Energy Conservation Plan
December 2005

Texas A&M University-Corpus Christi
The Island University

A Campus of The Texas A&M University System
Corpus Christi, Texas
This document was prepared to comply with the Governor’s Executive Order RP49 - October 27, 2005 relating to energy conservation by state agencies. Texas A&M University-Corpus Christi contracted with Bath Engineering, located in Corpus Christi, to assist us with the analysis, preparation and goal setting aspects of this Energy Conservation Plan. There are three energy components included in our conservation plan. They are electricity, gasoline, and natural gas. Historically, on the TAMU-CC campus, these three commodities breakdown to electricity (90%), natural gas (8%), and gasoline (2%) including diesel fuel, of our energy purchases.

EXECUTIVE SUMMARY

Texas A&M University-Corpus Christi, the Island University, has doubled in size and student enrollment in the past ten years and expects to double again by 2015. Being situated on an island, fronting Corpus Christi Bay and surrounded by the Cayo Del Oso estuary adds to the challenges of effective, efficient use of the buildings and their systems including energy conservation.

Historically, the university has made a significant investment in energy conservation measures as noted below. This Energy Conservation Plan will continue that effort. Also, the University participates with other A&M and UT campuses in the aggregate purchase of electricity and natural gas to minimize our purchase price for these commodities as much as possible. Electrical consumption is the largest component of the three commodities addressed by this plan, and offers the most opportunities for conservation. Given the sustained growth of the campus, and based upon the analysis provided by Bath Engineering and university operational need, our goals for the Energy Conservation Plan are: a reduction of 1.5% in both electrical and natural gas consumption per square foot/per heating/cooling degree days/per year; and gasoline consumption at current minimal levels.

This plan will be submitted to the Office of the Governor and the Legislative Budget Board by December 1, 2005. And, a report shall be prepared and submitted quarterly to the Office of the Governor and the Legislative Budget Board indicating goals achieved, and ideals for additional savings beginning with the first report due on April 1, 2006. Texas A&M University-Corpus Christi will also post the report in a conspicuous place on the Physical Plant Website for public inspection.

HISTORY OF ENERGY CONSERVATION

The Texas A&M University Corpus Christi Campus is a dynamic and expanding facility, constantly changing and growing to meet the needs of its escalating enrollment. Energy costs are a substantial portion of the operating budget, requiring careful and constant scrutiny. Energy Conservation, and proper equipment operation and maintenance, has been an integral part of the university’s operating plan for well over 15 years. Electrical
energy reduction has been the main focus since electrical energy accounts for the largest portion of total campus energy usage and total cost. Significant energy conservation improvements and activities during the past 15 years have included:

1) Construction of new Central Chiller/Boiler Plant and chilled water/hot water utility loop in 1994 converted seven stand-alone buildings to the more energy efficient plant/loop system.
2) Thermal Storage 1995 – Installation of a 12,000 ton-hr thermal storage system to shift load to off-peak hours and reduce demand charges.
3) Interior Bldg Lighting retrofit – 47% of Sq Footage requires retrofit from incandescent & T12 lamps to compact and T-8 lamps with electronic ballast. 24% of this work has been accomplished to date with maintenance crews.
4) Exterior Lighting retrofits of incandescent and mercury vapor lamps to high pressure sodium have been completed. Selected areas have been placed on the Energy Management System (EMS) control instead of photocell. Security lighting of critical areas has been greatly enhanced.
5) EMS installation during major building remodels.
6) A more efficient 1500 ton chiller was installed in 2004 to address additional load. The more efficient chiller is now used for the base load.
7) High Efficiency Motor replacements. Failed motors are replaced with high efficiency motors.
8) Building replacements. Older less efficient buildings are taken out of service and demolished as replacements are brought on line.
9) Building remodel – Major remodels include lighting retrofits, EMS, and multi-zone Variable-Air-Volume HVAC systems, Variable Frequency Drives on Air Handler Units and pumps.
10) Building Commissioning Programs for all existing buildings.
11) When reproofing, additional insulation is added when appropriate for conservation.
12) Manually setback thermostats during campus breaks.
13) Utilization of HVAC equipment condensate water from selected buildings for campus landscape irrigation.
14) Installed water softener for cooling tower makeup water to reduce blow-down frequency.
15) Installed SpiralVent to remove air and particulates from makeup water.
16) Occupancy sensors in selected new buildings.
17) Campus Energy Saving Awareness Campaign (turn off lights when you leave room, etc).
18) On-going routine and preventive maintenance of systems equipment to optimize their efficiency.
19) Energy Audit by Siemens in 2003 found the campus to be unusually advanced in energy saving activities and improvements.
Along with the conservation issues noted above, the university believes in the proper operation and maintenance of all of the building and infrastructure electrical and mechanical systems. This includes:

**Seasonally, at the beginning of the heating season**
- Inspect, test, and tune up heating systems - adjust, replace filters, etc.
- Turn off or reduce heating in unoccupied areas.
- Check thermostat accuracy, and adjust for desired heating levels.
- Cover window air-conditioners where appropriate.

**Seasonally, at the beginning of the cooling season**
- Inspect, test, and clean cooling systems.
- Turn off or reduce air-conditioning in unoccupied areas.
- Adjust thermostats for desired cooling levels.
- Adjust outdoor light timers, or modify EMS programming for length of day and/or daylight savings.

**Seasonally, at the end of the cooling season**
- Caulk, weather-strip, and fix doors and windows.

**ELECTRICITY CONSUMPTION**

TAMUCC Physical Plant management believes the majority of quick payback energy saving actions has been accomplished over the last 15 years. Additional savings will be mainly attained by careful monitoring and analysis, resulting in minor modifications and tweaking of the system operation to maintain and improve energy use efficiencies. Additional projects can be undertaken if funds are allocated for such. Without such funding, a 1.5% decrease in electrical consumption per square foot/per heating/cooling degree days/per year will be the goal. This will be documented by specific project energy saving calculations as they are accomplished.

**Future Electricity Conservation Actions**

1) Document all energy saving actions and calculated savings for quarterly reports. Analyze potential projects for payback and apply for funding when beneficial projects are identified.

2) Continue load shifting to off peak hours and load leveling to reduce demand charges by monthly analysis of 15 minute electric usage data and tweaking system

3) Power Factor Correction – The Utility Company is going to start penalizing for power factor below .95. A study is underway to determine the existing power factor situation and, if necessary, install power factor correction equipment to maintain power factor above .95.

4) Continue including lighting retrofits, EMS, and multi-zone Variable-Air-Volume HVAC systems, Variable Frequency Drives on Air Handler Units and pumps on major and minor building remodel projects as appropriate.

5) Develop a “Continuous Commissioning Program” to assure building systems maintain the highest feasible efficiency.
6) Continue Interior Building Lighting retrofit as equipment fails or funds and time allow. Replace Incandescent exit lights with LED type, T12 lamps & magnetic ballast with T8 and electronic ballast, Incandescent lamps with Compact Florescent Lamps.

7) Install occupancy and sunlight sensors where applicable.

8) Convert exterior lighting from photocell to EMS or time clock control so lights in remote areas can be turned off after class hours.

9) Continue High Efficiency Motor replacements as motors fail. Properly size new motors to the load to help improve efficiency and power factor.

10) Continue EMS retrofits during major remodels. Convert electric strip heat to more efficient gas heat or add to expanded central hot water loop.

11) Replace old inefficient buildings with new efficient buildings as budgets allow.

12) Install limiting/setback thermostats in housing units

13) Set up more buildings to use “free cooling” during low humidly periods (winter).

14) Consolidate off period activities into selected energy efficient buildings so less efficient buildings can be set to unoccupied status.

15) Schedule more classes during cooler morning or evening hours.

16) Expand “Energy Saving Awareness Campaign”

17) Investigate potential subsidies, grants and payback for improvements like the following:

   i) Solar power
   ii) Wind Power
   iii) Green/LEED Building Program
   iv) Wave Power
   v) More efficient light sources such as Induction and LED

GASOLINE AND DIESEL FUEL CONSUMPTION

Since 1998, the Texas A&M University-Corpus Christi campus has continued to grow in size and complexity. At the same time, we have reduced gasoline powered vehicles from a maximum of forty-four to six today (including three cruisers used by the University Police department). Non-university state agencies (which are occupants of the Truan Natural Resource Center, located on the university campus) also utilize our fueling facilities. In addition, off-campus vehicle business travel is done on a case by case basis by means of a rental agreement with Enterprise Rent-A-Car. All vehicles owned by the university are part of an on-going preventative maintenance program; and the university utilizes the State's Fleet Data Management System. And, as a part of the university safety program, employees that drive motor vehicles, including gasoline powered utility carts, are trained in the proper use and fuel-efficient operation of those vehicles.

The balance of gasoline and diesel fuel usage on the campus is tied to physical plant operations including forklifts, emergency generators, man-lifts, backhoes, utility carts, grounds mowers and small equipment, etc. In the past three fiscal years, gasoline consumption has been reduced from approximately 16,007 gallons to 11,832 gallons per year and diesel fuel consumption has been holding relatively steady at approximately 2,000 gallons per year.
Based upon this information and university operational need, our goal for future fuel consumption would be for gasoline and diesel fuel to remain steady at approximately 12,000 gallons and 2,000 gallons per year respectively. However, TAMUCC will continue to explore energy conserving alternatives whenever possible to reduce our minimal fuel consumption.

**Natural Gas Consumption**

The TAMUCC Central Chiller/Boiler Plant, which supplies chilled and hot water to approximately of the buildings on campus, is the largest user of natural gas on the campus. Future savings will be mainly attained by careful monitoring and analysis, resulting in minor modifications and adjustments of the system operation to maintain and improve energy use efficiencies. Additional projects can be undertaken if funds are allocated for such. Without such funding a 1.5% decrease in natural gas consumption per square foot/per heating/cooling degree days/per year will be the goal. This will be documented by specific project energy saving calculations as they are accomplished.

**Future Natural Gas Conservation Actions**

1) Document all energy saving actions and calculated savings for quarterly reports. Analyze potential projects for payback and apply for funding when beneficial projects are identified.

2) Develop a “Continuous Commissioning Program” to assure building and central plant gas systems maintain the highest feasible efficiency.

3) Replace old inefficient buildings with new efficient buildings as budgets allow.

4) Consolidate off period activities into selected energy efficient buildings so less efficient buildings can be set to unoccupied status.

5) Increase amount of insulation to smaller hot water boilers and storage tanks located in various buildings.

6) Purchase higher efficiency equipment as gas units are in need of replacement (water heaters, boilers, kitchen equipment, etc.).

7) Install controls upgrade on central plant boilers to improve efficiency.

8) Investigate alternative humidity control in two buildings so the central plant boilers and hot water loop can be shut down during summer months.

9) Expand “Energy Saving Awareness Campaign.”

10) Investigate potential subsidies, grants and payback for improvements like the following:

    i) Solar water heating

    ii) Green/LEED Building Program

**Other Conservation**

While not specifically addressed in the Governor’s Executive Order RP49, the University is using or looking at other conservation measures, such as:
1) Expanding the use of HVAC equipment condensate for landscape irrigation in appropriate areas of the campus.

2) Introducing the use of effluent water to appropriate irrigation systems, in the majority of the campus, when the City of Corpus Christi effluent water is available.

3) Continued use of appropriate chemical water treatment in the utility loop to reduce wear and tear on equipment, and help reduce domestic water consumption.

Prepared By: Physical Plant  
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