2020

Energy & Water Management Plan

Finance & Administration

Stephen F. Austin State University

October, 2020

Progress Report

In January of 2009, SFASU embarked on a mission to reduce utility costs that involved an issuing of a RFQ for a performance contract with an energy service contractor. Prior to that time, little had been done on campus to reduce energy or water consumption and curb associated costs. Building systems were run indiscriminately—often being left in "hand" position, therefore bypassing automated controls—in order to minimize impact to business operations. As a result, SFASU combined annual utility costs reached nearly $10.9M in fiscal year 2008, and the energy use index (EUI) peaked at 152.1 MBtu per conditioned square foot of space.

SFASU began by establishing an Energy Conservation Committee with a goal of reducing energy consumption by 30% over a 10-year period. After a lengthy review and evaluation process, SFASU selected Siemens Building Technologies Inc. (Siemens Industry, INC.) as its energy service contractor and authorized the preparation of a detailed utility assessment report. After securing necessary funding, and subsequently completing all approved conservation measures (phases 1 & 2), SFASU reduced annual utility costs to under $7.5M in 2013, while reducing its EUI to 118.0. Continued fine tuning of building systems and favorable utility rates further reduced the annual utility spend to $6.56M in fiscal year 2014.

As a result of the success of the initial energy service contract, SFASU commissioned another study (phase 3) to identify additional facility improvement measures to reduce the consumption and/or costs of campus utilities. These improvements were completed in March of 2016 and included building HVAC/Automation improvements, water sub-metering for sewer credits, and additional lighting projects. The third full year energy savings for electricity and natural gas were 8.43 MWh and 55,340 MMBtu respectively. Sewer credits from irrigation activities, cooling tower evaporation, and swimming pool water loss were 34,932 kgals for the same period.

Most recently, Siemens had prepared a preliminary report for the next round of facility improvement measures (phase 4). The scope of work and associated costs were reviewed by SFASU Administration and tabled for future discussions. Siemens has since offered to implement their Desigo CC Management Platform, which is a flexible, full client-server architecture and it presents a single point of entry for users to operate, monitor, and optimize building automation. SFASU is currently undergoing implementation of this system. This system will help SFASU to continue to strive for energy reduction initiatives and enable SFASU to review current energy saving techniques for further analysis.

In addition to saving energy and dramatically reducing costs, SFASU has strategically replaced inefficient, aging equipment that may have otherwise ended up on a long list of capital replacement needs in line fighting for shrinking funds with other institutional factions.

Energy and water usage reductions coupled with favorable electricity and natural gas commodity rates reduced SFASU fiscal year 2020 utility spend to approximately $4.80M, down 57% from the baseline year of 2008. It should be noted that conditioned space gross square footage increased by

approximately 8.9% (338,000) during this same period, city water and sewer rate increased significantly, and SFASU lost the benefit of a 20% electricity distribution credit in 2017. Furthermore, the global COVID-19 Pandemic dramatically changed the landscape of the University and affected the energy consumption across the entire footprint of SFASU. SFASU transitioned to near 100% online instruction in March of 2020 through August 2020.

Summaries of each phase of utility facility improvement projects are included on the following page.

Phase 1 Summary:

- Start Date: July, 2010
- Completion Date: December, 2011
- Scope of Work:
  - ✓ Energy Management and Control Systems – Chiller Plant Optimization
  - ✓ Energy Management and Control Systems – Airside Optimization
  - ✓ Water Management Upgrades (80% of total in phase 1; 20% in phase 2)
- Project Cost: $9,817,962
- Cumulative 8-year Guaranteed Savings: $9,590,850
- Cumulative 8-year Measured Savings: $14,168,369 (148% of guarantee)

Phase 2 Summary:

- Start Date: July, 2010
- Completion Date: December, 2011
- Scope of Work:
  - ✓ Deferred Maintenance (central plant #1 boiler replacement, outside air handling unit – Music Building)
  - ✓ Water Management and Upgrades (20% of total in phase 2; 80% in phase 1)
  - ✓ Lighting Efficiency Retrofits (lamp technology and controls)
  - ✓ Power Factor Correction
- Project Cost: $7,427,500
- Cumulative 8-year Guaranteed Savings: $8,060,712
- Cumulative 8-year Measured Savings: $8,556,647 (106% of guarantee)

Phase 3 Summary:

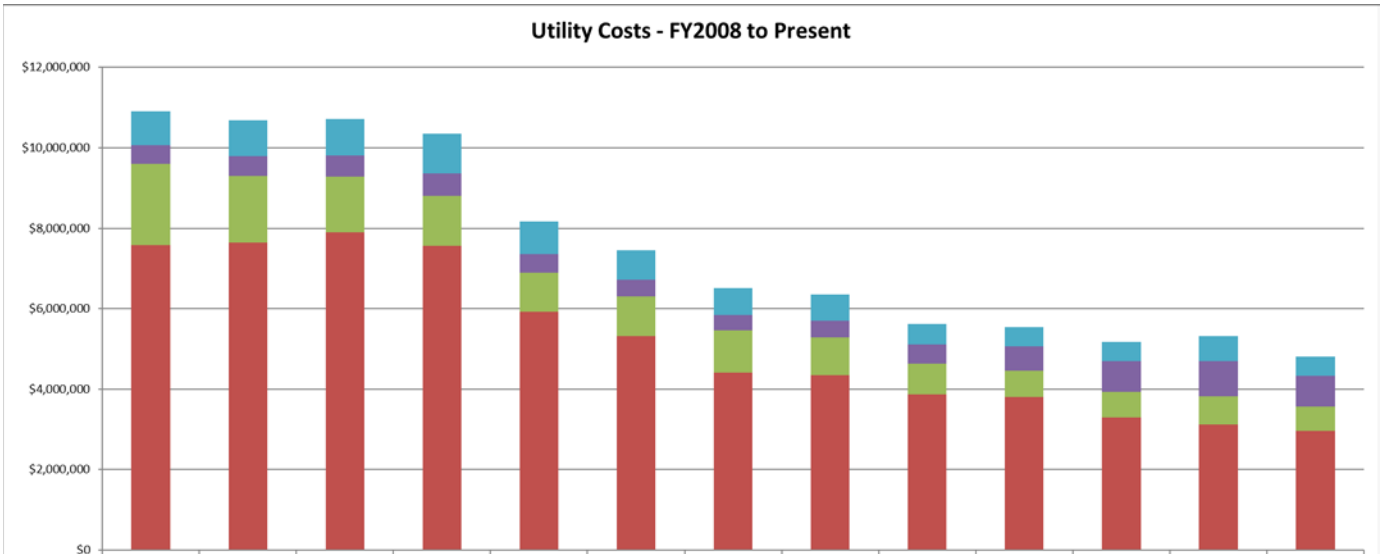
- Start Date: January, 2015
- Completion Date: March, 2016
- Scope of Work:
  - ✓ Building automation/HVAC upgrades in 15 buildings (combined 1.3M gross square feet)
  - ✓ Deferred maintenance (central plant #2 and auxiliary building boiler replacement), lighting retrofits
  - ✓ Sewer credit sub-metering for irrigation, cooling tower evaporation, and swimming pool water.
- Project Cost: $11,345,915
- Cumulative 46-month Guaranteed Savings: $3,337,714
- Cumulative 46-month Measured Savings: $3,806,686 (114% of guarantee)

Phase 4 Summary:

- Survey completed in September, 2015
- Proposed scope was reviewed by SFASU Administration in FY2019 and Phase 4 was tabled.
- Scope included additional building system upgrades (automation & HVAC upgrades), and campus-wide irrigation system upgrades.

Historical Data:

The chart below shows the utility costs (Electricity, Natural Gas, Water, & Sewer) since FY2008. Note that while total costs have gone down substantially, there has been a net gain of approximately 340,000 conditioned square feet of space.



	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
Totals	$10,901,432	$10,672,172	$10,712,074	$10,362,482	$8,172,276	$7,449,719	$6,513,872	$6,354,458	$5,612,966	$5,536,660	$5,158,676	$5,312,531	$4,795,332
Sewer	$826,531	$870,556	$896,648	$995,334	$821,619	$737,392	$674,209	$667,997	$506,552	$475,116	$458,607	$605,154	$453,114
Water	$470,776	$494,881	$534,578	$566,795	$455,621	$411,942	$384,164	$404,487	$459,465	$589,909	$768,042	$884,416	$777,064
Gas*	$2,020,319	$1,660,012	$1,382,633	$1,244,712	$981,181	$996,840	$1,040,235	$937,826	$772,618	$654,560	$635,023	$702,175	$605,065
Electricity	$7,583,805	$7,646,722	$7,898,215	$7,555,641	$5,913,855	$5,303,544	$4,415,264	$4,344,148	$3,874,331	$3,817,075	$3,297,004	$3,120,785	$2,960,089

**Figures exclude LP gas consumed at the Agriculture Center*

UAR Documentation:

The Utility Assessment Reports and Annual Savings Reports are on file with the SFASU Physical Plant Department.

Goals

SFASU has made tremendous strides reducing utility consumption by implementing various facility improvement measures as well as reducing associated rates by employing strategic negotiating techniques. As a result, SFASU has reduced the total annual utility spend (electricity, natural gas, water & sewer) by 57% since the base year of FY2008. Results and future short-term goals for each utility are listed below.

Electricity:

Achieved:

SFASU reached its peak electrical consumption in FY2008 with just over 88.5 MWh. Electricity costs peaked in FY2010 at just under $7.9M. FY2020 actual figures were 60.2 MWh and $2.96M. These figures represent reductions of 32.0% in consumption and 62.5% in associated costs from the respective peak years. Note that FY2020 figures were down from FY2019 figures, primarily due to the global COVID-19 Pandemic and subsequent initiative of near 100% online instruction from March 2020 through August 2020. SFASU's President placed a campus wide directive that called for a minimal student population residing in residence halls during this period as well.

Future:

Negotiated electric rate reductions for fiscal years 2018 – 2021 are expected to save approximately $700k per year in electricity costs. The subsequent loss of a 20% State College and University Discount (SCUD) for distribution charges was eliminated in 2017 which will offset some of the anticipated savings from the lower commodity rate.

Natural Gas:

Achieved:

SFASU reached its peak natural gas consumption in FY2009 with just over 227,000 MMBtu. Natural gas costs peaked in FY2008 at just over $2.0M. FY2020 actual figures were 173,412 MMBtu at a cost of $605,065. These figures represent reductions of 23.7% in consumption and 70.1% in associated costs from the respective peak periods. Note that FY2020 figures were down from FY2019 figures, primarily due to the global COVID-19 Pandemic and subsequent initiative of near 100% online instruction from March 2020 through August 2020. SFASU's President placed a campus wide directive that called for a minimal student population residing in residence halls during this period as well.

Future:

Phase 4 Implementation has been tabled as previously stated, however SFASU will evaluate future possibilities in savings and usage reduction and discuss the feasibility of incorporating initiatives in FY2021.

Water & Sewer:

Achieved:

Annual water and sewer reduction results are more difficult to track at SFASU because of the lack of historical data available and the influence of weather conditions on consumption. During the four year period from FY2008 – 2011, the campus averaged 215,683 kgals per year. Over the past nine years, the average consumption has dropped to 156,961 kgals per year. This figure represents an average reduction in consumption of 27.2%.

In addition, adding sub-meters throughout the campus to measure irrigation, cooling tower evaporation, and swimming pool water loss helped reduce the annual billed sewer units from an average of 163,250 to 89,097 kgals in FY2020 which represents an overall reduction of 45.4%. Despite an increase in city sewer charges, these costs fell from a high of $995k in FY2011 to $453k in FY2020 (54.5% reduction) despite a 30% increase in city sewer charges beginning in October 2016.

Note that FY2020 figures were down from FY2019 figures, primarily due to the global COVID-19 Pandemic and subsequent initiative of near 100% online instruction from March 2020 through August 2020. SFASU's President placed a campus wide directive that called for a minimal student population residing in residence halls during this period as well.

Future:

Phase 4 Implementation has been tabled as previously stated, however SFASU will evaluate future possibilities in savings and usage reduction and discuss the feasibility of incorporating initiatives in FY2021.

Note that a new water/sewer rate schedule approved by the City of Nacogdoches increased the water and sewer rates substantially in 2017. As approved, the city's water/sewer rates substantially increased in 2019 and another increase will be applied in 2021.

Strategy for Achieving Goals

SFASU will continue to build on the success achieved through the implementation of recent facility improvement measures, including the use of performance contracting, opportunities presented through the capital renewal process, taking advantage of available funding incentives, and by achieving best practices through its operations and maintenance programs. Specifically this includes, but is not limited to the following:

Performance Contracting:

SFASU has already realized the benefits of performance based contracts in its pursuit of achieving utility reductions. Due to the results achieved through this partnership, it is expected that SFASU will continue exploring other viable facility improvement measures in this manner.

Capital Renewal Program:

- Perform economic analysis and life cycle costing for major system purchases.
- Specify cool roofing technology for replacement projects.
- Upgrading constant volume air distribution systems with variable air volume systems.
- Replacing pneumatically controlled systems with direct digital control.
- Replacing boilers with more efficient condensing units.
- Upgrading existing HID lighting at outdoor athletic venues to LED technology.

Incentive Programs:

- Apply for utility rebates where applicable.
- Utilize tax credits where appropriate.
- Applying for grants when available.

Operations & Maintenance Practices:

- Controlling conditioned environments remotely through an integrated building automation system to approved standards and schedules.
- Continue upgrading lighting as reliable technological advancements dictate.
- Replacing motors with premium efficiency units; installing variable frequency drive units where feasible.
- Perform maintenance on all related equipment and components in accordance with manufacturer recommendations and established and evolving best practices.
- Monitoring and reporting consumption levels and variances for all utilities.

Implementation Schedule

Due to the tabling of Phase 4, SFASU entered into an agreement with a professional engineering & consulting service to expand Central Utility Plant #1. The agreement and subsequent results from evaluation(s) have been completed under the first step of a project that will enable Central Utility Plant #1 to feed three additional buildings in conjunction with planned construction activities. This construction project is tentatively scheduled to begin in November 2020.

The SFASU plan for measurement and verification of savings for each facility improvement measure (FIM) is consistent with the International Performance Measurement and Verification Protocol. Depending on the improvement measure, one of the following four options will be used:

Option A – Retrofit Isolation: Key Parameter Measurement

Savings are determined by field measurement of the key performance parameter(s) which define the energy use of the FIMs affected system(s) and/or the success of the project. Measurement frequency ranges from short-term to continuous, depending of the expected variations in the measured parameter, and the length of the reporting period. Parameters not selected for field measurement are estimated. Estimates can be based on historical data, manufacturer's specifications, or engineering judgment. Documentation of the source or justification of the estimated parameter is required. The plausible savings error arising from the estimation rather than measurement is evaluated.

Option B – Retrofit Isolation: All Parameter Measurement

Savings are determined by field measurement of the energy use of the FIM-affected system. Measurement frequency ranges from short term to continuous, depending on the expected variations in the savings and the length of the reporting period.

Option C – Whole Facility

Savings are determined by measuring energy use at the whole facility or sub-facility level. Continuous measurements of the entire facility's energy use are taken throughout the reporting period.

Option D – Calibrated Simulation

Savings are determined through simulation of the energy use of the whole facility, or of a sub-facility. Simulation routines are demonstrated to adequately model actual energy performance measured in the facility.

Finance Strategy

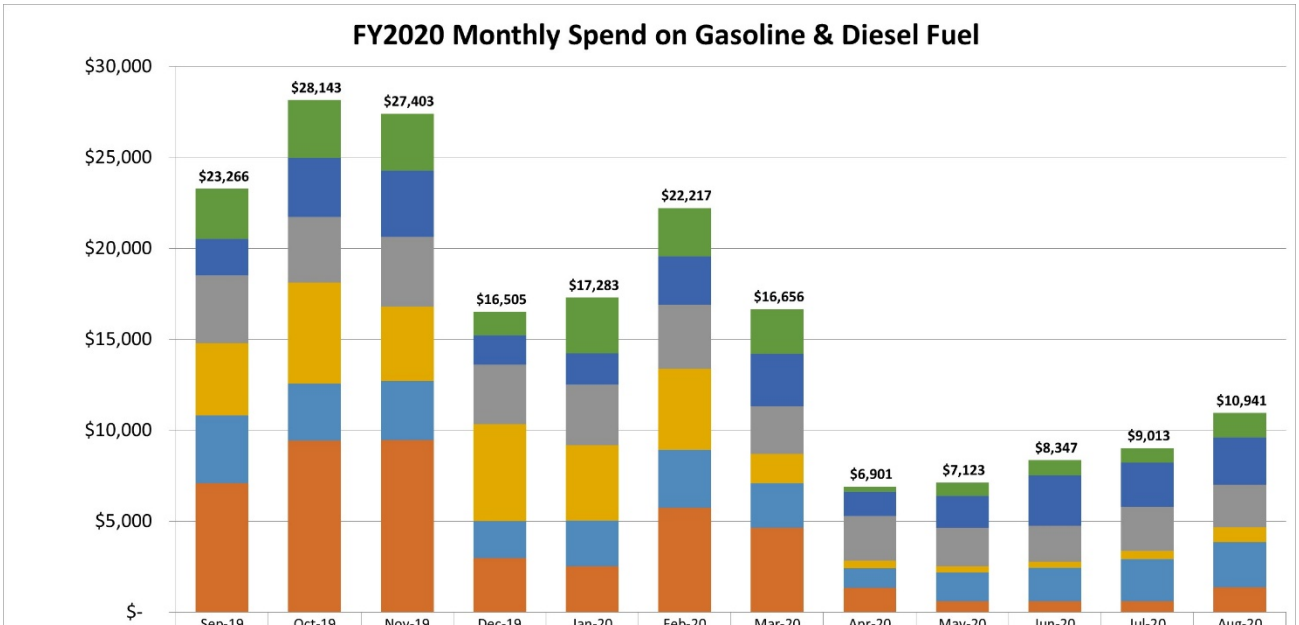
SFASU has incurred debt in excess of $28M to finance various facility improvement measures to reduce energy and water consumption. As of September 1, 2020, SFASU had the following outstanding debt related to energy service contracts:

Date (Fiscal Year)	Phase I & II Beg Balance	Phase I & II Payment	Phase III Beg Balance	Phase III Payment
FY 2021	$1,655,805	$1,506,436	$8,723,373	$956,737
FY 2022	$182,666	$190,913	$8,001,294	$977,991
FY 2023	$0		$7,238,538	$999,735
FY 2024			$6,433,520	$1,021,979
FY 2025			$5,584,603	$1,044,735
FY 2026			$4,690,093	$1,068,017
FY 2027			$3,748,240	$1,091,834
FY 2028			$2,757,234	$1,116,202
FY 2029			$1,715,202	$1,141,133
FY 2030			$620,208	$636,891
FY 2031			$0	

SFASU will continue exploring feasible opportunities while managing its debt obligations. Future projects will be funded with available capital improvement funds and likely will utilize energy service performance contracting.

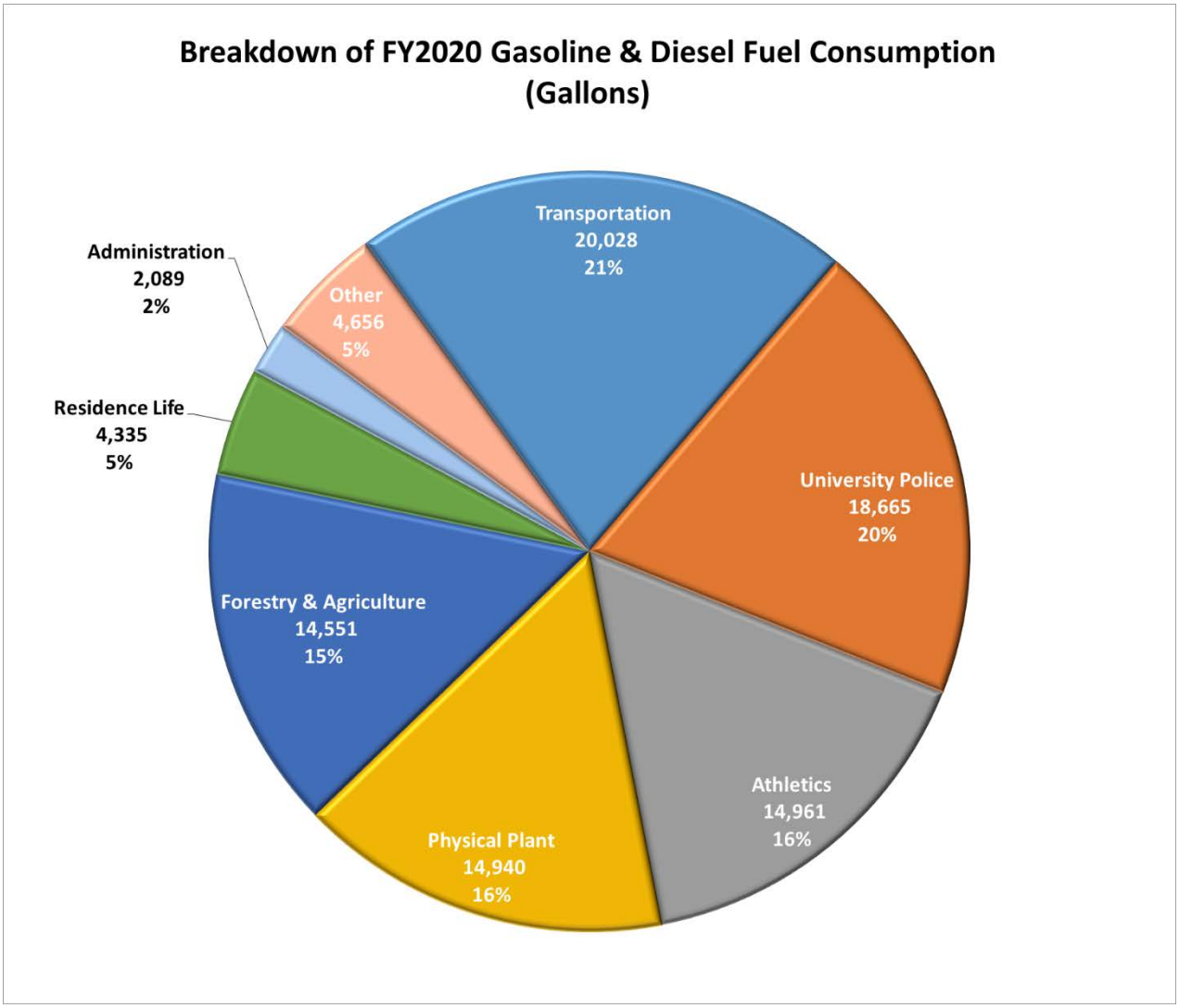
Gasoline Consumption

During fiscal year 2020, SFASU reported using 94,225 gallons of gasoline and diesel (fuel) at a total cost of $193,799 and an average cost of $2.06 per gallon. These figures represent a decrease in consumption of 25.1% and a cost decrease of $98,666 for the year. These dramatic decreases can be attributed to the Global Pandemic, subsequent mandated furlough days for staff partners, and the campus directive of moving to near 100% remote/online learning for almost the entire second half of fiscal year 2020. The average cost per gallon decreased by $0.27 for the year. Monthly consumption is broken down on the following chart. Note that SFASU was shut down for twelve days around the Christmas / New Year's holiday season, another nine days in March for Spring Break and nine days for the week of Thanksgiving. Furthermore, as noted previously the Global Pandemic can be seen by the dramatic decreases in the chart from March through August 2020.



	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Totals	$23,266	$28,143	$27,403	$16,505	$17,283	$22,217	$16,656	$6,901	$7,123	$8,347	$9,013	$10,941
Other	$2,742	$3,178	$3,143	$1,295	$3,057	$2,670	$2,450	$290	$749	$841	$784	$1,351
Forestry & Agriculture	$2,012	$3,251	$3,625	$1,597	$1,733	$2,653	$2,895	$1,315	$1,740	$2,771	$2,449	$2,600
University Police	$3,722	$3,590	$3,835	$3,284	$3,307	$3,524	$2,624	$2,462	$2,117	$1,975	$2,416	$2,319
Athletics	$3,971	$5,569	$4,106	$5,327	$4,152	$4,456	$1,600	$420	$348	$324	$450	$836
Physical Plant	$3,739	$3,127	$3,251	$2,025	$2,522	$3,168	$2,440	$1,086	$1,556	$1,850	$2,325	$2,480
Transportation	$7,080	$9,429	$9,444	$2,977	$2,512	$5,746	$4,647	$1,328	$611	$587	$590	$1,354

The chart on the following page shows the breakdown of fuel (gallons) by SFASU department. The Transportation Department was the biggest user of fuel, which provides vehicles, vans, road buses, and shuttle service for the campus community. The university police department was the second largest user of fuel. This department is driving "rounds" throughout the campus on a 24/7 basis. The Athletics Department, accounting for road games and recruitment activities was the third highest user. The Physical Plant Department, which is the largest department on campus providing various building trades, custodial and trash collection services, and grounds maintenance was the fourth highest user. The College of Forestry and Agriculture was the fifth highest user.



Identified gasoline reduction opportunities, include:

- Continue updating fleet with models that offer improved mileage.
- Research and implement fuel saving technologies such as fuel additives, alternative fuels, electric vehicles, hybrids where feasible as well as any infrastructure improvements necessary to support the technology.
- Plan fleet design and utilization starting from the top, as a whole institution, rather than individualized departments.
- Set department limits on fuel consumption and/or award/penalize departments who cannot meet limits or cannot improve fuel consumption.
- Consider renting vehicles for longer trips when rental vehicles offer better fuel mileage.

- An implemented plan of choosing the most economical vehicle for the desired trip (i.e. do not use a twelve passenger van with only two passengers), is on hold due to COVID-19.
- Analyze and implement department head approval for travel and what type of vehicle should be taken.
- Encourage car-pooling for travel and or work assignments.
- Plan daily trips to maximize traveling efficiency.
- Encourage walking or using the shuttle service for inter-campus travel.
- Implement stronger security controls over fuel purchases.
- Reduce access to fuel cards for vehicles in each department.

SFASU uses two battery powered ATV's for grounds maintenance. These vehicles are out and about campus each weekday. They help campus gardeners perform their duties and the special services group to collect trash from exterior waste receptacles on a regular basis.

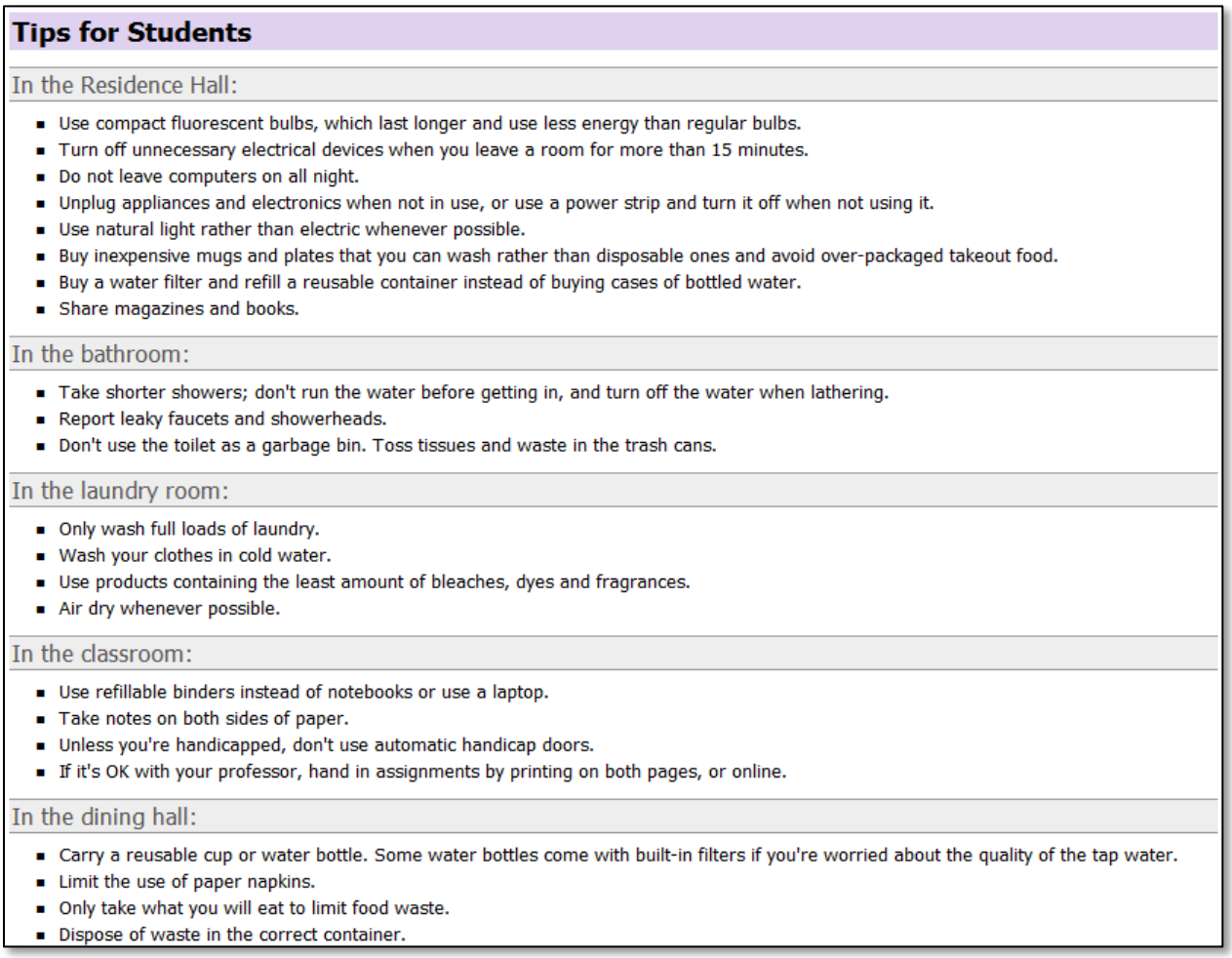
SFASU will carefully consider the feasibility of alternative forms of transportation as each fleet vehicle is due for replacement.

Employee Awareness Plan

Employee awareness initiatives on the SFASU campus include the following:

1. Maintaining a sustainability website that includes:

    - Definition of sustainability
    - Vision Statement
    - Goals and objectives (with graphs of results)
    - Campus initiatives – outlines various facility improvement initiatives completed at SFASU
    - Getting Involved – campus and local events
    - News – i.e. announcing new electric utility vehicles for grounds maintenance
    - Fun facts
    - Student Tips (shown below)



Tips for Students

In the Residence Hall:

- Use compact fluorescent bulbs, which last longer and use less energy than regular bulbs.
- Turn off unnecessary electrical devices when you leave a room for more than 15 minutes.
- Do not leave computers on all night.
- Unplug appliances and electronics when not in use, or use a power strip and turn it off when not using it.
- Use natural light rather than electric whenever possible.
- Buy inexpensive mugs and plates that you can wash rather than disposable ones and avoid over-packaged takeout food.
- Buy a water filter and refill a reusable container instead of buying cases of bottled water.
- Share magazines and books.

In the bathroom:

- Take shorter showers; don't run the water before getting in, and turn off the water when lathering.
- Report leaky faucets and showerheads.
- Don't use the toilet as a garbage bin. Toss tissues and waste in the trash cans.

In the laundry room:

- Only wash full loads of laundry.
- Wash your clothes in cold water.
- Use products containing the least amount of bleaches, dyes and fragrances.
- Air dry whenever possible.

In the classroom:

- Use refillable binders instead of notebooks or use a laptop.
- Take notes on both sides of paper.
- Unless you're handicapped, don't use automatic handicap doors.
- If it's OK with your professor, hand in assignments by printing on both pages, or online.

In the dining hall:

- Carry a reusable cup or water bottle. Some water bottles come with built-in filters if you're worried about the quality of the tap water.
- Limit the use of paper napkins.
- Only take what you will eat to limit food waste.
- Dispose of waste in the correct container.

The SFASU Sustainability website can be viewed at http://www.sfasu.edu/sustainability/

2. Communications from senior management to all staff regarding the conservation program, results achieved, and contractual obligations of SFASU.
3. Friendly shutdown reminders during the institution down time encouraging all to turn off everything possible and avoid using the facilities.

From: VP of Finance and Administration No Reply
To: ALLFACSTAFF-L
Subject: Spring Break 2020 Campus Notification
Date: Monday, March 2, 2020 10:47:24 AM

Notice:

In an effort to maximize utility savings associated with the Spring Break week closure, the following operational changes will be in effect from March 7 - March 15, 2020.

- Power Plant Chillers (cooling) and building air handling equipment will operate only for critical areas.
- Buildings with dedicated HVAC equipment will be shut down or adjusted manually to conserve energy.

In addition, we ask that you please do your part by participating in the reduction efforts. Below is a list of actions that will help us realize our energy consumption and associated cost reduction goals:

- Minimize use of SFASU buildings (this will help stabilize interior conditions and keep the lights off).
- Turn off peripheral electronic equipment (printer, monitor(s), copier, etc.) before leaving on the afternoon on Friday, March 6, 2020.
- DO NOT turn off your PC; there will be updates applied by IT over Spring Break and all machines MUST remain on to receive these updates.
- Adjust your thermostats down or turn the heating option "off" if you are in one of the smaller off-campus buildings.

Should you have questions or concerns, please contact the following:

During Normal Working Hours
[redacted]
Manager of Mechanical Maintenance & Building Trades
Office: x4546 / Mobile: [redacted]
[redacted]

After Normal Working Hours
University Police Department
x2608

4. Passive reminders reminding everyone to conserve, such as lighting controls throughout the campus and water aerators at bathroom/kitchen lavatories and resident showers.
5. In January, 2014, SFASU officially opened the Ina Brundrett Conservation Education Building in SFASU's Pineywoods Native Plant Center. The 3,100 square foot facility will assist with the development and presentation of environmental education programs year-round, rain or shine. Funded entirely through private donations, the building is designed to integrate educational and outreach programs offered to the more than 17,000 SFASU Gardens visitors each year. The facility includes a 12.75 kW solar array system installed on the building's roof which results in approximately 50% energy savings. The solar array was acquired through a $30,000 donation from the Sun Club, a program of Green Mountain Energy, which is the country's longest-serving renewable energy retailer. The array and its energy-use monitoring system also will serve to educate students and visitors about solar energy.
6. Annual Earth Day activities held in the main plaza in which various student organizations participate in order to raise awareness to their specific causes.
7. Consolidation of observed holidays to achieve prolonged equipment shutdown periods in order to reduce energy consumption and realize greater savings.

Designated Contact:

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