2016

Facilities Operations Benchmarking and Performing Indicators Report
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University of Missouri System
Core Services provided by Campus Facilities Management
- Building systems operation
- Custodial services
- Facilities maintenance, including preventive maintenance, service calls, trouble calls
- Renovation and renewal program
- Fire safety systems maintenance
- Energy and resource conservation
- Event support
- Landscape services
- Recycling
- Solid waste disposal
- Surplus property
- Administrative, personnel, and business support for Facilities Services

Core Services provided by Campus Utilities and Energy Management
- Self-generation of electricity and/or thermal energy.
- Mechanical distribution of utilities (steam, chilled water/wastewater)
- Electrical distribution of electricity (12,000 Volts, 4,160 volts and above)
- Elevator, escalator, wheel chair lift, and dumbwaiter maintenance and inspection
- Metering of in-plant steam, electricity, chilled water, and domestic water, plus building meters
- Billing for all generated utilities and purchased utilities

This report also includes comparisons between University of Missouri campuses and peer institutions selected by Sightlines based on the following criteria: Student population (size) and technical complexity of plant and location. Comparing the data of these campuses aid the university with decisions for campus facilities operations.
University of Missouri - Columbia

Campus profile:

• 29,580 FTE Students
• 6,838,353 gross square feet maintained
• E&G Energy Management provide services for 8,616,818 gsf
• 1 Cogeneration Power Plant
• 2 Substations
• 130,944 feet of Steam and Condensate Pipe and Tunnels
• 1 Wind Turbine
• 135,944 feet of Domestic Water Pipe and Fire Hydrants
• 2 Chiller Plants
• 5 Wells
• 124,080 feet of Chilled Water Pipe
• 208,032 feet of Electric Lines and Equipment
• 15,452 feet of Compressed Air
• 110,352 feet of Optic Fiber

Sightlines Peer Comparators:

• Indiana University - Bloomington
• Iowa State University
• Northwestern University
• Purdue University
• The Ohio State University
• The Pennsylvania State University
• University of Illinois - Urbana/Champaign
• University of Iowa - General Funds
• University of Michigan
• University of Minnesota - Twin Cities
The Facilities Operating Budget Actuals Benchmark analyzes the amount spent each year to operate campus physical assets and the department that maintains them.

- **Daily Service:** Materials, labor costs, service contracts, office expense, etc. associated with the regular maintenance, cleaning and grounds keeping of the campus.

- **Planned Maintenance:** Materials, labor costs, service contracts, etc. that enhance or extend the useful life of campus buildings and components. Some examples include changing belts and filters on HVAC equipment, elevator service contracts, sprinkler and fire alarm system testing/maintenance contracts, etc.

- **Utilities:** The procurement of utility commodities, i.e. natural gas, oil, steam, electricity, water/sewer, etc. NOTE - Utilities costs do not include institutionally held people costs, plant operations or service contracts of utility systems.
Campus Energy Consumption & Expense Summary

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</thead>
<tbody>
<tr>
<td>MMBTU Used</td>
<td>1,013,130</td>
<td>976,394</td>
<td>974,657</td>
<td>946,201</td>
<td>949,619</td>
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<tr>
<td>Cost</td>
<td>$7,137,424</td>
<td>$7,706,819</td>
<td>$8,518,584</td>
<td>$8,148,120</td>
<td>$7,995,800</td>
</tr>
<tr>
<td>Cost/MMBTU</td>
<td>$7.04</td>
<td>$7.89</td>
<td>$8.74</td>
<td>$8.61</td>
<td>$8.42</td>
</tr>
<tr>
<td>BTU/GSF</td>
<td>141,235</td>
<td>135,915</td>
<td>135,542</td>
<td>124,161</td>
<td>124,690</td>
</tr>
</tbody>
</table>

• **Energy Consumption (BTU/GSF):** The sum of fossil and electric BTU's per square foot the campus consumes each year. Energy consumption is influenced by many factors including region/climate, type of institution, technical complexity, utility systems, campus backlog, etc.

• **Energy Total Unit Cost ($/MMBTU):** The composite cost for an MMBTU of energy; includes electricity and all fossil fuels. Region and type of utility system (centralized, independent, co-generation, etc.) greatly influence unit cost.

Peer Energy Unit Cost
• Custodial Staffing (GSF/FTE) – The average amount of space cleaned by a custodial worker measured in Gross Square Footage. This benchmark captures the staff that is assigned to cleaning buildings. Custodians assigned to non-cleaning duties such as set-ups, moves, recycling, or any other function that does not directly impact the cleanliness of buildings are excluded for consistency.

• Grounds Staffing (Develop Acres/FTE) — A measure of the acreage covered by the grounds department. The total developed and maintained acreage is divided by the number of grounds workers. It is expected that schools with a high grounds intensity will have a lower coverage ratio.

• Maintenance Staffing (GSF/FTE) - The coverage ratio for maintenance staff, or the amount of space that each maintenance employee is responsible for covering. Maintenance staff include mechanical (HVAC, Plumbing, Electrical, etc) and structural (Painting, Carpentry, Lock Shop, etc) workers. Utility workers, construction crews and sold services are removed so as to only include full time equivalents performing daily service or annual stewardship in buildings.

• Maintenance Work Order Production (Work orders/FTE) – The number of daily service repair work orders completed by each tradesmen on an annual basis. This benchmark is a measure of worker productivity and tracking sensitivity.
Sightlines offers a campus inspection as a service to provide an independent judgement of campus appearance gained by an inspection of a representative sample of campus buildings and grounds. The inspection rates are on a scale of 0-5, with 0 being the lowest and 5 being the best score possible.

- **Exterior Inspection (%)** – An inspection to evaluate the condition of building envelopes/exteriors, rated on a scale of 0-4. This inspection includes exterior doorways, siding, pointing, roofs, windows, etc.
- **General Repair/Impression (%)** – An independent judgment of campus general repair/impression gained by an inspection of a representative sample of campus buildings, on a scale of 0-4. Space is inspected to.
- **Cleanliness Inspection (%)** – An independent judgment of campus cleanliness gained by an inspection of a representative sample of campus buildings, rated on a scale of 0-4. Space is inspected to determine if it is free from dirt, debris, and stocked with the proper paper products in restrooms, etc.
- **Grounds Inspection (%)** - An evaluation of grounds appearance including plantings, turf, fixtures, and walkways, rated on a scale of 0-4.
University of Missouri - Kansas City

Campus Profile

- 10,890 FTE Students
- 3,030,013 gross square feet maintained
- 15,000 feet of Steam and Condensate Pipe and Tunnels
- 1 Main Boiler Plant
- 5 Individual Boiler Plants
- 16,000 feet of Chilled Water Pipe
- 1 Main Chiller Plant
- 1 Small Chiller Plant
- 4 Individual Chiller Plants
- 24,405 feet of Domestic Water Piping
- 24,080 feet of Sewer Piping
- 16,000 feet of Electrical Distribution
- 151,200 feet of Data Conduit
- 155,000 feet of Fiber Optic Cable
- 120,600 feet of Copper OSP Cable

Sightlines Peer Comparators:

- Indiana University Purdue University - Indianapolis
- Portland State University
- Rutgers University - New Brunswick - College Avenue
- Temple University
- University of Cincinnati
- University of Missouri - St. Louis
- University of Toledo
- Virginia Commonwealth University
- West Chester University of PA
The Facilities Operating Budget Actuals Benchmark analyzes the amount spent each year to operate campus physical assets and the department that maintains them.

- **Daily Service**: Materials, labor costs, service contracts, office expense, etc. associated with the regular maintenance, cleaning and grounds keeping of the campus.
- **Planned Maintenance**: Materials, labor costs, service contracts, etc. that enhance or extend the useful life of campus buildings and components. Some examples include changing belts and filters on HVAC equipment, elevator service contracts, sprinkler and fire alarm system testing/maintenance contracts, etc.
- **Utilities**: The procurement of utility commodities, i.e. natural gas, oil, steam, electricity, water/sewer, etc. NOTE - Utilities costs do not include institutionally held people costs, plant operations or service contracts of utility systems.
**UMKC - Energy Consumption & Expense Summary**

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<tbody>
<tr>
<td>MMBTU Used</td>
<td>382,571</td>
<td>406,116</td>
<td>457,449</td>
<td>428,489</td>
<td>370,414</td>
</tr>
<tr>
<td>Cost</td>
<td>$5,327,261</td>
<td>$5,475,725</td>
<td>$5,866,173</td>
<td>$6,097,954</td>
<td>$6,063,318</td>
</tr>
<tr>
<td>BTU/GSF</td>
<td>129,791</td>
<td>137,742</td>
<td>149,508</td>
<td>139,732</td>
<td>122,032</td>
</tr>
</tbody>
</table>

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- **Energy Total Unit Cost ($/MMBTU):** The composite cost for an MMBTU of energy; includes electricity and all fossil fuels. Region and type of utility system (centralized, independent, co-generation, etc.) greatly influence unit cost.
**Custodial Staffing (GSF/FTE)** – The average amount of space cleaned by a custodial worker measured in Gross Square Footage. This benchmark captures the staff that is assigned to cleaning buildings. Custodians assigned to non-cleaning duties such as setups, moves, recycling, or any other function that does not directly impact the cleanliness of buildings are excluded for consistency.

**Grounds Staffing (Develop Acres/FTE)** – A measure of the acreage covered by the grounds department. The total developed and maintained acreage is divided by the number of grounds workers. It is expected that schools with a high grounds intensity will have a lower coverage ratio.

**Maintenance Staffing (GSF/FTE)** - The coverage ratio for maintenance staff, or the amount of space that each maintenance employee is responsible for covering. Maintenance staff include mechanical (HVAC, Plumbing, Electrical, etc) and structural (Painting, Carpentry, Lock Shop, etc) workers. Utility workers, construction crews and sold services are removed so as to only include full time equivalents performing daily service or annual stewardship in buildings.

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- **Grounds Inspection (%)** – An evaluation of grounds appearance including plantings, turf, fixtures, and walkways, rated on a scale of 0-4.
Missouri University of Science and Technology

Campus Profile

- 6,949 FTE Students
- 1,959,697 gross square feet maintained
- 11,000 feet of Domestic Water
- 7,000 feet of Soft Water Distribution
- 20,400 feet of Chilled and Heating Water Distribution Pipe
- 2,250 feet of Balance Chilled Water
- 5,000 feet of Storm Water Sewer
- 10,000 feet of Sanitary Sewer
- 10,500 feet of Electrical Distribution

Sightlines Peer Comparators:

- Georgia Institute of Technology - Facilities
- Illinois Institute of Technology
- Massachusetts Institute of Technology
- Oregon Institute of Technology
- Purdue University
- Rensselaer Polytechnic Institute
- South Dakota School of Mines and Technology
- Stevens Institute of Technology
S&T - Operating Expense Summary

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<tbody>
<tr>
<td>Total Daily Service</td>
<td>$6,053,710</td>
<td>$5,662,406</td>
<td>$6,628,367</td>
<td>$6,667,215</td>
<td>$6,484,819</td>
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<tr>
<td>Planned Maintenance</td>
<td>297,542</td>
<td>283,630</td>
<td>354,033</td>
<td>625,677</td>
<td>900,675</td>
</tr>
<tr>
<td>Utilities (Electric, Water, Etc.)</td>
<td>4,036,721</td>
<td>4,337,123</td>
<td>3,886,584</td>
<td>4,265,289</td>
<td>4,202,957</td>
</tr>
<tr>
<td>Total</td>
<td>$10,387,973</td>
<td>$10,283,159</td>
<td>$10,868,984</td>
<td>$11,558,181</td>
<td>$11,558,451</td>
</tr>
</tbody>
</table>

Cost per GSF

$5.55 $5.52 $5.80 $5.90 $5.97

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S&T - Energy Consumption & Expense Summary

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<tbody>
<tr>
<td>MMBTU Purchased</td>
<td>366,244</td>
<td>379,373</td>
<td>352,471</td>
<td>169,229</td>
<td>165,601</td>
</tr>
<tr>
<td>MMBTU Geothermal Produced</td>
<td></td>
<td></td>
<td></td>
<td>133,237</td>
<td>113,531</td>
</tr>
<tr>
<td>Cost</td>
<td>$3,145,807</td>
<td>$3,145,916</td>
<td>$3,286,299</td>
<td>$3,090,269</td>
<td>$3,005,300</td>
</tr>
<tr>
<td>Cost/MMBTU</td>
<td>$10.29</td>
<td>$9.55</td>
<td>$8.83</td>
<td>$10.22</td>
<td>$10.77</td>
</tr>
<tr>
<td>BTU/GSF</td>
<td>163,948</td>
<td>178,499</td>
<td>201,844</td>
<td>162,466</td>
<td>150,871</td>
</tr>
</tbody>
</table>

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University of Missouri - St. Louis

Campus Profile

- 8,033 FTE students
- 2,494,098 gross square feet maintained
- 53,000 feet of Domestic Water Distribution
- 14,000 feet of Domestic Water Plant Fire Water
- 10,000 feet of Chilled Water Distribution
- 65,000 feet of Storm Sewer
- 32,000 feet of Sanitary Sewer
- 45,000 feet of Electric Distribution
- 59,000 feet of Data Distribution
- 25,000 feet of Video Distribution
- 23,000 feet of Telephone Distribution
- 1 Electric Substation
- 24,000 feet of Natural Gas Distribution

Sightlines Peer Comparators:

- Bloomsburg University of PA
- Edinboro University of PA
- Jackson State University - E&G
- Kutztown University of PA
- Millersville University of PA
- Missouri University of Science and Technology
- Portland State University - E&G
- University of Massachusetts - Dartmouth
- University of Missouri - Kansas City
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UMLC - Energy Consumption & Expense Summary

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<tbody>
<tr>
<td>MMBTU Used</td>
<td>284,994</td>
<td>297,099</td>
<td>328,296</td>
<td>294,263</td>
<td>293,663</td>
</tr>
<tr>
<td>Cost</td>
<td>$3,763,994</td>
<td>$3,758,851</td>
<td>$4,244,273</td>
<td>$3,860,109</td>
<td>$4,427,322</td>
</tr>
<tr>
<td>Cost/MMBTU</td>
<td>$13.21</td>
<td>$12.65</td>
<td>$12.93</td>
<td>$13.12</td>
<td>$14.05</td>
</tr>
<tr>
<td>BTU/GSF</td>
<td>112,486</td>
<td>118,109</td>
<td>131,134</td>
<td>105,628</td>
<td>107,041</td>
</tr>
</tbody>
</table>

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