WYLite
Energy Engineering Study
for
Sheridan County, Wyoming
Fulmer Public Library

Developed by:


June-July 2019
Under the directive of the Wyoming Business Council (WBC) the Wyoming State Energy Office promotes energy efficiency and conservation throughout Wyoming. For more information or continued assistance please feel free to contact us.

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For this project, Trident Energy Services is providing services under contract to the WBC.

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Disclaimer
This report is preliminary and general in nature. Results are intended to identify potential, cost-effective, energy-saving measures and the potential for proceeding with a comprehensive project to upgrade your facilities through energy efficiency.
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EXECUTIVE SUMMARY

The WYLite program is a multi-phase process through which the Wyoming Business Council (WBC) and its State Energy Office (SEO) provides coaching and technical support to agencies wishing to develop a “home-grown” energy management and building improvement program. Sheridan County (the County) has committed to working with the SEO and its consultants, Trident Energy Services, to assess building energy improvements for the County’s Fulmer Public Library. This report is an important decision making step in the process and should be used by the County to choose measures to fund/implement that will improve its overall comfort, efficiency and operating cost. Under WYLite, Trident can continue to work with the County to achieve its goals.

The County wishes to obtain funding assistance to offset the cost of replacing a portion of the Fulmer Library’s large single pane windows in its 1974 section and the clerestory glazings in the 1994 section with new, high efficiency double pane glazings. Additionally, overall improving of the sealing of windows, doors and other areas is included. Our analysis and report focuses only on these measures.

A full facility needs assessment was recently completed for the library which included these recommendations as well as estimated costs for their implementation. The economic analyses used in this report include these cost estimates, as provided by the County with a 10 percent added for potential contingency. In the County’s endeavor to obtain funding, this report is a step to apply to the WBC/SEO for its Local Government Energy Improvement Grant Program which, if approved, can provide grant funds to the County up to $25,000 and requires a 10 percent match from the County. Additionally, if additional funds are necessary, the County may consider applying to the Wyoming Association of Municipalities/Wyoming County Commissioners’ Association’s Energy Lease Program (ELP), which provides funds under a no interest loan. This analysis and report fulfills the County’s technical eligibility requirement to apply for these funding sources.

Facilitating this effort for the County is Mr. Cameron Duff, the Library Director.

During our on-site building survey, we identified building and efficiency improvement needs which are identified in this report, with the main focus on window replacement and overall building air sealing, per the request of the County. The results of this analysis indicate implementing the recommended upgrades will result in energy use and energy cost reductions as well as improved comfort conditions in the affected areas.

Table 1 on the following page provides the energy and cost results of our analysis.

For more information on WYLite and how we can assist and support you, please contact John Canfield at Trident Energy Services at (303) 247-0193 or jfcanfield@tridentenergy.com or Sherry Hughes in the State Energy Office at (307) 777-2824 sherry.hughes@wyo.gov
Table 1

<table>
<thead>
<tr>
<th>Energy Efficiency Measure</th>
<th>Estimated Cost to Implement ($)</th>
<th>Estimated Annual Cost Savings ($)</th>
<th>Estimated Simple Payback (years)</th>
<th>Estimated Annual Electric Usage of OLD System (kWh)</th>
<th>Estimated Annual Fuel Usage of OLD System (Units)</th>
<th>Estimated Annual Electric Usage SAVINGS for NEW System (kWh)</th>
<th>Estimated Annual Fuel Usage SAVINGS for NEW System (DTherm)</th>
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<tbody>
<tr>
<td>Fulmer Library</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Replace Windows</td>
<td>$48,510</td>
<td>$431</td>
<td>112.4</td>
<td>157,679</td>
<td>1,311</td>
<td>3,154</td>
<td>32.8</td>
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<tr>
<td>Upgrade Seals of Windows</td>
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<td>$431</td>
<td>95.1</td>
<td>157,679</td>
<td>1,311</td>
<td>3,154</td>
<td>32.8</td>
</tr>
<tr>
<td>and Doors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bldg. Total</strong></td>
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<td><strong>$863</strong></td>
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<td><strong>315,358</strong></td>
<td><strong>2,622</strong></td>
<td><strong>6,307</strong></td>
<td><strong>65.5</strong></td>
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</table>
ENERGY AND COST SAVING IMPROVEMENTS

Following are descriptions of existing conditions and recommended upgraded and efficiency improvements for each of the buildings.

Fulmer Public Library

Facility Description

The Fulmer Public Library was built in multiple phases. The original construction was completed in 1973 with additions in 1985 and 1994 and now totals about 35,000 square feet in total area. Hours of operation to the general public are Monday through Friday from 9 am until 9 pm; Friday and Saturday from 9 am until 5 pm. Closed on Sundays. Custodial and Maintenance staff are in the building starting at 3:30 am on Monday through Friday. Cleaning crew also comes in from 5-7 pm on Friday. These are hours closed to the public.

Utility Use

Electricity and natural gas are provided to the Fulmer Library by Montana-Dakota Utilities. The building has one electric and one natural gas meter. According to utility data provided by the County, the building’s energy utilization index, or EUI (thousand Btus per square foot per year; kBtu/sf/yr) for electricity and natural gas was 34.0 and 51.5, respectively. During the same period, the annual utility cost per square foot ($/sf/yr) was $1.13. Overall, this EUI rating indicates that this building in its climate zone is a bit above average in energy use per square foot, particularly for natural gas use. (See Appendix A for detailed utility use profiles.)
**Recommendations for Existing Energy Systems**

The following provides brief descriptions of the window replacement and sealing improvement measures and their recommendations. *The following descriptions are extracted from the afore mentioned needs assessment report.*

**Glazing/Windows**

**Existing Condition**

Windows assemblies within the 1974 exterior wall assemblies are aluminum storefront systems with operable sections in isolated locations. These assemblies are single pane window systems with a thermally broken frame. From the exterior one can see that these window systems have been repaired or caulked, indicating that they have leaked. Gasketing around the glazing for some windows has become compromised or is missing and could result in leaking. Evidence of moisture was observed inside which could be a result of a compromised seal around the glazing or a result of condensation collecting inside due to single pane window construction. Assemblies located in interior wall systems are of the same construction and do not require any action.

**Recommendations**

All the window systems in the ground level and mezzanine level of the 1974 as well as the clerestory windows in the 1994 addition to the building are single pane window systems that lose energy readily to the exterior, both in summer and winter. Some systems show signs of water infiltration and sealants on the exterior around these systems are compromised.

- Remove and replace all single pane windows with new double pane window systems.

**Estimated Cost: $48,510**
Building Envelope

Existing Condition
Weather stripping thresholds and door sweep around hollow metal doors no longer seal the openings off when closed. Secondly, interior doors require new door silencers, wall guard and smoke seals. Stopping air leakage stops energy loss. This is a major maintenance item that is small and ongoing that needs addressed but can have an impact on heating and cooling costs.

Recommendations

- Provide new door bottom sweeps
- Provide new thermally broken thresholds
- Provide new gasketing and seals around each door jamb and head
- Provide new door silencers, wall guards and smoke seals on hollow metal framed doors
- Replace windows as they fail in 1985 construction
- Replace exterior sealants

Estimated Cost: $41,030

Cost estimates shown in this analysis/report were provided to the County from in the needs assessment report and are incorporated into our economic analysis with 10% added for potential contingency.
WATER SAVING OPPORTUNITIES

Like energy savings, water cost savings can be applied to the investment of water-saving equipment replacements and landscape irrigation systems County-wide. A quantitative evaluation of potential water-saving measures has not been conducted, however, the following measures are presented for consideration.

- Convert faucets and toilets to low-flow when appropriate or when they need replacement.
- Continually inspect faucets and flush valves and repair immediately.
- Thoroughly inspect and repair all components of any irrigation system.
- If not already installed, consider installing moisture sensing controllers that will turn sprinklers on only when necessary.

LOW-NO-COST OPPORTUNITIES

Following are additional recommendations that can be applied County-wide.

- Initiate an on-going formal utility tracking/management program. It is an excellent way for the County to visually see how buildings are operating and the results of energy investments and notice when utility use appears unusual.
- When motors are in need of replacement, install premium efficiency motors. The incremental additional cost will quickly pay back due to energy cost savings.
- Turn off all lights when leaving an area for over 10 minutes. Consider installing automatic occupancy sensing lighting controls in appropriate areas.
- Turn off (or initiate “sleep” or standby mode) all computers, monitors, and appropriate video equipment when not in use, such as over lunchtime and at the end of each day. If computers MUST be left on, turn off the just the monitors.
- If the County has refrigerated vending machines, each are rated at an estimated 200 - 400 watts, and refrigerated water fountains estimated at 100 - 200 watts. These devices are enabled to operate at all times.
  - Install a VendingMizer™ on each vending machine to ensure that vending machines operate only when necessary while keeping their product at the correct temperature. VendingMizer™ are approved by both Coca Cola and Pepsi Cola companies for retrofits on their vending machines. These devices typically save 30 to 70 percent of a vending machines energy use and cost and pay back in around 3 years. Additional energy savings may be achieved by removing the lamps from the machine.
  - For refrigerated water fountains, a simple plug-in time clock programmed to keep these units off during unoccupied times will save close to 50% of their overall energy use. This technology may also be appropriate for vending machines.

- Initiate an energy education and awareness program with County staff to ensure equipment, such as lights and computers, are operated only when necessary. This should also apply to water use and conservation. The State Energy Office can provide assistance and support for this program if the County desires.
POSSIBLE FUNDING SOURCES

To successfully implement any desired energy and improvement measures, the County must secure necessary funding. The following are some options for consideration.

Possible funding sources include:

• Funding Through Capital Budget - If you have adequate capital budgets, any additional funds may be used to fully, or partially fund the cost of all desired improvements.

• Grants and loans – Currently, there are available to local governments a number of viable grant and low-/no-interest loans.
  o The Wyoming Business Council and the State Energy Office have recently developed the Local Government Energy Improvement Grant program.

  The intent of this program is to retrofit existing buildings to maximize energy savings and create sustainable reduction in energy usage. To qualify, each applicant is required to participate in the Wyoming Energy Conservation Improvement Program (WYECIP) or WYLite (a scaled down version of WYECIP), which includes a no cost Energy Assessment of the facility in question. [http://www.wyomingbusiness.org/energy](http://www.wyomingbusiness.org/energy)

  o Another example is the zero-interest Energy Lease Program (ELP) sponsored by the Wyoming Association of Municipalities (WAM) and the Wyoming County Commissioners’ Association (WCCA)

  The Wyoming Association of Municipalities-Wyoming County Commissioners Association (WAM-WCCA) Energy Lease Program offers loan funding for municipal energy savings projects. The program is overseen by a joint Board consisting of three County and three municipal officials appointed by the Presidents of the WCCA and WAM. All leases are for a period of two years, amortized over ten years, and each lease can be renewed up to four times. For further information, please visit: [http://wyomuni.org/services-partners/](http://wyomuni.org/services-partners/)

  • Utility incentives and rebates if available.

NEXT STEPS

• Using the results of this report, the County will decide which measures it wishes to implement.

• Obtain funding.
  o This may include the State Energy Office Local Government Energy Improvement Grant Program and the WAM/WCCA Energy Lease Program which provides zero-interest loans which may be used to supplement the SEO grant funds.

• Once funding is approved, the County should get final vendor and contractor bids for the measures.

• The County will manage the installation of all measures.

• The County will be responsible for any reporting requirements of the SEO grant or the ELP.
APPENDIX A -UTILITY PROFILES

(As provided by the County)
Utility History - Electricity
Sheridan County, Wyoming
Fulmer Library
May 2018 through April 2019

Do all buildings have the same utility providers?
Yes

Utility: Montana-Dakota Utilities
Location: 320 N. Brooks St.
Account/Rate: 606 862 1000 0
Premise #: 11468164
Base Rate: Large General

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<th>Usage Month</th>
<th>On-Peak (kWh)</th>
<th>kWh Cost</th>
<th>On-Peak Demand (kW)</th>
<th>Demand Cost/kW ($)</th>
<th>Total Cost</th>
<th>Blended Cost ($/kWh)</th>
<th>CO2 Emissions (tons CO2)</th>
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<tbody>
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<td>May-18</td>
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<td>123.2</td>
<td>$1,540.00</td>
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<td>$1,521.74</td>
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<td>$1,700.00</td>
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<td>$1,037.50</td>
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<td>81.1</td>
<td>$1,013.75</td>
<td>$0.0392</td>
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<td>Feb-19</td>
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<td>89.5</td>
<td>$1,118.75</td>
<td>$0.0392</td>
<td>$12.50</td>
<td>$2,321.99</td>
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<td>Mar-19</td>
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<td>$1,054.24</td>
<td>89.1</td>
<td>$1,113.75</td>
<td>$0.0392</td>
<td>$12.50</td>
<td>$2,307.14</td>
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<td>$1,116.94</td>
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<td>$13,694.21</td>
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<td>$0.0393</td>
<td>$12.50</td>
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Utility History - Natural Gas
Sheridan County, Wyoming
Fulmer Library
May 2018 through April 2019

User Input Cells with Drop Down Menu

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<tr>
<th>Fuel Type: Natural Gas</th>
<th>Fuel Units: Dekatherm</th>
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Utility Montana-Dakota Utilities
Avg. $/Dekatherm $4.459

Location 320 N. Brooks St.

Meter No. 

Account/Rate Rate 70 Firm

Bldg. Sq. Ft. 35,000

Natural Gas $ / ft²-yr $0.23

Elec. & Natural Gas $ / ft²-yr $1.13

Natural Gas kBtu / ft²-yr 51.5

Elec. & Natural Gas kBtu / ft²-yr 85.5

Natural Gas kBtu / ft²-yr 51.5

Auto Calculates

Usage Month | Usage (Dekatherm) | Total Cost | Cost/Dekatherm | CO2 Emissions (tons CO2)
---|---|---|---|---
May-18 | 38.5 | $215.07 | $5.59 | 2
Jun-18 | 16.9 | $127.00 | $7.51 | 1
Jul-18 | 6.7 | $107.73 | $16.08 | 0
Aug-18 | 12.5 | $113.66 | $9.09 | 1
Sep-18 | 46.3 | $248.41 | $5.37 | 3
Oct-18 | 115.6 | $484.40 | $4.19 | 7
Nov-18 | 218.7 | $863.36 | $3.95 | 13
Dec-18 | 270.2 | $1,227.26 | $4.54 | 16
Jan-19 | 278.4 | $1,249.59 | $4.49 | 17
Feb-19 | 398.9 | $1,706.96 | $4.28 | 24
Mar-19 | 270.6 | $1,132.95 | $4.19 | 16
Apr-19 | 127.9 | $554.36 | $4.33 | 8

Note: Btu content of is 1000 kBtu/Fuel Units:

1,801 $8,030.75 $4.46 108.07
APPENDIX B - ENGINEERING CALCULATIONS AND ASSUMPTIONS

(ESTIMATED PROJECT COST AND ANNUAL SAVINGS)
### Sheridan County, Wyoming

#### Estimated Energy and Energy Cost Savings

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Area (sf)</th>
<th>Existing Annual Energy Use</th>
<th>Estimated Post Efficiency Annual Energy USE Savings</th>
<th>Estimated Post Efficiency Annual Energy Use</th>
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<tr>
<td></td>
<td></td>
<td>Electricity Usage (kWh)</td>
<td>Fuel Usage (DTherm)</td>
<td>Ann. Electricity (kWh)</td>
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<td>1,801</td>
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<tr>
<td>Total</td>
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<td>1,801</td>
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1.81%  3.64%

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Area (sf)</th>
<th>Existing Annual Energy Cost</th>
<th>Estimated Post Efficiency Ann. Energy COST Savings</th>
<th>Estimated Post Efficiency Annual Cost</th>
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<tr>
<td>Total</td>
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<td>$ 8,031</td>
<td>$ 571</td>
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1.81%  3.64%  2.18%
<table>
<thead>
<tr>
<th>Measure Est. Cost</th>
<th>Measure Est. Savings</th>
<th>Simple Payback</th>
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<tr>
<td>Replace Windows</td>
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<tr>
<td>Est. No. of Units</td>
<td>Avg Unit Cost</td>
<td>Cost (Contractor Est. plus)</td>
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<tr>
<td>Fulmer Library 1974 Section and Clerestory</td>
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<tr>
<td>Total</td>
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<td>$ 48,510</td>
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<table>
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<th>Measure Est. Cost</th>
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<td>Est. No. of Points</td>
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<tr>
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Totals Svd/Summary: $ 89,540 $ 863 103.8 yr. SPB