

Natural Resource Management and Conservation Strategic Plan

Introduction

Remarkable improvements in utility operations and efficiency have allowed the University to double its size since 1977 with no increase in total energy consumption. Based on previous conservation efforts CPFM has provided in excess of \$20M in cost savings associated with reductions in resource demand. However, there are several factors that require the development of a more integrated and strategic plan for the use of natural resources by the University of Texas at Austin:

1. Production side efficiency improvements have peaked
2. Continued campus growth threatens the ability to maintain current efficiency levels.
3. The need and opportunities to reduce demand side resources requirements
4. Exposure to changes in cost and availability of essential natural resources
5. Need for consistent funding sources to sustain on-going resource conservation efforts

The proposed plan builds on the previous investments in the utility operation that have produced an extremely efficient production system and as well as the need to provide an uninterrupted supply of energy to meet the teaching and research requirements of the University.

The plan establishes resource use objectives, strategies for accomplishing these objectives and a proposed funding model for sustain existing conservation programs and provide the additional resources necessary to move forward with an aggressive demand side natural resource reduction program. Implementing innovative approaches to building operations and integrating these with utility operations will allow the University to enhance reliability at the individual building level, reduce water and energy use and their associated costs as well improving the sustainability of our campus operations. The intent of the plan is to make significant improvements in these areas by August 31, 2020.

Resource Goals: Reliability – Efficiency – Sustainability

The University can reduce the demand for water and energy, and minimize our financial exposure to changes in the cost of essential resources such as natural gas and water as well as the potential for future carbon costs by reducing demand side resource consumption and improving operational efficiencies and accomplish these goals in an environmentally responsible manner.

Reliable and Efficient Energy System

CPFM will maintain utility system performance at, or above, its current level of average performance (8,000 BTU per KWH) and reliability levels. In addition, CPFM will continue to anticipate changes in campus demand and plan to meet these new requirements utilizing existing equipment and systems, avoiding additional capital investment, to the extent possible.

Demand Side Energy Efficiency

The University of Texas at Austin will reduce energy consumption at the building level by an average of

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20% per square foot per degree-day by August 31, 2020 using 2009 as the base year. Accomplishing this goal will require an investment in energy management staffing, centralized building energy control systems, conservation and efficiency projects and a specific resource reduction goal for each building. Achieving this goal will produce three specific benefits; one is avoided energy costs (estimated at \$4M annually), second will be a reduction in the campus carbon footprint (approximately 40,000 metric tons CO₂e) and the third will be to allow the utility operation to maintain its current level of efficiency (a 1% reduction in efficiency adds \$300,000/year to utility costs).

Renewable Energy

By August 31, 2020, 5% of all energy consumed by UT Austin facilities, approximately 57M KWH, will be produced by renewable sources. Renewable energy sources include solar, wind, waste management, biomass, wood burning, small hydro and other carbon neutral sources. Achieving this goal will reduce the UT Austin carbon footprint by an estimated 6,000 metric tons but will have a negative impact on overall cost reductions.

Water Conservation

By August 31, 2020, UT Austin will reduce water use by 20% with at least 40% of total water use coming from reuse/reclaimed sources. Water and wastewater costs have been increasing at a substantial rate, meeting this goal will produce annual avoided costs in excess of \$2M annually. In addition achieving this goal will reduce the City of Austin's carbon footprint by at least 460 tons CO₂ equivalent.

Waste Management

By August 31, 2020, UT Austin will reduce the total amount of waste going to landfill by 20% and recycle 50% of the total waste stream. This will reduce the UT Austin carbon footprint by 600 metric tons of CO₂ equivalent and save at least \$5,000 annually.

Campus Fleet and Mass Transit

By August 31, 2020, UT Austin will reduce use of gasoline and diesel fuels for the campus vehicle fleet by 20%, the remaining fuel volume will be 50% E85 gasoline and bio-diesel, increase the number of car pool and mass transit users by 30%, and utilize 100% natural gas fuel for the shuttle bus system. Achievement of these strategies will reduce the UT Austin carbon footprint and produce annual savings.

Strategies For Reaching Resource Goals

In May 2007, President Powers established the University Task Force on Sustainability and the University adopted a policy regarding sustainability in April 2008. Several elements of the policy directly apply to the Resource Management and Conservation Strategic Plan.

As noted earlier CPFM has provided in excess of \$20M in total avoided costs associated with reductions in resource demand. The actions implemented to provide this benefit include:

- Improvements in utility plant equipment focused on reliability and efficiency

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- Optimization software to improve operational efficiency within the Utilities operation.
- Campus-wide upgrades to building lighting systems
- Implementation of campus-wide water conservation projects,
- Improvements to steam trap equipment in buildings
- Becoming a U. S. Environmental Protection Agency Energy Star Partner to substantiate institutional commitment to sustainability
- In partnership with the Office of Facility Planning and Construction developing and implementing a commissioning program for new construction to insure properly designed and installed and optimally operated building mechanical systems

Building on these previous efforts, CPFM is positioned to move the University forward in two areas; (a) the utility enterprise providing energy resources to the Main Campus and (b) the management of natural resources associated with facilities supporting the teaching, research and public service functions of the University.

Utilities Enterprise Supply Management

Strategy #1: Campus-wide Energy System Management and Optimization. The historical approach to reducing campus energy demand has focused on efficiencies in the utility plant generation of electricity, steam and chilled water. However, an essential element of future energy management reducing building demand and a critical element of this effort is accurate and reliable metering of primary utilities at the individual building level, requiring approximately 1,000 meters. Accurate meter information is an essential resource to support increased efforts on campus-wide conservation and efficiency. Implementing and sustaining this metering capability will require six FTE within the Utility and Energy Management organization.

Strategy #2: Re-investment Utility Operations. As noted above substantial savings have been achieved by the installation of new and more efficient equipment, more effective operating systems and procedures because of optimization software. However, to maintain this level of savings it will be necessary to insure that funds are available to reinvest in existing equipment and software as it reaches the end of its productive life. In addition, there will be opportunities to install equipment that is more efficient as well as implement upgrades to optimization software that will increase the overall efficiency of the utility operations. Matching the campus demand for energy with the plant size is also a key element of maintaining existing efficiencies. Engineering studies of the production and distribution systems will be incorporated into a long-term utilities plan that will assist with the overall campus master planning effort. This plan will also begin to address the long-term vision for the Main Campus utility operations.

Strategy #3: Re-invest in Utility Equipment. Improvements to the production and distribution of chilled water have provided substantial cost avoidance and there are additional opportunities to make further improvements associated with the existing equipment in these systems.

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Demand Side Energy Management

Strategy #1: Building Controls Design, Engineering and Installation. CPFM will become increasingly proficient in the areas of building control systems engineering and installations. The existing Facilities Services instrumentation and controls shop and the UEM meter and controls groups will collaborate to provide controls integration and coordination throughout the entire energy supply chain and establish the infrastructure necessary for a campus-wide Energy Control Center. Future roles for the controls technicians will include extensive participation in building commissioning, testing and balancing of HVAC systems and direct digital control (DDC) installation in new construction and existing facilities. Any additional staff required will be supported by a combination of utility budget savings and charges against project budgets in place of the costs associated with outside vendor charges.

Strategy #2: Central Building Control and Monitoring. The University will pursue a course of action to invest in a centralized building controls system with the goal of achieving control and monitoring of the space inventory representing 80% of the E&G energy expense by August 31, 2020. The information provided by this system as well as the energy metering system will be directed to an Energy Control Center which will monitor campus-wide energy use and determine trends in energy use and efficiency. This information will be provided to operational groups, the primary occupants of each building and the general campus.

Strategy #3: Building Commissioning and Operating Plans. All new facilities, major building renovations and replacement of MEP systems will be commissioned, with the costs supported by the project budgets. Where economically feasible and practical, existing facilities will be retro-commissioned and LEED buildings will be re-commissioned. Savings in the energy budget will provide funding for these efforts. In all cases, the on-going commissioning effort will result in a natural resource plan for each building developed in concert with the operations groups and building occupants. This plan must identify a specific resource use target and include savings realized because of HVAC equipment scheduling during low or non-occupancy periods.

Strategy #4: Energy Management Staffing. Identifying appropriate resource targets for each building and working with building occupants to meet these targets will require six to eight FTE. These individuals will conduct resource audits, insure compliance with operational requirements established in commissioning plans and provide information to occupants regarding building resource use in support of reporting and communication requirements. Funding for these positions will come from energy savings.

Strategy #5: Life Cycle Costing and Campus Design Standards. All new construction and major renovations that involve MEP systems will implement the recommendations of a life cycle cost analysis and these recommendations will be funded through the project budget. Minor renovations that involve MEP systems must invest in conservation improvements that provide at least a seven-year payback. All projects must comply with UT Austin Campus Design Standards that reflect overall sustainability goals as well as the latest ASHRAE standard included in Campus Design Standards.

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Strategy #6: Collaboration and Partnerships. CPFM will seek, develop and leverage relationships with academia, students, professional organizations, governmental entities and business partners to pursue the Energy Policy objectives of reliability, sustainability and conservation. CPFM will take the lead in establishing a collaborative environment that supports innovation, discovery and the development of creative solutions to the challenges associated with reducing the University's environmental footprint.

Strategy #7: Resource Conservation Metrics. CPFM will develop and utilize a system of metrics to measure progress and success toward achieving the stated energy objectives. Actual returns on investment will be measured against projected returns to assess the effectiveness of planning assumptions and to validate success.

Strategy #8: Reporting. CPFM will develop a communication strategy structured to increase campus, community and State of Texas awareness of the University's energy initiatives and our progress meeting goals and executing its strategies. This strategy will include an annual report, progress reports, web-based resources and information, press releases and internal reports related to the effectiveness of resource conservation investments. The internal reports will help the University community understand how resource conservation/efficiency projects are determined and evaluated, provide a list of past and future projects, their rate of return/payback period and possible funding source(s).

Strategy #9: Space Management. Although not specifically a part of the CPFM responsibility, effective space management will play a significant role in the overall conservation effort. Increasing space use in existing facilities provides a number of benefits including reducing the need for additional construction and expansion of the utility infrastructure and additional opportunities for minimizing HVAC equipment operation during periods of low or non-occupancy.

Campus Fleet and Mass Transit

Strategy #1: Collaboration and Partnerships. Parking and Transportation Services (PTS) will maintain and strengthen collaborative relationships with Capital Metro and the City of Austin to enhance the opportunities UT Austin staff to participate in mass transit and carpooling for travel to and from both the Main Campus and the Pickle Research Campus.

Strategy #2: Reduction of Campus Service Fleet. PTS will work with campus departments to identify a specific reduction in traditional vehicles that is appropriate as alternative vehicle or transportation methods to meet their operational requirements.

Strategy #3: Alternative Fuels. PTS will install the capacity to provide alternative lower carbon fuels such as E85 and biodiesel for campus operations as well as other local governmental agencies.

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Reinvestment and Funding Strategy

The current University practice of directing all avoided costs associated with conservation and efficiency efforts into the general University budget does not provide a sustainable funding model for resource conservation and efficiency efforts. The current approach does not provide a means to incentivize the campus community to support the cultural and organizational changes required to implement on-going resource conservation on a campus-wide basis.

In addition, strategic reinvestment in infrastructure and innovative technological solutions are required if the University is to reduce resource consumption and sustain on-going financial returns. As noted earlier, energy reductions associated with CPFM efficiency and conservation efforts from 1997 to 2009 have produced in excess of \$20M in savings. All of the major efficiency and conservation projects implemented in the past several years are exceeding their estimated payback periods.

This plan proposes that savings from resource conservation would be redirected into a multi-tiered approach to funding resource conservation and efficiency efforts. One tier would be utilize net savings/avoided costs to support the additional staff required to implement and sustain resource conservation efforts as well as funding for campus-wide incentive programs directed to students, staff and faculty. Another tier would utilize some of the one-time funding that may be available, either a fixed percentage of avoided energy costs and/or some other University fund source. This fund would support small and medium sized investment opportunities identified in the course of maintenance and R&R work that occurs throughout the year as well as campus-wide projects. Funding conservation and efficiency elements associated with renovation and remodeling projects from individual project budgets would provide a third tier of support. The final funding tier would be the use of institutional debt to support large scale, multiple component conservation projects.

Summary

Implementing a clear resource management and conservation plan will have a significant impact on reducing campus energy consumption, meeting ongoing campus resource demands, lowering operational costs and expanding the sustainable energy portfolio by the end of fiscal year 2020. However CPFM recognizes that it does not currently have sufficient organizational capacity to realize these goals and as result in order to pursue the types of projects and implement the technologies necessary for success the funding mechanisms and policies need to be in place. This will allow the plan to build on previous efforts and provide the positive outcomes desired by the University.