



October 12, 2016

Office of the Governor  
1100 San Jacinto  
Austin, Texas 78701

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

RE: **Annual Energy Report, FY2016**

The Texas Tech University Health Sciences Center (TTUHSC) Annual Energy Report for FY-2016 is being submitted in accordance with Governor's Executive Order # RP 49. TTUHSC continues to promote energy conservation measures and strategies and seeks new ideas to reduce consumption and improve building system efficiencies.

#### **A. Energy Consumption & Cost**

In FY2016, the institution consumed 475,788,294 kBtu. FY2016 energy utilization index (EUI) is 223 kBtu/gsf, which decreased by 1% compared to FY2015. FY2016 energy cost index (ECI) is \$2.69/gsf, which decreased by 9.5% compared to FY2015. The gross area (gsf) of the institution in FY2016 has increased by 1% as compared to FY2015. Heating Degree Days (HDD) for the FY2016 has decreased by 13% as compared to FY2015, and Cooling Degree Days (CDD) for the FY2016 has increased by 18% as compared to FY2015.

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 FY2016 energy consumption and cost breakdowns. It includes FY2015 energy consumption, cost, and energy equivalents to facilitate comparison between annual totals. Exhibit 'B' shows a benchmarking report for comparison of energy index (EUI & ECI) values of TTUHSC from FY-2011 to FY-2016 with the median index value range of health related institutions in Texas.





## B. Energy Conservation Plan & Action

TTUHSC Engineering Services Department maintains specific operating policy and procedures relating to the energy conservation program and utility review. Operating policy and procedures make the responsibility of energy conservation the obligation of every employee. Flyers, brochures, and periodic reminders are in progress, with a focus on waste prevention, conservation of resources, and identifying new opportunities.

TTUHSC Engineering Services 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 (age), return on investment, and available resources. Projects that were implemented in the past were listed in the previous annual reports. Below is a partial list and status of projects that were completed in FY-2016 or are currently being designed and/or implemented.

1. Replacement of air handling units (AHUs) in Lubbock HSC which are inefficient and beyond their expected service life with newer robust, energy efficient units. Three projects were completed, and the new AHUs are direct digital control (DDC) and fanwall type systems. Three more air handling units are planned to be replaced, and are expected to be completed in FY-2017.
2. Completed the installation of (8) 350W LED outdoor parking lot fixtures, (350) LED T8 tubes, and (7) LED wall packs & lamps at various locations. Reduced electricity consumption with better illumination was achieved.
3. Negotiated the electricity contract to serve the new buildings in Permian Basin and Abilene campuses. Lubbock, Power & Light, and XCEL Energy provide electricity to serve buildings in Lubbock and Amarillo campuses respectively. ATMOS provides natural gas to all of our campuses.
4. Replacement of the HID lamps with energy efficient fluorescent lamps on the 3<sup>rd</sup> floor of PS Library building to comply with the illumination requirement and reduce energy consumption.
5. Verification of equipment performance, building automation system logic, air flow properties of three buildings in Amarillo and Abilene locations. Sectors of the Lubbock HSC building were investigated as well in support of project work and periodic review. Provided recommendations to reduce energy consumption and improve equipment performance. Select recommendations were implemented.
6. Installation of five more pressure independent valves for chilled water flow control to the air handling unit coils. Measurement and verification continues to indicate optimum and consistent flow to the coils.





7. Provided technical support for operational troubleshooting, and building renovations/alterations projects.
8. Provided project support for the new Simulation Center building (capital project) in Amarillo and the Public Health building in Abilene to ensure compliance with the state energy code.
9. Upgrading pneumatic control systems to DDC systems. This is being done as and when funding is available.
10. Incorporation of occupancy sensors for automatic lighting control. Project is being implemented through new construction and renovations.
11. Replacement of inefficient motors with premium efficiency motors. Motors are being replaced at the end of their service life.
12. Planned replacement of chillers with HCFC refrigerants (R-22) to comply with evolving federal regulations. The FY-2017 plan is to replace four older chillers with new chillers with zero (0) Ozone Depletion Potential (ODP) refrigerants, subject to availability of funding. A project to replace two chillers is in design phase, and is expected to be completed in FY-2017.
13. Upgrading the HVAC controls and associated components at PS Library building. This is expected to be completed by end of CY-2016.
14. Retro-commissioning of building automation systems and components, to ensure the HVAC equipment function as intended. Energy saving features are being evaluated and adapted as necessary.
15. TTUHSC Physical Plant policy is to use F28T8 lamps for office/laboratory/classroom and other such areas, and F25T8 lamps for hallway/toilet and other areas which need less illumination. This is being done to comply with the lighting power density requirement of the state energy code. Project is being implemented through maintenance and renovations.
16. New energy efficient LED lights are being tested for performance and reliability.
17. Provided project support for selection/specification of LED lighting in all of our new buildings, which are in design phase.

### **C. Future Energy Reduction Plans**

TTUHSC Engineering Services is involved in continuous improvement of mechanical and electrical systems. Old, inefficient, and pneumatically controlled air handling units and terminal units are being replaced with newer units and DDC systems. Chillers, boilers, pumps, motors, which are nearing the end of expected service life, are being replaced with modern efficient systems. A comprehensive list of projects is included in the 'Energy & Water Management Plan'.





**D. Fuel Consumption Reduction Plans**

TTUHSC continues to emphasize fuel conservation awareness with strategies such as group travel, regular preventative maintenance to gain economies. FY-2016 total fuel consumption has decreased by 0.5% as compared to FY-2015. TTUHSC has several remote regional campuses in West Texas, which require employees to drive to those locations frequently.

Fuel (gasoline/propane/diesel) Data:

FY16 Consumption	FY16 Cost	FY15 Consumption	FY15 Cost
27,851 Gallons	\$52,087	27,986 Gallons	\$69,656

The total miles driven in FY2016 have increased by 4% as compared to FY2015.

Your consideration of this update and information is appreciated.

Sincerely,

***George G. Morales***

George G. Morales, P.E., M.Eng., M.B.A.  
Assistant Vice-President for Physical Plant & Support Services

Attachment: EXHIBITs ‘A’ & ‘B’

XC:

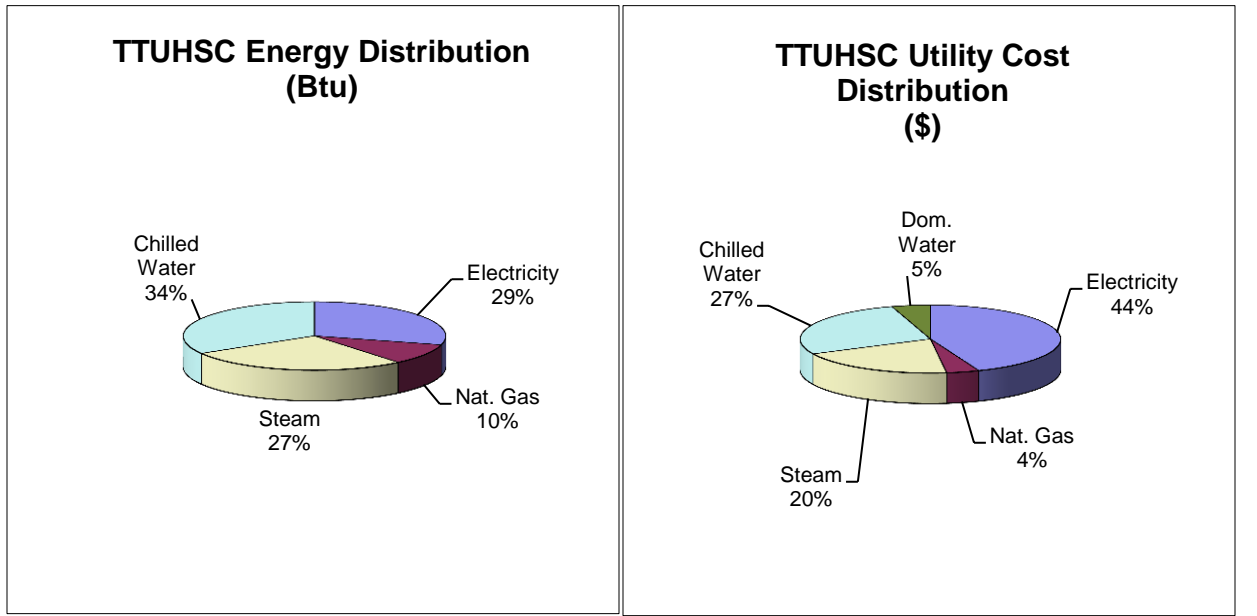
1. Elmo Cavin,  
Executive Vice-President, TTUHSC Finance & Administration
  
2. Director, State Energy Conservation Office  
111 E. 17<sup>th</sup> Street, Suite 1118, Austin, Texas 78774



**EXHIBIT ‘A’**

<b>ANNUAL ENERGY CONSUMPTION AND COST</b>				
ENERGY	CONSUMPTION		COST	
TYPE	FY 2016	FY 2015	FY 2016	FY 2015
ELECTRICITY, kWh	42,283,154	41,081,589	\$ 2,647,121	\$ 2,761,685
NATURAL GAS*, ccf	471,288	536,829	\$ 244,503	\$ 338,233
STEAM, Mlb	120,542	116,033	\$ 1,187,305	\$ 1,373,523
CHILLED WATER, Ton-hr	13,810,371	13,306,802	\$ 1,655,247	\$ 1,787,189
TOTAL ENERGY (kBtu), COST (\$)	475,788,294	473,784,714	\$ 5,734,176	\$ 6,260,630

**Note\*:** Natural Gas is used to produce the Thermal Energies of Steam and Chilled Water



Note: The annual water consumption intensity for the institution is 24 Gal/sf, which is within the limits of SECO (State Energy Conservation Office) water conservation guidelines.





**EXHIBIT ‘B’  
(ENERGY BENCHMARKING REPORT)**

Institution	Energy Utilization Index (EUI) in kBtu/gsf	Energy Cost Index (ECI) in \$/gsf
Texas Tech Univ Health Sciences Center (FY-16)	<b>223</b>	<b>\$2.69</b>
Texas Tech Univ Health Sciences Center (FY-15)	<b>225</b>	<b>\$2.97</b>
Texas Tech Univ Health Sciences Center (FY-14)	<b>236</b>	<b>\$3.06</b>
Texas Tech Univ Health Sciences Center (FY-13)	<b>236</b>	<b>\$2.83</b>
Texas Tech Univ Health Sciences Center (FY-12)	<b>252</b>	<b>\$2.90</b>
Texas Tech Univ Health Sciences Center (FY-11)	<b>246</b>	<b>\$2.90</b>
Health Related Institutions in Texas (Median)	<b>289</b>	<b>\$3.90</b>
TTUHSC Energy Management Plan Target	<b>220 - 250</b>	<b>&lt; \$3.35</b>

Notes:

1. EUI can increase significantly with more research and hospital space; occupancy density; year of construction; heating and cooling degree days, building plug loads etc.
2. ECI can vary significantly with the local utility cost.
3. CLEAResult, 4301 Westbank Drive, Austin, TX 78746, provided the median EUI and ECI of HRIs in Texas for years 2011 & 2012.

