Sustainable Stewardship

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TEXAS STATE UNIVERSITY

The rising STAR of Texas
Texas State University Facts

Rankings by Public University Size

- 1st in The Texas State University System
- 4th in Texas
- 34th in the United States

Campus

- 457 acres in the main San Marcos campus (20.5 million sq. ft.)
- 5,038 additional acres of farm, ranch, residential and recreational areas
- 266 main campus buildings with 7.6 million GSF
- 101 acres at the Texas State Round Rock Campus

Students

- 36,790 total students in fall 2014
Our Challenges

- 17 years of a continuous growth in student enrollment
- Change in goal of university to research focus
- Infrastructure modifications and new construction for 5.7% net increase in GSF in 3 years
- Continue energy and water reduction even during this extended period of growth.
- Environmentally sensitive location
Geographical setting

- Unique Attributes Long east-west orientation
- Geography/topography hilly with 220 ft. elevation change
- Located at the headwaters for the San Marcos River and situated over the Edwards Aquifer contributory zone
“Texas State University intends to ensure environmentally responsible practices and the efficient use of energy and water resources.”

President Denise Trauth
Sustainable Stewardship

The continuous process to meet the campus energy and water demands in a safe, efficient, effective, reliable, and sustainable manner.
Sustainable Stewardship

- Buildings: HVAC/Envelope/Water/ Lighting/Equipment (40%)
- Plants: Chillers/Boilers/Pumps/Motors/Distribution (30%)
- People: Students/Faculty/Staff/Vistors (30%)
Sustainable Stewardship

**Load**: Buildings operation, maintenance, equipment selection, controls, metering

**Supply**: District thermal energy production, utilities distribution systems

**Information**: Practices, information, education, behavior and expectations
Construction and Maintenance have inherently have opposing objectives
- Pay now or pay later
- Owner/operator sets the balance

Process changes implemented:
- Require total lifecycle costs
  - New construction
  - Renovation
  - Replacement
- Improved construction standards for water and energy
- Operations & maintenance input into programming/design
- Plan and communicate with a broader view

What is in motion?
Process and communication changes
What is in motion? New and renovated buildings

- New construction and major building renovations are influenced LEED criteria as appropriate
  - Three new LEED certified buildings - 400,000 sq. ft.

- Fully renovated classroom/office building - first installation of automatic building power controls at the individual outlet level.

- Remodeled office spaces are parking lots, garages, and walkways continue to be retrofitted with LED lighting

- Submeters required
What is in motion?
Existing buildings

- Heating season space temperatures at 69° F
- Space heaters are banned
- Cooling season space temperatures at 75° F
What is in motion? Existing buildings

- 3\textsuperscript{rd} year of 4 year energy and water retrofits (2012 audit)

- Retrofits in 10 existing buildings = 665,000 GSF
  - Energy efficient motors, fan walls array AHUs,
  - Replaced pneumatic controls with direct digital controls (DDC)
  - Retrofitted roof top exhaust systems
  - Classrooms lighting to LED (Light Emitting Diode).
  - Replacement of steam and chilled water coils with higher $\Delta T$
Another 750,000 GSF will be renovated through either a combination of energy bond money and deferred maintenance funding or through capital improvement (CIP) in the next 3 to 5 years.

- Begin re-commissioning buildings
District energy system

- Four thermal plants with combined design capacity of 19,000 tons cooling and 160,000 lb./hr. steam
  - 16 chillers
  - 11 cooling towers
  - 5 steam boilers
  - Multiple heat exchangers
  - 60 buildings (4.5 Million s.f.)

- 40 miles of underground chilled water, steam and hot water piping
What is in motion?
Utilities – thermal plants

- Upgraded thermal plant controls to DDC and interconnect plant control/monitoring
- VFDs added at chilled water and condenser pumps, cooling tower fans in three plants
- Last three chillers are variable driven
- Revised plant equipment dispatching
What is in motion?
Utilities – thermal distribution

- Replacement of steam and condensate lines
- Interconnection of chilled water system
- Improved chilled water filtration and water treatment
- Thermal Utility Study - Analyze current chilled water, steam generation and distribution capacity, and condition assessment.
Building rainwater and building condensate harvesting systems

Retrofits and designs efficient irrigation systems via drip irrigation where applicable and a computer based central control system

Certified Irrigation Auditors conduct about 25 irrigation audits/year and separately metered for the past 20+ years

Standard plant palette
What is in motion?
Water

- Campus water reuse/reclaimed with purple pipe installed
- Participant with City of San Marcos in reclaimed water grant
- Reduction in thermal plant water use
- Building water saving fixtures
What is in motion?
Student involvement

- Student member of campus in Energy Conservation Committee

- Grant funded “Green Impact Campaign” energy audits by students for campus buildings under 16,000 GSF

- McCoy Business School started the first Net Impact chapter in Texas and completed annually with recent 2nd place standing
Multiple funding strategies

- Direct self funding for energy and water retrofits with bonds repaid with energy savings
- Coordinate bonds funds with deferred maintenance funds to accomplish more
- When ground opened for new building construction – maximize utilities distribution improvements
Results - 2012 baseline to 2014

Electric Consumption Savings

- 2012 baseline

Target Savings

Percentage

Fiscal Year

Base Year