November 22, 2010

# SUMMARY
# PRELIMINARY ENERGY ASSESSMENT AND RECOMMENDATIONS REPORT
# LIBERTY-EYLAU ISD
# LIBERTY-EYLAU, TEXAS


MS. JULINE FERRIS
PROGRAM SPECIALIST
STATE ENERGY CONSERVATION OFFICE
COMPTROLLER OF PUBLIC ACCOUNTS
111 EAST 17TH STREET
AUSTIN, TEXAS 78774
PHONE: (512) 936-9283

ESTES, McCLURE & ASSOCIATES, INC.
ENGINEERING AND CONSULTING
3608 WEST WAY
TYLER, TEXAS 75703
PHONE: (903) 581-2677
jmcclure@estesmcclure.com

STATE OF TEXAS
JAMES D. McCLURE
30580
REGISTERED
PROFESSIONAL ENGINEER

11-22-10

James D. McClure, P.E.
Texas P.E. 30580
Estes, McClure & Associates, Inc.
Registration Number F-893

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# 1.0 EXECUTIVE SUMMARY

The Preliminary Energy Assessment is provided by the State Energy Conservation Office (SECO), a division of the Comptroller of Public Accounts of the State of Texas. This service assists school Districts in taking basic steps toward energy-efficient facility operation. Active involvement by the District in the partnership is critical in developing a customized blueprint for energy efficiency.

One of the first steps toward energy-efficient school operation is identifying the current energy performance of District facilities. An energy performance summary of the subject schools is included in Section 2 and more detailed data by month for each school is in the Appendix of this report.

Successful school energy management programs include the following:

- Identify the Need – District Energy Evaluation
- Appoint an Energy Manager & Provide Training
- Adopt a District Energy Policy
- Write an Energy Management Plan & Present to the School Board
- Implement Energy Accounting System
- Conduct Energy Audits
- Establish Energy Committees
- Adopt Building Operating Procedures & Guidelines
- Involve School Personnel & Students
- Obtain Publicity
- Create Competition & Incentives
- Communicate Success
- Give Personal Contact and Feedback from Energy Accounting
- Energy Procurement

This Preliminary Energy Assessment Report addresses the following specific requirements for 5 campuses:

- Lighting Systems and Projects (Section 4)
- HVAC Systems and Replacement Projects (Section 5)
- M & O (Section 6)
- Energy Management Policy and Guidelines (Section 7)

The Preliminary Energy Assessment report addresses the following five main campuses.

- Primary School
- Pre-Kindergarten School
- Elementary School
- Middle School
- High School

James D. McClure, P.E. visited the District and met with Mr. Dave Wilcox, Director of Support Services and Mr. Jay Maynard, Director of Maintenance. James D. McClure conducted on-site observations. Your personal contact at SECO is Ms. Juline Ferris (Phone: (512) 936-9283); your contact at Estes, McClure & Associates, Inc. is James McClure, P.E., and Gary Bristow, P.E. (Phone: (903) 581-2677). Please call us if you have any questions or comments about this report or other energy management issues.

The following is a brief summary of technical assistance requested by the District and approved by SECO. Some of the projects have longer payback because of the infrastructure nature rather than just a component replacement. Also fortunately the district has much lower electrical cost compared to schools in the deregulated market. The paybacks are also longer because the district is doing a good job of managing energy. These should be useful for master planning, energy reduction, comfort improvements, and environmental improvements. Budget estimates are opinions of probable construction cost and do not include any assessments or budgets of hazardous materials (eg. Asbestos, etc.).

Lighting Systems and Projects (5 campuses) (Section 4)

- Provides lighting retrofit projects for the five subject schools.
- These include replacing metal halide light fixtures in gymnasiums with T-5 lamp fluorescent and electronic ballast fixtures, occupancy sensors to automatically turn lights off, replacing older T12 fluorescent lighting with energy efficient fluorescent T8/electronic ballasts.

- Budget: $ 77,578
  Kw-hrs est. savings/yr 127,754
  Annual savings $ 8,284

HVAC System and Replacement Project – Middle School (Section 5)

- HVAC replacement projects
- Budget: $ 2,255,000
  Kw-hrs est. savings/yr 278,000
  mcf est. savings/yr 80
  Annual savings $ 15,300

Estimated District Savings

For the projects summarized that are the subject of this report.

| | | | |
|---|---|---|---|
| $ Est. Cost/yr | 2,332,578 | mcf saved/yr | 80 |
| Kw-hr saved/yr | 405,754 | Est. $ saved | 23,584 |

General

Based on review of utility usage and cost as well as on-site observations, Liberty-Eylau ISD is being good stewards with energy. There are some opportunities for energy savings because of old HVAC equipment and new technology in lighting. All administration, maintenance, and campus personnel were knowledgeable, helpful, and interested in saving the district energy dollars.

Appreciation

EMA appreciates the opportunity to provide the information in this report. Our intent is to be helpful and responsive to questions that were asked. SECO is commended for sponsoring this assistance program for the District.

Please call to discuss or ask questions. Thank you.

# 2.0 DISTRICT ENERGY AND COST PERFORMANCE

For Liberty-Eylau ISD the student enrollment as listed in the Texas School Directory as of October 2009 is 157,111 students. The following are for the five subject campuses.

The energy use performance or energy use index (EUI) and the energy cost performance or energy cost index (ECI) is provided below. Other detailed data is shown on the Base Year Energy Consumption History table provided in Appendix of this report.

The energy cost index is a valuable tool for comparing the energy cost ($) of different schools and campuses in a given area. The energy use index allows for comparison of schools on a quantity (BTU) basis. Since the cost of electricity varies by school and natural gas is so much less than the cost of electricity, this index is a true value of the actual energy use on a square foot basis. The energy cost index (ECI) and the energy use index (EUI) are determined by the following formulas.

$$ECI = \frac{\text{Annual Electrical Cost + Annual Natural Gas Cost}}{\text{Total Area of School}}$$

$$EUI = \frac{\text{Annual Electrical BTUs + Annual Natural Gas BTUs}}{\text{Total Area of School}}$$

**Energy Cost & Performance**

| Schools | ECI | EUI | KWH per Sq. Ft. | 1000 Mcf per Sq. Ft. | Area (sq. Ft.) | Total Energy Cost |
|---|---|---|---|---|---|---|
| Primary School | $1.21 | 62,528 | 15.5 | 9.5 | 40,000 | $48,343 |
| Pre-Kindergarten | $1.26 | 78,054 | 18.9 | 13.2 | 28,050 | $35,286 |
| Elementary School | $0.56 | 31,677 | 7.6 | 5.8 | 80,000 | $44,579 |
| Middle School | $0.69 | 40,965 | 9.9 | 7.1 | 120,000 | $83,280 |
| High School | $1.05 | 61,191 | 14.3 | 12.1 | 210,000 | $221,350 |

# 3.0 ENERGY ACCOUNTING

## 3.1 Monitoring and Tracking

Liberty-Eylau ISD Business Offices uses a spread sheet to monitor and track energy.

## 3.2 Utility Providers and Rates

The District purchases electricity from SWEPCO, a regulated electrical company. Natural gas is provided by Atmos Energy Company.

# 4.0 LIGHTING SYSTEMS & MISCELLANEOUS PROJECTS

The following are recommended lighting projects for the five campuses.

Several years ago Liberty-Eylau ISD had a lighting retrofit project that replaced most of the T-12 fluorescent/magnetic ballasts with energy efficient T-8 lamps and electronic ballasts.

Recommended lighting projects include the following;

- Replace metal halide gym lighting with T-5 fluorescent lamp fixtures having electronic ballasts. (High School, Middle School, Elementary School, and Pre-Kindergarten School). Also include weight room at Middle School.
- Replace incandescent gym lighting at Primary School with T-5 fluorescent lamp fixtures having electronic ballasts.
- Replace exit light fixtures with LED type lighting. Incandescent and fluorescent observed.
- Replace T-12/magnetic ballasts fixtures (2x2 fixtures) at the High School – East Campus.
- Provide occupancy sensor for lighting control at the Middle School.

Replace Gym Lighting

In all gyms and Middle School Weight Room recommend the District replace the existing metal halide fixtures with energy-saving T-5 HO fixtures. An existing 400 Watt metal halide fixture consumes 458 watts as compared to the 6-lamp T-5 HO fluorescent fixture which consumes approximately 351 watts. The 4-lamp T-5 HO fixture uses approximately 234 watts. Additional savings may be realized because the fixtures are instant on/off requiring no warm up time and, therefore, are more likely to be turned off when not in use. The addition of occupancy sensors to enhance energy savings is recommended. After install assign responsibility to keep lights off anytime gym is unoccupied. Note the Primary School has 300 watt incandescent. Here these also will be maintenance savings as the incandescent has a short life.

**Gym Lighting Retrofits**

| | School | Est. Cost | Est. Annual Energy Savings (Kwh) | Est. Annual Savings | Simple Payback (Yrs) |
|---|---|---|---|---|---|
| b | Primary School | $2,400 | 8,470 | $551 | 4.4 |
| b | Pre-Kindergarten School | $3,600 | 5,276 | $343 | 10.5 |
| b | Elementary School | $4,000 | 5,874 | $382 | 10.5 |
| a | Middle School (Gym Weight Room) | $18,400 | 17,614 | $1,145 | 16.0 |
| a | High School – West | $6,400 | 6,401 | $416 | 15.4 |
| a,c | High School – East | $5,400 | 6,600 | $429 | 12.6 |

a 6-lamp T-5HO fluorescent fixtures
b 4-lamp T-5HO fluorescent fixtures
c Replace 300 – watt inc. with 60-watt compact fluorescent lamps.

High School East Fluorescent Retrofits

The library, some corridors, and media have 2ft.x2ft. T-12 fluorescent/magnetic ballasts. Recommend replacing with T8 electronic ballasts.

| | |
|---|---|
| Est. Cost | $ 10,878 |
| Est. kw-hr saved/yr | 9,828 |
| Est $ saved/yr | $ 658 |

Exit Light Retrofit

In general, exit lights at all campuses are incandescent and some are fluorescent. Recommend replacing exit lights with LED type lighting that uses about 4 watts per exit light. Some of the incandescent exit lights had lamps as large as about 40 watts.

Please note that it was observed some areas have exit lights with no electrical power to them. They did not appear to be the self-illuminating type. Recommend district verify and make any necessary changes.

Exit Lights Retrofitted to LED

| | |
|---|---|
| Est. Cost | $ 7,500 |
| Est. kw-hr saved/yr | 19,710 |
| Est. $ savings/yr | $1,281 |

Install Occupancy Sensors – Middle School

Occupancy sensors turn lights off in spaces after a preset time when no people are detected. They can be utilized in all spaces – classrooms, halls, offices, meeting rooms, etc. A variety of studies indicate that lighting energy savings of 20 percent or more may be realized from utilizing occupancy sensors. At the Middle School during the site visits numerous rooms were observed with lights "on" and unoccupied.

| | |
|---|---|
| Est. Cost | $ 19,000 |
| Est. kw-hr saved/yr | 47,381 |
| Est. $ savings/yr | $3,079 |

The other campuses are spread out in multiple smaller buildings. Occupancy sensors may not be as effective in these circumstances. See M&O Section.

Lighting Summary

| Project | Est. Cost ($) | Est. Annual kw-hr Savings | Est. Annual $ Saved |
|---|---|---|---|
| Gym Lighting | $40,200 | 50,235 | $3,266 |
| Fluorescent Retrofits | $10,878 | 9,828 | $658 |
| Exit Lights | $7,500 | 19,710 | $1,281 |
| Occupancy Sensors (M.S.) | $19,000 | 47,381 | $3,079 |
| **Total** | **$77,578** | **127,154** | **$8,284** |

# 5.0 HVAC DESCRIPTION AND REPLACEMENT PROJECTS

The replacement projects are provided for District Master Planning and energy reduction. The paybacks are long because much of the recommendations are infrastructure type projects. All projects whether maintenance replacement basis or capital retrofit project are recommended to comply with International Energy Code and ASHRAE Ventilation Standard as well as other local codes and ordinances.

The HVAC equipment has R22 refrigerant. R22 for the direct-expansion HVAC equipment has been the standard for many years. CFC and HCFC refrigerants are being phased out (federal law) due to their potential damaging effects on the earth's protective ozone layer. Several important deadlines have already passed, and others are rapidly approaching.

CFC refrigerants (e.g. R11, R12) have already been banned. HCFC refrigerants (e.g. R22, R123), are now being eliminated. Manufacturers cannot make new equipment that uses R22 or R123 beginning in 2010 and 2030, respectively. Production of R22 must stop in 2020 and R12 in 2030. There are also intermediate dates with reductions in production limits and today R22 production is greatly reduced. Refrigerants are reclaimed and recycled and this will help the supply some.

Prior to the 2010 deadline for ending R22 equipment production manufacturers redesigned their Dx products for R410A.

R410A, a non-ozone depleting refrigerant, has been introduced as an alternative for R22 in new equipment. However, it is not a direct drop-in replacement for R22 due to differences in operating characteristics. Also, since R410A operates at higher pressure than previous refrigerants, technicians need additional training and new tools (e.g. hoses, gauges, etc.). R410A cannot be retrofitted into existing R22 equipment. As the district purchases new HVAC Dx equipment, R410A is recommended.

ASHRAE issues industry recognized standards relating to heating, air-conditioning and ventilation that are often incorporated into building codes. ASHRAE Standard 62 with significant increased ventilation rates is now in the building codes. As HVAC renovation projects occur, providing outside air per the current standard/codes is recommended.

A few years ago ASHRAE introduced a strategy called demand control ventilation. This allows automatically adjusting the amount of outside air introduced into a building as $CO_2$ concentration may be used as in indicator of occupancy or number of occupants. $CO_2$ level increases more outside air up to the ASHRAE Standard 62 requirement is savings. A $CO_2$ sensor is in the conditioned space with the sensor controlling room space temperature. This strategy utilizes the energy management control system for operations. $CO_2$ levels correlate with the number of occupants in a room. Demand control ventilation is an energy savings strategy.

Note: The existing controls will not accommodate this strategy. Controls work will be required.

Also recommend new HVAC Dx units be high efficiency two speed compressors with condenser energy reclaim for humidity control. The ASHRAE increased outside air requirements result in needing this type equipment for humidity control.

## 5.1 Middle School

The Middle School is a modern looking school constructed of block and brick. The school is about 21 years old. A few air-conditioning components have been replaced. The school design is such that there are many interior zones such that the primary load on HVAC is cooling due to people, lights, computers, and outside air.

HVAC System Description

- Split system direct expansion systems, one per classroom. Classroom units have electric strip heating. Air-handlers located above ceiling in corridors. Condensing units on roof.
- Split system direct expansion systems for larger zones. These have hot water heating coils. Hot water provided by hot water boilers and pumped to air-handler hot water coils.
- Energy management controls installed. Most thermostats are the old accustat type. Parts are no long available. The control system is on/off only. Space temperature may be read from central computer in office but no resets may be accomplished.
- A small addition has split-system Dx units that are heat pumps.

Recommendations

- The HVAC system at the Middle School has reached its life expectancy based on ASHRAE data and general observations of Dx unitary systems in schools. Recommend replacement of HVAC system in original part of building.
- Recommend high efficiency split-system Dx heat pumps where now have split system Dx with electric strip heat.
- Recommend high efficiency split-system Dx cooling air-handlers and hot water heating coils as now installed for larger zones. Include new boilers, pumps.
- Upgrade Energy Management Controls at time of new HVAC. Provide new technology space sensors with capability for temperature control/reset from central computer in maintenance.

Estimated Cost $ 1,880,000

Estimated Energy Savings

| | |
|---|---|
| Kw-hrs saved/yr | 253,000 |
| mcf saved/yr | 80 |
| $ Savings/yr | $ 13,500 |

## 5.2 Primary School

The campus is made up of 8 separate buildings of varying age. The 1938 original building has recently been renovated. The library building is very old and part of it originally was a small cafeteria. The walls are deteriorated. This entire Library building is a candidate for demolition and a new building.

HVAC System Description

- 1938 original building HVAC and building renovated recently, split system Dx.
- Maintenance report much of equipment on campus have had component replacements in last five years. (Unitary Dx).
- Gym HVAC is a package rooftop unit located on the ground (about 7 years old).
- Cafeteria has original 1984 RTU
- Computer lab building, music, Room 27-30 building, classroom building Room 1-16 all have split-system Dx with components of varying age. Some components are about 20 years old. Some of the furnace appears to be standing type pilot basis.
- The units are turned on/off by the central control system.

Recommendations

- Build new library/media center in place of existing building. Consult district architect.
- Replace old 1984 RTU on cafeteria.
- Replace old A/C units especially those with standing natural gas pilots and old condensing units.
- About 24 units estimated to replace (split-system Dx; unitary)
- Upgrade controls

Estimated Cost $ 375,000

Estimated Energy Savings

| | |
|---|---|
| Kw-hrs saved/yr | 25,000 |
| $ Savings/yr | $ 1,800 |

## 5.3 Pre-Kindergarten School

HVAC System Description

The Pre-K School has a new cafeteria and new large addition. The original part includes classrooms 1-18. The HVAC is reported to be 8-10 years old. Systems observed were spilt-system Dx unitary. The units are turned on/off by the central control system.

Recommendations

- Continue to upgrade on maintenance replacement basis.

## 5.4 Elementary School

The Elementary School consists of 11 buildings of various size and age. The original part appears to be 1950's type construction.

HVAC System Description

The HVAC systems are split-system Dx unitary and the cafeteria has packaged Dx rooftop units as well as the gym (located on ground). Maintenance reports the age varies from 20 years to new. They reported the larger units have been replaced. Some of the small size Dx units have had major components replaced. Not much HVAC problems reported. Equipment is turned on/off with the central controls.

Recommendations

- Continue to upgrade on maintenance replacement basis.

## 5.5 High School

The High School is located just east of the Administration Building. It is divided into an East Campus (Freshman/Sophomore) and a West Campus (Junior/Senior). There are 6 buildings on the East Campus and 7 on the West Campus.

HVAC System Description

The HVAC is unitary individual Dx systems. Maintenance reported that the larger Dx units have been replaced and much of 2-4 ton equipment is reported about 3-10 years old. Equipment is turned on/off

with central controls.

Recommendations

- Continue to upgrade on maintenance replacement basis.

# 6.0 M & O

**Primary School**

- Turn off computers after school, week-ends, holidays, etc. Conduct a night/weekend audit to verify number of computers left on.
- Install occupancy sensor in copy room of main building to turn lights off when unoccupied. Also in other offices/areas with intermittent use.
- Turn outside lights off in daytime. Train/assign custodial or physical education staff. Wall lights at south gym entrance on in daytime.
- Gym main entrance (south side) door frame and door about ½ inch gap.
- Turn off lights in unoccupied areas.
- Assign custodial responsibility to have lights on only in room being cleaned and keep thermostat set on an unoccupied setting.

**Pre-Kindergarten School**

- Turn off computers after school, week-ends, holidays. Conduct a night/weekend audit to verify number of computers left on.
- Turn outside lights off in daytime. Train/assign custodial to turn off outdoor canopy lights in daytime.
- Caulk windows. Two buildings for classrooms 10-18 and for classrooms 5 and 7.
- Turn off lights in unoccupied areas.
- Assign custodial responsibility to have lights on only in rooms being cleaned and keep thermostat set on an unoccupied setting.

**Elementary School**

- Turn off computers after school, weekends, holidays, etc. Conduct a night/weekend audit to verify number of computers left on.
- Turn off outside lights in daytime. Train/assign custodial staff.
- Install occupancy sensors for lighting control in offices, copy rooms, and other intermittent use rooms.
- Turn off lights in unoccupied area.
- Assign custodial responsibility to have lights on only in rooms being cleaned and keep thermostat set on an unoccupied setting.
- Some of the windows need caulking.

**Middle School**

- Turn off computers after school, weekends, holidays, etc. Conduct a night/weekend audit to verify number of computers left on.
- Turn off lights in unoccupied area. Numerous rooms unoccupied and all lights "on".
- Assign custodial responsibility to have lights on only in rooms being cleaned and keep thermostat set on an unoccupied setting.
- Hot water heater tanks rusted out. Replace (located in boiler room).

**High School – East Campus**

- Turn off computers after school, weekends, holidays, etc. Conduct a night/weekend audit to verify number of computers left on.
- Turn off outside lights in daytime. Train/assign custodial staff.
- Install occupancy sensors for lighting control in offices, copy rooms, and other intermittent use rooms.
- Turn off lights in unoccupied area.
- Assign custodial responsibility to have lights on only in rooms being cleaned and keep thermostat set on an unoccupied setting.
- De-lamp vending machine.
- Install occupancy sensors for lighting control in offices, copy rooms and other intermittent used areas.

**High School – West Campus**

- Turn off computers after school, weekends, holidays, etc. Conduct a night/weekend audit to verify number of computers left on.
- Install occupancy sensors for lighting control in offices, copy rooms, and other intermittent use rooms.
- Turn off lights in unoccupied area.
- Assign custodial responsibility to have lights on only in rooms being cleaned and keep thermostat set on an unoccupied setting
- Install occupancy sensors for lighting control in offices, copy rooms and other intermittent used areas.

# 7.0 ENERGY MANAGEMENT POLICY AND GUIDELINES

The most successful school energy management programs have the backing and support of the school board and administration. An energy management policy adopted by the board is an effective approach to show commitment. This policy need not be a lengthy document but a simple statement saying we are going to manage energy and reduce usage. This can also be part of the efforts to comply with SB 300.

A sample policy is included in the Appendix.

As part of the planning, Energy Management Guidelines developed for specific districts has shown to be successful. Guidelines typically include but are not limited to the following. Guidelines also helps to educate occupants on energy saving strategies.

- Temperature set points and range for heating and cooling in both occupied and unoccupied mode.
- After-hours use of the building, by-whom and when.
- Time of day and day occupied level air-conditioning will be available.
- Responsibility for turning off lights when leaving a room.
- Responsibility for turning off computers daily and during week-ends, holidays, etc.
- Responsibility to use daylighting when available rather than energized lighting. Assign responsibility.
- No personal refrigerators or microwaves in classrooms unless required for instructional purposes.
- No portable electric heaters.
- Operate kitchen appliances as needed. For example include appliance warm-up time on recipes and wait until needed to turn on.
- Reporting requirement and assignment for water leaks, broken windows, etc.
- Keep exterior doors closed and classroom doors closed when using air-conditioning
- On extremely cold nights if the building is not comfortable when students arrive in the morning, notify the principal so corrective and preventive steps may be taken.
- Interior lighting to be turned off when a space is unoccupied regardless of time away from the space.
- Times when students are not in room, teachers are encouraged to use a task lamp or use the lower level of lighting if dual switched.
- After school clean large areas (having more lighting load) first and then turn-off (eg. Gyms, cafeteria, etc.)
- Custodial services use lower lighting level when possible. Lights on only in room being cleaned.
- Decorative lamps shall utilize low wattage or energy saver fluorescent lamps. Turn off after regular hours.
- Display lighting (eg. Trophy cases) off at night.
- All outside lighting off in daytime.
- Conduct an audit of each facility at least once per year.
- Turn off business machines such as computers and monitors when appropriate.
- Turn off laminators after hours or only use on certain days.
- Principals shall include energy awareness in staff meetings. Principal's shall also conduct periodic energy conservation inspections for compliance with guidelines.
- In summer, if unoccupied by students, un-plug electric water coolers except for a few depending on size of campus.

- De-lamp all vending machines.
- Turn-off electronic scoreboards in summer, spring break, etc.
- Every campus shall have an energy contact for communication and coordination of energy related items at the campus.
- All departments shall coordinate and cooperate in identifying and communication energy management items. For example, there are common interests between Integrated Pest Management (IPM), energy management, custodial, security, and maintenance.
- Custodial staff shall have the lights on only in the room as it is being cleaned.

The list above are samples. Guidelines for a district should be developed, approved, and communicated. Some have also found that providing simple checklists for a teacher is effective. (The following is an example).

Checklist for Teachers and Office Staff

- ☐ If leaving room unoccupied, turn off lights, computers, printers, etc.
- ☐ Use central refrigerators and eliminate personal refrigerators.
- ☐ Set thermostat for unoccupied mode.
- ☐ Close blinds.
- ☐ Do not leave open food in classroom.
- ☐ Report any broken windows, stained or wet ceiling tiles.
- ☐ Keep the air-conditioning supply and return air grilles free from blockage by books, decorations, furniture, etc.
- ☐ Report any water leaks

# APPENDICES

# APPENDIX A

SECO
State Energy Conservation Office

## Public Schools, Colleges and Non-Profit Hospitals

## Preliminary Energy Assessment
## Service Agreement

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

**Description of the Service**

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

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

**Principles of the Agreement**

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

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

**Acceptance of Agreement**

no previous PEA

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

Signature: [signature]

Date: 10/04/10

Name (Mr./Ms./Dr.) Dave Wilcox

Title: Director of Support Services

Organization: LEISD (Liberty Eylau ISD)

Phone: 903-832-1535

Street Address: 2109 Leopard drive

Fax: 903-838-9444

Mailing Address: Texarkana TX 75501

E-Mail: dave.wilcox@leisd.net

County: Bowie - EMA

**Contact Information:**

Name (Mr./Ms./Dr.): Dave Wilcox

Title: Same

Phone: 903-832-1535

Fax:

E-Mail: dave.wilcox@leisd.net

County: Bowie

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.

# APPENDIX B

# TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

**METER/ACCT#: 2584, 1768, 8174, 0760, 2329 (ELEC)**
(area served by meter)

**DISTRICT:** LIBERTY EYLAU ISD

**BUILDING:** ELEMENTARY

**FLOOR AREA:** 80,000 square feet

**STUDENTS:** 611

| | | ELECTRICITY DATA | | | WATER | | NATURAL GAS/OTHER FUEL | |
|---|---|---|---|---|---|---|---|---|
| MONTH | YEAR | CONSUMPTION KWH | COSTS $ | BILLED KW | WATER CONSUMPTION | WATER COSTS $ | CONSUMPTION UNITS (MCF) | COSTS |
| OCT | 2009 | 42,843 | $2,866 | 183 | 87600 | $1,168 | 13 | $164 |
| NOV | 2009 | 53,750 | $3,127 | 194 | 83200 | $1,139 | 15 | $183 |
| DEC | 2009 | 61,745 | $3,458 | 209 | 72100 | $1,065 | 20 | $199 |
| JAN | 2010 | 58,547 | $3,305 | 203 | 54600 | $948 | 63 | $579 |
| FEB | 2010 | 49,946 | $3,141 | 196 | 85800 | $1,156 | 129 | $1,189 |
| MAR | 2010 | 39,384 | $2,865 | 157 | 74000 | $1,078 | 93 | $844 |
| APR | 2010 | 53,498 | $3,520 | 200 | 66900 | $1,030 | 60 | $557 |
| MAY | 2010 | 43,885 | $3,277 | 201 | 83800 | $1,143 | 23 | $282 |
| JUN | 2010 | 47,670 | $3,374 | 185 | 93700 | $1,209 | 12 | $151 |
| JUL | 2010 | 53,788 | $4,029 | 246 | 198700 | $1,910 | 5 | $75 |
| AUG | 2010 | 60,795 | $4,081 | 237 | 64900 | $1,017 | 3 | $49 |
| SEP | 2010 | 43,588 | $3,211 | 199 | 84800 | $1,150 | 3 | $52 |
| TOTAL | | 609,439 | $40,255 | 2,411 | 1,050,100 | $14,013 | 441 | $4,324 |

| | | | |
|---|---|---|---|
| Annual Total Electricity Cos | = | $40,255 | Per Year |
| Annual Total Energy Cost | = | $44,579 | Per Year |
| Total KWH x 0.003413 | = | 2,080.0 | x $10^6$ |
| Total MCF x 1.03 | = | 453.7 | x $10^6$ |
| Total Other x _____ | = | | x $10^6$ |
| Total Site BTU's/yr | = | 2,533.7 | x $10^6$ |
| Cost per KWH | = | $0.066 | Per Year |
| Cost per student | = | $72.96 | Per Year |

Energy Use Index:
Total Site BTU's/yr = 31,672 BTU/sq.ft./yr
Total Area (sq.ft.)

Energy Cost Index:
Total Energy Cost/yr = $0.56 $/sq.ft./yr
Total Area (sq.ft)

kwh per square foot = 7.6

1,000 mcf / square foot = 5.5

# TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

METER/ACCT#: _____
(area served by meter)

DISTRICT: LIBERTY EYLAU ISD

BUILDING: PRIMARY

FLOOR AREA: 40,000 square feet

STUDENTS: 429

| | | ELECTRICITY DATA | | | WATER | | NATURAL GAS/OTHER FUEL | |
|---|---|---|---|---|---|---|---|---|
| MONTH | YEAR | CONSUMPTION KWH | COSTS $ | BILLED KW | WATER CONSUMPTION | WATER COSTS $ | CONSUMPTION UNITS (MCF) | COSTS |
| OCT | 2009 | 41,342 | $3,192 | | 9081 | $105 | 37 | $458 |
| NOV | 2009 | 37,185 | $2,847 | | 12699 | $133 | 51 | $604 |
| DEC | 2009 | 40,423 | $3,209 | | 6314 | $83 | 61 | $576 |
| JAN | 2010 | 64,825 | $3,938 | | 4594 | $70 | 74 | $599 |
| FEB | 2010 | 46,263 | $3,124 | | 10350 | $115 | 68 | $458 |
| MAR | 2010 | 42,145 | $2,885 | | 9150 | $106 | 51 | $367 |
| APR | 2010 | 41,864 | $3,030 | | 8567 | $101 | 29 | $218 |
| MAY | 2010 | 46,864 | $3,575 | | 8765 | $103 | 7 | $103 |
| JUN | 2010 | 66,618 | $4,598 | | 6266 | $83 | 1 | $62 |
| JUL | 2010 | 49,843 | $3,745 | | 6249 | $83 | | $59 |
| AUG | 2010 | 73,834 | $5,448 | | 5290 | $75 | | $59 |
| SEP | 2010 | 67,328 | $5,130 | | 7761 | $95 | | $59 |
| TOTAL | | 618,534 | $44,721 | | 95,086 | $1,152 | 379 | $3,622 |

| | | | |
|---|---|---|---|
| Annual Total Electricity Cos | = | $44,721 | Per Year |
| Annual Total Energy Cost | = | $48,343 | Per Year |
| Total KWH x 0.003413 | = | 2,111.1 | x $10^6$ |
| Total MCF x 1.03 | = | 390.1 | x $10^6$ |
| Total Other x _____ | = | | x $10^6$ |
| Total Site BTU's/yr | = | 2,501.1 | x $10^6$ |
| Cost per KWH | = | $0.072 | Per Year |
| Cost per student | = | $112.69 | Per Year |

Energy Use Index:
Total Site BTU's/yr = 62,528 BTU/sq.ft./yr
Total Area (sq.ft.)

Energy Cost Index:
Total Energy Cost/yr = $1.21 $/sq.ft./yr
Total Area (sq.ft)

kwh per square foot = 15.5

1,000 mcf / square foot = 9.5

# TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

METER/ACCT#: _____
(area served by meter)

DISTRICT: LIBERTY EYLAU ISD

BUILDING: PRE-KINDERGARTEN

FLOOR AREA: 28,050 square feet

STUDENTS: 230

| | | ELECTRICITY DATA | | | WATER | | NATURAL GAS/OTHER FUEL | |
|---|---|---|---|---|---|---|---|---|
| MONTH | YEAR | CONSUMPTION KWH | COSTS $ | BILLED KW | WATER CONSUMPTION | WATER COSTS $ | CONSUMPTION UNITS (MCF) | COSTS |
| OCT | 2009 | 33,065 | $2,076 | | 73300 | $1,176 | 13 | $176 |
| NOV | 2009 | 22,826 | $1,696 | | 69200 | $1,159 | 15 | $195 |
| DEC | 2009 | 50,586 | $2,869 | | 47100 | $980 | 15 | $164 |
| JAN | 2010 | 65,465 | $3,373 | | 56300 | $1,256 | 57 | $539 |
| FEB | 2010 | 59,065 | $2,986 | | 114500 | $1,263 | 97 | $911 |
| MAR | 2010 | 43,945 | $2,404 | | 148900 | $1,693 | 79 | $433 |
| APR | 2010 | 36,667 | $2,140 | | 165900 | $1,802 | 44 | $409 |
| MAY | 2010 | 30,584 | $2,008 | | 260000 | $2,432 | 22 | $256 |
| JUN | 2010 | 46,506 | $2,711 | | 176700 | $1,877 | 13 | $158 |
| JUL | 2010 | 31,620 | $2,164 | | 26570 | $919 | 9 | $111 |
| AUG | 2010 | 44,500 | $2,825 | | 6550 | $784 | 6 | $76 |
| SEP | 2010 | 64,581 | $4,542 | | 122090 | $1,519 | 4 | $64 |
| TOTAL | | 529,410 | $31,794 | | 1,267,110 | $16,860 | 371 | $3,492 |

| | | | |
|---|---|---|---|
| Annual Total Electricity Cos | = | $31,794 | Per Year |
| Annual Total Energy Cost | = | $35,286 | Per Year |
| Total KWH x 0.003413 | = | 1,806.9 | x $10^6$ |
| Total MCF x 1.03 | = | 382.5 | x $10^6$ |
| Total Other x _____ | = | | x $10^6$ |
| Total Site BTU's/yr | = | 2,189.4 | x $10^6$ |
| Cost per KWH | = | $0.060 | Per Year |
| Cost per student | = | $153.42 | Per Year |

Energy Use Index:
Total Site BTU's/yr = 78,054 BTU/sq.ft./yr
Total Area (sq.ft.)

Energy Cost Index:
Total Energy Cost/yr = $1.26 $/sq.ft./yr
Total Area (sq.ft)

kwh per square foot = 18.9

1,000 mcf / square foot = 13.2

# TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

METER/ACCT#: _____
(area served by meter)

DISTRICT: LIBERTY EYLAU ISD

BUILDING: MIDDLE SCHOOL

FLOOR AREA: 120,000 square feet

STUDENTS: 850

| | | ELECTRICITY DATA | | | WATER | | NATURAL GAS/OTHER FUEL | |
|---|---|---|---|---|---|---|---|---|
| MONTH | YEAR | CONSUMPTION KWH | COSTS $ | BILLED KW | WATER CONSUMPTION | WATER COSTS $ | CONSUMPTION UNITS (MCF) | COSTS |
| OCT | 2009 | 99,840 | $6,456 | | 148700 | $1,077 | 40 | $430 |
| NOV | 2009 | 81,840 | $5,102 | | 171900 | $1,433 | 49 | $500 |
| DEC | 2009 | 85,800 | $5,111 | | 134700 | $1,135 | 50 | $428 |
| JAN | 2010 | 113,320 | $6,563 | | 118700 | $1,125 | 68 | $623 |
| FEB | 2010 | 92,440 | $5,839 | | 96800 | $752 | 181 | $1,412 |
| MAR | 2010 | 84,440 | $5,188 | | 106600 | $833 | 167 | $1,306 |
| APR | 2010 | 93,240 | $5,728 | | 122900 | $1,073 | 119 | $917 |
| MAY | 2010 | 93,560 | $6,445 | | 205000 | $1,805 | 86 | $763 |
| JUN | 2010 | 105,480 | $6,622 | | 208000 | $1,967 | 44 | $453 |
| JUL | 2010 | 98,280 | $6,515 | | 24500 | $2,456 | 24 | $270 |
| AUG | 2010 | 111,520 | $7,862 | | 36150 | $2,526 | 11 | $197 |
| SEP | 2010 | 124,760 | $8,340 | | 339500 | $3,230 | 11 | $210 |
| TOTAL | | 1,184,520 | $75,771 | | 1,713,450 | $19,412 | 848 | $7,509 |

| | | | |
|---|---|---|---|
| Annual Total Electricity Cos | = | $75,771 | Per Year |
| Annual Total Energy Cost | = | $83,280 | Per Year |
| Total KWH x 0.003413 | = | 4,042.8 | x $10^6$ |
| Total MCF x 1.03 | = | 873.0 | x $10^6$ |
| Total Other x _____ | = | | x $10^6$ |
| Total Site BTU's/yr | = | 4,915.8 | x $10^6$ |
| Cost per KWH | = | $0.064 | Per Year |
| Cost per student | = | $97.98 | Per Year |

Energy Use Index:
Total Site BTU's/yr = 40,965 BTU/sq.ft./yr
Total Area (sq.ft.)

Energy Cost Index:
Total Energy Cost/yr = $0.69 $/sq.ft./yr
Total Area (sq.ft)

kwh per square foot = 9.9

1,000 mcf / square foot = 7.1

# TABLE 1 - BASE YEAR ENERGY CONSUMPTION HISTORY

METER/ACCT#: _____
(area served by meter)

DISTRICT: LIBERTY EYLAU ISD

BUILDING: HIGH SCHOOL

FLOOR AREA: 210,000 square feet

STUDENTS: 677

| | | ELECTRICITY DATA | | | WATER | | NATURAL GAS/OTHER FUEL | |
|---|---|---|---|---|---|---|---|---|
| MONTH | YEAR | CONSUMPTION KWH | COSTS $ | BILLED KW | WATER CONSUMPTION | WATER COSTS $ | CONSUMPTION UNITS (MCF) | COSTS |
| OCT | 2009 | 202,926 | $15,045 | | 353500 | $3,609 | 6 | $129 |
| NOV | 2009 | 167,791 | $12,725 | | 210090 | $2,718 | 14 | $207 |
| DEC | 2009 | 247,260 | $15,959 | | 181250 | $2,518 | 55 | $500 |
| JAN | 2010 | 351,056 | $19,946 | | 136400 | $2,229 | 288 | $2,121 |
| FEB | 2010 | 315,890 | $18,121 | | 179650 | $2,530 | 393 | $3,242 |
| MAR | 2010 | 255,583 | $15,542 | | 131350 | $2,198 | 832 | $5,606 |
| APR | 2010 | 213,725 | $14,400 | | 182300 | $2,530 | 469 | $3,780 |
| MAY | 2010 | 210,090 | $15,835 | | 110330 | $2,065 | 287 | $3,426 |
| JUN | 2010 | 254,956 | $17,206 | | 480050 | $4,488 | 164 | $1,978 |
| JUL | 2010 | 238,303 | $17,255 | | 701800 | $4,985 | 13 | $171 |
| AUG | 2010 | 266,543 | $18,807 | | 723200 | $5,200 | 11 | $155 |
| SEP | 2010 | 274,360 | $19,046 | | 1045900 | $7,428 | 9 | $148 |
| TOTAL | | 2,998,483 | $199,887 | | 4,435,820 | $42,498 | 2,540 | $21,463 |

| | | | |
|---|---|---|---|
| Annual Total Electricity Cos | = | $199,887 | Per Year |
| Annual Total Energy Cost | = | $221,350 | Per Year |
| Total KWH x 0.003413 | = | 10,233.8 | x $10^6$ |
| Total MCF x 1.03 | = | 2,616.2 | x $10^6$ |
| Total Other x _____ | = | | x $10^6$ |
| Total Site BTU's/yr | = | 12,850.0 | x $10^6$ |
| Cost per KWH | = | $0.067 | Per Year |
| Cost per student | = | $326.96 | Per Year |

Energy Use Index:
Total Site BTU's/yr = 61,191 BTU/sq.ft./yr
Total Area (sq.ft.)

Energy Cost Index:
Total Energy Cost/yr = $1.05 $/sq.ft./yr
Total Area (sq.ft)

kwh per square foot = 14.3

1,000 mcf / square foot = 12.1

# APPENDIX C

# STATE ENERGY CONSERVATION OFFICE SUGGESTED WATER EFFICIENCY GUIDELINES FOR BUILDINGS AND EQUIPMENT AT TEXAS STATE FACILITIES

The 77th Legislature directed the State Energy Conservation Office to develop a set of water efficiency standards for state agencies. This document represents SECO's response to that request.

We wish to thank the Texas Water Development Board and the City of Austin Water Conservation Office for their assistance in preparing these guidelines.

The following is a guideline that should be followed for new buildings and facilities and purchase of any new or used equipment by the State. These guidelines would also apply when purchasing new or used equipment to replace existing equipment, or for making major modifications to existing systems or equipment that equals more that half the original purchase price of the equipment. These should also be used as guides for upgrading existing equipment. A system approach should be used when examining water use in this sector. The goal shall be to balance water, wastewater, energy, and related costs to achieve the lowest lifecycle cost when purchasing new equipment or making modifications to existing equipment.

## Irrigation Requirements

Automatic irrigation systems should comply with the following guidelines. These guidelines should be noted on a plan drawn by the agency, licensed irrigator or licensed landscape architect.

1. Adjustable flow controls valves on circuit remote control valves. Pressure regulation component(s) shall be required where static pressure exceeds manufacturer's recommended operating range (30-60 psi). This component(s) may be installed at the valve or at the head.

2. Valves and circuits shall be separated based on water use, (hydro-zoned) so that turf and shrub areas, sun and shade areas, as well as high and low runoff areas may be watered separately.

3. The minimum precipitation rate that can be applied by any zone of conventional irrigation should be in accordance with State regulations established by the Texas Natural Resource Conservation Commission. Sprinkler heads shall have matched precipitation rates within each control valve circuit.

4. Serviceable check valves shall be required where elevation differential may cause low head drainage adjacent to paving areas.

5. Sprinkler head spacing shall be designed for head-to-head coverage or heads shall be spaced as per manufacturer's recommendations and adjusted for prevailing winds. The system shall be designed for minimum run-off. There shall be no direct over spray onto impervious areas (i.e. paving and structures).

6. All automatic irrigation systems shall be equipped with a controller capable of dual or multiple programming. Controllers should have multiple cycle start capacity and flexible calendar program, including the capability of day of week or day interval watering. All automatic irrigation systems shall be equipped with a rain sensor shut-off device.

7. Irrigation construction plans shall include a water budget. A water budget should include:

a) Estimated monthly water use (in gallons per application) and the area (in square feet) irrigated.
b) Precipitation rates for each valve circuit.
c) Monthly irrigation schedule for the plant establishment period (first three months) and recommended yearly watering schedule, including seasonal adjustments.
d) Location of emergency irrigation system shut-off valve.

8. All in-ground irrigation systems shall have backflow prevention device installed that meet local code.

9. In addition to local requirements, all irrigation systems must comply with the Texas Natural Resource Conservation Commission rules and regulations.

10. Where available, reclaimed water will be used for all purposes allowed by rules established by the Texas Natural Resource Conservation Commission, if the reclaimed water is less costly than potable water or other water currently being used by the purposes that reclaimed water can be use.

11. Sources of water such as water from foundation and basement sump pump discharges, air conditioner condensate, captured stormwater or rainwater, and other sources should be explored and used as long as local plumbing codes are followed.

**Landscape Design Standards** (Based on the Landscaping Guidelines adopted by the General Services Commission pursuant to SB 814, 73rd Legislature)

1. Irrigated turf areas and planting beds should be limited to as small an area as possible.

2. Areas that are irrigated shall have at least six inches of a good quality soil in the areas to be watered.

3. Plants having similar water needs shall be grouped together and shall be selected based on use, soil and sun/shade conditions, adaptability to geographic and climatic conditions, and upon ability to survive, once established, on normal rainfall or minimal irrigation.

4. Irrigated turf shall be used sparingly and only in circumstances where other landscaping media will not satisfy the site's needs.

5. Turf and overhead sprinklers should not be placed along curbs and in parkways and planning islands less than 6 feet wide.

6. All new construction projects shall include specifications for soil analysis and amendments, such as compost, in type and quantity necessary to enhance plant growth and maximize water retention. All landscape planting selections must, be appropriate for the soil as analyzed and amended.

7. In planted areas, mulches of two inches or more shall cover most soil surfaces to minimize soil moisture evaporation.

8. Turf shall be limited to 90% of landscaped areas.

9. Turf grass selection shall be determined by facility need and geographic location. Use of different types of turf for distinctive purposes is encouraged. Turf types that can be maintained on natural rainfall is encouraged.

## Plumbing Fixtures and Practices

1. All water closets shall comply with state plumbing standards as administered by the Texas Natural Resource Conservation Commission.

2. Faucet aerators in public lavatories and hand washing facilities shall have a flow rate of no more than 1.0 gallons per minute. All other faucet aerators shall comply with state plumbing standards as administered by the Texas Natural Resource Conservation Commission.

3. Faucets in high use restrooms shall be self-closing or shall be equipped with on-off sensors.

4. Showerheads for lockers, dorms, and other non-medical purposes shall use no more than 2.0 gallons per minute. All other showerheads shall comply with state plumbing standards as administered by the Texas Natural Resource Conservation Commission.

5. All water fountains shall be self-closing.

6. All hot water lines shall be insulated.
7. All water pipes subject to freezing shall be insulated.

8. Special plumbing fixtures other that the ones mentioned above should be chosen based on their water and energy efficiency and functionality.

9. All major new buildings, cooling towers, and irrigation systems shall be separately metered and records kept to determine use.

10. Signage requesting that leaks and other plumbing problems be promptly reported shall be placed in each restroom, shower facilities, kitchen, laundry, pool, and other high water use areas. The signage shall also have the phone number where to report such problems.

## Heating, Ventilation, & Air Conditioning Equipment

1. Cooling towers and boiler chemical contracts shall specify the cycles of concentration to be achieved. The cycles of concentration should be set to match local water chemistry but shall exceed at least four cycles unless the blowdown from the tower is being beneficially reused for landscape irrigation or other uses.

2. Steam condensate shall be returned to the boiler unless volumes are too low to justify condensate return loops. In the latter case, the condensate shall be reused beneficially wherever possible.

3. Condensate from the air conditioner cooling coils should be captured and used for cooling tower makeup or other purposes where feasible. Building design should be considered that would help facilitate the easy capture of condensate by convent location of air handling units.

4. Cooling tower side stream filtration shall be investigated when new systems are purchased.

## Water Treatment Equipment

1. If water softening is used, regeneration shall be controlled by actual hardness or by a flow volume control that is based on the hardness of the water to be softened. Softeners that use timers for recharging are prohibited.

2. If reverse osmosis or nano-filtration is used, reject waste volumes shall be reused for landscape irrigation or other beneficial purposes.

**Refrigeration Equipment**

1. Once through cooling of any refrigeration equipment is prohibited. Refrigeration equipment (i.e. refrigerators, walking coolers, ice cream and yogurt machines, and similar equipment) of 10 tons per hour or less shall be air-cooled or be fed with water from a closed cooling water loop.

2. Ice flake machines should be used instead of ice cubes makers whenever possible. Ice flakes require less water to produce. If ice cube makers are used, they shall be air-cooled and use no more than 20 gallons per 100 pounds of ice produced based on the Air-conditioning & Refrigeration Institute's annual Directory of Certified Automatic Commercial Ice-Cube Machines and Ice Storage Bins.

**Warewashing**

1. New warewashing equipment shall use less than 1.2 gallons of fresh water per rack based on National Sanitation Foundation information.

2. Conveyor-type dishwashers shall have electronic eye sensor system so that the machine only operates when there are dishes present on the conveyor belt, not continuously. If the conveyor is continuously running, expecting another load of dishes, water and chemicals are also spraying, to clean the ware that is not even there. This is a waste of energy, water, and chemicals.

**Garbage Disposals**

1. Manually scrap dishes into a garbage can or scrap basket to reduce the need for pre-rinse and/or pre-rinse time.

2. Manual pre-wash units shall have shut-off's that turn the water off when the operator lets go of the nozzle.

3. Garbage grinders and disposals should not be use where manually scrapping and the use of a scrapping basket with the pre-wash spray can be efficiently done.

4. All garbage disposals shall be equipped with solenoids that shut water flow to the disposal off when not in use.

5. All garbage disposals shall be air-cooled.

6. A scrapping system, a complete pre-rinsing and disposing system, that can increase efficiency in some kitchens. A recirculated water plume in the salvage basin allows the ware to be simultaneously soaked and rinsed, increasing scrapping efficiency and because the water is recirculated, new water does not need to be added. Waste falls from the salvage basin into a collection basket.

7. Where volume of use makes it feasible, install a recirculating "pot scrubbing" or Jacuzzi-style sink to loosen up foodstuff rather than under a stream of running water.

8. A fresh-water trough system, used for scrapping and pre-rinse, can use up to 14 gallons a minute and is not recommended. The amount of pressure and water needed to keep the waste

moving down the trough to the disposal or scrap basket is not efficient. A recirculating trough system, with water flow controls can cut water use in half. However, recirculating pre-rinse and scrapping basins are more water efficient than trough systems in general. If possible do not even use a trough.

## Steamers

1. Steamers shall be of the self-contained, boilerless type that does not have a direct connection to a water supply.
2. Steamers that are connected directly to a water line, at the best, have a continuous blowdown of a quarter of a gallon per minute, but most continuously dump much more. They are significantly less energy efficient and require soft water with no more that 60 parts per million of total dissolved solids or require that very large volumes of water be continuously passed through to the sewer for water quality control.

## Clothes Washing Equipment

1. Commercial clothes washing equipment such as those found in central laundry facilities shall use no more that 1.6 gallons per pound washed.

2. Clothes washers shall have double dump valves and equipment of 150 pounds capacity or greater shall be equipped so that the final rinse water can be returned for use in the first flush wash.

3. Smaller residential type clothes washers intended for personal use by clients or inmates shall have a water use factor of 9.5 gallons per cubic foot of washer volume or less. This is a different standard from the one cited for commercial laundries above. Information for this can be obtained Oregon Residential Tax Rebate Program at the following web site http://www.energy.state.or.us.

## Pumps

Water pumps shall have mechanical seals unless prohibited by code.

## Metering

1. All buildings intended for daily occupation or for water using equipment operation shall be metered separately and records of its water use maintained by that agency.

2. If any one, single activity or piece of equipment at a facility accounts for more that 20% of the total water use at that facility, it shall be metered separately and records of its water use maintained by that agency.

3. Any water use that does not create waste water should be metered separately to better align waste water costs with actual usage.

## Vehicle Washing

1. New softeners installed at carwash facilities shall not use timers to determine when to recharge. Recharge cycles shall be controlled by instruments that measure volume of water treated or the actual quality of the water being softened

2. Reverse osmosis or nano-filtration reject water shall be reused beneficially for vehicle washing.

3. Chamois wringer shall have self-closing valves on their faucets

**In-bay**: Hand held spray wash equipment including spray wands and foaming brushes shall use no more that 3.0 gallons of water per minute and shall be equipped with trigger shutoffs. The shutoffs shall have weep holes or other devices to allow for drainage and pressure surges. All pressure wash equipment shall be equipped with unloader valves.

**Conveyor, drive-through, and rollover type car washes**: Equipment for automobiles and small truck and vans shall use no more than 15 gallons per vehicle. Washes designed specifically for buses and tractor-trailer rigs shall use no more than 40 gallons per vehicle washed. All such equipment shall be equipped with re-circulation or reuse equipment.

## Bench Mark Indices[1]

For Texas, the amount of outdoor water will vary with location ranging from 20 inches per year in Far East Texas to 48 inches a year in Far West Texas. For the San Antonio to Dallas line, the demand is about 36 inches per year or about 22 gallons per square foot of use. Many state facilities do not water the whole campus and when they do, they use under that amount. Most schools do not irrigate in Texas. For your use, the conversion from inches to gallons per square foot is 0.623 gallons of water per inch per square foot. In other words, if a campus irrigates 10,000 square feet at a rate of 40 inches a year, they will use {10,000 X 40 X 0.623 = } 249,200 gallons a year.

As for the numbers above, they represent the low end from an American Water Works Association study completed in 2000. The range of use we see in public facilities can be significantly higher. For example, in a study of over 300 schools in Texas, the water use ranged from two gallons per student per day to over 130 gallons per student per day. The high number was from a school that has now made **MAJOR** repairs to a basket case of a plumbing system. High schools should be at the high end of the table above, while most elementary schools can use under 10 gallons per student per day.

Office Buildings

| End Use/Benchmark Measure | N*** | Efficiency Benchmark Range* |
|---|---|---|
| **INDOOR USE** | | |
| Gal./sf/year | 62 | 9 - 15 |
| Gal./employee/day | 72 | 9 - 16 |
| **COOLING USE**** | | |
| Gal./sf/year | 49 | 8.5 - 22 |
| **IRRIGATION USE**** | | |
| Inches per year | 47 | 26 - 50 |
| **TOTAL WATER USE**** | | |
| Gal./sf/year | 62 | 26 - 35 |

* Developed from combined methods (field studies, audit data, and modeling results).
** Appropriate benchmarks will depend upon local climate.
***Sample size.

[1] Information provided by Bill Hoffman, City of Austin, Water Conservation Department (2001).

Schools

| End Use/Benchmark Measure | N*** | Efficiency Benchmark Range* |
|---|---|---|
| **INDOOR USE** | | |
| Gal./ sf /year | 142 | 8 - 16 |
| Gal./school day/student | 141 | 3 - 15 |
| **COOLING USE**** | | |
| Gal./ sf /year | 35 | 8 - 20 |
| **IRRIGATION USE**** | | |
| Inches per year | 132 | 22 - 50 |
| **TOTAL WATER USE**** | | |
| Gal./ sf /year | 142 | 40 - 93 |

* Developed from combined methods (field studies, audit data, and modeling results).
** Appropriate benchmarks will depend upon local climate.
*** Sample size.

Bench mark indices continued

Food Service

| End Use/Benchmark Measure | N*** | Efficiency Benchmark Range* |
|---|---|---|
| **INDOOR USE** | | |
| Gal./sf/year | 142 | 8 - 16 |
| Gal./school day/student | 141 | 3 - 15 |
| **COOLING USE**** | | |
| Gal./sf/year | 35 | 8 - 20 |
| **IRRIGATION USE**** | | |
| Inches per year | 132 | 22 - 50 |
| **TOTAL WATER USE**** | | |
| Gal./sf/year | 142 | 40 - 93 |

* Developed from combined methods (field studies, audit data, and modeling results).
** Appropriate benchmarks will depend upon local climate.
***Sample size.

# APPENDIX D

# Energy Conservation Policy
# for
# Liberty-Eylau Independent School District

Recognizing our responsibility as Trustees of the Liberty-Eylau Independent School District, we believe that every effort should be made to conserve energy and our natural resources. We also believe that this commitment will be beneficial to our students and taxpayers in prudent financial management and the saving of energy.

The fulfillment of this policy is the joint responsibility of the trustees, administrators, teachers, students and the support personnel. Cooperation shall be experienced on all levels for the success of this policy.

The District will maintain accurate records of energy consumption and cost of energy on a monthly basis. Information will be furnished to the media on the goals and progress of the Energy Conservation Program.

In compliance with Senate Bill 300, as passed by the 81st Texas Legislature, the District sets a goal to reduce its annual electric consumption by five percent. Reporting will be in accordance with House Bill 3693.

An energy audit will be conducted annually at each campus and recommendations will be made for updating the energy program. Energy conservation guidelines and procedures will be reviewed and accepted or rejected by the Board of Trustees.

**Adopted this _____day of _____, 20__**

**President of the Board:** _____

**ATTEST:** _____