

**Report of Energy Efficiency Study and  
Metering/Utilities Profile for Electricity Deregulation at the  
Texas A&M University - Texarkana (TAMU-T)  
Texarkana, Texas**

**Submitted to**

**Texas A&M University - Texarkana  
The Texas A&M University System**

**Submitted by**

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## **Acknowledgement**

The Electric Utility Regulation and Energy Efficiency Study for all universities in the TAMU System was initiated in May 1999 and is funded through an interagency agreement between the Chancellor's office and TEES's Energy Systems Laboratory. Detailed site visits were made to all system universities throughout the summer and fall. The Energy Systems Laboratory wants to thank all physical plant directors and their staff for their cooperation and support during the site visits.

## **Executive Summary**

The physical plant director at Texas A&M University - Texarkana (TAMU-T) does a very good job of maintaining TAMU-T facilities and keeping expenses down. During our visit, however, we were able to identify several opportunities for improving energy efficiency.

### **Energy Savings Potential for the Campus**

1. Estimated savings: \$5,000/yr for the New Academic building.

### **Commissioning Targets**

1. Optimize operation and reduce energy costs for the New Academic building.
2. Improve comfort conditions for the Aikin building.

### **Metering Recommendations for Electric Deregulation**

Two options exist –install ESL metering and install a data logger or purchase the utility interval data from SWEPCO. Because the campus is so small and the potential savings from commissioning are small, we recommend purchasing the interval data from SWEPCO. For any commissioning savings of natural gas, we would use the monthly gas bills for analysis. The 15-minute electrical interval data would be needed both for commissioning and for utility deregulation.

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## **Energy Efficiency Study**

### **General Introduction**

The TAMUT campus is located in Texarkana, Texas. The weather is hot in the summer and mild in the winter.

There is total of three buildings with 111,700 square feet of conditioned area on this campus. It is the smallest campus within the TAMU system. This is an upper-level only campus at the present time, serving about 1,300 students. Many are part time, averaging approximately 8 hours per student. The facilities are not occupied from 10:00 p.m. to 6:00 a.m. The academic building was built in 1998 and was occupied in late December 1998.

The electricity and gas costs for FY99 were \$76,672 and \$8,688. This translates to about \$0.76/yr/sq-ft for all three buildings on the campus. The utility bill from September 1998 to December 1998 only counts the costs for the Aikin and Library building plus some power consumption of the construction site of the Academic building. Therefore, the energy cost index will be actually higher than \$0.76/yr/sq-ft.

There is no central plant for this campus. The major types of air handler units (AHUs) are multi-zone units for the Aikin building, single duct variable air volume (VAV) systems for the Academic building and rooftop units for the Library building. The chillers are air-cooled for the Aikin and Academic buildings. The chilled water and hot water pumps for those two buildings are constant volume pumps.

The HVAC systems are controlled by a Barber-Coleman DDC system for the Academic building, by a pneumatic control system for the Aikin building and by thermostat only for the Library building. The systems for the Academic building are still under warranty.

On November 3, 1999, we conducted a commissioning survey for the campus. All three buildings were surveyed in detail and measurements were taken for the HVAC systems, which were on line.

According to the information from the DDC control system and from the physical plant director, two buildings have nighttime shutdown schedules.

Based on our survey results, the general mechanical systems are well maintained. There is little potential for savings at this campus, either from electricity deregulation or from commissioning. Comfort problems were reported, however, for the Aikin building in the summer. There may be the opportunity to tie into their control system at College Station and work with Mr. Ward Martaindale, the Physical Plant director, on line to give him some help in case it is needed.

## **Commissioning Potential for the Campus**

### **Energy Savings Potential for the Campus**

1. Estimated savings: \$5,000/yr for the New Academic building.

### **Commissioning Targets**

1. Optimize operation and reduce energy costs for the New Academic building
2. Improve comfort conditions for the Aikin building

## **Summary of Building Information and Major Commissioning Recommendations**

### **A. M. & Welma Aikin Instructional Center-Main Building (offices, classrooms)**

#### *Building Information*

It is a 3-story building with an area of 51,600 sq-ft. The HVAC systems are controlled by a pneumatic control system with the room temperature display in the central computer and the panel meter in the Physical Plant director's office. The system's on/off controls are scheduled in the control system.

There are two 100 ton air-cooled chillers providing the chilled water to this building. One 1.3MMBtu/hr boiler provides hot water to the building in winter. At the time of the ESL visit, the outside air temperature was from 43°F to 50°F, the chillers and boiler were off. Two 7.5 hp constant volume chilled water and two 3 hp constant volume hot water pumps were off. According to the Physical Plant (PP) director, the chilled water pumps will be on if the outside air temperature is 55°F or higher, and will be off if outside air temperature is 50°F and lower.

Three multi-zone AHUs serve the building. The system only supplied the mixed air to the rooms at the time of visit. There was very little outside air intake for the AHUs.

According to the Physical Plant director, there are comfort problems in this building in the summer. Some areas were over 76°F and some areas were cold. Obviously, there is an air balance problem in the building. This was not addressed during this visit due to the weather conditions.

#### *Recommended Commissioning Measures*

1. Tie into the control system at the College Station as that on line help may be given.
2. Provide advice for the operation to the PP director.

### **New Academic Building (offices, classrooms)**

#### *Building Information*

It is a 2-story building with an area of 37,100 sq-ft. This building was put into use in late December 1998. The HVAC systems are still under warranty. The HVAC systems are

controlled by a Barber-Coleman DDC control system.

There are two 100 ton air-cooled chillers providing chilled water to the building. According to PP director, each chiller has 3-stages of operation. At the time of the visit, one chiller was on line. Two 10 hp constant volume chilled water pumps were on. The chilled water supply temperature setpoint was reset from 40°F to 60°F based on different weather conditions. The setpoint was 43°F at the time of the visit. One 1.5 MMBtu/hr boiler was online. One of two 7.5 hp hot water pumps was on. The supply and return hot water temperatures were 139°F and 134°F.

Two single duct VAV AHUs with terminal reheat serve the building. The outside air is pretreated with pre-cooling and pre-heating coils. Also, there is a bypass section for the cold deck. It was found that one AHU was offline. The PP director called the company to solve the problem. AHU-1 was online. There were no complaints due to the weather. The VFD speed was 61% and the discharge air temperature was 69°F. The static pressure setpoints were 1.0”H<sub>2</sub>O for both AHUs. However, it was found that the outside air was heated from 45°F to 63.6°F and then cooled down to 45.8°F before entering the supply duct.

#### *Recommended Energy Measures*

1. ChW: Shut off chillers and pumps if Toa<50°F and turn on if Toa>55°F.  
Optimize the numbers of the chillers and pumps online at any time.
2. HW: Shut off boiler and pumps from April to October. The operator will control the boiler and pumps on/off from November to March or use control program controlling as follows:  
The boiler and hot water pump would be on if Toa<50°F and off if Toa>55°F.
3. Optimize the control of pre-cooling and pre-heating coils.
4. Optimize the control of neutral deck and cold deck.
5. Check conditions in all mixing boxes and optimize the static pressure reset schedule.
6. Shut down the systems based on the occupancy schedules.
7. Calibrate outside air temperature sensor.
8. Optimize the chill water setpoint temperature based on outside air temperature.

#### John F. Moss Library Building (library, offices)

##### *Building Information*

It is 2-story building with an area of 23,000 sq-ft. Thermostats control the HVAC systems.

Eight rooftop units with electric resistance reheat serve the building. There is no gas used in this building. Because this library facility is shared with the community college, and because there are no controls other than area thermostats, no commissioning measures are recommended.

## **Electricity Deregulation Metering Options**

Electricity:

Option 1: Buy the 15-minute time interval utility data from SWEPCO.

Option 2: Install the ESL loggers and share the pulse with SWEPCO to monitor the electricity consumption for the Aikin building meter (Academic building included) and the Library building meter.

Gas: Install ESL loggers for the two meters located in the Academic and the Aikin buildings.

Because of the size of the facility and the cost to install the ESL metering, both electricity and gas, it is recommended that the university purchase 15-minute electrical interval data from SWEPCO for the electric utility deregulation program. For the commissioning savings, we will use the electric utility 15-minute data, and for natural gas savings we will use the facility monthly gas bills.



**Utility Bill Summary**  
**Table 1: Utility Summary for 1998**

TAMUT	Electricity				Natural Gas		
Month	Energy -kwh	Energy Cost \$	Demand-kW	Demand Cost \$	Gas-MCF	Gas Cost \$	Total cost
Jan-98	73440	2033.75	342	1471.97			
Feb-98	88680	2415.19	310.8	1337.68			
Mar-98	75060	2117.69	349.8	1505.54			
Apr-98	108720	2963.24	369.6	1590.76			
May-98	131600	3584.72	372.6	1603.67			
Jun-98	136920	3749.65	429	1846.42			
Jul-98	159540	4519.88	483.6	2081.41			
Aug-98	144900	4104.36	421.8	1815.43			
Sep-98	154920	4009.91	478.2	2058.17			
Oct-98	123840	3313.88	492	2117.57			
Nov-98	103980	2780.24	362.4	1559.77			
Dec-98	129720	3540.94	430.8	1854.16			
<b>total/max</b>	<b>1431320</b>	<b>39133.45</b>	<b>492</b>	<b>20842.55</b>			

**Table 2: Utility Summary for FY1999**

TAMUT	Electricity				Natural Gas			
Month	Energy -kwh	Energy Cost \$	Demand-kW	Demand Cost \$	Gas-CCF	Gas Cost \$	Total cost	
Sep-98	154920	4009.91	478.2	2058.17			6068.08	
Oct-98	123840	3313.88	492	2117.57	15	11.7	5443.15	
Nov-98	103980	2780.24	362.4	1559.77	44	39.98	4379.99	
Dec-98	129720	3540.94	430.8	1854.16	443	239.96	5635.06	
Jan-99	159660	4381.43	511.2	2200.2	3459	3896.28	10477.91	
Feb-99	155580	4303.81	478.8	2055.59	1420	765.66	7125.06	
Mar-99	117840	3409.96	438.6	1887.73	620	459.2	5756.89	
Apr-99	158460	4513.35	466.8	2009.11	1179	786.89	7309.35	
May-99	160500	4563.77	462	1988.44	815	559.72	7111.93	
Jun-99	186360	5316.14	523.8	2254.44	746	520.47	8091.05	
Jul-99	223800	6210.7	579.6	2494.6	857	627.39	9332.69	
Aug-99	194880	5413.76	635	2434.76	914	780.92	8629.44	
<b>FY99</b>	<b>total/max</b>	<b>1869540</b>	<b>51757.89</b>	<b>635</b>	<b>24914.54</b>	<b>10512</b>	<b>8688.17</b>	<b>85360.6</b>
SWEPCO: Southwestern Electric Power Company								
Reliant: Reliant Energy/Arkla								