

University of North Texas
Denton Campus
RP-49 Energy Conservation Plan
for Facilities
December 7, 2005

Summary of Overall Strategy

University of North Texas has been progressive in adopting energy efficiency strategies and techniques. In 1996, UNT requested proposals from companies to audit, implement, and track energy efficient retrofits for the campus in Denton, Texas. Recent legislation (Senate Bill 726) passed at that time allowed for State Universities to utilize the savings generated from multi-year energy conservation projects to pay for the improvements over the term of the contract. UNT was also instrumental in securing the ability for State Universities to utilize the Texas Public Finance Authority's Master Lease Purchase Program to fund the projects.

With the performance contract project in E&G buildings underway and currently generating approximately \$1.5 million in utility cost savings annually from the 1996 baseline and the maintenance changes generating some utility cost savings, UNT has turned its attention toward more low cost, operational utility savings strategies, utility procurement and tracking processes and unique ways of procuring utilities as a means to build on these impressive utility savings.

UNT is served by a municipal electric utility and as such unable to participate in the deregulated electric utility market. This compounds the savings potential of any strategies and tactics that we employ in the utility procurement arena.

Detailed Energy Audits and Performance Contract

In July of 1997, UNT entered into a contract TAC Americas to audit, design, implement, and track, energy conservation measures in its Education and General facilities. This project covered 40 buildings on campus totaling 2,617,606 square feet. At the time of the project, this accounted for approximately 65% of the campus square footage.

The project consisted of lighting retrofits, direct digital controls, chiller replacements, HVAC replacements, and power factor correction. The project reduced annual electric and gas costs for the facilities retrofitted by \$1,405,051. This project caused a reduction of electricity and gas consumption for these facilities of 30.9%. The project was financed by the Texas Public Finance Authority – Master Lease Purchase Program.

UNT has a contract with TAC to perform Measurement and Verification of the annual project savings. This contract also includes training of University personnel in the efficient operation of campus buildings and systems and analysis of operations for potential additional savings.

Savings strategies currently under review for implementation include:

1. A comprehensive utility systems and energy conservation study currently nearing completion.
2. Replacement of inefficient chillers and boilers nearing the end of their useful life with modern, efficient equipment.
3. Test trial of waterless urinals and self-activating controls on commodes and basins.
4. Central Utility Plant and Distribution System Infrastructure Upgrades.

Other opportunities have arisen since the performance contract that will produce significant savings. The strategy for funding these items includes allocation of appropriate funding in E&G utility maintenance allocation, use of HEAF funds for renovation-related and equipment replacement opportunities and TRB and other conventional sources for the large infrastructure projects. Replacement of several boilers and two chillers has generated over \$100,000 in annual utility savings. Most of these projects have a 5 to 10 simple payback. Several major MEP renovation projects were included in a TRB request during the last legislative session. In addition, university utility cost savings strategies are always incorporated into maintenance, repair and renovation projects.

On the auxiliary building side of the ledger, similar projects are proposed and are implemented as funding becomes available. We estimate that a further **10% reduction** in utility usage and cost can be achieved over the next five years via these opportunities. For example, UNT Housing is pursuing the following projects in residence halls.

1. All buildings are being reviewed annually with infrared detection devices that detect loose electrical connections in switchgear and field panels allowing for quick corrective action for safety and energy management.
2. All buildings are being brought to a higher standard of control through better soft ware and better reporting techniques in the energy management system.
3. Lighting controls have been installed in Kerr Hall and Crumley Hall to cut energy usage during early morning hours. Our goal is to get all possible lighting converted to this system within five years. This will require the addition of three more halls to this group.
4. Parking lot lighting is being converted to the energy management control system so more stringent and accurate control of the time lighting is on and off can be in place.
5. Any electrical appliance, equipment, computer, or lighting will be required to have the Energy Star label before it can be purchased and put into service.

6. Natural gas consumption is being reduced by replacing old water heating systems with high efficiency commercial water heaters that operate independently from the heating boilers. We have almost completed this conversion in our buildings and our goal is to be complete by 2008.
7. Except in the newer buildings with high outside ambient air requirements, all heating boilers are shut down for six months each year to save gas consumption and to provide time for thorough inspections in the water and fire tube areas.
8. We will complete the installation of temperature controls in all areas by the year 2008 so that heating boilers can be regulated by computer software preset for maximum efficiency.
9. Continued installation of the variable speed drives on circulating pumps will help lessen the peak demand and reduce our penalty rate charges.
10. DHW temperatures will be lowered and heating set points will be lowered one degree.
11. Low flow showerheads and commodes are being installed with renovations.

Utility Procurement

UNT has been pursuing some utility procurement initiatives in recent years that have not reduced consumption but have reduced utility cost. UNT has participated in the deregulated natural gas market for many years, but has negotiated favorable rates from the Texas General Land Office and other gas suppliers. We are being squeezed by the recent natural gas price spikes as is everyone, but are on the lookout to lock-in more favorable rates as the opportunity presents itself.

As was mentioned above, our campus is located in a city with a municipal electric utility that has not entered the deregulated power market. This restrictive circumstance is not within our power to influence, but UNT does challenge the electric utility to provide the most favorable rates available within its legislated rate schedules for each of the meters that serve us. We are concerned, however, that the current 20% discount provided to State higher education facilities is set to expire in 2007, raising our rates

Utility Tracking and Monitoring

UNT currently logs all utility bills in an inexpensive, on-line web-based tracking program. Though somewhat simplified, this tool allows us to accurately define costs and set budgets for utilities. It also has some indexing tools to allow some basic comparative analysis of the relative efficiency of different buildings as well as some capability in identifying billing errors and anomalies. We are constantly searching for more advanced software tools to let us better analyze our utility use.

UNT has an extensive electric power-monitoring program having sub-metered all buildings on the two large sub-station of the main campus. We also receive power at 13.2 Kv and distribute to our facilities with our own distribution system. This provides for a

better rate structure with the utility. These sub-meters will facilitate identification of the relative “higher” energy consuming buildings so that the nature of their higher use can be determined and possibly eliminated.

Alternative Utility Procurement

UNT is increasingly on the lookout for unique opportunities for providing utilities to its campuses. A recent example was the re-activation of the lake fed irrigation system on the old Eagle Point golf course to water turf and landscape around the newly constructed facilities. These lakes are well water fed. A similar system is available at the Research Park site, however the lake at this site is dependent on rainwater and runoff.

We are currently studying the potential for cooperative purchase of natural gas with nearby agencies.

Utility Usage and Cost Statistics and Utility Savings Goals

The following table is a summary of FY 2005 utility costs. Take note that without the performance contract savings in place, the total cost would have been approximately \$11.6 million annually.

The bottom part of the table is intended to illustrate what we believe is the UNT the savings potential. Reductions are not across the board. For example, we anticipate electrical and gas savings potential at 10% in our auxiliary facilities and only 5% in E&G facilities due to the on-going performance contract. We project that water conservation measures (a utility not as aggressively pursued in the performance contract) has a much higher potential for savings. Similarly, while we believe that natural gas consumption can be reduced, we believe that natural gas rate increases will eliminate any associated cost savings. None of these reductions take into account any increases in enrollment, building square footage, hours or operation changes that are of course likely to occur to some degree in this time.

RP49 ENERGY CONSERVATION PLAN

TOTAL UTILITY COSTS RP49 BASELINE YEAR - FY2005

SOURCE	Electricity		Natural Gas		Water		Total Cost
	kWh/yr	\$/yr	MCF/yr	\$/yr	kgal/yr	\$/yr	
State	65,272,690	\$5,007,910	88,521	\$812,196	130,367	\$681,915	\$6,502,021
Local	30,323,221	\$2,306,738	71,184	\$643,165	124,450	\$718,200	\$3,668,103

Total 95,595,911 \$7,314,648 159,705 \$1,455,361 254,817 \$1,400,115 **\$10,170,124**

Rate \$0.076516 \$9.112808 \$5.494590

PROPOSED TOTAL UTILITY COSTS FY 2010

SOURCE	Electricity		Natural Gas		Water		Total Cost
	kWh/yr	\$/yr	MCF/yr	\$/yr	kgal/yr	\$/yr	
State	62,009,056	\$4,744,685	84,095	\$766,342	110,812	\$608,867	\$6,119,894
Local	27,290,899	\$2,088,190	64,066	\$583,821	112,005	\$615,422	\$3,287,433

Total 89,299,955 \$6,832,875 148,161 \$1,350,163 222,817 \$1,224,289 **\$9,407,327**

Rate \$0.076516 \$9.112808 \$5.494590

Net Reductions 6,295,956 \$481,773 11,544 \$105,198 32,000 \$175,826 **\$762,797**

% Reduction 7% 7% 7% 7% 13% 13% 8%