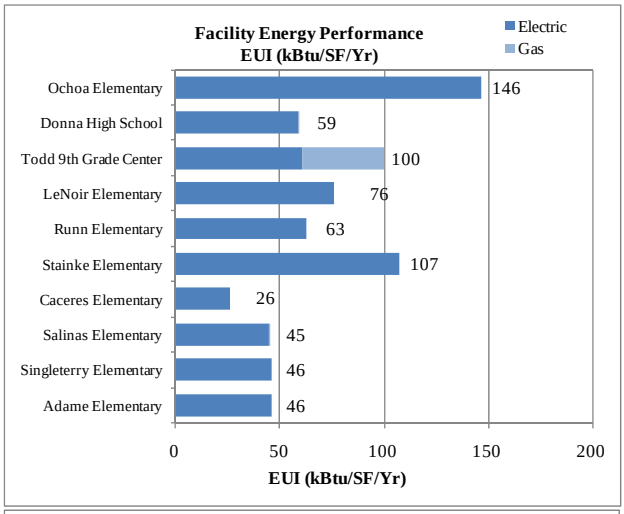
To help the District evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI represents a facility's annual energy usage per square foot; it is measured in thousands of BTUs per square foot per year (kBTU/SF/Year).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

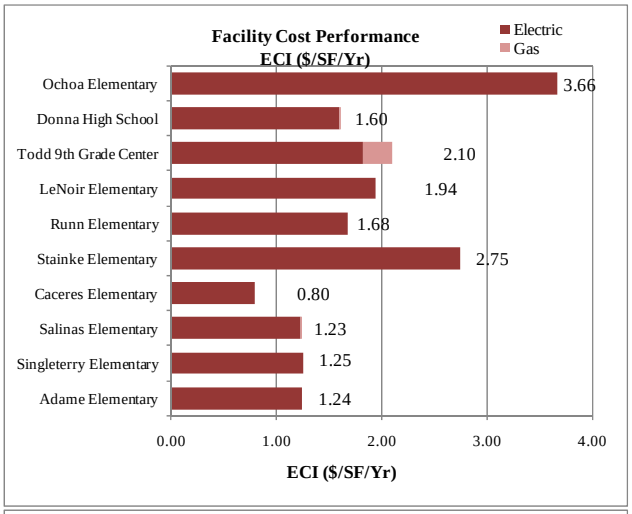
Energy Cost and Consumption Benchmarks

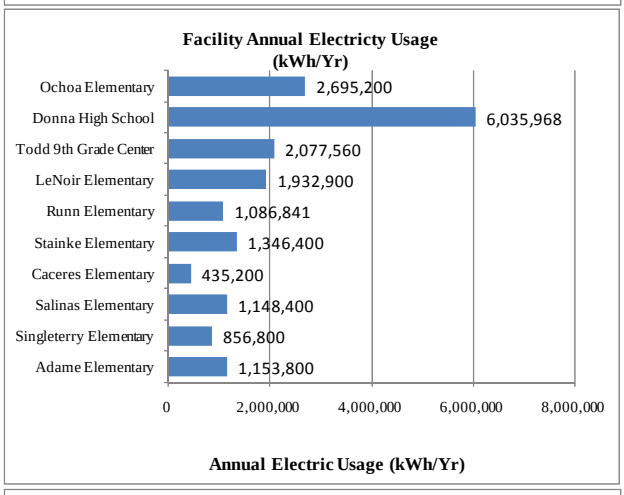
		Electric				Natural Gas				Total	Total	EUI	ECI	
	Building	kWh/Yr	MMBTU/Yr	$Cost/Yr	kWh/SF	MCF/Yr	MMBTU/Yr	$Cost/Yr	MCF/SF	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	Ochoa Elementary	2,695,200	9,199	229,918	43	0	0	0	0.0000	229,918	9,199	146	3.66	62,811
2	Donna High School	6,035,968	20,601	559,620	17	312	321	2,357	0.0009	561,978	20,922	59	1.60	351,730
3	Todd 9th Grade Center	2,077,560	7,091	213,798	18	4,506	4,642	32,347	0.0384	246,145	11,732	100	2.10	117,243
4	LeNoir Elementary	1,932,900	6,597	168,818	22	0	0	0	0.0000	168,818	6,597	76	1.94	87,033
5	Runn Elementary	1,086,841	3,709	99,434	18	0	0	0	0.0000	99,434	3,709	63	1.68	59,096
6	Stainke Elementary	1,346,400	4,595	118,093	31	0	0	0	0.0000	118,093	4,595	107	2.75	42,952
7	Caceres Elementary	435,200	1,485	45,687	8	0	0	0	0.0000	45,687	1,485	26	0.80	57,390
8	Salinas Elementary	1,148,400	3,919	106,936	13	36	37	657	0.0004	107,593	3,957	45	1.23	87,467
9	Singleterry Elementary	856,800	2,924	79,256	14	0	0	0	0.0000	79,256	2,924	46	1.25	63,404
10	Adame Elementary	1,153,800	3,938	106,648	13	0	0	0	0.0000	106,648	3,938	46	1.24	86,069
		kWh/Yr	MMBTU/Yr	$Cost/Yr	kWh/SF	MCF/Yr	MMBTU/Yr	$Cost/Yr	MCF/SF	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		18,769,069	64,059	1,728,207	18	4,855	5,000	35,362	0.0048	1,763,569	69,059	68	1.74	1,015,195

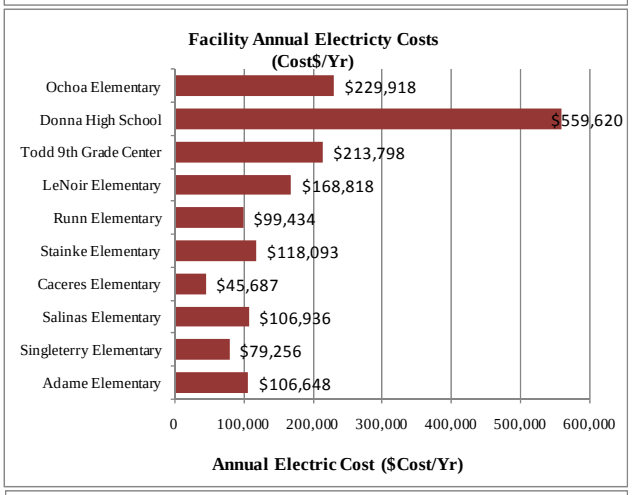
Knowing the EUI and ECI of each facility is useful to help determine the District's overall energy performance. In addition, the District's EUI was compared to TEESI's database of Texas schools. See **Appendix D** to determine how the EUIs of these facilities compared to those of other schools in Texas.

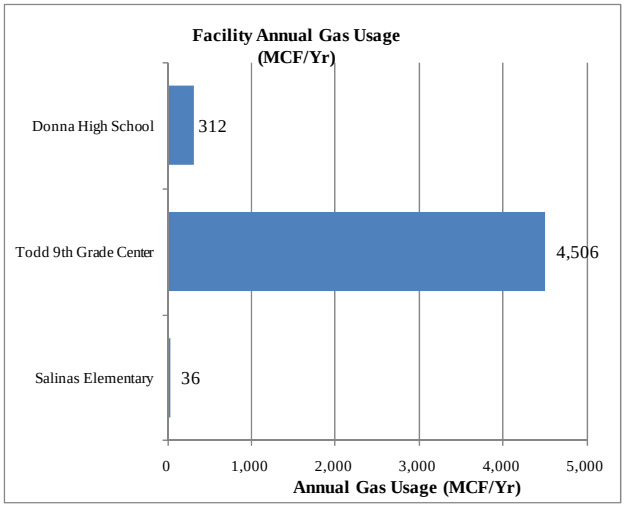
The following charts summarize the data presented in the previous table. See **Appendix C** for further detail.

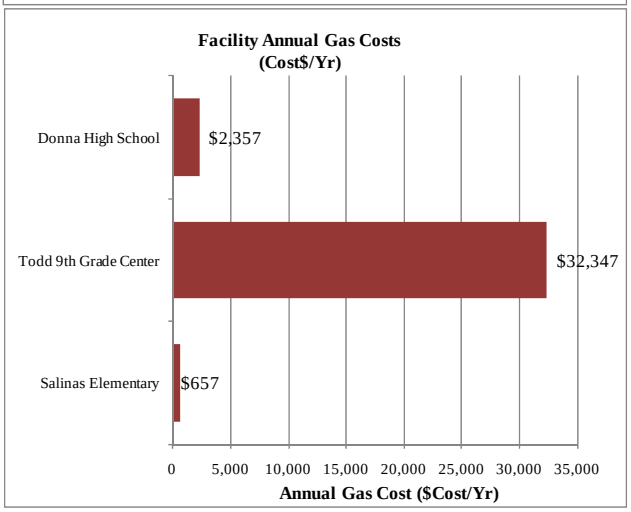




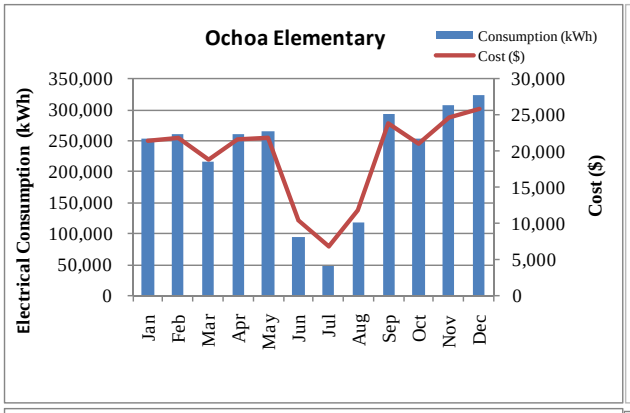








The following charts summarize the each campus monthly utility data. See **Appendix C** for further detail.



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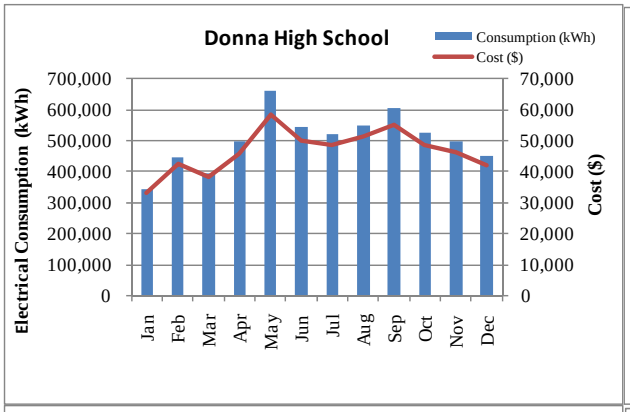

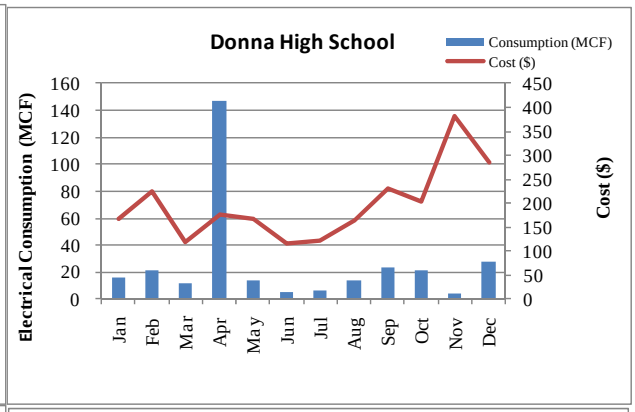

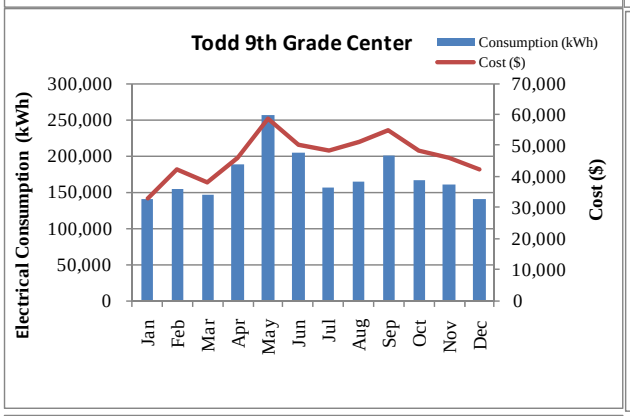

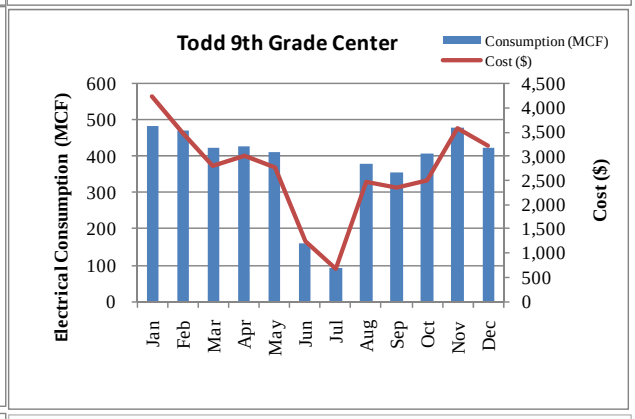

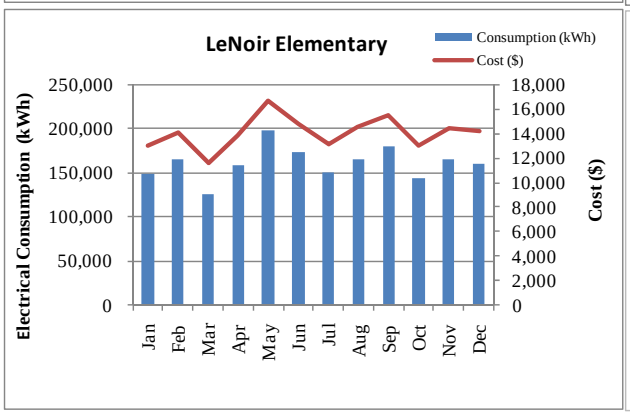

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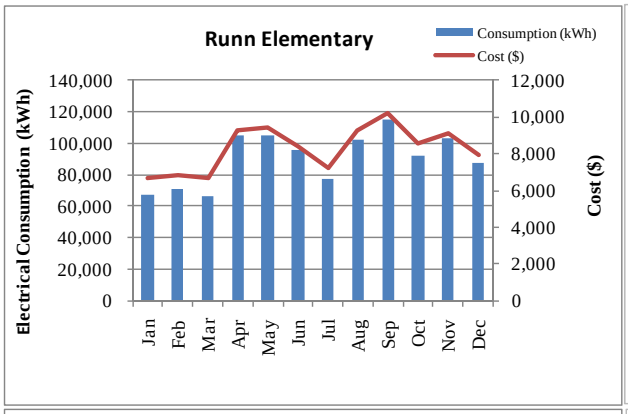

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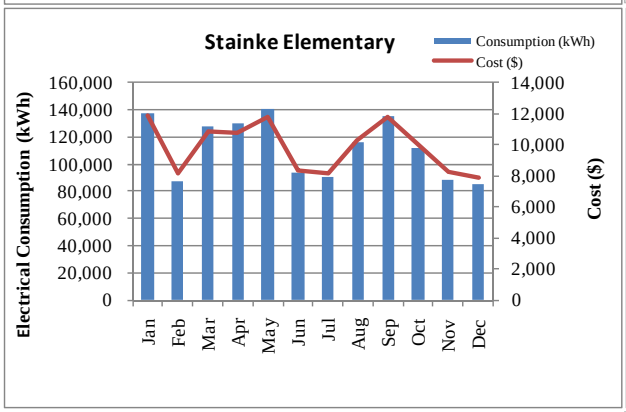

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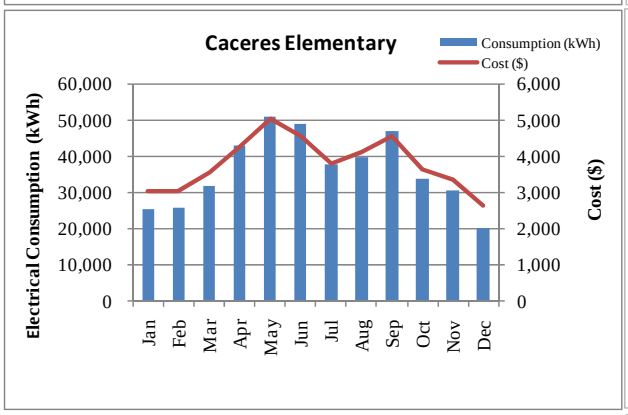

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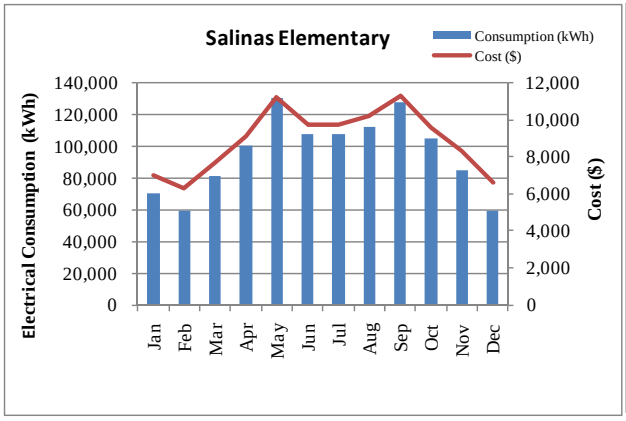

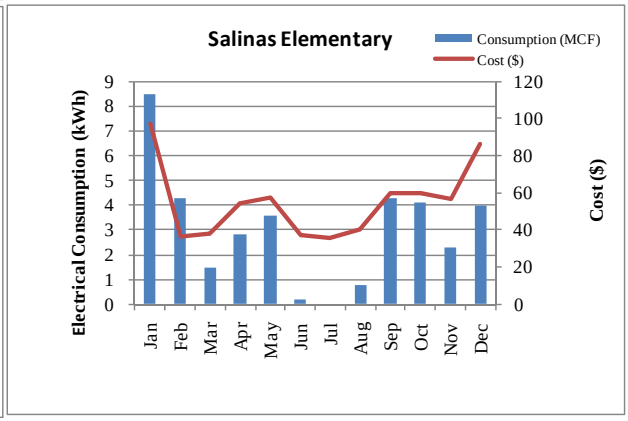

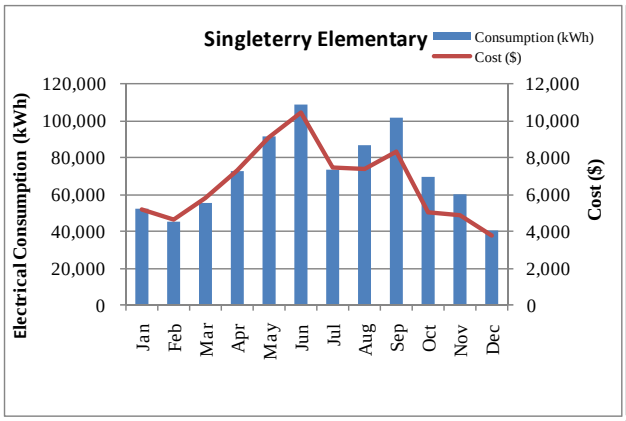

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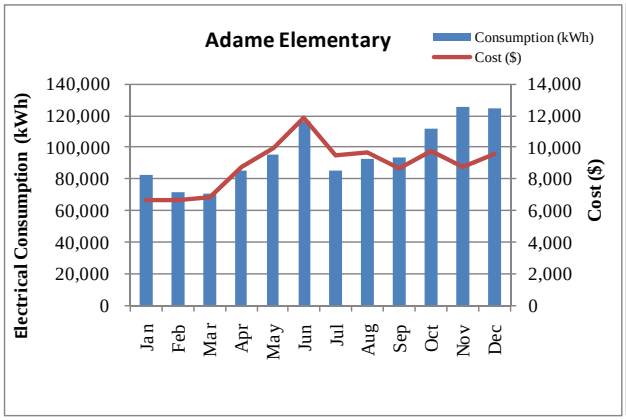


NATURAL GAS N/A

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 buildings.

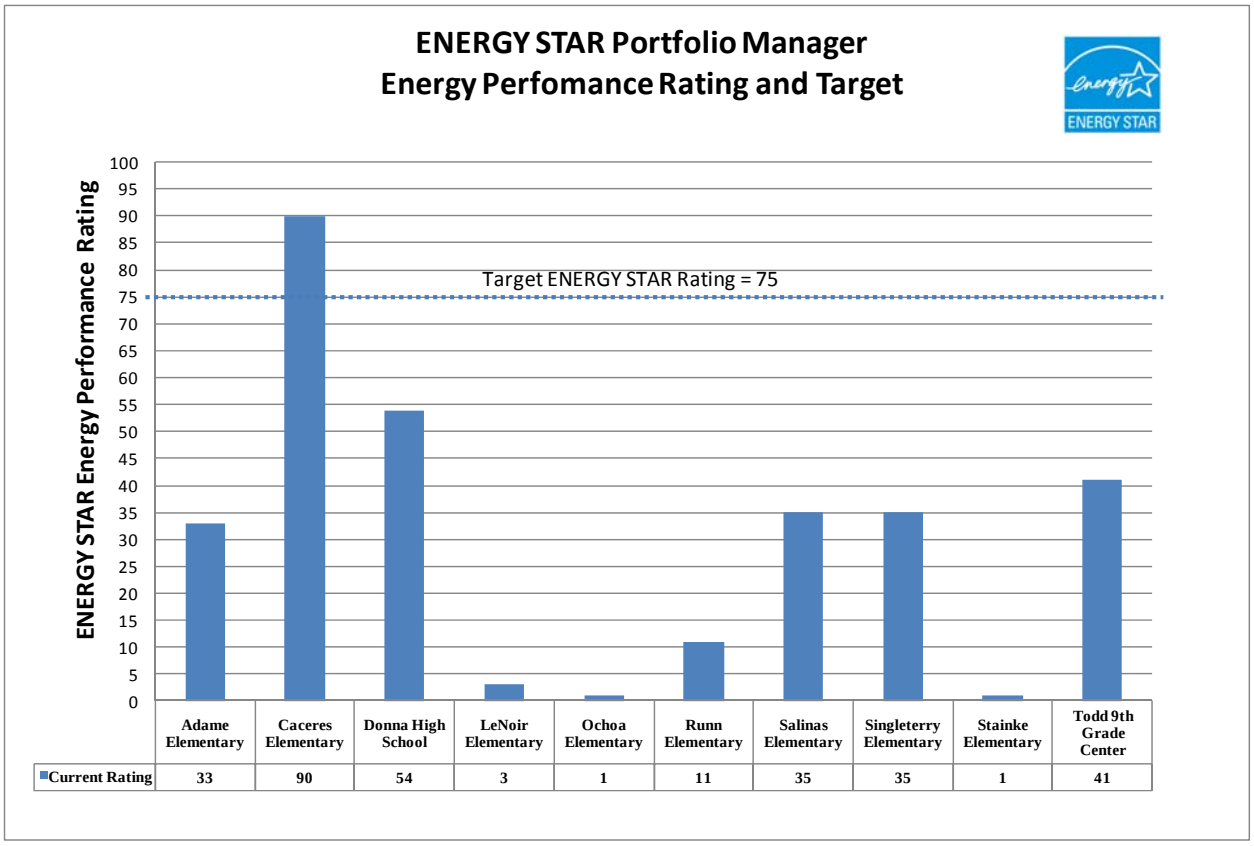
In addition, Portfolio Manager is used to generate a Statement of Energy Performance (SEP) for each building, summarizing key energy information such as site and source energy intensity, greenhouse gas emission, energy reduction targets and energy cost. The Statement of Energy Performance can help in 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. 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.

EnergySTAR 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)

The following indicates the schools' current energy performance ratings ending in December 2010. The target for each of these schools is a rating of 75 to qualify for ENERGY STAR.



ENERGY STAR ratings for Donna ISD schools

A benefit of using ENERGY STAR's Portfolio Manager is its ability to set goals for energy performance. It allows an energy performance target to be set and calculates the estimated savings per year to reach the goal. With a performance target of 75 and 69 set, the estimated yearly savings for each of the schools are indicated below.

	ENERGY STAR Rating			ENERGY STAR Rating Target			ENERGY STAR Rating Target		
	EXISTING RATING			TARGET RATING = 69			TARGET RATING = 75		
Facility	Current ENERGY STAR Rating	Current Utility Cost $/SF/yr	Greenhouse Gas Emissions ($MtCO_2e/yr$) / ($kgCO_2e/ft^2/yr$)	Target Utility Cost $/SF/yr	Potential Target Savings $/yr	Greenhouse Gas Emissions (MtCO2e/yr) / (kgCO2e/ft2/yr)	Target Utility Cost $/SF/yr	Potential Target Savings $/yr	Greenhouse Gas Emissions (MtCO2e/yr) / (kgCO2e/ft2/yr)
Adame Elementary	33	$1.24	658 / 8	$0.89	$29,775	474 / 6	$1.45	$34,718	444 / 5
Donna HS	54	$1.59	3441 / 10	$1.39	$72,104	2998 / 9	$1.30	$103,470	2805 / 8
LeNoir Elementary	3	$1.92	1102 / 13	$0.87	$91,268	499 / 6	$0.81	$95,932	467 / 6
Ochoa Elementary	1	$3.66	1537 / 24	$0.86	$175,835	362 / 6	$0.81	$179,305	338 / 5
Runn Elementary	11	$1.68	620 / 10	$0.93	$44,401	343 / 6	$0.87	$47,950	321 / 5
Salinas Elementary	35	$1.23	657 / 8	$0.90	$28,832	481 / 6	$0.84	$33,899	450 / 5
Singleterry Elementary	35	$1.19	507 / 8	$0.87	$20,253	371 / 6	$0.81	$23,818	347 / 5
Stainke Elementary	1	$2.75	768 / 18	$0.93	$78,100	260 / 6	$0.87	$80,673	243 / 6
Todd 9th Grade Center	41	$1.72	1185 / 10	$1.33	$47,968	919 / 8	$1.25	$58,649	860 / 7

5.0 ENERGY ACCOUNTING

UTILITY PROVIDERS

American Electric Power (AEP), TXU Energy, and Magic Valley Electric Cooperative provide electric service to the District. Texas Gas Service provides natural gas service to the District.

MONITORING AND TRACKING

Currently, the District does not have an energy tracking software or spreadsheet in place. An effective energy tracking system is an essential tool by which an energy management program's activities are monitored. The system should be centralized and available for all engaged staff members to use in verifying progress toward established targets and milestones.

The District should consider consolidating the tracking and recording of all the District's utility accounts (i.e., Electricity, Natural Gas, Propane, Water, etc.) into an electronic spreadsheet similar to the chart shown on the following page. Along with total utility costs ($), utility consumption should be recorded as well (i.e., kWh, MCF, gallons, etc.). The District can use this data to track utility consumption patterns and budget utility expenses. **Preferably, the District should also consider an electronic database such as ENERGY STAR Portfolio Manager, which will provide a means of storing and tracking utility information. For more information on ENERGY STAR Portfolio Manager, please see Section 4.0.** Having this historical data improves the District's awareness of their energy performance and will help in tracking their energy reduction goals.

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

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

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

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

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

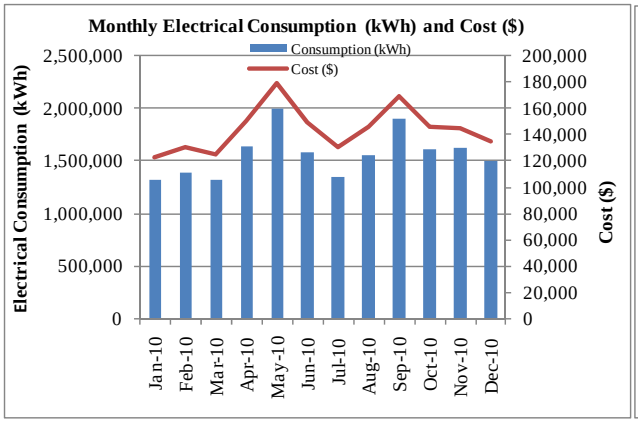
Furthermore, below is a sample format the District can customize to help summarize their overall utility usage and costs.

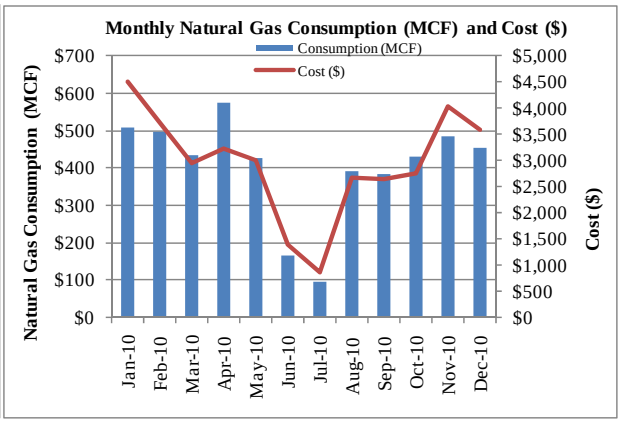
The data presented below is a summation of the data provided by the District. This data below includes only selected utility accounts and is for reference purposes only and does not represent the District's total utility data. See **Appendix C** for further detail regarding each utility account represented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

Donna ISD - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Jan-10	1,321,564	122,479	$0.0927	$509	$4,512	$8.9
Feb-10	1,388,733	130,027	$0.0936	$498	$3,742	$7.5
Mar-10	1,316,305	125,452	$0.0953	$435	$2,942	$6.8
Apr-10	1,642,655	150,242	$0.0915	$576	$3,224	$5.6
May-10	1,991,628	178,899	$0.0898	$427	$2,996	$7.0
Jun-10	1,585,223	149,291	$0.0942	$166	$1,401	$8.4
Jul-10	1,345,732	130,379	$0.0969	$97	$849	$8.8
Aug-10	1,547,944	145,889	$0.0942	$392	$2,668	$6.8
Sep-10	1,899,388	169,405	$0.0892	$385	$2,645	$6.9
Oct-10	1,615,381	146,321	$0.0906	$431	$2,756	$6.4
Nov-10	1,621,882	144,692	$0.0892	$485	$4,027	$8.3
Dec-10	1,492,634	135,131	$0.0905	$455	$3,601	$7.9
Total	18,769,069	$1,728,207	$0.0921	4,855	$35,362	$7.3

Gross Building Area:	1,015,195	SF





6.0 METER MAPPING

The following chart shows the meter number and associated ESI number for each school's electric service. See figures on next few pages for approximate meter locations.

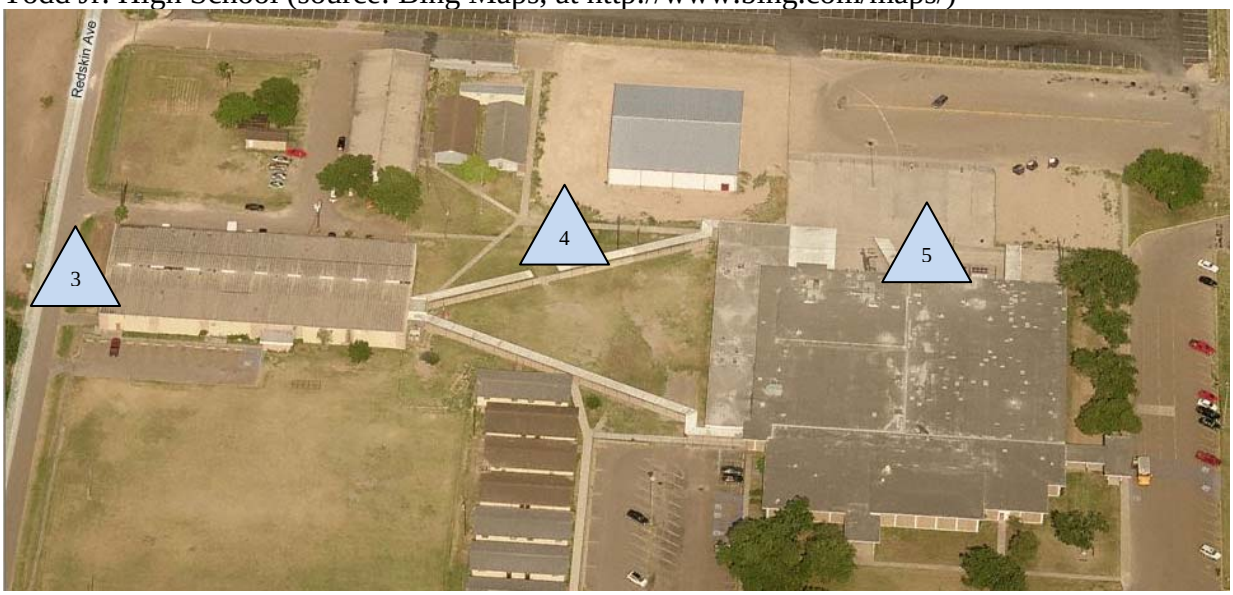
Point Number*	Meter Number	ESI Number	School
1	323570865	10032789422295255	Ochoa
2	435505708	10032789474904206	Ochoa
3	428330289	10032789456542370	Todd
4	428702993	10032784910175551	Todd
5	428769805	10032789441563431	Todd
6	428976383	10032789454473210	High School
7	436157513	10032789457641155	High School
8	428080283	10032789430843080	High School
9	428330667	10032789447967890	High School
10	013924	10032789432864490	High School
11	014949	10032789406945971	High School
12	323570422	10032789458137629	LeNoir
13	321067984	10032789465382015	LeNoir
14	428399348	10032789412091317	Stainke
15	321244584	10032789466376138	Runn
16	428976114	10032789426659871	Runn
17	321471325	10032789486733241	Runn
18	321067953	10032789422226179	Runn
19	321068071	10032789410942529	Caceres
20	321068140	10032789439160025	Caceres
21	17931843	10032789483851541	Salinas
22	1800653	96330-063	Singleterry
23	1800687	96330-068	Adame

*Point numbers are located within triangles

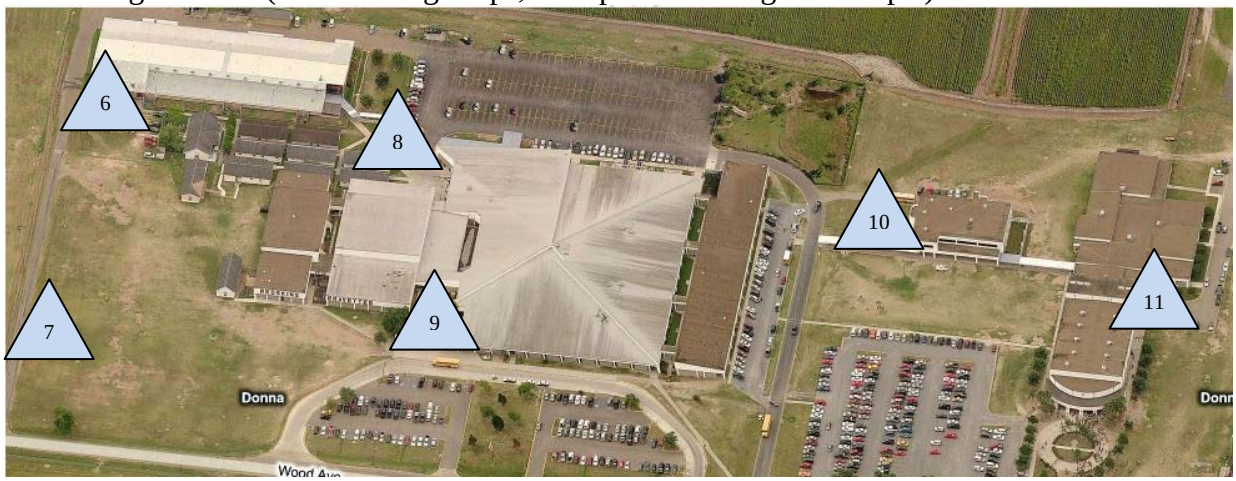
The following figures illustrate the locations of each electric meter. The aerial views were obtained from Bing Maps.

Ochoa Elementary (source: Bing Maps, at http://www.bing.com/maps/)

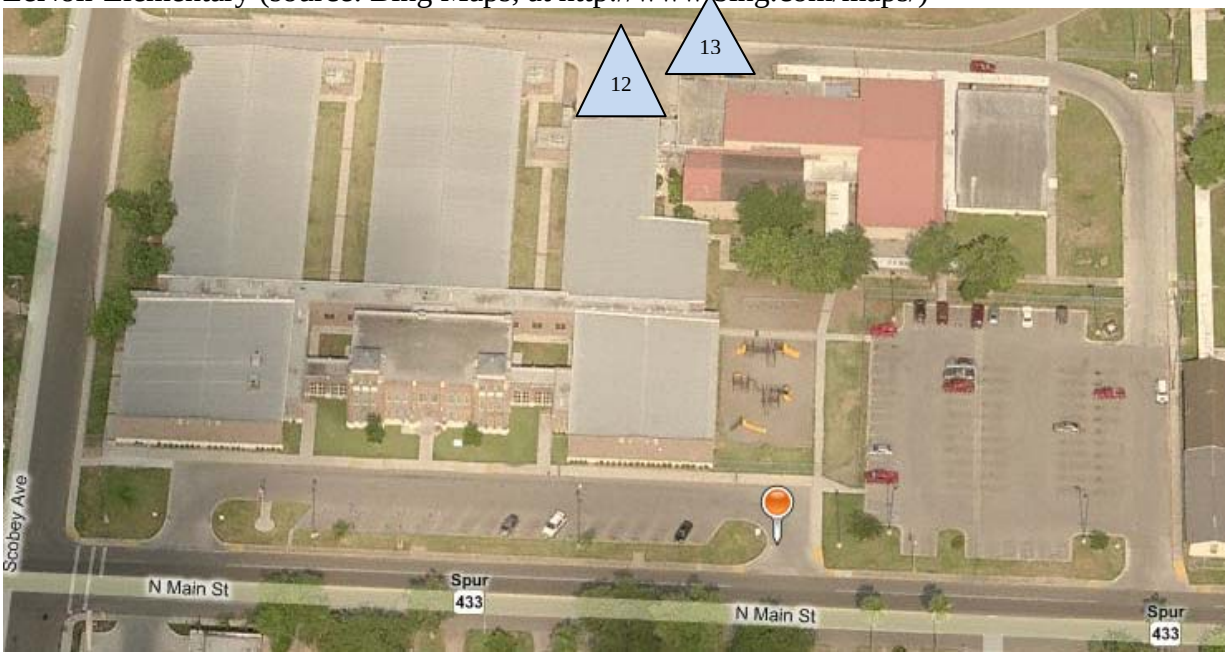
Todd Jr. High School (source: Bing Maps, at http://www.bing.com/maps/)



Donna High School (source: Bing Maps, at http://www.bing.com/maps/)

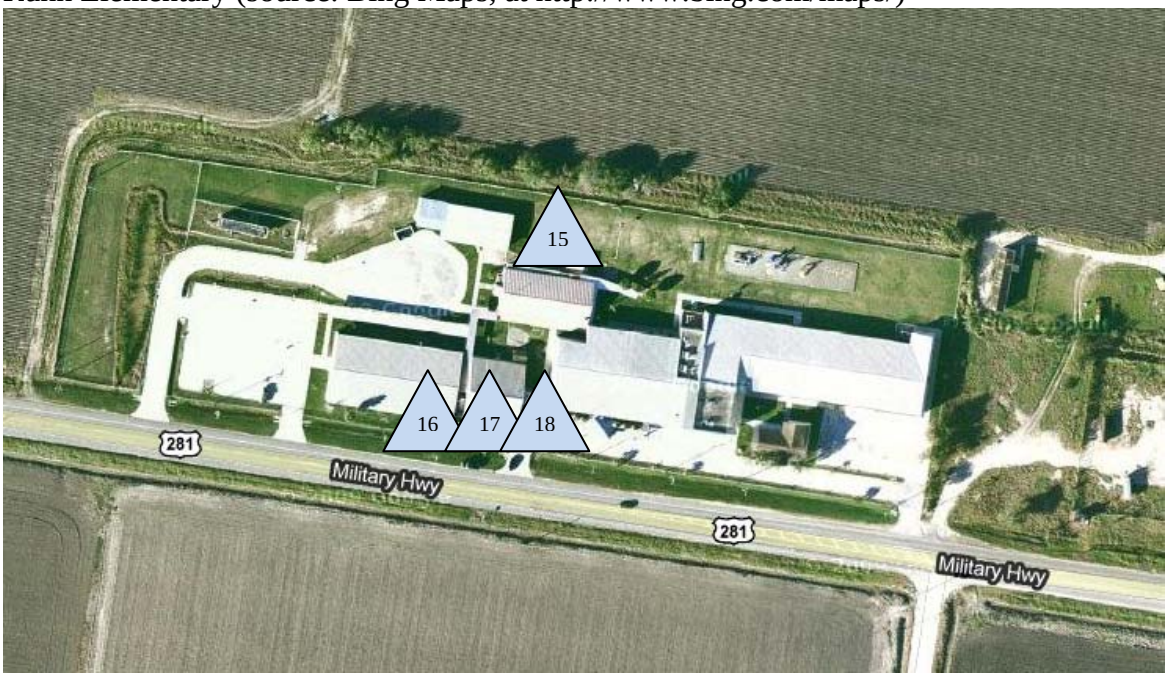


LeNoir Elementary (source: Bing Maps, at http://www.bing.com/maps/)



Stainke Elementary (source: Bing Maps, at http://www.bing.com/maps/)

Runn Elementary (source: Bing Maps, at http://www.bing.com/maps/)



Carceres Elementary (source: Bing Maps, at http://www.bing.com/maps/)

Salinas Elementary (source: Bing Maps, at http://www.bing.com/maps/)

Singleterry Elementary (source: Bing Maps, at http://www.bing.com/maps/)

Adame Elementary (source: Bing Maps, at http://www.bing.com/maps/)

7.0 ENERGY LEGISLATION OVERVIEW

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

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

Following are key requirements established by the above energy legislation:

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

- Record electric, water, and natural gas utility services (consumption and cost) in an electronic repository. The recorded information shall be on a publicly accessible Internet Web site with an interface designed for ease of navigation if available, or at another publicly accessible location. To help with the utility reporting process, a sample input form can be found in **Appendix B** of this report.

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

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

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

8.0 SAMPLE SCREENSHOTS OF ENERGY MANAGEMENT SYSTEM (EMS)

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

While this information only provides a brief sample of the indoor conditions, this information is helpful in providing a general understanding of a facility's HVAC system operations. Since the HVAC system is the major energy consumer in most facilities, investigating these systems can help identify energy reduction opportunities. Below are some examples of the information obtained using the EMS. Please note the following images were obtained during the month of March 2011.

Figure 1. EMS screenshot of air-conditioning units operating schedule at Donna HS gymnasium. At present, all the gym air conditioning units are operating from 6am to 10pm on Monday through Friday and from 8am to 6pm on Saturday.

Donna High School gymnasium utilizes one outside air temperature and humidity sensor to measure the outdoor conditions, which are malfunctioning. All buildings with controls that are not identified in this preliminary assessment report could benefit from Commissioning. The Commission process should include site system evaluations, provide recommendations for corrective action and staff training in use and operation of controls.

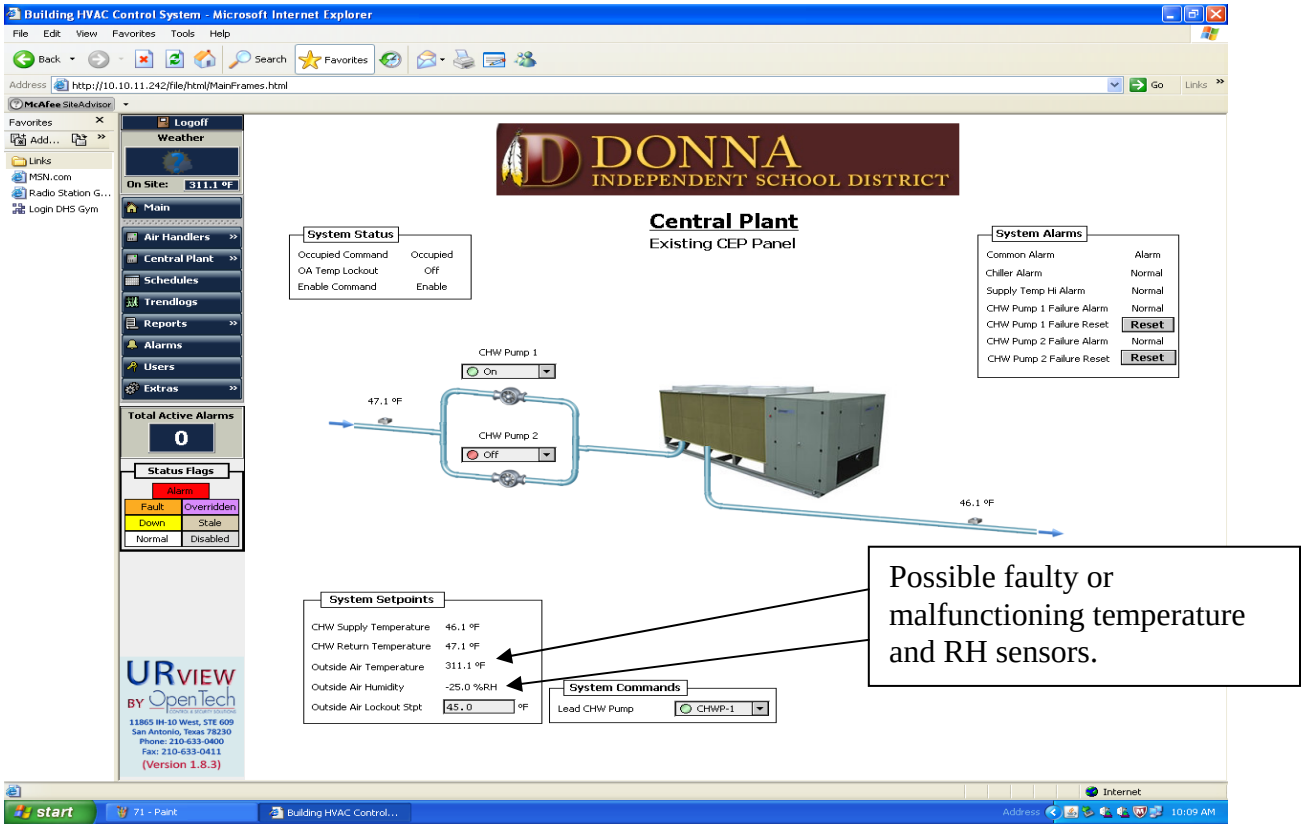


Figure 2. EMS screenshot of Donna HS gymnasium central plant.

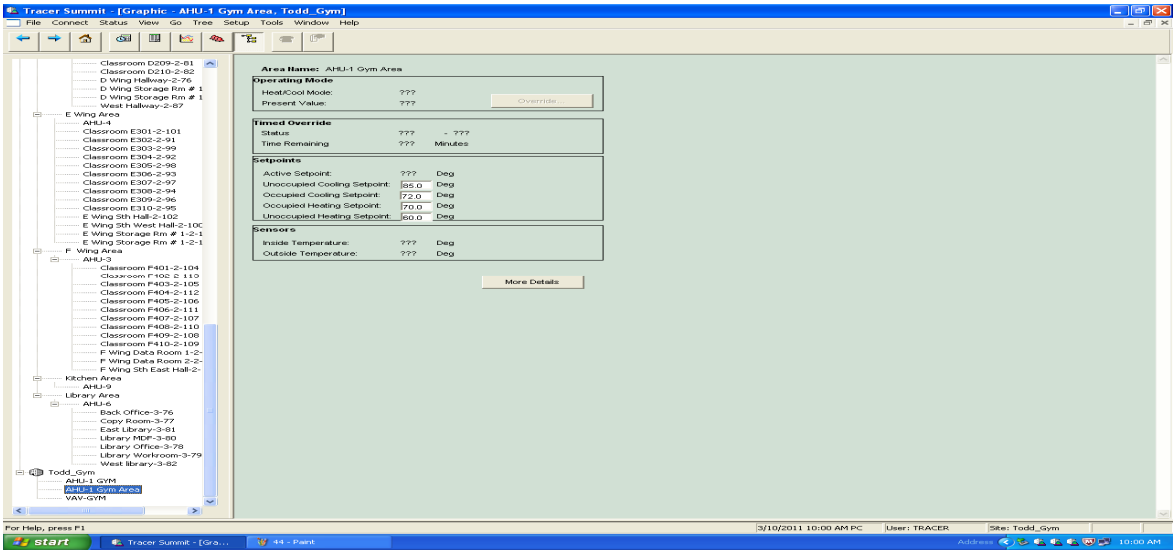


Figure 3. EMS screenshot of Todd gymnasium air handling unit. Sensors and statuses are not reporting correctly.

9.0 RECOMMENDED MAINTENANCE & OPERATION PROCEDURES

Good Maintenance and Operation procedures significantly improve operating economy, equipment life, and occupant comfort. Generally, maintenance and operation procedural improvements can be made with existing staff and budgetary levels. Below are typical maintenance and operations procedures that have energy savings benefits. The District may already be following some of the recommendations noted below. The following maintenance and operation procedures should be encouraged and continued to ensure sustainable energy savings.

PUBLICIZE ENERGY CONSERVATION

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

MANAGE SMALL ELECTRICAL EQUIPMENT LOADS

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

ESTABLISH HVAC UNIT SERVICE SCHEDULES

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

PRE-IDENTIFY PREMIUM EFFICIENCY MOTOR (PEM) REPLACEMENTS

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

IMPROVE CONTROL OF INTERIOR & EXTERIOR LIGHTING

Establish procedures to monitor use of lighting at times and places of possible/probable unnecessary use: Offices and classes at lunchtime, maintenance shops, closets, exterior and parking lots during daylight hours, etc. Encouraging staff (i.e. Teacher, Custodial, maintenance, and students) to participate in the District's efforts to limit unnecessary lighting use would help improve this effort. The pictures on the following page provide examples of unnecessary lighting use.

Example 1 - Gym Lights: The picture below is of the High Intensity Discharge (HID) Lights in the gym at LeNoir Elementary School. During the walkthrough, the lights were on during an unoccupied period. The District should establish a procedure to reduce the time gym lighting is left on during unused periods and consider utilizing natural light from the windows and doors. A good energy awareness campaign, a collective effort, and good communication will help ensure the success of this no/low cost energy saving strategy.

Lights on during unoccupied time in LeNoir Elementary gym

Example 2 - Exterior Lights: The picture below is of exterior lights on during daylight hours. Exterior lighting is typically controlled using light sensing photocells, timeclocks or manual switching. Another option is to use the Energy Management System (EMS) to relays in the lighting circuits. Photocells tend to fail in the "On" state, so someone should check regularly to see that the lights are not on during the day. Timeclocks are more reliable, and those with astronomical control or that operate in series with photocells also provide dusk-to-dawn operation that is seasonally corrected. Timeclocks also offer the option of turning off the lights in the middle of the night. Manual control is limited to when someone is present and remembers to go to the switch and actuate it. EMS control can use a single light sensor and many schedules to control many lighting groups. It also offers easy means to override normal schedules for special events. The EMS light sensor calibration should be checked periodically, or a second sensor should be used for constant cross-calibration.

Exterior lights on during daytime hours at Runn Elementary

Example 3 – Day Lighting Opportunity: The pictures below are a good example of a day lighting opportunity. The building's windows placed along the corridor help bring in sufficient natural light to illuminate the space during school hours. The District should consider reducing the amount of artificial lighting in areas where sufficient natural light is available.

Adame Elem. hall lights on: 80 – 100 foot-candles

Adame Elem. hall lights off: 50 – 70 foot-candles

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. The picture below depicts exterior doors with insufficient weather stripping, which allows sunlight and thermal heat to infiltrate the building, as well as conditioned air to escape.

Exterior doors at Todd 9th Grade Campus

REPLACE INCANDESCENT LAMPS WITH COMPACT FLUORESCENTS

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

ENERGY STAR POWER MANAGEMENT

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

INSTALL ENERGY SAVING DEVICES ON VENDING MACHINES

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

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.

10.0 FLUORESCENT LIGHTING RETROFIT ANALYSIS

The District can choose from many options when retrofitting or replacing linear fluorescent lighting. The following is a brief analysis of the fluorescent lamp options with regard to energy efficiency, lighting levels, and lamp efficiency.

Generally, when speaking of linear fluorescent fixtures, the normal lighting retrofit is from F34T12 (or F40T12) lamps and magnetic ballasts to F32T8 lamps and magnetic ballasts. Recently, new lamp products have been developed that both allow that retrofit to be more specific to the facility as well as allowing an energy retrofit in the form of lower wattage T8 lamps that maintain close to the same lighting levels while consuming significantly less energy. Table 1 below shows some characteristics of different 4' T8 lamps.

Lamp Characteristics	Generic F32T8	Specification Grade, Long-Life F32T8	Specification Grade, Long-Life F28T8	Specification Grade, Long-Life F25T8
Nominal Lamp Wattage	32	32	28	25
Lamp Lumens (Initial)	2,800	3,100	2,725	2,475
Lamp Lumens (Maintained)	2,520	2,950	2,590	2,350
Depreciation Factor	90%	95%	95%	95%
Initial Lamp Efficacy (Lumens/Watt)	87.5	96.9	97.3	99
Maintained Lamp Efficacy (Lumens/Watt)	78.8	92.2	92.5	94
Lamp Life (12 Hours/Start)	28,000	50,000	50,000	50,000
Lamp Life (3 Hours/Start)	24,000	36,000	36,000	36,000
Average Cost per Lamp (Large Quantity)	-	$2.40	$2.00	$2.60

Table 1: Lamp Characteristics

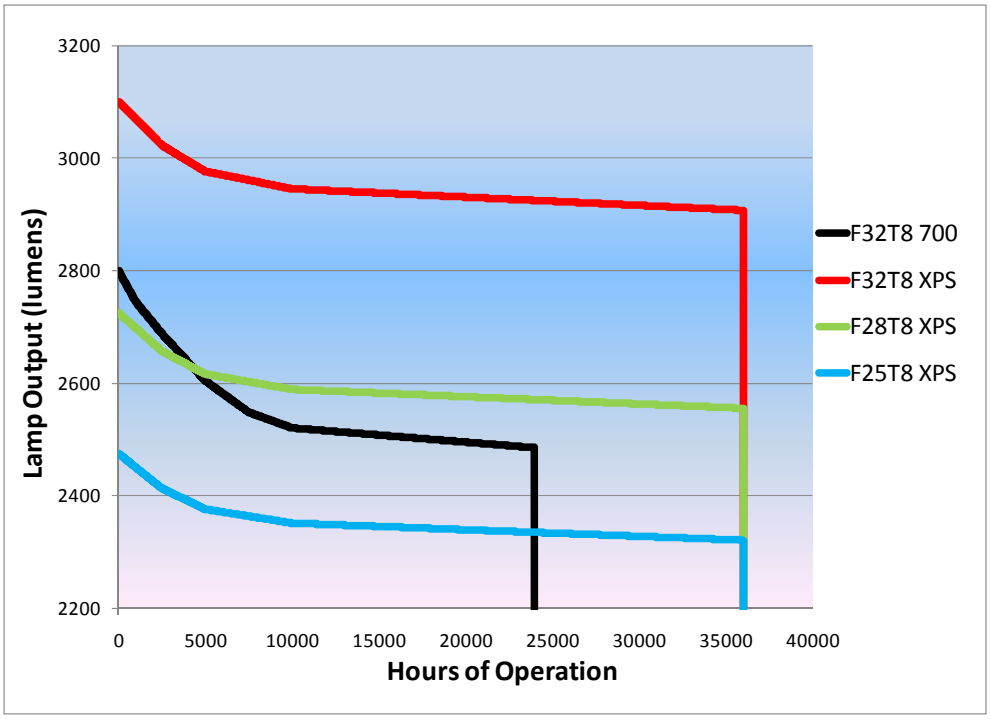
From the Table above:

- Nominal lamp wattage: This is the lamp wattage indicated on the bulb. It is not the wattage used by the fixture itself due to ballast factor, as well as ballast losses. Therefore, the wattages on the lamp specification sheet are relative values and indicative of lamp performance, however the input watts for the specific lamp/ballast combination are used in any energy savings calculations.
- Lamp Lumens: This is a measure of the output of the lamp at the nominal wattage. The initial Lumens are the amount produced when the lamp is new and the maintained lumens are the amount the lamp will maintain until failure. The depreciation factor is simply the maintained lumens divided by the initial lumens as a simple way to view the losses of the lamp over time.
- Lamp Efficacy: The lamp efficacy is the lumens produced per watt used. It is a relatively simple way to show the energy efficiency of a lamp.

- Lamp Life: The lamp lives shown are rated life until 50% of the tested lamps failed. The two cases given (12 and 3 hours per start) are there to show the effects on the lamp life where the lamps are switched regularly.
- Average cost per lamp: This cost per lamp is the material cost of the different lamp options. This cost is based on buying large quantities for retrofit or maintaining an inventory for re-lamping purposes.

As can be seen from Table 1, there are significant advantages to be had by utilizing a higher caliber of lamp. From a maintenance stand point, the extended lamp life will alleviate lamp replacement requirements due to a 50% increase in average life of the lamp.

From an energy efficiency stand point, there are two things that stand out. The first is that the F28T8 lamp maintains a higher lumen level than the generic F32T8 while using 87.5% of the same number of watts. The other item that stands out is that the F25T8 maintains 93% of the output of the generic F32T8 and uses 78% of the energy. In cases where a very slight reduction in light output is acceptable, or desirable, the F25T8 can have a significant impact on the lighting energy consumption of a facility. Graph 1 below shows the above information in a concise format.



Graph 1: Lumen Depreciation Graph

The focus to this point has been primarily on theoretical analysis. In practical terms, these numbers have to coincide with the physical fixture layout and construction as well as staff expectations. In order to use this information in a practical application, a site visit to Donna ISD was conducted. The general findings at Donna ISD were average foot-candle levels in the classrooms between 45 and 65. These levels are in the recommended range published by the Illumination Engineering Society (IES). The lighting levels published by the IES are also anecdotally supported by interviews conducted by TEESI with teachers in multiple schools. In general, complaints of over-lit conditions usually start when the average foot-candle levels exceed 60, depending on the age of the teacher. Based on these findings it is anticipated that either F28T8 or F25T8 lamps could be utilized in a retrofit of the existing F32T8 lamps. The existing ballasts could be reused to minimize costs. Runn Elementary School will be demonstrated as one such application.

Pre-Retrofit Lamp	F32T8 (E)
Post-Retrofit Lamps	F28T8 (N)
Lamp Quantity/Fixture	3.00
Fixture Quantity	11.00
Existing Average Lighting Level (FC)	61
New Average Lighting Level (FC)	62.31
Ballast Replacement	No
Assumed Ballast Factor	88.0%
Lighting Level Maintained (%)	102.2%
Pre-Retrofit Wattage per Fixture	86.00
Post-Retrofit Wattage per Fixture	76.00
Energy Savings (Watts)	110.0
Rate ($/kWh)	$0.0915
Hours	2,600
Annual Savings (kWh)	286.0
Annual Savings ($)	$26.17
Approximate Retrofit Cost per Room ($)	$185.63
Payback (yrs)	7.09

Table 2: Runn ES F32 to F28 Retrofit

Pre-Retrofit Lamp	F32T8 (E)
Post-Retrofit Lamps	F25T8 (N)
Lamp Quantity/Fixture	3.00
Fixture Quantity	11.00
Existing Average Lighting Level (FC)	61
New Average Lighting Level (FC)	56.60
Ballast Replacement	No
Assumed Ballast Factor	88.0%
Lighting Level Maintained (%)	92.8%
Pre-Retrofit Wattage per Fixture	86.00
Post-Retrofit Wattage per Fixture	67.00
Energy Savings (Watts)	209.0
Rate ($/kWh)	$0.0915
Hours	2,600
Annual Savings (kWh)	543.4
Annual Savings ($)	$49.72
Approximate Retrofit Cost per Room ($)	$185.63
Payback (yrs)	3.73

Table 3: Runn ES F32 to F25 Retrofit

Tables 2 and 3 show two options for retrofitting a classroom at Runn Elementary School. In this particular classroom, the average foot-candle levels are approximately 61. Table 2 shows that by replacing the existing F32T8 lamps with a specification grade F28T8 lamp the maintained lighting levels would actually increase a small amount (probably unnoticed) while the energy consumption would decrease. Table 3 shows the effect of replacing the same classroom with F25T8 lamps. While the lighting levels decrease, there are still within IES recommended levels and the energy savings are almost double. In this instance, TEESI would recommend the F25T8 lamp retrofit.

It is TEESI's recommendation that when pursuing this type of retrofit, an entire campus be retrofitted to the same lamp. This greatly aids maintenance personnel when lamps need to be replaced.

11.0 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.

T12 TO T8 FLUORESCENT LIGHTING RETROFIT

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

T12 TO LOW WATTAGE T8 FLUORESCENT FIXTURE RETROFIT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Caceres Elementary	$32,300	$5,400	176	6.0
Salinas Elementary	$49,200	$8,200	300	6.0
TOTAL	**$81,500**	**$13,600**	**476**	**6.0**

REPLACE EXISTING T8 FLUORESCENT LAMPS WITH LOWER WATTAGE LAMPS

4'-T8 fluorescent lamps are available in a variety of wattages, from the standard 32-watt to 30, 28 and 25-watt versions. It is recommended the District replace the existing 32-watt T8 Fluorescent lamps with lower wattage lamps throughout a facility where conditions permit. Changing to a lower wattage T8 Lamp is a relatively straightforward process but does have limitations and are only suitable for certain applications. Lower wattage T8 lamps have reduced lighting output so it is important to ensure recommended lighting levels are verified before lamp replacement. In addition, compatibility with existing ballasts, local codes and other requirements must be verified prior to retrofitting. Switching to lower wattage T8 lamps will have sustainable energy savings with minimal cost or impact. For example, replacing a "Standard" 32-watt, 2800 lumen T8 lamp with a high performance 28-watt, 2725 lumen T8 lamp will approximately have a 12% lighting energy reduction with only a lighting level drop of 3%.

The estimated costs and savings noted below are based on replacement of existing 32-watt T8 lamps with 28-watt lamps, and does not account for ballast replacements or lamp quantity reduction. Estimates are based on a preliminary walkthrough of the facilities. A detailed lighting analysis should be performed to determine exact cost, quantities and configuration to maximize the energy savings and lighting performance.

T8 TO LOW WATTAGE T8 FLUORESCENT LAMP REPLACEMENT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Ochoa Elementary	$12,600	$2,800	112	4.5
Donna High School	$56,300	$12,500	460	4.5
Todd 9th Grade Center	$19,900	$4,000	133	5.0
LeNoir Elementary	$17,400	$3,500	137	5.0
Runn Elementary	$11,800	$2,400	90	4.9
Stainke Elementary	$8,600	$1,700	66	5.1
Caceres Elementary	$2,900	$500	16	5.8
Singleterry Elementary	$12,700	$2,300	85	5.5
Adame Elementary	$17,200	$3,800	140	4.5
TOTAL	**$159,400**	**$33,500**	**1,238**	**4.8**

GYMNASIUM HID TO FLUORESCENT FIXTURE LIGHTING RETROFIT

Several gyms in the District utilize High Intensity Discharge (HID) fixtures to light the Gym. It is recommended that the District replace the existing HID fixtures with fluorescent fixtures suitable for gym applications. Fluorescent fixtures offer improved control, reduce energy consumption and improve lighting levels. In addition, due to the long re-strike times associated with HID fixtures, they cannot be effectively switched on/off during unoccupied periods. This causes the HID lamps to operate longer, which both consumes more energy and affects lamp life. The cost and savings estimates below are based on preliminary observations and analysis. Note that fixtures selected for unheated spaces or where subject to abuse (like gyms) will require special features.

HID TO FLUORESCENT LIGHTING RETROFIT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Donna High School	$34,700	$5,300	195	6.5
LeNoir Elementary	$7,100	$1,000	39	7.1
Salinas Elementary	$14,300	$1,700	62	8.4
TOTAL	**$56,100**	**$8,000**	**296**	**7.0**

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 following table below provides an estimated cost and energy savings for the installation of these types of sensors. Please note this estimation is based on a preliminary assessment exact sensor location, technology (Infrared, Ultrasonic, and Dual Technology) and quantity can be determined during a detailed energy assessment or design phase. In general, enclosed areas with intermittent use, are typically good candidates for occupancy sensors (i.e. hallways, specific classrooms, administration office, break rooms, etc.).

OCCUPANCY SENSOR INSTALLATION				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Ochoa Elementary	$13,800	$2,800	112	4.9
Donna High School	$40,200	$6,900	254	5.8
Todd 9th Grade Center	$19,200	$3,200	106	6.0
LeNoir Elementary	$18,900	$3,400	133	5.6
Runn Elementary	$15,300	$2,700	101	5.7
Stainke Elementary	$15,000	$2,700	105	5.6
Salinas Elementary	$15,300	$2,400	88	6.4
Singleterry Elementary	$19,200	$2,700	100	7.1
Adame Elementary	$21,300	$3,700	137	5.8
TOTAL	**$178,200**	**$30,500**	**1,135**	**5.8**

REPLACE HVAC SYSTEMS

Replace existing HVAC units with new high efficiency units at the facilities indicated in the table below. The existing systems are inefficient and are beyond their useful life. Units to be replaced consist of 2 Split-DX systems at Donna High School totaling approximately 6.4 tons (23 years old). The table below summarizes the estimated cost and savings for replacing the units indentified at the school.

HVAC REPLACEMENT				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Donna High School	$12,800	$900	33	14.2
TOTAL	**$12,800**	**$900**	**33**	**14.2**

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, most of the District's HVAC systems are controlled using conventional thermostats. 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 Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Ochoa Elementary	$135,000	$22,500	900	6.0
Donna High School	$232,200	$18,600	685	12.5
Todd 9th Grade Center	$147,200	$12,300	408	12.0
LeNoir Elementary	$123,500	$13,000	508	9.5
Runn Elementary	$116,800	$9,700	362	12.0
Stainke Elementary	$146,500	$16,300	634	9.0
Salinas Elementary	$97,900	$5,900	216	16.6
Singleterry Elementary	$135,000	$8,400	310	16.1
TOTAL	**$1,134,100**	**$106,700**	**4,022**	**10.6**

HVAC SYSTEMS COMMISSIONING (Cx)

Preliminary examination of the District indicates an opportunity for Commissioning. Typical Commissioning (Cx) is detailed analysis of existing building systems to ensure compliance with the original set-up/design conditions and, where feasible, the conducting of basic research to adjust operating parameters to enhance comfort and reduce energy consumption. 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 provide training to facility operator.

The buildings listed in the table below are good candidates for Commissioning (Cx). For general information on Commissioning, please refer to Appendix G. The estimate is based on a preliminary walkthrough, available utility data analysis, and discussion with staff. The 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 COMMISSIONING (Cx)				
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Estimated Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
Ochoa Elementary	$78,500	$31,400	1,256	2.5
Donna High School	$140,700	$25,600	942	5.5
Todd 9th Grade Center	$76,200	$15,200	724	5.0
TOTAL	**$295,400**	**$72,200**	**2,923**	**4.1**

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 Energy Savings (MMBTU/yr)**	**Simple Payback (years)**
T12 TO LOW WATTAGE T8 FLUORESCENT FIXTURE RETROFIT	$81,500	$13,600	476	6.0
T8 TO LOW WATTAGE T8 FLUORESCENT LAMP REPLACEMENT	$159,400	$33,500	1,238	4.8
OCCUPANCY SENSOR INSTALLATION	$178,200	$30,500	1,135	5.8
HID TO FLUORESCENT LIGHTING RETROFIT	$56,100	$8,000	296	7.0
HVAC REPLACEMENT	$12,800	$900	33	14.2
EMS INSTALLATION	$1,134,100	$106,700	4,022	10.6
BUILDING COMMISSIONING (Cx)	$295,400	$72,200	2,923	4.1
DETAILED ENERGY ASSESSMENT (DEA)	$98,875	-	-	-
CONTINGENCY	$300,000	-	-	-
TOTAL:	**$2,316,375**	**$265,400**	**10,123**	**8.7**

The above projects implementation costs and annual savings are estimated based on a preliminary examination of the facilities. Detailed Energy Assessment phase is strongly recommended to identify more specific scope and costs, as there is potential for additional energy savings opportunities. Furthermore, maintenance cost savings and rebates 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.

12.0 CAPITAL IMPROVEMENT PROJECTS

This section is intended to describe the capital improvement projects that have energy savings opportunities but cannot be justified solely based on the potential energy savings alone. The following are the capital improvement projects recommended for the District.

REPLACE HVAC SYSTEMS NEARING END OF USEFUL LIFE

The District has several Split-DX air-conditioning units nearing the end of their useful life. The average age of these systems are sixteen (16) years. The District should budget and plan to replace these units within the next four (4) years. Replace these systems with new high efficiency units will have energy savings and help reduce maintenance costs. The HVAC systems nearing the end of their useful life consist of 35 Split-DX systems totaling approximately 105 tons at Salinas Elementary. The table below summarizes the estimated cost for replacing the units indentified at the school.

CAPITAL RETROFIT - HVAC REPLACEMENT	
Project Description	**Estimated Implementation Cost**
Salinas Elementary	$360,000
TOTAL	**$360,000**

RETRO COMMISSIONING (RCx)

Retro Commissioning is recommended for buildings that have never before been commissioned. It involves documenting methods to improve the building's systems operation with primary focus on meeting the original design intent. Salinas Elementary commissioning should begin once the HVAC replacements listed above have been completed. The following schools can benefit from the Retro Commissioning process, estimates below were based on a preliminary walkthrough.

CAPITAL RETROFIT - RETRO COMMISSIONING	
Project Description	**Estimated Implementation Cost**
Salinas Elementary	$35,000
Adame Elementary	$34,400
TOTAL	**$69,400**

13.0 ENERGY MANAGEMENT POLICY

By requesting this study, the District has demonstrated interest in taking a more aggressive approach to energy management. In order to establish an effective Energy Management Program it should have support from top management. An Energy Management Policy adopted by the school board sends a strong signal that energy management is an institutional priority. A formal Energy Management Policy can be as simple as a two-page document that clearly states the District's energy management objectives. The policy should cover items such as:

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

Energy cost reduction opportunities are identified for implementation in this preliminary energy assessment report. Increased energy savings can be achieved by ensuring that the District follows through with a board supported energy management plan.

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

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

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

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

4. ESTABLISH ACCEPTABLE EQUIPMENT PARAMETERS

Establish a District-wide uniform temperature set point for all HVAC units. Having a standard setpoint will help keep HVAC runtimes to a minimum. The following are some suggested temperature settings, however, the district will need to monitor and ensure that other building parameters (humidity levels etc.) are within acceptable limits. Also, areas with special equipment (MDF/IDF, server rooms, etc.) or materials (wood flooring, paper storage, etc.) shall be maintained at the equipment supplier's recommended settings and settings appropriate to the material.

Occupied Cooling Temperature Setpoints:

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

Unoccupied Cooling Temperature Setpoints:

Instructional Areas	85 F
Admin Areas	85 F

Occupied Heating Temperature Setpoints:

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

Unoccupied Heating Temperature Setpoints:

Instructional Areas	55 F
Admin Areas	55 F

5. STAFF INCENTIVES AND RECOGNITION PROGRAM

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

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

EXAMPLE:

High School - Annual Total Electric Cost

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

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

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

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

6. NEW BUILDING AND CONSTRUCTION

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

7. ESTABLISH A WATER MANAGEMENT PROGRAM

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

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

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

Qualified School Construction Bond (QSCB)

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

Build America Bonds

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

Energy Efficiency and Conservation Block Grant (EECBG)

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

Qualified Energy Conservation Bonds (QECB)

Energy projects can be eligible for QECBs, which are tax credit bonds that serve to assist with energy efficient capital projects, renewable energy usage, and reductions in energy consumption. The federal government has issued this loan program, which assists with funding of the interest costs for the bonds. These energy conservation bonds are different from tax-exempt bonds traditionally used because they can be regarded as taxable income. For more information on QECBs, please visit http://www.dsireusa.org.

Qualified Zone Academy Bond (QZAB)

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

15.0 ANALYST IDENTIFICATION

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APPENDICES

APPENDIX A

ENERGY LEGISLATION
(SB12, HB3693 AND SB300)

How to comply with SB12 & HB 3693

What you need to know about Texas Senate Bill 12

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

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

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

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

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

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

What you need to know about Texas House Bill 3693

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

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

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

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

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

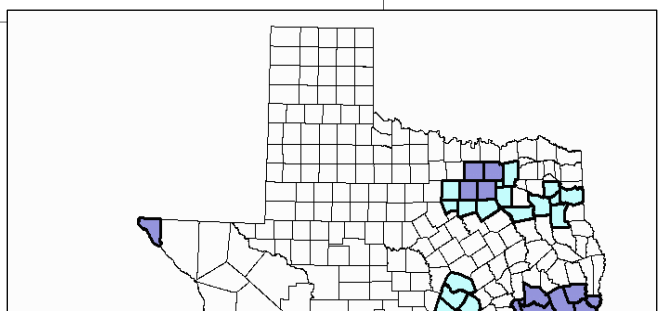
How do you define energy-efficiency measures?

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

Examples of energy-efficiency measures include:

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

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



What counties are affected?

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

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

What assistance is available for affected areas?

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

To assist jurisdictions, the Texas Energy Partnership will:

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

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

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

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

SECO Program Contact Information

LoanSTAR;
Preliminary Energy Assessments:
Eddy Trevino - 512-463-1876
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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.

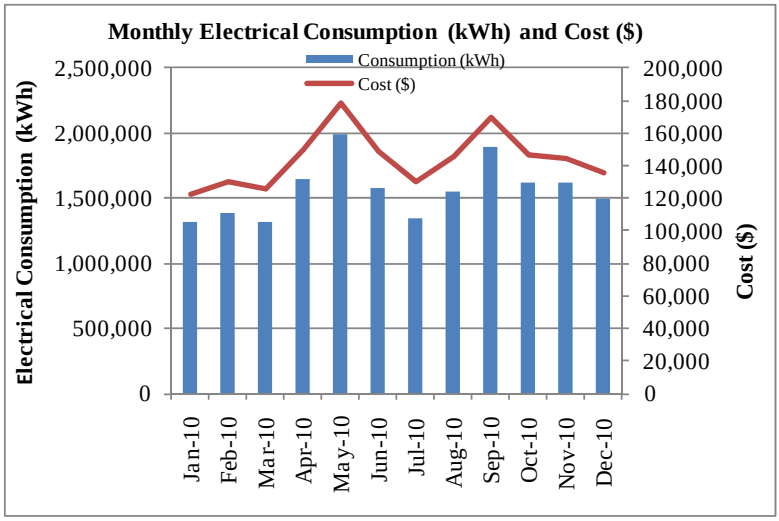
APPENDIX B

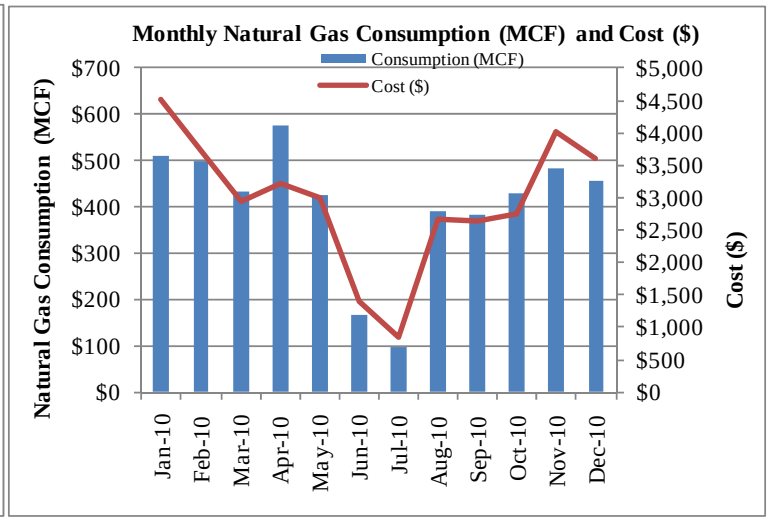
SAMPLE UTILITY DATA REPORTING FORM

Donna ISD - Sample Utility Input Form

MONTH	ELECTRICITY			NATURAL GAS		
	KWH	COST $	Avg. Rate $/KWH	MCF	COST $	Avg. Rate $/MCF
Jan-10	1,321,564	122,479	$0.0927	$509	$4,512	$8.9
Feb-10	1,388,733	130,027	$0.0936	$498	$3,742	$7.5
Mar-10	1,316,305	125,452	$0.0953	$435	$2,942	$6.8
Apr-10	1,642,655	150,242	$0.0915	$576	$3,224	$5.6
May-10	1,991,628	178,899	$0.0898	$427	$2,996	$7.0
Jun-10	1,585,223	149,291	$0.0942	$166	$1,401	$8.4
Jul-10	1,345,732	130,379	$0.0969	$97	$849	$8.8
Aug-10	1,547,944	145,889	$0.0942	$392	$2,668	$6.8
Sep-10	1,899,388	169,405	$0.0892	$385	$2,645	$6.9
Oct-10	1,615,381	146,321	$0.0906	$431	$2,756	$6.4
Nov-10	1,621,882	144,692	$0.0892	$485	$4,027	$8.3
Dec-10	1,492,634	135,131	$0.0905	$455	$3,601	$7.9
Total	18,769,069	$1,728,207	$0.0921	4,855	$35,362	$7.3

Gross Building Area:	1,015,195	SF





APPENDIX C

BASE YEAR CONSUMPTION HISTORY

Energy Cost and Consumption Benchmarks

		Electric				Natural Gas				Total	Total	EUI	ECI	
	Building	kWh/Yr	MMBTU/Yr	$Cost/Yr	kWh/SF	MCF/Yr	MMBTU/Yr	$Cost/Yr	MCF/SF	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	Ochoa Elementary	2,695,200	9,199	229,918	43	0	0	0	0.0000	229,918	9,199	146	3.66	62,811
2	Donna High School	6,035,968	20,601	559,620	17	312	321	2,357	0.0009	561,978	20,922	59	1.60	351,730
3	Todd 9th Grade Center	2,077,560	7,091	213,798	18	4,506	4,642	32,347	0.0384	246,145	11,732	100	2.10	117,243
4	LeNoir Elementary	1,932,900	6,597	168,818	22	0	0	0	0.0000	168,818	6,597	76	1.94	87,033
5	Runn Elementary	1,086,841	3,709	99,434	18	0	0	0	0.0000	99,434	3,709	63	1.68	59,096
6	Stainke Elementary	1,346,400	4,595	118,093	31	0	0	0	0.0000	118,093	4,595	107	2.75	42,952
7	Caceres Elementary	435,200	1,485	45,687	8	0	0	0	0.0000	45,687	1,485	26	0.80	57,390
8	Salinas Elementary	1,148,400	3,919	106,936	13	36	37	657	0.0004	107,593	3,957	45	1.23	87,467
9	Singleterry Elementary	856,800	2,924	79,256	14	0	0	0	0.0000	79,256	2,924	46	1.25	63,404
10	Adame Elementary	1,153,800	3,938	106,648	13	0	0	0	0.0000	106,648	3,938	46	1.24	86,069
		kWh/Yr	MMBTU/Yr	$Cost/Yr	kWh/SF	MCF/Yr	MMBTU/Yr	$Cost/Yr	MCF/SF	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		18,769,069	64,059	1,728,207	18	4,855	5,000	35,362	0.0048	1,763,569	69,059	68	1.74	1,015,195

District: Donna ISD

ACCOUNT# 10032789474904206 10032789422295255 Electric

Gas

BUILDING: Ochoa Elementary

FLOOR AREA: 62,811 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	253,500		297		21,349	0	0
Feb	2010	261,000		297		21,735	0	0
Mar	2010	216,600		297		18,735	0	0
Apr	2010	261,000		305		21,669	0	0
May	2010	265,800		316		21,841	0	0
Jun	2010	94,800		310		10,488	0	0
Jul	2010	47,100		297		6,797	0	0
Aug	2010	118,800		297		11,905	0	0
Sep	2010	293,400		342		23,775	0	0
Oct	2010	252,900		305		21,069	0	0
Nov	2010	306,900		305		24,713	0	0
Dec	2010	323,400		306		25,843	0	0
TOTAL		2,695,200				229,918	0.0	0

Annual Total Energy Cost = 229,918 $/year

Total KWH/yr x 0.003413 = 9,198.72 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 9,199 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 146 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 3.66 $/SF/year

Electric Utility: AEP

Gas Utility:

District: Donna ISD

ACCOUNT# 10032789406945971 10032789432864490 10032789489924531
10032789454473210 10032789447967890 10032789457641155 Electric
10032789430843080
1075186 234481 Gas

BUILDING: Donna High School

FLOOR AREA: 351,730 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	344,350		826		33,016	16	169
Feb	2010	447,087		826		42,318	22	226
Mar	2010	393,439		826		38,132	12	118
Apr	2010	499,184		826		45,908	147	176
May	2010	659,023		885		58,474	14	168
Jun	2010	542,824		899		50,168	5	116
Jul	2010	519,921		948		48,568	6	123
Aug	2010	548,884		979		51,380	13	163
Sep	2010	605,204		1,049		55,006	24	229
Oct	2010	528,042		934		48,476	21	205
Nov	2010	496,612		984		46,072	4	381
Dec	2010	451,398		839		42,100	28	284
TOTAL		6,035,968				559,620	311.8	2,357

* Natural Gas service not included in this summary.

Annual Total Energy Cost = 561,978 $/year

Total KWH/yr x 0.003413 = 20,600.76 MMBTU/year
Total MCF/yr x 1.03 = 321.15 MMBTU/year
Total Other x_____ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 20,922 MMBTU/year

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

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.60 $/SF/year

Electric Utility: AEP

Gas Utility: Texas Gas

District: Donna ISD

ACCOUNT# 10032789441563431 10032789410175551 10032789456542370 Electric

1075183 Gas

BUILDING: Todd 9th Grade Center

FLOOR AREA: 117,243 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	139,723		315		14,660	484	4,246
Feb	2010	154,333		315		16,240	472	3,481
Mar	2010	147,203		320		15,625	422	2,786
Apr	2010	187,729		368		19,231	427	2,994
May	2010	256,259		381		25,400	409	2,771
Jun	2010	203,374		337		20,533	161	1,248
Jul	2010	156,167		305		16,092	91	690
Aug	2010	165,220		322		17,105	377	2,465
Sep	2010	200,220		341		20,332	357	2,356
Oct	2010	166,604		316		17,089	406	2,491
Nov	2010	161,022		373		16,875	478	3,589
Dec	2010	139,706		305		14,614	423	3,230
TOTAL		2,077,560				213,798	4,506.4	32,347

Annual Total Energy Cost = 246,145 $/year

Total KWH/yr x 0.003413 = 7,090.71 MMBTU/year

Total MCF/yr x 1.03 = 4,641.59 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 11,732 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 100 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 2.10 $/SF/year

Electric Utility: AEP

Gas Utility: Texas Gas

District: Donna ISD

ACCOUNT# 10032789458137629 10032789465382015 Electric

Gas

BUILDING: LeNoir Elementary

FLOOR AREA: 87,033 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	148,180		297		13,030	0	0
Feb	2010	165,140		296		14,106	0	0
Mar	2010	125,600		299		11,570	0	0
Apr	2010	158,700		314		13,888	0	0
May	2010	197,320		337		16,695	0	0
Jun	2010	173,020		321		14,813	0	0
Jul	2010	150,000		296		13,081	0	0
Aug	2010	165,720		333		14,553	0	0
Sep	2010	179,340		337		15,436	0	0
Oct	2010	144,260		337		13,060	0	0
Nov	2010	165,460		337		14,443	0	0
Dec	2010	160,160		337		14,143	0	0
TOTAL		1,932,900				168,818	0.0	0

Annual Total Energy Cost = 168,818 $/year

Total KWH/yr x 0.003413 = 6,596.99 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 6,597 MMBTU/year

Energy Use Index:

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

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.94 $/SF/year

Electric Utility: AEP

Gas Utility:

District: Donna ISD

ACCOUNT# 10032789466376138 10032789486733241 10032789426659871 10032789422226179 10032789457558300 Electric

Gas

BUILDING: Runn Elementary

FLOOR AREA: 59,096 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	67,331		150		6,703	0	0
Feb	2010	71,133		150		6,856	0	0
Mar	2010	66,343		158		6,669	0	0
Apr	2010	104,642		167		9,274	0	0
May	2010	105,106		175		9,394	0	0
Jun	2010	95,765		150		8,386	0	0
Jul	2010	77,504		150		7,193	0	0
Aug	2010	101,840		195		9,241	0	0
Sep	2010	115,384		197		10,182	0	0
Oct	2010	91,855		185		8,543	0	0
Nov	2010	102,688		161		9,087	0	0
Dec	2010	87,250		157		7,906	0	0
TOTAL		1,086,841		1995		99,434	0.0	0

Annual Total Energy Cost = 99,434 $/year

Total KWH/yr x 0.003413 = 3,709.39 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,709 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 63 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.68 $/SF/year

Electric Utility: AEP

Gas Utility:

District: Donna ISD

ACCOUNT# 10032789412091317 Electric

Gas

BUILDING: Stainke Elementary

FLOOR AREA: 42,952 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	137,520		335		11,870	0	0
Feb	2010	87,840		283		8,148	0	0
Mar	2010	128,160		287		10,857	0	0
Apr	2010	130,320		292		10,758	0	0
May	2010	140,400		306		11,817	0	0
Jun	2010	93,600		268		8,310	0	0
Jul	2010	90,720		268		8,163	0	0
Aug	2010	115,920		326		10,320	0	0
Sep	2010	135,360		348		11,784	0	0
Oct	2010	112,320		313		9,989	0	0
Nov	2010	88,560		288		8,226	0	0
Dec	2010	85,680		278		7,851	0	0
TOTAL		1,346,400		3591		118,093	0.0	0

Annual Total Energy Cost = 118,093 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 107 kBTU/SF/year

Total KWH/yr x 0.003413 = 4,595.26 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 4,595 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 2.75 $/SF/year

Electric Utility: AEP

Gas Utility: _____

District: Donna ISD

ACCOUNT# 10032789410942529 10032789439160025 Electric

Gas

BUILDING: Caceres Elementary

FLOOR AREA: 57,390 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	25,600		117		3,050	0	0
Feb	2010	25,840		117		3,051	0	0
Mar	2010	31,600		126		3,543	0	0
Apr	2010	42,880		127		4,290	0	0
May	2010	50,800		148		5,044	0	0
Jun	2010	49,040		119		4,552	0	0
Jul	2010	37,920		119		3,806	0	0
Aug	2010	39,840		132		4,120	0	0
Sep	2010	47,120		132		4,570	0	0
Oct	2010	33,680		126		3,651	0	0
Nov	2010	30,480		120		3,360	0	0
Dec	2010	20,400		119		2,651	0	0
TOTAL		435,200		1500		45,687	0.0	0

Annual Total Energy Cost = 45,687 $/year

Total KWH/yr x 0.003413 = 1,485.34 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 1,485 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 26 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.80 $/SF/year

Electric Utility: AEP

Gas Utility:

District: Donna ISD

ACCOUNT# 10032789483851541 Electric

1481922 Gas

BUILDING: Salinas Elementary

FLOOR AREA: 87,467 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	70,560		298		6,994	9	97
Feb	2010	59,760		298		6,271	4	36
Mar	2010	81,360		298		7,726	2	38
Apr	2010	100,800		311		9,134	3	54
May	2010	130,320		333		11,206	4	57
Jun	2010	108,000		333		9,764	0	37
Jul	2010	108,000		333		9,764	0	36
Aug	2010	112,320		356		10,186	1	40
Sep	2010	128,160		367		11,296	4	60
Oct	2010	105,120		343		9,623	4	60
Nov	2010	84,960		343		8,333	2	57
Dec	2010	59,040		339		6,639	4	86
TOTAL		1,148,400		3951		106,936	36.4	657

Annual Total Energy Cost = 107,593 $/year

Total KWH/yr x 0.003413 = 3,919.49 MMBTU/year

Total MCF/yr x 1.03 = 37.49 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,957 MMBTU/year

Energy Use Index:

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

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.23 $/SF/year

Electric Utility: AEP

Gas Utility: Texas Gas

District: Donna ISD

ACCOUNT# 96330-063 Electric

Gas

BUILDING: Singleterry Elementary

FLOOR AREA: 63,404 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	52,000		263		5,159	0	0
Feb	2010	45,200		263		4,625	0	0
Mar	2010	55,200		224		5,797	0	0
Apr	2010	72,400		235		7,288	0	0
May	2010	91,600		287		9,121	0	0
Jun	2010	108,800		287		10,422	0	0
Jul	2010	73,200		287		7,437	0	0
Aug	2010	86,800		280		7,406	0	0
Sep	2010	101,600		284		8,330	0	0
Oct	2010	69,200		243		5,026	0	0
Nov	2010	60,000		235		4,850	0	0
Dec	2010	40,800		180		3,797	0	0
TOTAL		856,800		3067		79,256	0.0	0

Annual Total Energy Cost = 79,256 $/year

Total KWH/yr x 0.003413 = 2,924.26 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 2,924 MMBTU/year

Energy Use Index:

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

Energy Cost Index:

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

Electric Utility: Magic Valley

Gas Utility:

District: Donna ISD

ACCOUNT# 96330-068 Electric

Gas

BUILDING: Adame Elementary

FLOOR AREA: 86,069 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	82,800		288		6,649	0	0
Feb	2010	71,400		290		6,677	0	0
Mar	2010	70,800		311		6,798	0	0
Apr	2010	85,000		311		8,803	0	0
May	2010	95,000		332		9,906	0	0
Jun	2010	116,000		376		11,855	0	0
Jul	2010	85,200		376		9,479	0	0
Aug	2010	92,600		376		9,672	0	0
Sep	2010	93,600		376		8,695	0	0
Oct	2010	111,400		376		9,796	0	0
Nov	2010	125,200		376		8,733	0	0
Dec	2010	124,800		407		9,586	0	0
TOTAL		1,153,800		4192		106,648	0.0	0

Annual Total Energy Cost = 106,648 $/year

Total KWH/yr x 0.003413 = 3,937.92 MMBTU/year

Total MCF/yr x 1.03 = 0.00 MMBTU/year

Total Other x_____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 3,938 MMBTU/year

Energy Use Index:

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

Energy Cost Index:

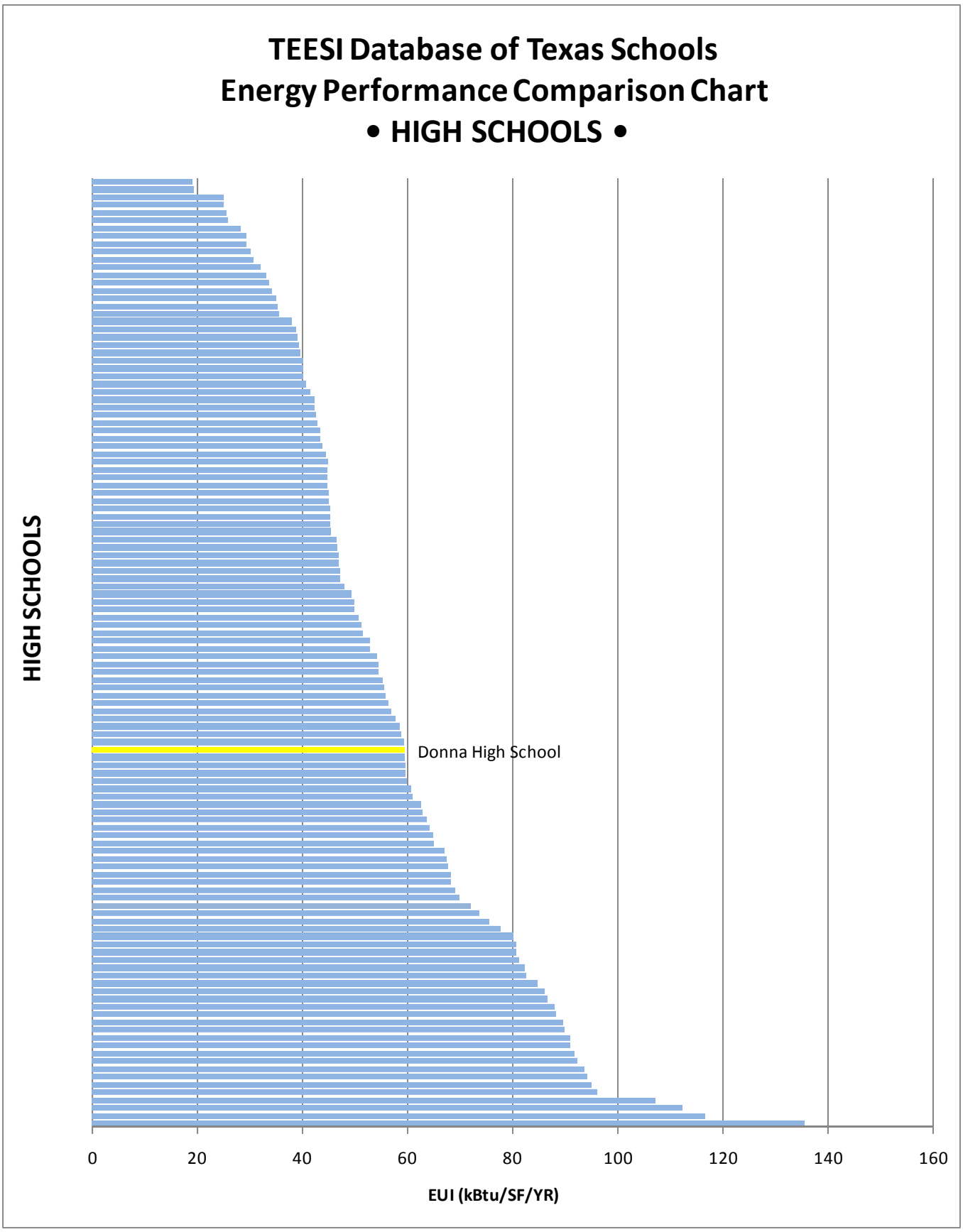
Total Energy Cost/Yr ÷ Total Area (SF) = 1.24 $/SF/year

Electric Utility: Magic Valley

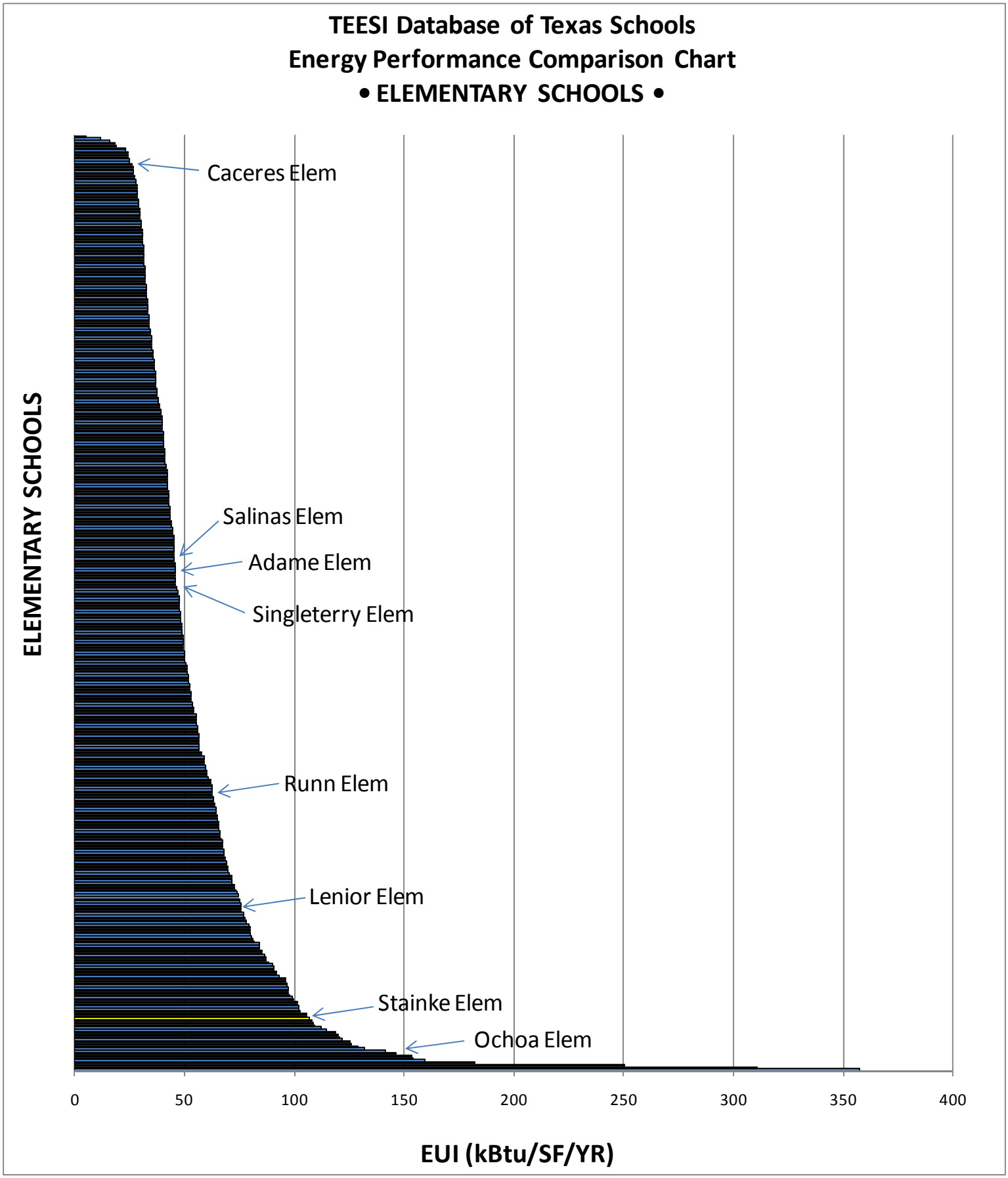
Gas Utility:

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)

APPENDIX E

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Boilers Checklist

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

Boilers Checklist (contd)

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

Boilers Checklist (contd)

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

Chillers Checklist

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

Building Controls Checklist

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

Pumps Checklist

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

Fans Checklist

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

APPENDIX F

LOANSTAR INFORMATION

Texas LoanSTAR Program

FACTS ABOUT LoanSTAR

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

ELIGIBLE PROJECTS

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

PROGRAM REQUIREMENTS

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

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

SAVINGS VERIFICATION

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

For additional information regarding the
LoanSTAR program, please contact:

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

APPENDIX G

BUILDING COMMISSIONING INFORMATION

BUILDING COMMISSIONING GENERAL INFORMATION

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

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

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

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

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

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

[1] *Continuous Commissioning Guidebook for Federal Energy Managers (Oct 2002)*, US DOE Office of Energy Efficiency and Renewable Energy.

The costs of commissioning to the owner vary between forms, as well as from building to building. The cost per square foot (SF) of the facility to be commissioned may vary from $.40/SF to $2.00/SF. However, for typical new construction or renovation projects, the following lists the commissioning costs as percentages of each system cost.

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

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

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

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

END

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

APPENDIX H

REQUEST FOR ENERGY ASSISTANCE

State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

Preliminary Energy Assessment
Service Agreement

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

Description of the Service

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

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

Principles of the Agreement

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

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

Acceptance of Agreement

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

Signature: [signature] Date: 01/13/2011

Name (Mr./Ms./Dr.): Rene Reyna Title: Asst. Superintendent

Organization: Donna Independent School District Phone: (956) 464-1620

Street Address: 116 N. 10th St. Donna, TX 78537 Fax: (956) 464-1636

Mailing Address: Same as above E-Mail: JRREYNA@donnaisd.net

County: Hidalgo

Contact Information:

Name (Mr./Ms./Dr.): URIAN Gonzalez Title: Energy Program Manager

Phone: (956) 464-1663 Fax: (956) 464-1763

E-Mail: uagonzalez@donnaisd.net County: Hidalgo

Please sign and mail or fax to: Juline Ferris, **Schools and Education** Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-936-9283. **Fax 512-475-2569.**