TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™

September 30, 2019

Office of the Governor
1100 San Jacinto
Austin, Texas 78701

Mrs. Ursula Parks, Director
Legislative Budget Board (LBB)
Robert E. Johnson Bldg. – 5th Floor
1501 North Congress
Austin, Texas 78701

**RE: Annual Energy Report, FY2019**

The Texas Tech University Health Sciences Center (TTUHSC) Annual Energy Report for FY2019 is being submitted in accordance with Governor's Executive Order # RP49.

**A. Energy Consumption & Cost**

In FY2019, the institution consumed 526,120,236 kBtu. FY2019 energy utilization index (EUI) is 222 kBtu/gsf. FY2019 energy cost index (ECI) is $2.50/gsf. The gross conditioned area of the institution has increased to 2,372,663 gsf. The weighted average Heating Degree Days (HDD) and Cooling Degree Days (CDD) were 3,396 and 2,051 respectively.

TTUHSC continues to undergo capital and system improvements, increase in overall occupancy and steady program growth, which are generally expected to increase the overall energy consumption. Attached Exhibit 'A' shows FY2019 energy consumption and cost breakdowns. Exhibit 'B' shows a benchmarking report for comparison of energy index (EUI & ECI) values of TTUHSC from FY2012 (base year) to FY2019, with the target value of the energy management plan, and the average value of health related institutions in Texas.

**B. Energy Conservation Plan & Action**

TTUHSC Facilities maintain specific operating policies and procedures relating to the energy conservation program and utility review. Operating policies and procedures make the responsibility of energy conservation the obligation of every employee.

TTUHSC Facilities has identified several projects for potential consideration in reducing the campus energy consumption. Projects were prioritized based on a variety of factors including life-cycle cost based on expected service life, return on investment, and available resources. Below is a partial list and status of projects that were completed in FY2019, or are currently being designed and/or implemented.

1. HSC Facilities completed projects to refurbish six air handling units in the Lubbock HSC building with direct digital controls (DDC), chilled water coils with pressure independent valves, steam heating, and fanwall modular systems. The retrofits reduce energy consumption, and improve chilled water differential temperature.
2. HSC Facilities completed projects to retrofit ten air handling units in the Lubbock HSC building, with JCI direct digital controls (DDC). The pneumatic controls and associated valves were replaced. Based on field measurement and verification, the temperature differential of chilled water has increased up to 150% as compared to standard valve. This results in reduced chilled water flow.
3. In Odessa campus, two reciprocating chillers were replaced with variable rotary screw chillers with zero ozone depletion potential refrigerants. Replacement of chillers with HCFC refrigerants (R-22) are planned to comply with evolving federal regulations. The new chillers exceed the most recent energy code performance requirements, and has reduced 17% in annual energy consumption of the building.
4. HSC Facilities personnel have completed the installation of up to 93 LED fixtures on the outdoor parking lot poles in the Lubbock campus. Typical cost to procure and install, is up to $1,400 per fixture. Estimated energy, and maintenance savings is up to $2,300 per fixture over its expected service life. In addition, LED retrofits improve lighting quality, and provide better illumination.
5. Planned replacement of chillers with HCFC refrigerants (R-22) to comply with evolving federal regulations: Two chillers in the Amarillo campus and one chiller in the Odessa campus, are being designed to be replaced with new chillers with zero (0) Ozone Depletion Potential (ODP) refrigerants. The projects are expected to be completed by the end of FY-20.
6. There is plan to upgrade all classrooms with new LED light fixtures with dimming controls. Several classrooms were upgraded in FY-19, and few other are expected to be completed in FY-20.
7. Some of the exterior building lights in Midland and Odessa campus were replaced with LED lights. Payback is estimated to be less than 5 years.

8. Retrofit older pneumatic variable air volume boxes with direct digital control (DDC) boxes for accurate and precise control of space conditions. The advantages of DDC are flexible controls, PID algorithm, no controller drift, no recalibration, and cost effective based on life-cycle cost analysis. Project is ongoing.
9. TTUHSC procures electricity thru the utility contracts for the buildings in Lubbock, Permian Basin and Abilene campuses. XCEL Energy provides electricity to serve buildings in the Amarillo campus. ATMOS provides natural gas to all our campuses. Utility contracts provide cost guarantee irrespective of market fluctuations.
10. TTUHSC Facilities provide project support for the design and construction of new buildings in Odessa and Lubbock campuses, to ensure compliance with applicable engineering principles, practices, and codes/ standards. All new construction projects are designed to have energy efficient HVAC systems, LED lighting with controls, variable drive screw or scroll chillers, condensing boilers, and building automation system. Three of the four buildings are completed in FY-19.
11. HSC Facilities monitor energy consumption on a monthly basis to identify equipment performance and deficiencies. Several defective equipment and controls were identified and corrected.
12. All TTUHSC buildings use integrated building automation and control system to monitor, schedule mechanical and electrical equipment operations and maintenance.
13. TTUHSC Facilities plan to use dimmable LED troffers for the office/ laboratory/ classroom and other such areas, and LED T8 lamps for hallways/ restrooms and other areas which are not continuously occupied. This is being done to reduce energy consumption, improve lighting quality, and provide better illumination. This is being implemented through maintenance activities, and facility renovations.

## C. Future Energy Reduction Plans

TTUHSC Facilities & Safety Services continues to promote energy conservation measures and strategies and seeks new ideas to reduce consumption and improve building system efficiencies. Our plan is to achieve continuous performance improvement of mechanical and electrical systems. Old, inefficient, and pneumatically controlled air handling units and terminal units are being replaced/ or refurbished with newer units and DDC systems. Chillers, Boilers, Pumps, Motors, which are nearing the end of expected service life, are being replaced with newer efficient equipment. A comprehensive list of energy reduction projects is included in the 'Energy & Water Management Plan' (EWMP). The EWMP is being submitted to SECO on an annual basis.

**D. Fuel Consumption Reduction Plans**

TTUHSC continues to emphasize fuel conservation awareness with strategies such as group travel, and regular preventive maintenance to gain economies. TTUHSC has several remote regional campuses in Texas, which require employees to drive to those locations frequently.

Fuel (gasoline/propane/diesel) Data:

| FY19 Consumption | FY19 Cost | FY18 Consumption | FY18 Cost |
|---|---|---|---|
| 36,762 Gallons | $ 88,552 | 34,881 Gallons | $ 86,880 |

The total miles driven in FY2019 has increased by 5% as compared to FY2018.

Your consideration of this update and information is appreciated.

Sincerely,

*Harry F. Slife, Jr.*

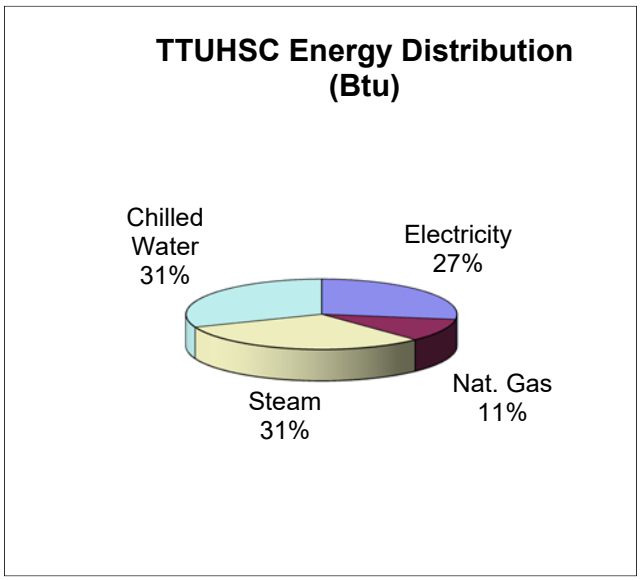
Harry F. Slife, Jr., PhD.
Vice President, Facilities & Safety Services

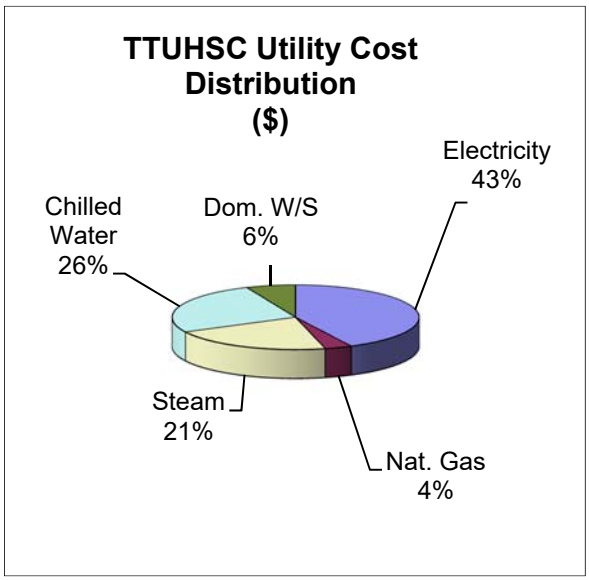
Attachment: EXHIBITs 'A' & 'B'

XC: Penny Harkey, Vice President and Chief Financial Officer
TTUHSC Finance & Administration

# EXHIBIT 'A'

| FY2019 ENERGY CONSUMPTION AND COST | | |
|---|---|---|
| Energy | Consumption | Cost |
| ELECTRICITY, kWh | 44,378,196 | $2,695,638 |
| NATURAL GAS, ccf | 568,117 | $226,544 |
| STEAM, mlb | 153,327 | $1,350,730 |
| CHILLED WATER, ton-hour | 14,297,441 | $1,652,038 |
| N:B: Natural Gas is used to produce the Thermal Energies of Steam and Chilled Water | | |




Note: The annual water consumption intensity for the institution is 22 Gal/sf, which is within the limits of SECO (State Energy Conservation Office) water conservation guidelines.

# EXHIBIT 'B'

| ENERGY BENCHMARKING | | |
|---|---|---|
| Institution | Energy Utilization Index (EUI) kBtu/gsf | Energy Cost Index (ECI) $/gsf |
| Texas Tech Univ Health Sciences Center (FY-19) | **222** | **$2.50** |
| Texas Tech Univ Health Sciences Center (FY-18) | 212 | $2.71 |
| Texas Tech Univ Health Sciences Center (FY-17) | 215 | $2.77 |
| Texas Tech Univ Health Sciences Center (FY-16) | 223 | $2.68 |
| Texas Tech Univ Health Sciences Center (FY-15) | 225 | $2.97 |
| Texas Tech Univ Health Sciences Center (FY-14) | 237 | $3.06 |
| Texas Tech Univ Health Sciences Center (FY-13) | 236 | $2.83 |
| Texas Tech Univ Health Sciences Center (FY-12) Base Year | **249** | **$2.69** |
| Health Related Institutions in Texas (Average) | **262** | **Note-3** |
| TTUHSC Energy Management Plan Target | **< 250** | **Note-2** |

N.B.:

1. EUI can increase significantly with more research and hospital space; occupancy density; year of construction; building plug loads etc.
2. ECI can vary significantly with the local utility cost.
3. HRI Texas average EUI value was obtained from SECO website. ECI value is not available.