

# Sustainable Stewardship

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*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 continuous student enrollment growth
- ❖ Additional university goal focused on research
- ❖ Infrastructure modifications and new construction for 5.7% net increase in GSF in 3 years
- ❖ Continue energy and water reduction during this extended period of growth
- ❖ Environmentally sensitive location

## Physical setting

- ❖ Unique attribute of long east-west orientation
- ❖ Hilly topography with 220 ft. elevation change
- ❖ Located at the headwaters for the San Marcos River and situated over the Edwards Aquifer contributory zone



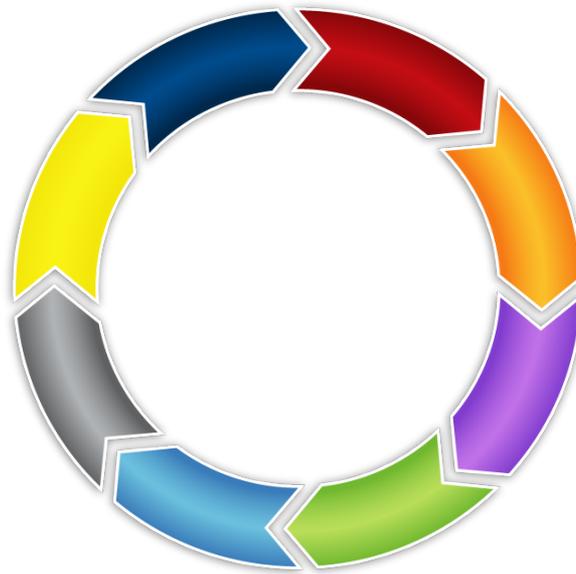


*“Texas State University intends to ensure environmentally responsible practices and the efficient use of energy and water resources.”*

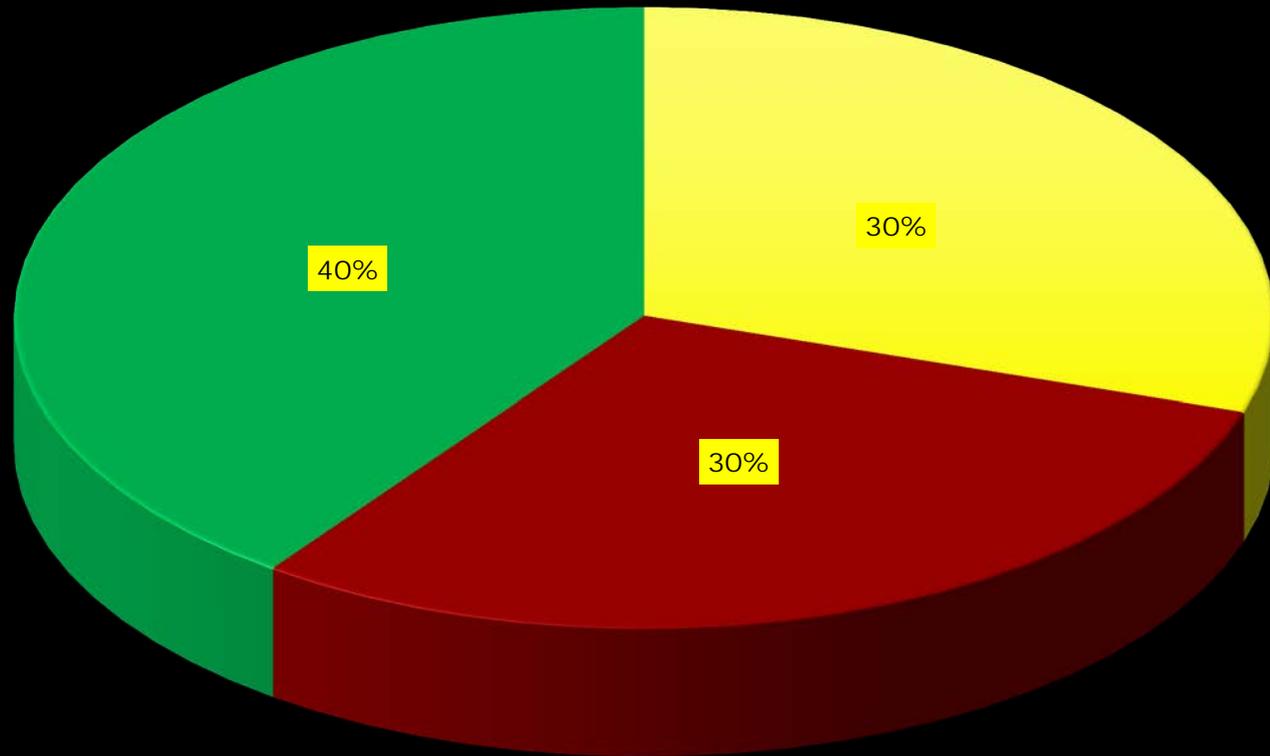
President Denise Trauth

# 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-Envelop-Water-Lighting-Equipment
- Plants: Chillers-Boilers-Pumps-Motors-Distribution
- People: Students-Faculty-Staff-Vistors

# Sustainable Stewardship

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

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

**Information:** Practices, information, education, behavior and expectations

# What is in motion?

## Process and communication changes

- ❖ *Construction and Maintenance have inherently 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?

## New and renovated buildings

- ❖ New construction and major building renovations are influenced by 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, parking lots, garages, and walkways continue to be retrofitted with LED lighting
- ❖ Submeters required addition

# 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<sup>rd</sup> 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  $\Delta T$

# What is in motion?

## Existing buildings

- ❖ Another 750,000 GSF planned to 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 sq.ft.)
- ❖ 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.

# What is in motion?

## Water

- ❖ 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 installation underway
- ❖ 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

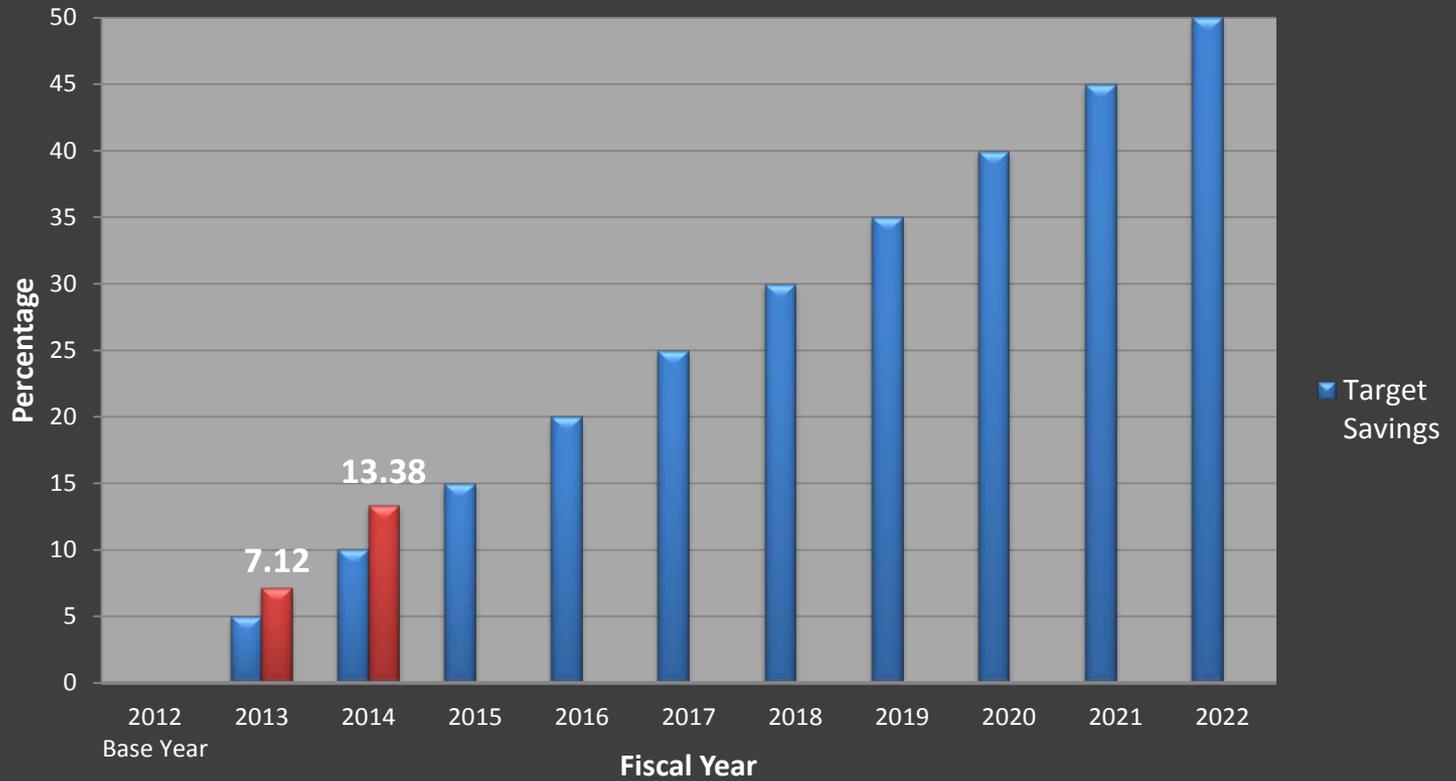
- ❖ Student member of campus in Energy Conservation Committee
- ❖ Grant funded “Green Impact Campaign” energy audits by students for campus buildings under 16,000 GSF
- ❖ McCoy Business School started the first Net Impact Chapter in Texas and competed annually with recent 2nd place standing

## 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

## Cumulative Electric Consumption Savings





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STATE  
UNIVERSITY

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SAN MARCOS